David A. Bolnick
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Surgical Guide to Circumcision

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Foreword

This volume is being written at the same time as the independent production of statements by both the American Academy of Pediatrics and the Center for Disease Control regarding circumcision, its efficacy, and advisability. I first became embroiled in the circumcision debate in 1971 when I was interviewed by a reporter from the Chicago Tribune following the report of the Task Force of the AAP that stated “there is no medical indication for routine circumcision.” Shortly thereafter I was asked to write a monograph about circumcision, its methodology, and complications. The research that I did in preparing that piece convinced me that there probably is no procedure that has produced as much emotion and rhetoric as circumcision.

Twenty five years later I was appointed a member of the AAP Task Force on Circumcision that produced its report in 1999. By then, there was some evidence that urinary infections in infants were less frequent after circumcision and that penile cancer was less frequent as well. For that reason the statement that was prepared did not recommend routine circumcision nor did it condemn newborn circumcision. However, the rhetoric that surrounded those deliberations and even more vociferously following the report is, in my opinion, truly astounding.

Since that time there is solid evidence that the incidence of HIV infections, other sexually transmitted diseases, and human papilloma virus carriage rates are all substantially reduced after circumcision. Is that reason enough to recommend routine newborn circumcision? For those who are strongly opposed to circumcision whether for cultural reasons, xenophobic reasons, financial reasons, or blind bias, I am sure the answer will be a resounding NO!

Because there is increased evidence that circumcision does provide some small but definite health advantages, the debate will continue. This volume has attempted to produce a balanced view of the subject. The chapter authors have been prominent on both sides of the debate. Only time will tell whether this volume will help to settle the ongoing arguments or perhaps only further stoke the fires of passion and debate.

CA, USA George Kaplan, M.D.

About the Authors

David A. Bolnick

Dr. Bolnick is an amalgam of scholar, scientist, technology design guru, media producer, and photographer. Bolnick's contributions have been recognized by numerous achievement awards including seven US Patents (most recent, March 2010), United Nations Outstanding Achievement Award, US Vice President Gore's Hammer Award, seven Telly Awards, California Governor's Media Access Award, Easter Seals' Special EDI Award, two Aurora Awards, AEGIS Award of Excellence, and many others. From 1973, Bolnick's early research interest was in coronary artery flow dynamics followed by vision and retinal physiology. In 1984 he completed his Ph.D. in physiology with a focus on photoreceptor physiology at the University of California, Davis. From 1984 to 1988 Dr. Bolnick undertook postdoctoral studies in photoreceptor membrane biophysics at the University of California, San Francisco. Bolnick switched from basic research to computers/software and in 1990 took a position at Microsoft for the following 10 years. There he designed software, helped redesign software for use by people with disabilities, served on federal committees on accessible technology compliance, and testified before the US Senate, the US House of Representatives, and the Federal Communications Commission on accessible technology for people with disabilities. Currently, Dr. Bolnick is co-owner of a small media production company and is director of its medical media division, MedicoLens.com. In addition, he has served the Pacific Northwest Jewish community as a certified mohel (Jewish ritual circumciser) for nearly a quarter century. Dr. Bolnick is an affiliate faculty in the Department of Urology, University of Washington, Seattle.

Martin Koyle

Martin Koyle is a pediatric urologist, currently living in Toronto, Canada. There he serves as Professor of Surgery and Program Director, Pediatric Urology at the University of Toronto and the Hospital for Sick Children. After growing up in Canada where he received his medical degree (1976), he trained in surgery at Los Angeles County+USC Medical Center and in urology at Harvard Program centered at the Brigham and Women's Hospital in Boston (1980–1984). He then advanced through academic posts at UCLA (1984–1989), University of Colorado, and The Children's Hospital (1989–2008), and the University of Washington and Seattle Children's Hospital (2008–2011). During his almost three decades in academic urology, Dr. Koyle has been known for his multiple innovations and contributions to the fields of pediatric urology and transplantation. He was the first to publish on laparoscopic nephrectomy in infants, introduced the MACE (Malone Antegrade Continence Enema), the Bianchi technique (single incision orchidopexy), and the Bracka hypospadias repair to North America, and also one of the first surgeons to gain experience in the tubularized incised urethral plate hypospadias repair (Snodgrass technique) and to demonstrate its applicability beyond North America to Europe and Asia. He invented and patented the Koyle stent (Cook Inc), which is used around the world for hypospadias and urethral surgery. To date, he has contributed over 200 major publications and chapters to the literature. Recently he has been a co-editor to the textbooks, *Pediatric Urology – Surgical Complications and Management* and *Guide to Pediatric Urology and Surgery in Clinical Practice*. He is Associate Editor of *Dialogues in Pediatric Urology* and serves on the editorial boards of *Pediatric Surgery International* and the *Journal of Pediatric Urology*. Dr. Koyle is past president of the Rocky Mountain Urology Society, the Society for Pediatric Urology, and the American Association of Pediatric Urologists. He is a Fellow of the American College of Surgeons, Fellow of the American Academy of Pediatrics, and Fellow of the Society for Pediatric Urology. In January, 2010, he was elected "on merit" as Fellow of the Royal College of Surgeons for his contributions to urology, pediatric surgery, and pediatric urology internationally, and in particular in the British Isles.

Assaf Yosha

Dr. Assaf Yosha is known for his emphasis on patient and community centered care. He is a family physician at the Woodward Health Center, a Community Health Center that is part of the Anthony Jordan Health Center in Rochester, NY. He is skilled in operative obstetrics and cares for common high risk perinatal conditions. His focus throughout his career has been to provide inner-city underserved residents access to quality healthcare. Dr. Yosha attended Albany Medical College and in 2005 completed his Family Medicine training at NY-Presbyterian Hospital, Columbia. He then spent a year working in tandem with his wife in rural New Zealand and at Indian Health Service facilities in America. In 2007 Dr. Yosha completed an Obstetrics Fellowship training program for family physicians in Seattle, WA, where he established a circumcision clinic which included resident physician training. Now, as a Senior Instructor at the University of Rochester, in the Highland Family Medicine Department, Dr. Yosha teaches residents in the three common circumcision techniques. Besides good technique and cosmetic outcome, he is always aiming to perform and teach a painless procedure with minimal anxiety to the parents. Dr. Yosha also serves the greater Rochester region as a mohel to reform and conservative families. In his spare time he enjoys running, watching films, and spending time with his wife and young daughters.

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Introduction

David A. Bolnick, Martin Koyle, and Assaf Yosha

The *Surgical Guide to Circumcision* is a compendium of the who, what, where, why, and most importantly, the how of circumcision. Given that one-third of the world's males have undergone this most ancient of surgical procedures, a contemporary resource on the subject is in order.

Most circumcisions are elective with no acute medical necessity; that is, most are done for religious and cultural reasons. Thus, in addition to being a standard surgical guide for those who perform circumcision, this book is an anthology of circumcision, from its prehistoric roots to its present-day admixture of religion, culture, and medicine.

The *Surgical Guide to Circumcision* is presented in eight parts: Prelude to Circumcision, Anatomy of Circumcision, Newborn Circumcision, Pediatric Circumcision, Adult Circumcision, The Case Against Circumcision, The Case for Circumcision, and Understanding Circumcision.

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Prelude to Circumcision

The chapters in this part review current trends and guidelines and the process of informed consent. Since most circumcisions are elective, the provider must be sensitive to and balance current regional mores with the views and desires of the patient (parents). Furthermore, there is a universal expectation to complete an appropriate informed consent process before performing a circumcision. Since most circumcisions are akin to cosmetic surgery, with no immediate medical benefit, the informed consent process ought to serve as a dialogue between the provider and patient to clarify the reason for the circumcision and to review its medical pros and cons.

Anatomy of Circumcision

When one asks an experienced surgeon – "what is the key to a successful surgery?" – at the top of their list will undoubtedly be to have a strong command of the anatomy of which you are operating on. Circumcision, as simple and common as it may seem, is no exception. Many common complications of circumcision could be significantly reduced if more providers had a good command of "normal" anatomy and an eye for recognizing the abnormal. Since most circumcisions today are carried out during the newborn period, we focused this part on the anatomy of the newborn phallus with respect to circumcision. Furthermore, given that many, if not most, complications of circumcision are associated with penile anatomy, normal and otherwise, we included the chapter on complications of circumcision in this part. Lastly, inherent in understanding urogenital anatomy, normal and abnormal, one must begin with its assembly, that is, embryology.

Newborn Circumcision

The balance of this book clearly tilts toward newborn circumcision. In the USA, most circumcisions are done during the first month of life, a trend that is being seen worldwide. Few would argue that circumcision during the newborn period, given a normal healthy constitution, is easier and safer. Furthermore, newborn circumcision is performed by a wide variety of practitioners with an equally wide range of surgical expertise. Thus, the chapters in this part were written as an equalizer, so to speak, to help in training the novice and to encourage good practice in those who are more seasoned. Additionally, primary care providers and obstetricians, whether or not they perform circumcisions, will find the Chap. 8 an invaluable aid to the physical examination of infant male genitalia.

Pediatric Circumcision and Adult Circumcision

Though pediatric circumcision and adult circumcision are presented in two separate parts they are more similar than not. Both require special hands-on training, and unlike newborn circumcision fall into the realm of the urologist or surgical specialist. The chapters in these parts are meant to complement the experienced surgeon's training while serving as an introduction to the concepts of non-newborn circumcision for the primary care provider. Furthermore, non-newborn circumcision is most often done as a treatment for an underlying condition. Hence no attempt is made to go into extensive detail of those conditions or the specific approaches that are already in the scope of a committed surgeon.

Two Sides to an Argument

There are always two sides to an argument, so the editors of this book, taking a neutral position, invited authors to present perspectives and arguments for and against circumcision. Our position was to allow any statement to be included as long as it was sensible and supported by published evidence.

The Case Against Circumcision

In the first chapter the author presents a reasoned argument against routine circumcision. The author is not anti-circumcision, but is opposed to unwarranted surgery and discusses how standard medical practice can in most cases prevent the need for circumcision. This and the next chapter, which reviews the care and issues of the uncircumcised penis, are valuable resources for all primary care providers caring for patients who wish to remain uncircumcised.

The third chapter presents a caveat that given the teeter-tottered balance between the medical value of circumcision and the risks associated with circumcision the informed consent process may be dubious and that there can be real risks to those who perform neonatal circumcision.

The Case for Circumcision

In the first chapter the authors present an argument in support of routine circumcision by detailing all the benefits of the procedure. They present an abundance of data that would support circumcision as a lifelong disease sparing practice that outweighs the minor risks of the procedure.

The second chapter reviews the impact of circumcision on sexual function and satisfaction. The author, from his own work and others, shows that circumcision has no negative effect on sexual function and satisfaction, and may in fact offer some benefits – especially so where circumcision programs are being instituted to suppress the spread of heterosexual HIV/AIDS in African countries.

Understanding Circumcision

In the preceding chapters the focus was on the what and how of circumcision; here we present the who, where, and why. Circumcision is one of the oldest surgeries in the history of mankind. The controversy is no different today in the twenty-first century as it was over 4,000 years ago in the twenty-first century BCE. There have always been two sides to this practice. Some of our earliest evidence from Egypt suggests that different dynasties switched sides; in some, royalty was circumcised and in some the commoner was circumcised. So here we explore the historical, religious, and cultural factors that have sustained the practice of circumcision into the twenty-first century.

In many ways, this part is the most interesting – it shines that proverbial light on an age old flap; a flap that, in its own unique way, has had a significant role in shaping the history of mankind.

This Book

This book does not take a position pro or con on routine circumcision. Instead, its purpose is to openly provide the history that has led to the propagation of circumcision for cultural and religious reasons, and to identify pertinent information that might benefit the practitioner, and for that matter the patient/parents, in making an informed decision whether to circumcise or not. The authors of each part have attempted, wherever possible, to avoid personal bias and to provide evidence-based information. Regardless, the editors understand that this topic is both controversial and highly emotional – to say the least. We thank the authors for their time and efforts in providing their thoughtful contributions. We also thank Randall Cohen (MedicoLens.com) for all his wonderful illustrations. And, we especially thank our families for supporting us and the commitment we made to complete this project.

Part I

Prelude to Circumcision

1 Current Circumcision Trends and Guidelines

Micah Jacobs, Richard Grady, and David A. Bolnick

Editors' Note

Most consensus statements are made after clear consideration of the evidence at hand tempered by local politics. Routine circumcision was the norm in Great Britain, Canada, and the USA until after the Second World War. The early promoters of routine circumcision reflected the state of medicine in the late nineteenth century and were primarily influenced by anecdotal case reports, often of dubious nature. The reports of neonatal deaths from circumcision and the advent of the National Health Service before the end of the 1940s led Great Britain to abandon coverage for routine circumcision. It was more than 20 years later that Canada and Australia followed suit. The United States, for various reasons, took a different path, and following the First World War promoted routine circumcision, with an even stronger position following the Second World War. In 1999, to address the growing question as to the validity of routine circumcision, the AAP issued a policy statement that took the middle of the road, rather than polarized for or against. This policy has been revisited and revised based on new data as it accrues and last reaffirmed in 2005. That is, circumcision confers some medical benefit but not enough to call for its routine application.

Introduction

Since the popularization of circumcision in western culture, in the mid-nineteenth century, the potential benefits of the procedure have been met with pragmatic and ethical concerns, producing confusion for practitioners and parents alike. In response to this confusion, multiple medical organizations have released recommendations and guidelines in order to provide consensus opinions to those who counsel families and practice routine neonatal circumcision (NC). Unfortunately, these guidelines are not always consistent and often change with popular sentiment. Our goal here is to review the major arguments in favor of and opposed to neonatal circumcision that are put forth by medical organizations, to outline the current recommendations from the major medical

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organizations in western medicine, and to provide a consensus of these views that may be put into practice.

American Academy of Pediatrics

In many ways the American Academy of Pediatrics (AAP) policy statement on routine circumcision has been the standard bearer for US policy against which other positions have been metered.

In 1999, the American Academy of Pediatrics released its most recent Circumcision Policy Statement that was reaffirmed in 2005 [1, 2]. The statement, published in Pediatrics councils, is that although there are potential benefits of NC, there is not a preponderance of evidence mandating its routine practice.

This statement addresses several areas of potential benefit from NC, including prevention of urinary tract infection, penile cancer, and sexually transmitted diseases. With regard to urinary tract infection, it acknowledges that there is a tenfold increase in risk of UTI in uncircumcised males. This evidence is tempered by the exceedingly low absolute risk of UTI and the loss of effect after the first year of life. In addition, the studies showing lower rates of UTI are often not controlled for other factors such as prematurity and use inadequate collection techniques such as bagging for urine specimens.

The AAP statement also addresses penile cancer and concludes that rates of squamous cell carcinoma are three times lower in circumcised men. The statement does not justify circumcision based on this, because, as with the rates of UTI, rates of penile cancer in the United States are low. Therefore, the number of boys circumcised to prevent one case of cancer is very large.

The issue of sexually transmitted diseases, in particular HIV, is addressed in a single paragraph in the AAP policy statement. It acknowledges that there is evidence that uncircumcised men are at higher risk of contracting HIV and that there is a biological mechanism to explain this. It also comments, however, that behavioral risk factors "appear to be far more important risk factors in the acquisition of HIV infection than circumcision status."

The AAP statement also points out several potential harms of the procedure. It sites a complication rate of 0.2–0.6%, but states that most of these complications are "minor". These include bleeding, infection, poor cosmetic outcome, and, at the extreme, amputation of the glans penis. In addition, the AAP describes the inability to obtain informed consent and the need for adequate family counseling.

For these reasons, the AAP concluded that although there may be some health benefit from circumcision, there is no clear evidence that this is profound enough to recommend its regular implementation by practitioners. It encourages health-care providers to offer unbiased information in an attempt to guide parents in their decision. Furthermore, the AAP statement affirms the parents' (guardian's) right to provide informed consent on behalf of their child:

> In cases such as the decision to perform a circumcision in the neonatal period when there are potential benefits and risks and the procedure is not essential to the child's current well-being, it should be the parents who determine what is in the best interest of the child. In the pluralistic society of the United States in which parents are afforded wide authority for determining what constitutes appropriate child-rearing and child welfare, it is legitimate for the parents to take into account cultural, religious, and ethnic traditions, in addition to medical factors, when making this choice.

While the AAP statement does not support the need for routine circumcision, it positively advocates the implementation of pain control for circumcision; "if a decision for circumcision is made, procedural analgesia should be provided."

American Academy of Family Physicians

The American Academy of Family Physicians (AAFP) position of 2001, and reaffirmed in 2007 [3], is similar in context and tone to the AAP statement including the call for the use of anesthesia of neonatal circumcision:

> "The AAFP Commission on Science has reviewed the literature regarding neonatal circumcision. Evidence from the literature is often conflicting and

> inconclusive. Most parents base their decisions whether or not to have their newborn son circumcised on nonmedical preferences (i.e. religious, ethnic, cultural, cosmetic). The American Academy of Family Physicians recommends physicians discuss the potential harms and benefits of circumcision with all parents or legal guardians considering this procedure for their newborn son." … "If the decision is made to circumcise, anesthesia should be used."

American Urological Association

The American Urological Association (AUA) policy statement of 1989 with a final revision in 2007 states that "neonatal circumcision has potential medical benefits and advantages as well as disadvantages and risks" [4]. It states that neonatal circumcision is relatively safe when performed by an experienced provider and that most complications are minor. Delayed complications of circumcision must be factored such as cicatricial buried penis, meatal stenosis, skin bridges, chordee, and poor cosmesis. In balance, it states that a properly performed circumcision prevents phimosis, paraphimosis, and balanoposthitis, and lowers incidence of penile cancer, urinary tract infections, and possibly sexually transmitted diseases. That is, "the risks and disadvantages of circumcision are encountered early whereas the advantages and benefits are prospective".

Centers for Disease Control and Prevention

Though highly anticipated since 2009, the Centers for Disease Control and Prevention (CDC) has not published recommendations for or against routine circumcision. The CDC reports that circumcision has some protective value against genital ulcer disease and chlamydia, infant urinary tract infections, penile cancer, and cervical cancer in women (the latter two being associated with human papillomavirus, HPV).

The CDC is currently reviewing whether the sub-Saharan African studies can be extrapolated to the modes of HIV transmission seen in the USA and whether there is an adjunct prophylactic role for circumcision. In the mean time they take a tempered position: "individual men may wish to consider circumcision as an additional HIV prevention measure, but they must recognize that circumcision (1) does carry risks and costs that must be considered in addition to potential benefits; (2) has only proven effective in reducing the risk of infection through insertive vaginal sex; and (3) confers only partial protection and should be considered only in conjunction with other proven prevention measures."

Canadian Pediatric Society

Canadian health organizations have largely opposed routine NC over the last 30 years. In 1989, the Canadian Pediatric Society commented that the evidence pertaining to STDs and UTI was not "sufficiently compelling to justify a change in policy" and revisited in 1996 [5]. This policy has discouraged neonatal circumcision since the 1970s. This position is also supported by the College of Physicians and Surgeons of British Columbia (CPSBC) position, released in 2009, which definitively states that the routine circumcision of neonates "is not recommended" and may even have human rights implications [6]. Though opposed to neonatal circumcision, the CPSBC cites CMA Code of Ethics, section 8, which protects parents from a provider who may deem circumcision an unacceptable practice: "If your personal beliefs dictate against infant male circumcision, this should be made known to your patients, with an offer of referral to another physician competent in performing the procedure." Interestingly, despite such opposition from the medical establishment, a 2009 survey by the Public Health Agency of Canada, "What Mothers Say: The Canadian Maternity Experiences Survey," reports that about one-third of responding mothers had their male child circumcised.

The Royal Australasian College of Physicians

In 1996, the Royal Australasian College of Physicians (RACP) acknowledged that rates of UTI, penile cancer, and HIV may be lower in circumcised males but that this does not support routine circumcision. Instead it recommended that the practice be delayed until the patient is old enough to make an “informed choice” [7].

In 2010, the Royal Australasian College of Physicians published an updated policy reaffirming their position against routine infant circumcision: “the frequency of diseases modifiable by circumcision, the level of protection offered by circumcision and the complication rates of circumcision do not warrant routine infant circumcision in Australia and New Zealand. However it is reasonable for parents to weigh the benefits and risks of circumcision and to make the decision whether or not to circumcise their sons” [8]. Though against routine circumcision as a matter of policy, the RACP states emphatically that where the parents choose circumcision for their infant male child, analgesia must be provided: “Infant circumcision without analgesia is unacceptable practice in Australia and New Zealand.”

In New Zealand, circumcision is defined as a restricted activity (Health Practitioners Competency Assurance Act, 2003) and may only be carried out by a medical practitioner, whereas in Australia, both lay and medical practitioners may perform circumcisions.

British Medical Association and British Association of Pediatric Surgeons

In England, the consensus of medical bodies has been similar to that in Canada. Both the British Medical Association (BMA) and the British Association of Pediatric Surgeons (BAPS) have expressed that there is “rarely a clinical indication for circumcision” [9]. These organizations raise the question of valid consent and ethical concerns in making a decision for a newborn male. They hedge on the potential impact of Human Rights Act [10]: “If it was shown that circumcision where there is no clinical need is prejudicial to a child’s health and wellbeing, it is likely that a legal challenge on human rights grounds would be successful.” They require that both parents must give consent. If the child is old enough to express person views, they must be taken into account. That said, the BMA emphasizes the role of parents as advocates for the child’s best interest: “… the BMA believes that parents should be entitled to make choices about how best to promote their children’s interests, and is for society to decide what limits should be imposed on parental choices … Male circumcision is not grounded in statute, however judicial review assumes that, provided both parents consent, non-therapeutic male circumcision is lawful.”

Royal Dutch Medical Association (KNMG)

Of all the points of view listed herein, the KNMG takes the strongest position in opposing nontherapeutic circumcision: “The KNMG calls for a dialogue between doctors’ organisations, experts and the religious groups concerned in order to put the issue of non-therapeutic circumcision of male minors on the agenda and ultimately restrict it as much as possible” [11]. Their position is that the complications of circumcision are significant and therefore outweigh grounds other than direct medical/therapeutic: “Contrary to what is often thought, circumcision entails the risk of medical and psychological complications. The most common complications are bleeding, infections, meatus stenosis (narrowing of the urethra) and panic attacks.” and “Non-therapeutic circumcision of male minors is contrary to the rule that minors may only be exposed to medical treatments if illness or abnormalities are present, or if it can be convincingly demonstrated that the medical intervention is in the interest of the child, as in the case of vaccinations.” and “Non-therapeutic circumcision of male minors conflicts with the child’s right to autonomy and physical integrity.” Finally, the KNMG equates, in a legal sense, male circumcision with “female genital mutilation” but fears the prohibition of the former would lead to the use of lay practitioners. Despite this opposition to circumcision, the KNMG does hold that circumcision is a surgical procedure that is covered by the Individual Healthcare Professions Act. Where circumcision is provided, it must be done by a doctor and under local or general anesthesia.

World Health Organization

"Male circumcision should be recognized as an additional important step in curbing heterosexually acquired HIV in men" – March 2007 (UN News Centre). The World Health Organization (WHO) is highly engaged in remedying the HIV epidemic, especially in sub-Saharan Africa. In addition to counseling safer behavior and early initiation of antiretroviral therapy, circumcision, especially in high prevalence areas, is recommended [12]. This is due largely to the evidence that circumcision has been shown to reduce the risk of transmission of HIV by as much as 60%. Because rates of HIV are so high in areas of sub-Saharan Africa, this reduction translates into the subsidence of HIV transmission in a profound number of people: "Modeling studies suggest that male circumcision in sub-Saharan Africa could prevent 5.7 million new HIV cases and three million deaths over 20 years." [13] Though currently the bulk of circumcisions in the HIV eradication programs are performed on adult males, there is a new push to extend this to newborns where the procedure is considered safer and less expensive. Accordingly, the WHO has published a guide for infant male circumcision [14].

It should be noted that several countries and regions of sub-Saharan Africa have developed their own policy statements on circumcision.

Summary

Outside of strategic regions in sub-Saharan Africa, no call for routine circumcision has been made by any established medical organizations or governmental bodies. The range of positions is from "some medical benefit/parental choice" in the United States, to "essential no medical benefit/parental choice" in Great Britain, to "no medical benefit/physical and psychological trauma/parental choice" in the Netherlands.

Ultimately, a number of factors play a role in the position on circumcision that a medical organization will take. In areas such as sub-Saharan Africa, where HIV rates are extremely high and recent evidence suggests a prophylactic value, there will be strong motivation to circumcise as many males as possible. Where circumcision is viewed as having nominal or no medical value, then only social, cultural, and religious factors will drive the practice. In fact, all policy statements reviewed, regardless of its position on circumcision, have made allowances for parental choice in support of their cultural or religious preference. Furthermore, some policy makers take the position that in such cases, circumcision should be covered by state health programs to discourage the use of lesser trained lay practitioners.

In places where the government or health insurances do not cover circumcision, the incidence is low or tends to decline. For example, the rates of circumcision and the support of this practice have fallen drastically in Great Britain once the government funded health care stopped covering circumcision. Moreover, the demographic distribution of circumcision in the United States is significantly affected by insurance and state (Medicaid) coverage such that a socioeconomic divide is apparent, which gives enhanced meaning to the have and have-nots.

In light of the most recent research on whether or not and to what extent circumcision has prophylactic value in preventing the transmission of HIV and HPV, many organizations have established new review committees. Thus, this review may well be dated.

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Informed Consent: Principles for Elective Circumcision

2

Vijaya M. Vemulakonda

Editors' Note

Informed consent is more than a process; it is a gestalt that embraces the concept of the provider (physician or other practitioner) and the patient engaging in a two-way exchange of ideas to best determine a medical course of action. In pediatric cases, the parents are the decision-makers for their children and are presumed to have the best interest of the child in mind. The most important point to keep in mind is that patients (parents) come with preconceived expectations and often cultural considerations. It is important to be sensitive to these and at the same time present a well-balanced summary of the pros and cons of circumcision. To that "a well-crafted informed consent document outlining the procedure, goals of surgery, risks, benefits, and expected outcomes of the procedure allows an opportunity to confirm that the patient has understood and retained the information needed to reach a meaningful decision."

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Introduction

The importance of informed consent cannot be overemphasized. Seeking a person's consent shows a respect for individual autonomy and allows the patient to determine what is in his or her best interests. It also follows the primary principle of medicine, *primum non nocere*, or first do no harm, by recognizing the physician's responsibility to treat others justly and in the manner in which he or she would expect to be treated. Finally, it helps to establish an active alliance between the physician and the patient, improving patient compliance with care and allowing for shared decision-making and shared responsibility for the patient's well-being. The application of these principles to the pediatric setting, especially in the case of an elective procedure such as circumcision, raises unique considerations and concerns. The purpose of this chapter is to delineate the general principles of informed consent and to identify their application to the pediatric population generally and to the case of elective circumcision specifically.

General Principles of Informed Consent

Informed consent is a process consisting of an ongoing dialogue between the physician and the patient that allows for a lasting alliance between the physician and patient based on trust. Although

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the consent form is documentation of this process, completion of the consent form is not sufficient to meet the requirements of informed consent. The process of consent requires a mutual understanding between the patient and physician about the procedure and its relative benefits and risks and culminates in a shared responsibility for medical decision-making.

The Three Elements of Informed Consent

Informed consent is comprised of three elements, each of which builds on the other to ensure a complete consent process. The first element of consent is *physician disclosure*. Disclosure refers to the physician's responsibility to inform the patient about the proposed treatment during the consent process. The physician must convey adequate information about the patient's condition, the options of management, including the option of nonintervention, the risks and benefits of each option, the expected sequelae of the treatment, and the medical uncertainties regarding the diagnosis, management options, and outcomes. Conveyance of information should be tailored to the patient's ability to understand and retain the information necessary to make a decision [1, 2]. It is incumbent upon the physician to clearly disclose this information in a way that is clearly understood by the patient or proxy decision-maker and that allows for a balanced perspective of the alternatives available.

The second element of consent is *patient understanding*. The patient needs to be attentive to the information being provided. The physician should take note of patient anxiety and focus during the discussion and should provide the opportunity for patient concerns to be addressed and questions to be answered throughout the consent process. The patient must be given sufficient time to process and absorb what the physician has said prior to making a decision. Finally, the physician should ensure that the patient not only understands the information being provided but also understands the decision he faces. The patient must process that, by consenting, he is allowing the physician to perform the procedure described and that, without his expressed consent, further treatment cannot occur. Furthermore, he must understand not only the goals of the procedure but also the expected potential outcomes of surgery, including postoperative recovery, functional limitations, and cosmetic changes due to the procedure. The onus is on the physician to ensure that patient understanding is reached. This may require questions by the physician to ensure that the patient has absorbed and can recollect information about his condition and the alternative treatments he faces. Alternatively, to avoid the potential embarrassment of verbal quizzes, a well-crafted informed consent document outlining the procedure, goals of surgery, risks, benefits, and expected outcomes of the procedure allows an opportunity to confirm that the patient has understood and retained the information needed to reach a meaningful decision. By reviewing the consent form with the patient, the physician can also gauge any confusion or uncertainty that needs to be addressed prior to obtaining consent [1].

The final element of the consent process is *decision-making*. This process allows the patient to have as much or as little participation in the decision as he desires [1]. The physician should ensure that the patient has an understanding of the basic elements of the procedure, risks, benefits, and alternatives and has a framework in which to make decisions. By aiding the patient in identifying values that are important to his or her decision, the physician can ensure that the patient has an adequate measure by which to gauge treatment alternatives. The physician should initially provide a balanced view of alternatives without offering recommendations for treatment. Once the patient has had the opportunity to evaluate alternatives within his own value framework, the physician may then offer recommendations. By allowing the patient to independently weigh alternatives prior to providing recommendations, the physician may ensure that the patient's decision is not unduly influenced by physician bias. By discussing the best way to meet patient concerns and by offering recommendations, the physician also allows for a sense of shared decision-making, where the physician and the patient are acting in concert to determine the best option of treatment, allowing for improved rapport between the patient and the physician and fostering a sense of shared responsibility.

Informed Consent in the Pediatric Setting

In pediatric cases, the parents are the decision-makers for their children and are presumed to have the best interest of the child in mind. The role of the physician in these cases is to keep this focus on the child's interest at the forefront of the discussion while respecting the parents' decision-making process. In identifying who is ultimately responsible for the decision, the physician should ideally involve both parents in the consent process [2, 3]. However, in cases of parental dissent, the physician may be tasked with determining parental responsibility, especially where parents are unmarried or divorced. Although there are exceptions, generally, the custodial parent has decision-making capability. In cases where the parents are unmarried, the mother generally has the responsibility of providing consent [4].

The pediatric patient should also be actively involved in the decision-making process. The role of the pediatric patient in the informed consent process is dependent upon the child's ability to participate meaningfully in the consent process. The age at which children are sufficiently mature to make a meaningful decision depends upon the individual and the governing state law. Generally, 18 years is the legal age for independent consent, although exceptions to this rule do exist, especially in cases regarding reproductive decision-making [2]. There has been a movement, however, to expand the pediatric patient's autonomy in the decision-making process to earlier in adolescence. As a result, the autonomy of adolescents who are able to understand the consent process and reach a meaningful decision should be respected even in cases where they are not legally of the age of independent consent [2].

Although not all children are capable of the understanding necessary for consent, to the extent that the pediatric patient is able to participate in the process, he should. The ability of the child to meaningfully participate in the consent decision may be based not only on age but also on cognitive capacity and personal experience [2]. The goal of the physician should be to take these circumstances into account when determining the extent to which the child should be involved in the decision-making process. For children who are not sufficiently mature to reach an informed decision, the goal of the physician should be to include the patient in the discussion of options and to provide information about the decision reached by the patient's parents, allowing them to participate in the discussion to the extent to which they are capable [1, 2].

In cases where the patient and parents disagree, the physician should act as arbitrator to allow for both the pediatric patient and his parents to come to a common understanding that allows for a decision that is acceptable to all involved parties. As a result, the physician's role is to evaluate both the parents' preferences and the child's needs to help the family reach a common understanding about which alternative is in the patient's best interest, not to determine whose decision "wins" [1, 2]. The more dependent children are upon their parents for support, the more the physician's focus should be on the best interests of the child in discussing plans of care.

Informed Consent for Elective Circumcision

The issue of elective circumcision continues to be a controversial one. While most boys in the United States undergo circumcision, this is not the case in many parts of the world. Given the debate surrounding circumcision, informed consent by parents for pediatric circumcision has also been controversial. In counseling families about circumcision, the American Academy of Pediatrics has recommended detailed discussion of the risks, benefits, and alternatives during informed consent but has not taken an official position for or against routine circumcision [5].

The medical benefits of circumcision, while present, tend to be small in magnitude and should be neither under- nor overemphasized. Furthermore, circumcision, while routine, is not risk free (see Chaps. 6 and 11 on complications of circumcision). Due to the potential risks and benefits and the lack of a clear medical indication, elective circumcision is often sought for cultural or social reasons rather than medical reasons [6].

While discussion of the medical indications, risks, and benefits are important, parents often do not change their decision even after being presented with information about the risks and benefits of the procedure [7]. It is essential that the physician also discuss the reasons behind the parents' decision to identify and address any unspoken concerns that are driving the decision. These may include concerns about the effects of peer attitudes or the circumcision status of other family members on the child's self-esteem. Additionally, some religious faiths, including Judaism and Islam, consider circumcision a religious act that is required for integration into the religious community [8]. It is therefore incumbent on the physician to discuss not only medical but also social and cultural concerns during the informed consent process to give parents a complete and balanced view of the procedure and its alternatives (see Part 8 of this book for details on rituals, cultures, and economic issues).

Given the absence of a medical indication for circumcision in most cases, the onus is on the parents to demonstrate that this is in the best interest of the child. The child's best interest must be considered in light of the patient's own desires, his ability to understand the proposed procedure and its alternatives and to participate in the discussion and in reaching a decision, the risks to the patient of pain or other adverse effects, parental desires and preferences, the social and cultural implications of proceeding or not proceeding with circumcision, and the impact of the decision on future patient choice and opportunity [9]. The physician's role is to clearly delineate the balance of risks and benefits of the procedure to the family [10]. The physician must also recognize his own biases in counseling the patient and his family; older, male physicians who are circumcised themselves are more likely to recommend circumcision to their patients [11].

The need for parental agreement in these cases is essential, and some medical associations have advocated required consent by both parents, either verbally or on the written consent form, to confirm their understanding of the procedure and their mutual agreement to proceed [8, 10]. In cases of parental disagreement brought to the courts, the decision has usually been not to circumcise. This decision is independent of who has the legal right to consent [4, 12]. Furthermore, the child should participate in the decision-making process to the extent to which he is capable [8, 10, 12]. In cases of significant disagreement, the physician may consider deferring treatment until the concerns of the parents are addressed and a common understanding can be reached [8]. Ultimately, in the absence of a clear medical necessity, the goal of the physician is to ensure that a thorough, balanced discussion of the procedure and its alternatives has been held; that parental social, cultural, and religious concerns outweigh the risks of surgery; and that this decision has been agreed upon by the physician, the parents, and, to the extent possible, the patient.

Conclusions

Informed consent for elective circumcision, like any procedure, is more than a piece of paper required by the bureaucracy of medicine. It is an ongoing process based upon the principles of mutual trust and understanding between the physician, the patient, and, in the case of the pediatric patient, the parents. While the process of consent is often a difficult one, it ultimately leads to a sense of shared responsibility and understanding, thereby improving patient and parent compliance and preparing the patient and parent for expected and unexpected postoperative sequelae. It is the responsibility of the physician to recognize and address not only medical concerns but also the social, cultural, and religious mores that influence the decision to proceed with elective circumcision. Additionally, it allows the physician to identify and minimize the impact of his or her own biases on the discussion. By taking the time to participate in meaningful discussion, the physician is able maintain his responsibility to his patient, forge a meaningful physician-patient relationship, uphold the principles of his profession, and, most importantly, allow the patient and his family to reach a well-considered decision about an elective procedure.

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Part II

Anatomy of Circumcision

Embryology of the Penis

3

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Editors' Note

Since the penis and its accouterments develop over time as a fusing of the urogenital membrane, it is particularly predisposed to congenital anomalies. Thus, understanding the development of the male genitalia is key to identifying congenital anomalies – many of which are grounds for deferring newborn circumcision.

Introduction

Due to the wide spectrum of penile anomalies, normal development of the penis has been an interest of physicians and researchers for decades. The penis is a multipurpose organ in the male that participates in both the propagation of the species and the elimination of liquid waste. Abnormal development can result in functional as well as cosmetic aberrations, which can result in ostracism in certain mammalian species, such as apes and hyenas. In humans, the penis and the prepuce are subject to scrutiny based upon societal expectations and norms with focus on both appearance and function. It is important to understand normal development and proposed function of the penis and prepuce to appreciate the controversy regarding the indications for and practice of circumcision.

Genital Differentiation in the Embryo

The normal development of male external genitalia requires the appropriate communication between three elements: chromosomal composition, gonadal development, and molecular interactions. A wide range of urogenital anomalies manifest if any of these processes are disrupted.

When the human genome was discovered in the 1920s, it was clear that males had to have both an X and Y chromosome. In 1966, it was discovered that there was a segment of the Y chromosome, called the testis determining factor, necessary for the development of a male phenotype. The protein that this region developed is designated as the sex-determining region Y (SRY) protein. Studies in mice during the 1990s further defined the SRY as a necessary protein in gonadal development: Insertion of SRY into XX mice resulted in a complete male phenotype [1].

When expressed in the male embryo, SRY initiates differentiation of the male primitive sex cords into Sertoli cells, which is the initial step in testicular

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Table 3.1 Genes involved in male genitalia development

Gene	Expression	Theoretical role	Result if abnormal
WT1	Genital ridges	Induction of the expression of SRY[a]	Female phenotype
SF1	Genital ridge formation, Sertoli cells	Conversion of cholesterol to testosterone, activation of MIS[b]	Fail to develop gonads[c]
SOX9	Differentiating Sertoli cells in mice and chickens; similar structure to SRY	Plays a role in bone development and sexual development[d]	Female phenotype
DAX 1	Developing ovaries	Ovarian inducer[e], antagonist of SRY gene[f]	Hypogonadotropic hypogonadism[g], female phenotype due to SRY inhibition

[a]Kreidberg JA, Sariola H, et al. WT-1 is required for early kidney development. Cell. 1993; 74: 679–91
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development. Subsequent development of the Leydig cells results in production of testosterone, which is converted (by 5-alpha-dehydroxlase) to dihydrotestosterone (DHT), the hormone responsible for the differentiation of genital tubercle and urogenital folds into the male phallus.

Mutations of SRY are responsible for 25% of sex reversals in humans. Clearly, there are other proteins not yet completely elucidated that are necessary to the formation of a male phenotype (Table 3.1).

Development of the embryo occurs immediately after fertilization. Until the eighth-week of gestation, the fertilized egg is referred to as an embryo and thereafter as a fetus.

In regard to genital differentiation, the hindgut and future urogenital system reach the surface of the embryo at the cloacal membrane around the end of one-month gestation [2]. At this time, the cloacal membrane, present on the embryo's ventral surface, divides into a posterior and anterior half. The anterior half is called the urogenital membrane. The cloacal folds meet in the midline and form the genital tubercle (cephalad) and the genital swellings on each side (Fig. 3.1). At this point, the male and female embryos are impossible to differentiate. In the ensuing weeks (between 7 and 10), the developing pituitary gland will release a surge of luteinizing hormone, which will prompt the release of testosterone, thereby instigating the development of the male external genitalia. The penile urethra forms as a fusion of the endodermal urethral folds. The ectodermal edges of the urethral groove then fuse to form the median raphe [2]. At around 8 weeks, lateral preputial infolds form, which soon fuse along the dorsal penile shaft. After separation of the glans and penile shaft by formation of the coronal sulcus, at about 11–12 weeks, the glanular urethra forms and the prepuce fuses along its ventral aspect. At 16–17 weeks, as the ventral penile curvature (a normal characteristic of raphe formation) resolves, the prepuce almost completely surrounds the glans penis. Shared epidermal cells fuse the prepuce to the glans at this stage of development.

As preputial development is affected by glanular urethral development, it is important to understand this formation. Two possibilities exist: endodermal cellular differentiation or intrusion of ectodermal

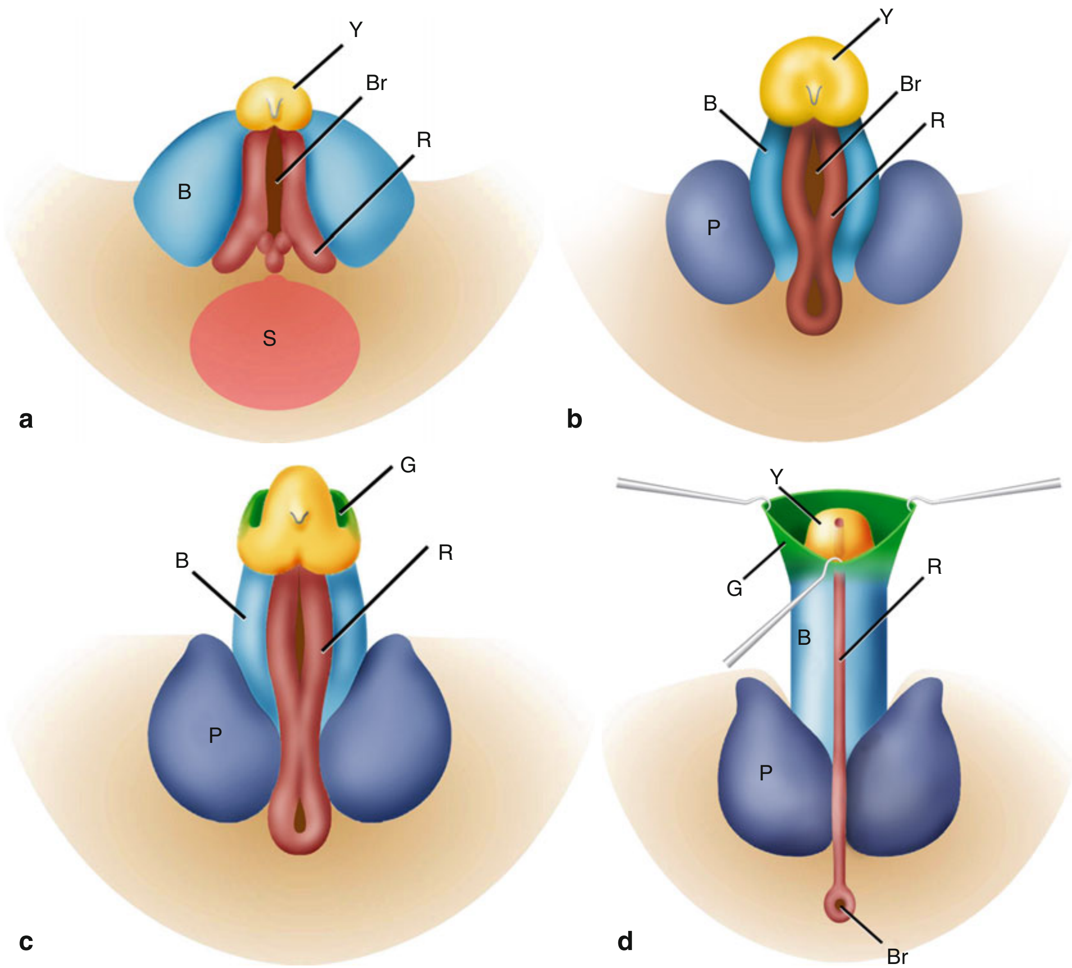

Fig. 3.1 The differentiation of the male external genitalia (8–16 weeks). (**a**) The indifferent stage of genital development. Genital tubercle (*yellow*), genital swelling (*blue*), cloacal membrane (*brown*), cloacal fold (*red*), caudal eminence (*salmon*) (Illustration by R. Cohen (MedicoLens.com)). (**b**) Under the influence of testosterone, male differentiation with resultant masculinization of the external genitalia begins. The distance between the anus and the genital structures increases. The phallus elongates, and the penile urethra starts to develop from the urethral groove. Glans penis (*yellow*), genital swelling (*purple*), genital folds (*blue*), urethral groove (*brown*), urethral folds (*red*) (Illustration by R. Cohen (MedicoLens.com)). (**c**) The coronal sulcus separates the glans from the shaft of the penis. The preputial folds appear on both sides of the penile shaft and extend dorsally. The ventral aspect of preputial formation is dependent on urethra development. Genital folds (*blue*), preputial folds (*green*), urethral folds (*red*), genital swelling/scrotum (*purple*) (Illustration by R. Cohen (MedicoLens.com)). (**d**) After fusion of the genital folds (raphe) and formation of the glanular urethra, normal preputial development extends ventrally. Glans penis (*yellow*), prepuce (*green*), penile shaft (*blue*), raphe (*red*), scrotum (*purple*), anus (*brown*) (Illustration by R. Cohen (MedicoLens.com))

tissue from the glans (Fig. 3.2). The ectodermal theory has been supported by many animal studies (Table 3.2), but the endodermal theory has gained support in more recent studies conducted with advanced immunohistochemical research [3].

Ectodermal Versus Endodermal Theory

Various investigators over the years have postulated theories on glanular urethral development, ranging from pure endothelial origin to pure

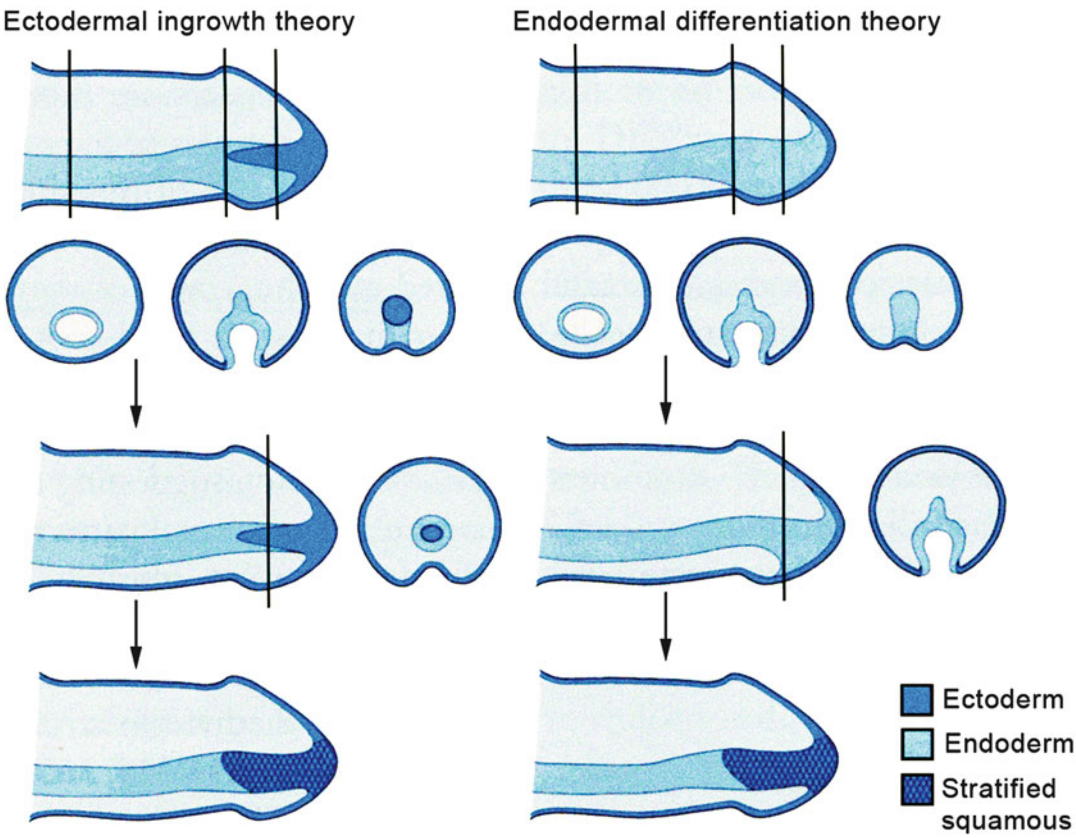

Fig. 3.2 Theories of human penile development. The ectodermal and endodermal graphic representations of glanular urethral development (Illustration courtesy of Dr. Larry Baskin)

ectodermal origin, and every conceivable combination between [4–6].

The ectodermal theories hypothesize that there is ectodermal ingrowth at the distal urethra, accounting for the squamous epithelial lining of the distal glanular urethra. This theory was supported by work done by Barnstein and Mossman [7] in red squirrels and by Williams' [8] studies in humans.

The endothermal theory was first put forth by Felix [4]. He postulated that the differentiation of the distal urethra forms by fusion of the urethral folds subsequent to the dissolution of the endodermal urethral plate. In the theory, the ectoderm is excluded from contribution to the lining of the distal part of the penile urethra.

More recent work by Kurzrock and Baskin in 1999 [3], using the more advanced technology of immunofluorescence, showed the development of the mouse phallus at incremental stages, mapped using immunohistochemistry with antibodies against certain cytokeratins. This showed that the ectoderm of the distal urethra was an extension of the ectoderm of the UG sinus [2].

Prepuce

The prepuce is a complex structure with multiple anatomic and physiologic functions and has been present in all mammals for an estimated 65 million years [9]. The prepuce or foreskin in humans is defined as the fold of skin that covers the glans penis. The prepuce extends from the penile shaft skin and folds over itself at the distal glans penis forming a mucocutaneous junction, much like the formation of the lips and eyelids. The formation of the prepuce is dependent on proper urethral development, although variants of hypospadias

Table 3.2 Endodermal vs. Ectodermal theory of glandular urethral development

Year	Who	Ecto/endo	Model	Theory
1910	Wood Jones	Ectodermal	Man	Formation of the glandular urethra is a result of canalization of surface with ectodermal ingrowth
1937	Siddiqi	Ectodermal and endodermal	Red squirrel	Urethra develops from both ectodermal and endodermal sources; glanular urethra derives from an infolding of surface ectoderm
1938	Barnstein and Mossman	Ectodermal	Red squirrel	Canalization of the urethral plate originating from an ingrowth of ectoderm beginning in front of the cloacal opening and extending to the tip of the phallus
1952	Williams	Ectodermal	Man, dog	Fusion of the urethral folds subsequent to the canalization of the urethral plate with surface ectoderm
1954	Glenister	Ectodermal and endodermal	Porcine, man	Proximal urethra is formed from the endodermal urethral plate which is partly ectodermal in origin
1958	Kanagasuntheram and Anandaraja	Endodermal	Dog	Progressive fusion from the base to the tip of the phallus of the urethral folds after the superficial epithelium covering the under surface of the urethral plate (which has been cast off). No ingrowth of surface epithelium
1999	Kurzrock and Baskin	Endodermal	Mouse	Entire urethra originates from the urogenital sinus without ectodermal ingrowth. Distal stratified epithelial changes are explained by differentiation of urothelium after appropriate mesenchymal induction

and epispadias can present with a normal, intact prepuce (Fig. 3.3). The prepuce forms in concurrence with urethral development and by 8 weeks gestation appears as a ring of thickened epidermis at the base of the glans penis/coronal edge [10]. By 16 weeks gestation, the prepuce has grown forward to cover the tip of the glans penis except in cases of malformation of the urethra. The prepuce has multiple proposed functions and serves as a physical barrier between the glans penis and the environment.

Immunology of the Prepuce

The prepuce maintains the moisture of the mucosal surface of the glans, which lubricates and protects the mucosa of the glans [11]. Other immunological functions have been identified, such as the high vascularity which readily delivers phagocytes to fight infection, and apocrine glands of the mucosal prepuce with secrete lysozyme, and enzymes that breaks down pathogen cell walls [12]. Additionally, the epidermis layer of the prepuce contains Langerhans cells which secrete cytokines which regulate the intensity and duration of the immune response, in addition to producing a substance known as langerin which acts as an additional barrier [13].

Neurology of the Prepuce

The prepuce has a dense network of innervation by somatosensory nerves through the dorsal nerve of the penis and branches of the perineal nerve [17]. Autonomic innervation arises from the pelvic plexus with parasympathetic innervation from the sacral plexus (S2–S4) and sympathetic innervation from the thoracolumbar center (T11-L2). The parasympathetic nerves run adjacent to and through the wall of the membranous urethra. Somatosensory receptors are predominantly composed of Meissner's corpuscles, which are responsible for sensing light touch. There are also nerve fibers for sensing pressure and vibratory stimuli, as well as pain. These clusters are found in the ridged bands of the prepuce, which are spaced about 1-mm apart.

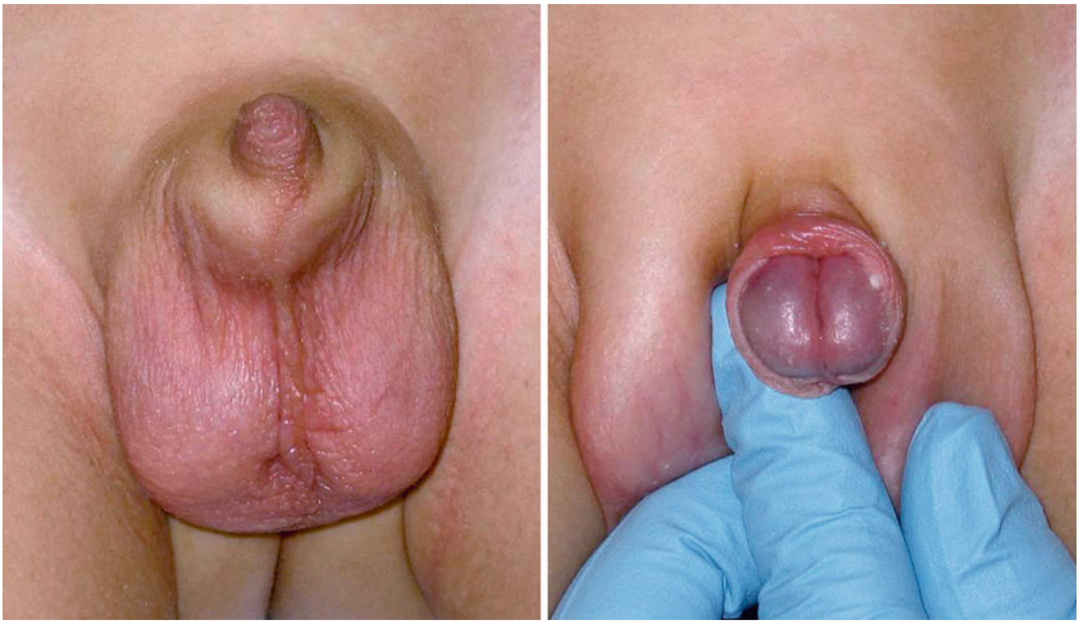

Fig. 3.3 The circumferential prepuce surrounds the glans penis. When retracted, epispadias exhibited by a dorsal glanular groove and displaced dorsal urethral opening

The glans penis is innervated by free nerve endings and has primarily poorly localized sensation referred to as protopathic sensitivity [17]. Poorly localized sensations such as pain, some temperature, and mechanical contact are present. Mechanoreceptors are sparse and found mainly along the coronal margin and frenulum. Hence, the glans penis has very poor fine-touch discrimination capability unlike that of the prepuce. It is postulated that both the protopathic sensitivity of the glans penis and the mechanoreceptor rich prepuce are important for sensation in copulatory behavior [17].

Postnatal Preputial Development and Retractibility

Almost all newborns exhibit a state of physiologic phimosis or inability to fully retract the prepuce. According to Gairdner, only 4% of newborns will have a retractable prepuce at this stage [10]. The prepuce separates naturally from the glans over time by desquamation of underlying cells forming the prepucial space (Fig. 3.4). This separation is gradual and variable between individuals and may result in temporary collection of the debris under the prepuce, termed smegma or pearls. The separation of the prepuce from the glans may take several years. Several studies report the variability in expected age of preputial retractability [14–17]. Although Gairdner reports 90% of 3-year-old boys will have a fully retractable prepuce, this is a much disputed figure. Øster, a Danish pediatrician, reported progressive increase in prepuce retractibility with increasing age. Four percent of the 1,968 boys examined, ages 6–17 years, had phimosis. This incidence diminished throughout the years, from 8% in 6–7 year olds to 1% in 16–17 year olds [17].

Conclusion

Formation of the prepuce is reliant upon proper formation of the penis, and in most cases, the distal and glanular urethra. Understanding proper

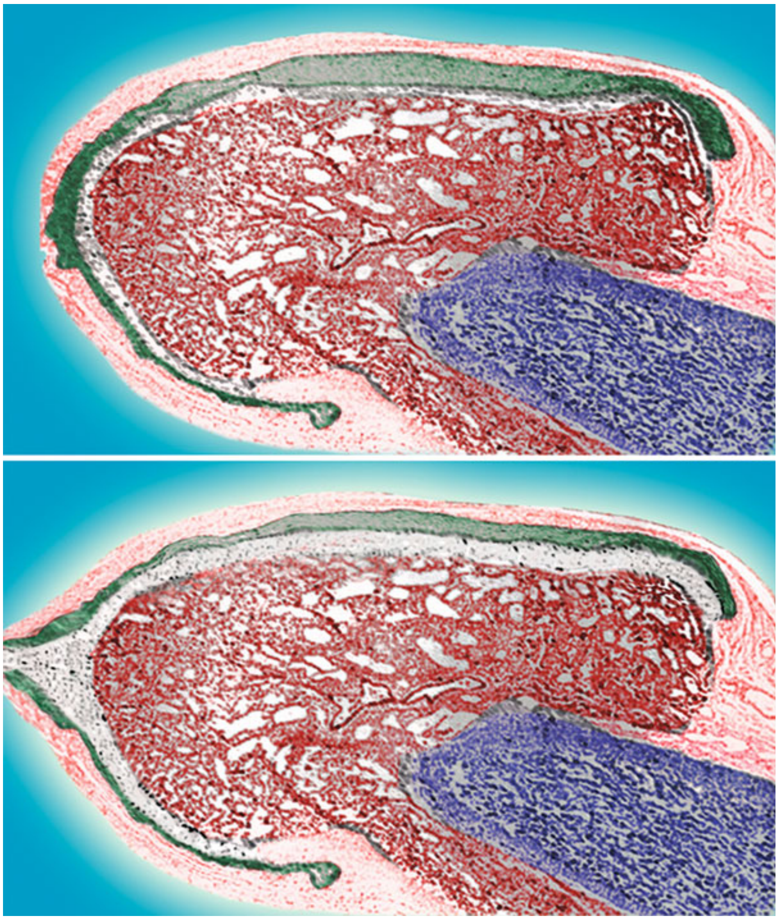

Fig. 3.4 Cross-section rendition of the distal glans and prepuce. *Above*: The prepuce (*green and pink*) at this stage is fused with the glans (*red*). *Below*: Over time, this separates by a process of desquamation

penile and urethral embryologic development can explain preputial abnormalities witnessed in the newborn period. In addition, recognition of the functional and societal properties of the prepuce is important regarding the decision-making process prior to circumcision.

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Anatomy for Newborn Circumcision

4

David A. Bolnick and Assaf Yosha

Editors' Note
A keen knowledge of applicable anatomy is essential when performing any surgical procedure, even one as straightforward as circumcision. This chapter provides a review of the basic anatomy along with some helpful tips for those practitioners who perform newborn circumcision.

Introduction

This chapter will review the anatomy of newborn male genitalia, the focus of most practitioners of circumcision. Furthermore, only the anatomy that is pertinent to newborn circumcision, the pre-circumcision exam, a urology referral, and a urology consult will be reviewed [1–3]. That is, no new anatomy is introduced in this chapter. Where there was a variation in nomenclature, the more contemporary or vernacular form was used. Those who perform surgical circumcisions on older children and adults should seek a more thorough review of urogenital anatomy.

Anecdotally, the two most common causes of complications and poor results are practitioner naiveté of the surgical equipment and of the urogenital anatomy. This chapter should provide the practitioner a sufficient understanding of "normal" anatomy to optimize their surgical approach and so that they will readily recognize the anomalies that contraindicate newborn circumcision (see Chap. 5).

Normal, Abnormal, and Anomalous

When discussing anatomical characteristics related to circumcision, many terms are used loosely without clear definition or delineation and should be avoided. What is normal in one instance may be anomalous in another. For example, a child with a nominally buried penis at birth would likely develop without issue and by puberty present with normal appearing and functioning genitalia. On the other hand, if this child were scheduled for circumcision, his buried penis would be considered an anomalous condition that could warrant deferral. When speaking to the parents about deferring circumcision, the term

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"anomalous" or "small" may be misleading and unnecessarily disconcerting. It might be better to say something like the penis is normal, or within normal limits, but its presentation at this time is not ideal for circumcision, i.e., put the blame on the technique and not the anatomy.

The distinction between abnormal and anomalous is equally ambiguous. Many like to use anomalous where the variation is subtle, easily corrected, or that it may correct itself with time. Whereas, abnormal is used where the appearance or function varies greatly from what is expected. For example, a glandular hypospadias may be considered an anomaly since it is unlikely to perturb functionality, whereas a penile hypospadias would be considered abnormal, even though the two are variants of the same congenital condition.

Thus, adjectives of this nature are often not helpful when describing anatomical characteristics, either to parents, in referrals, or in medical notes. It is usually best to describe what you observed so that it is easily understood. This approach is also helpful when you cannot quite recall a technical term. For example, when writing a referral, it is quite acceptable, and maybe preferable, to say that the penis presents with a downward curve instead of using the often misspelled if not forgotten term of chordee.

External Appearance and Landmarks

The first indication of whether the structure of the penis is "normal" is from the external appearance of the genitalia. Thus, a thorough assessment of the external genitalia is an essential component of a pre-circumcision exam. Since genitalia are not symmetrical, the examination must be made from all visible angles.

Ventrum, Dorsum, and Their Junctions

The male genitalia include the structures of the penis, scrotum, and testes (Figs. 4.1 and 4.2). The *dorsal* aspect or *dorsum* refers to the upper plane of the penis extending from the *penosubrapubic junction* (or dorsal junction) to the tip of the penis. The *ventral* aspect or *ventrum* refers to the lower plane extending from the *penoscrotal junction* (ventral junction) to the tip of the penis.

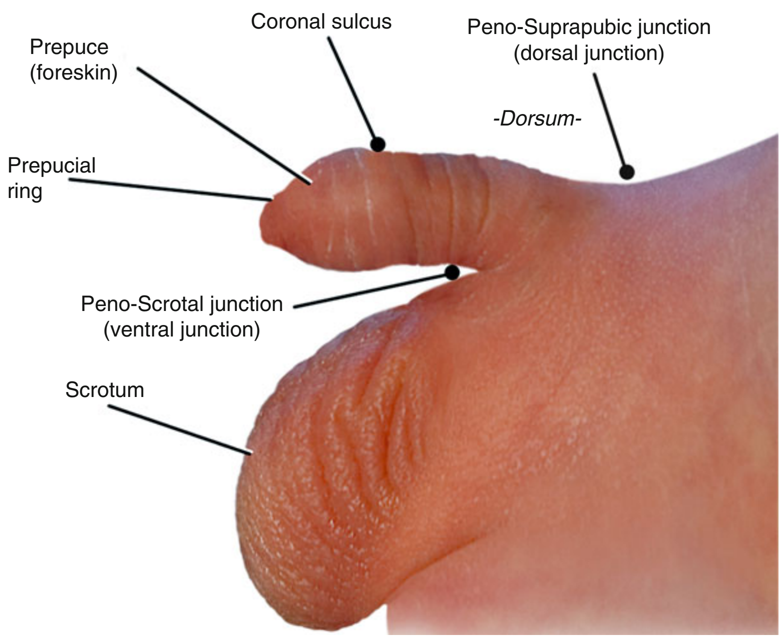

Fig. 4.1 External landmarks of newborn male genitalia. *Ball-tipped lines* point to landmarks (see Fig. 4.2 for underlying anatomy)

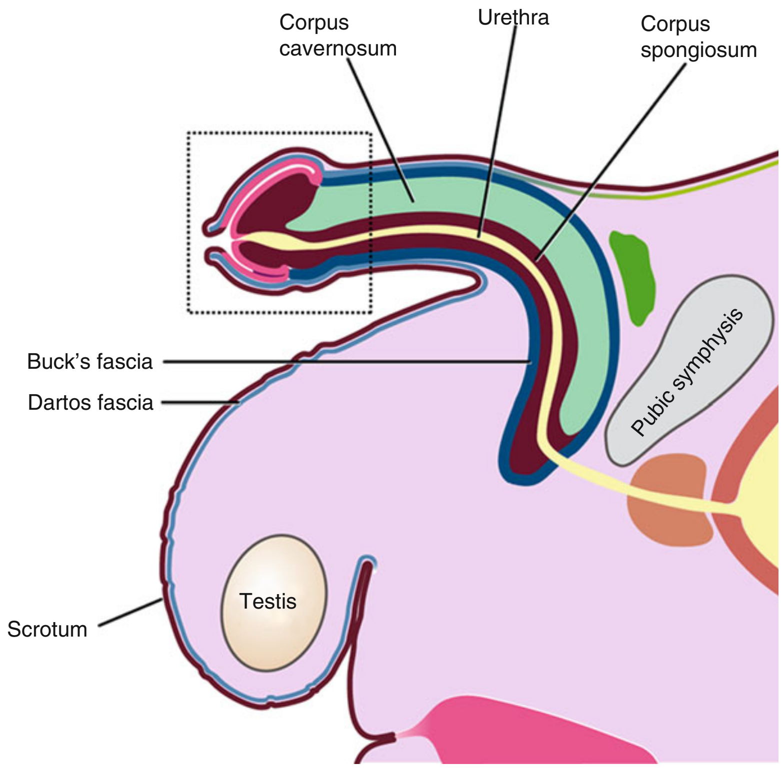

Fig. 4.2 Newborn genitalia illustration: lateral view. The *dotted square* section is presented in Fig. 4.6 below. *Green* blob represents the placement of anesthetic for a DPNB (Illustration by R. Cohen (MedicoLens.com))

The nature of the dorsal and ventral junctions is often ignored despite being a good marker for penile anomalies, especially as far as circumcision is concerned. For example, the dorsal junction may flatten or even bulge from a weak suspensory ligament or from an abundant fat pad, Camper's fascia, which in effect can bury the penis (Fig. 4.3). Likewise, the ventral junction may present too distally, resulting in a short ventral shaft or webbed penis. Either case may be a contraindication to circumcision or at least a cause to carefully assess the anatomy and surgical approach (see Chap. 5).

Fig. 4.3 Lateral appearance of a buried penis. Notice that there is little penile skin

Coronal Sulcus

The groove that delineates the glans (head of the penis) from the penile shaft is called the *coronal sulcus* (Figs. 4.1 and 4.6). The coronal sulcus is discernable through the foreskin and is a valuable landmark for circumcision. First, it is the point to which the foreskin is removed in neonatal circumcision (Fig. 4.6). Second, a good rule of thumb is to defer circumcision where there is less than

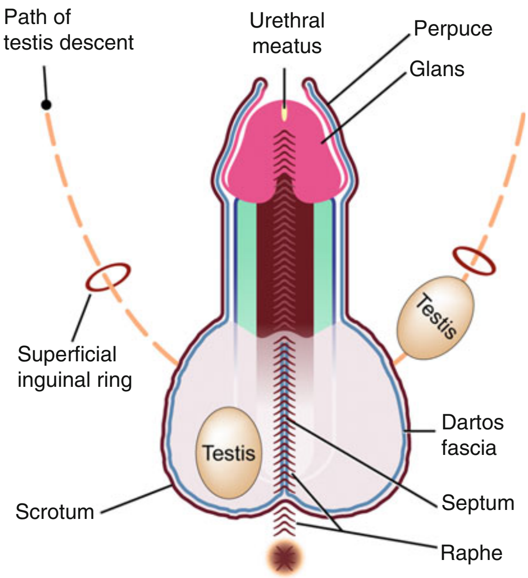

Fig. 4.4 Newborn genitalia illustration: ventral view. Note that in a newborn, the testes may be in the scrotum or anywhere along the path of descent (Illustration by R. Cohen (MedicoLens.com))

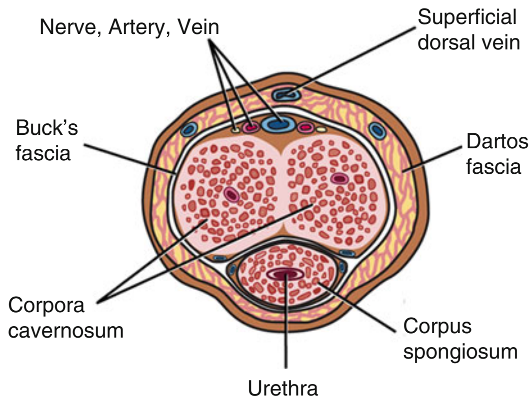

Fig. 4.5 Cross section of penis (Illustration by R. Cohen (MedicoLens.com))

1 cm of dorsal shaft skin (the distance between the dorsal junction and the coronal sulcus) and/or ventral shaft skin. For example, Fig. 4.1 above shows an ideal candidate for circumcision, whereas in Fig. 4.3, the circumcision should be deferred and the patient referred to urology.

Raphe

Extending from the anus along the midline scrotum and ventral penis is the *raphe* (Fig. 4.4); a skin seam formed by fusion of the urogenital folds during embryo development (see Chap. 3, "Embryology of the Male Penis"). Although not definitive, the characteristics of the raphe often contain telltale signs of anomalies. For example, if the raphe has an irregular course along the penis, careful analysis is in order since it might indicate a rotated penis, hypospadias, chordee, or the like. Similar consideration should be paid to the perineal raphe (between the anus and the scrotum) and the scrotal raphe.

The Penis

The penis, anchored to the pubic bone, courses outward along the pubic tubercle and emerges a centimeter or so below the *pubic symphysis* (Fig. 4.2). The penis can be viewed as three parts: the proximal root or base (below the point of emergence), the corpus or shaft, and the glans (which includes the prepuce or foreskin). Appreciating the proximity of the pubic symphysis, a useful landmark, to the base of the penis can be helpful when administering a dorsal penile nerve block (see Chap. 7) or when describing the location of palpable undescended testes in a urology referral.

Corpus

The corpus or body of the penis is composed of three spongy erectile tissue structures (Figs. 4.2 and 4.5). The top two structures, each called *corpus cavernosum*, are bundled with a strong fibrous sheath to form one functional unit. At its base, or crus, each corpus cavernosum courses laterally to anchor with the respective ischiopubic ramus.

The bottom structure, *corpus spongiosum*, encloses the greater part of the *urethra* and terminates distally in a mushroom-shaped expansion called the *glans penis*. At the tip of the glans is the vertical slit opening of the urethra, the *urethral meatus*.

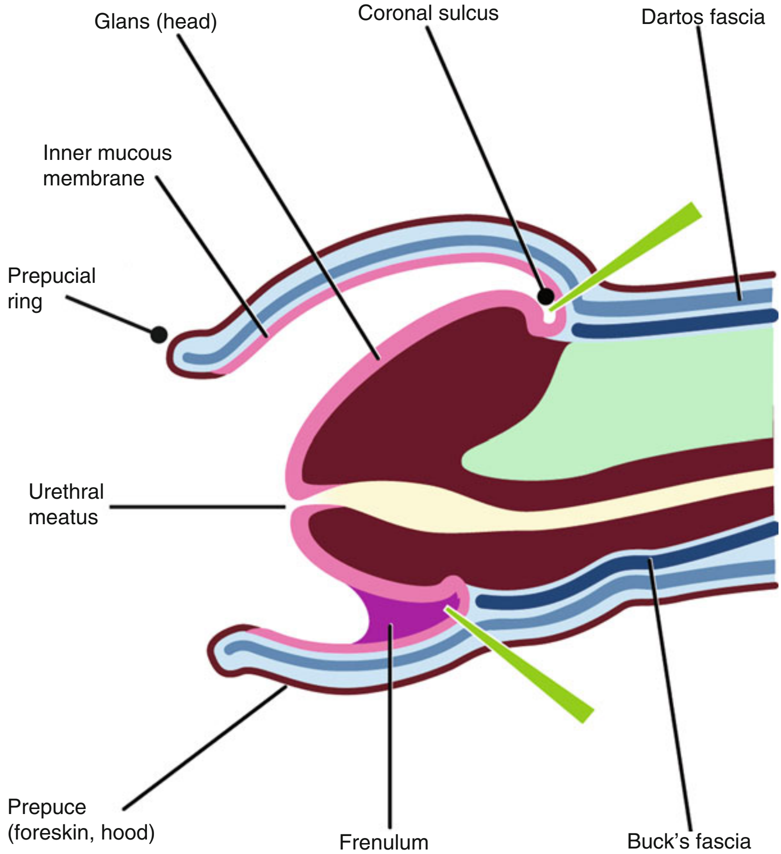

Fig. 4.6 Glans and prepuce illustration. *Green* wedges are site of circumcision. *Ball-tipped* pointers point to landmarks (Illustration by R. Cohen (MedicoLens.com))

The three spongy layers are bundled together from their root to the *coronal sulcus* by a loose mesh of connective tissue, *Buck's fascia*. Buck's fascia contains a network of small vessels and nerves and the deep dorsal vein, the dorsal arteries, and the dorsal nerves. The importance of Buck's fascia for the practitioner is that the administration of local anesthetic, for a dorsal penile nerve block (DPNB), is most effective if placed just outside Buck's fascia, in the subpubic space, where the penis begins its downward course under the pubic symphysis (Green blob in Fig. 4.2).

Surrounding Buck's fascia is a smooth muscle meshwork that extends from the scrotum called *dartos fascia* or layer. Unlike Buck's fascia that terminates at the coronal sulcus, the dartos fascia continues into the prepuce (Fig. 4.6). Within the dartos fascia lies the superficial dorsal vein which is sometimes prominent (Fig. 4.5).

The erectile capacity of the penis occurs with the engorgement of the corpora (cavernosum and spongiosum) and is apparent from birth, often as a prelude to urination. It is not advisable to do a circumcision on an erect penis since it can distort the layout of the penile skin and increase the likelihood of being urinated upon.

Prepuce

The *prepuce, foreskin, or hood*, is the sheath of skin that normally surrounds and extends distally beyond the glans tapering down to the *preputial ring* or meatus (Fig. 4.6). The outer side of the prepuce is continuous with the penile skin and the inner side is mucous membrane (Fig. 4.7). At birth, the mucous membrane surface of the glans is adhered to the mucous membrane of the prepuce.

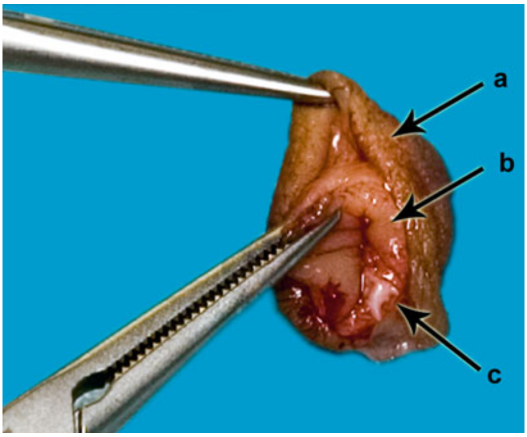

Fig. 4.7 Excised prepuce. (**a**) Outer keratinized layer, (**b**) inner mucous member, and (c) a preputial pearl (smegma)

This union of membranes naturally separates between birth and puberty, creating the *preputial space*.

The prepuce is tethered along the ventral raphe of the glans with a thin ribbon of mucous membrane containing a network of vessels and fibrous bands called the *frenulum*. If the frenulum is tethered too tightly, it may cause a downward curvature of the glans, or chordee. Furthermore, if the distal raphe is disrupted, for example, in the case of hypospadias, the frenulum will likely be absent.

In the case of newborn circumcision, the prepuce and part or all of the frenulum are removed (see green wedges in Fig. 4.6). To excise the prepuce, the preputial space must first be established through blunt dissection, i.e., separate the mucous membrane of the prepuce from the mucous membrane of the glans. Care must be taken to dissect along the plane closest to the glans so as not to create a false preputial space, thus leaving an additional covering of mucous membrane following circumcision. This iatrogenic covering has led many to incorrectly assume that there is an additional second layer of the foreskin. Furthermore, when dissecting the preputial space, care must be taken to avoid traumatizing the frenulum as it is often the site of pesky bleeding during and following circumcision.

Urethra

To fully understand the urethra, it is better to have fist read the chapter on embryology if you have not done so already. The normal course of the urethra runs from the bladder, enters the corpus spongiosum near its base, and then emerges at the tip of the glans, the *urethral meatus* (Fig. 4.2).

Since the urethra develops from a flat plate of tissue that, over several days, curls and progressively fuses from base to tip, it is easy to understand why it is subject to so many congenital malformations. Disruption at any time during development can result in an improperly fused urethra anywhere along the line of fusion, i.e., along the raphe. Thus, when performing a pre-circumcision exam, the entire raphe, from anus to meatus, must be carefully examined for openings, uncharacteristic translucent appearing tissue, or for areas of mucous membrane.

The Scrotum and Testes

Even though the scrotum and testes are tangential to circumcision, their appearance is an essential part of the pre-circumcision exam. Furthermore, the nature of the ventral junction (scrotal attachment) can affect the outcome of the circumcision and should be carefully assessed.

Scrotum

The scrotum, located above the anus and contiguous with the ventral penis, is a cutaneous sac that houses the testes and their accoutrement. The scrotum appears corrugated with a distinct pattern of **rugae** due to its fibromuscular *dartos layer* (Fig. 4.2). The dartos layer is also associated with temperature sensitivity and relaxes when warm and tenses when cold.

The scrotum is divided along its *raphe* by a *septum* with each respective pocket containing a testis (Figs. 4.2 and 4.4). The septum is a union of the dartos fascia of the penis with the dartos fascia of the scrotum. Thus, the position of the *ventral junction* is a consequence of how far the septum extends along the ventral penis. If it extends too distally, the scrotum is said to be webbed, a common contraindication to neonatal circumcision (see Chap. 5).

In the newborn, the appearance of the scrotum can range from little more than a bulge to a well-defined pendulous sac and is sometimes more pigmented than the rest of the body. At birth, the scrotum may bulge with a fluid-filled sac, or hydrocele, which usually resolves within a few days to a few weeks. Circumcision would be contraindicated should a hydrocele sufficiently distort or bury the penis.

Testes

The testes or testicles of a newborn baby are usually fully descended and found in the scrotum. In a small percent of newborns (more so in preemies), at least one testis is undescended and can usually be found anywhere along the inguinal region, and in rare case in the abdomen (Fig. 4.4).

A newborn circumcision should only take place after the testes have been assuredly palpated, be they in the scrotum or higher in the groin. Always palpate from high in the scrotum on down since sometimes a cold room will cause the testes to retreat to a warmer station. If neither testis can be palpated, the circumcision must be deferred and the child referred to urology to rule out such conditions as androgen insensitivity syndrome (AIS), ambiguous genitalia (AG), and the like.

Clinical Sketches

Graphically showing an anatomical finding in a chart note, referral, or when describing an anomaly to the patient (parents) is a valuable skill. Figure 4.8a–e shows some basic line sketches of a normal penis and some common anatomical anomalies. When drawing a graphical representation scale and absolute position are not as important as relative position. For example, when drawing a webbed penis, it is more important to show that the ventral junction is more distal than typical vs showing the exact position of the

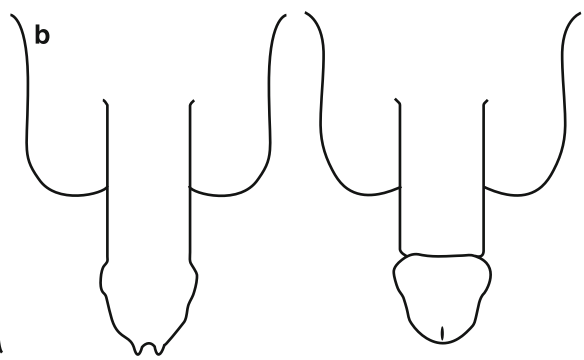

Fig. 4.8 Line drawings of penis. (**a**) Normal penis: lateral view. Natural, circumcised (Illustration by R. Cohen (MedicoLens.com)). (**b**) Normal penis: dorsal view. Natural, circumcised (Illustration by R. Cohen (MedicoLens.com)). (**c**) Normal penis: ventral view. Natural, circumcised (Illustration by R. Cohen (MedicoLens.com)). (**d**) Webbed penis, buried penis. Note the dashed line illustrates the typical position. This is helpful when discussing a webbed penis with a patient or parents (Illustration by R. Cohen (MedicoLens.com)). (**e**) Mid-shaft hypospadias. Ventral prepuce is not fused. This is an example of a drawing to be shown to the parents. Notice the use of the vernacular in the callouts (Illustration by R. Cohen (MedicoLens.com))

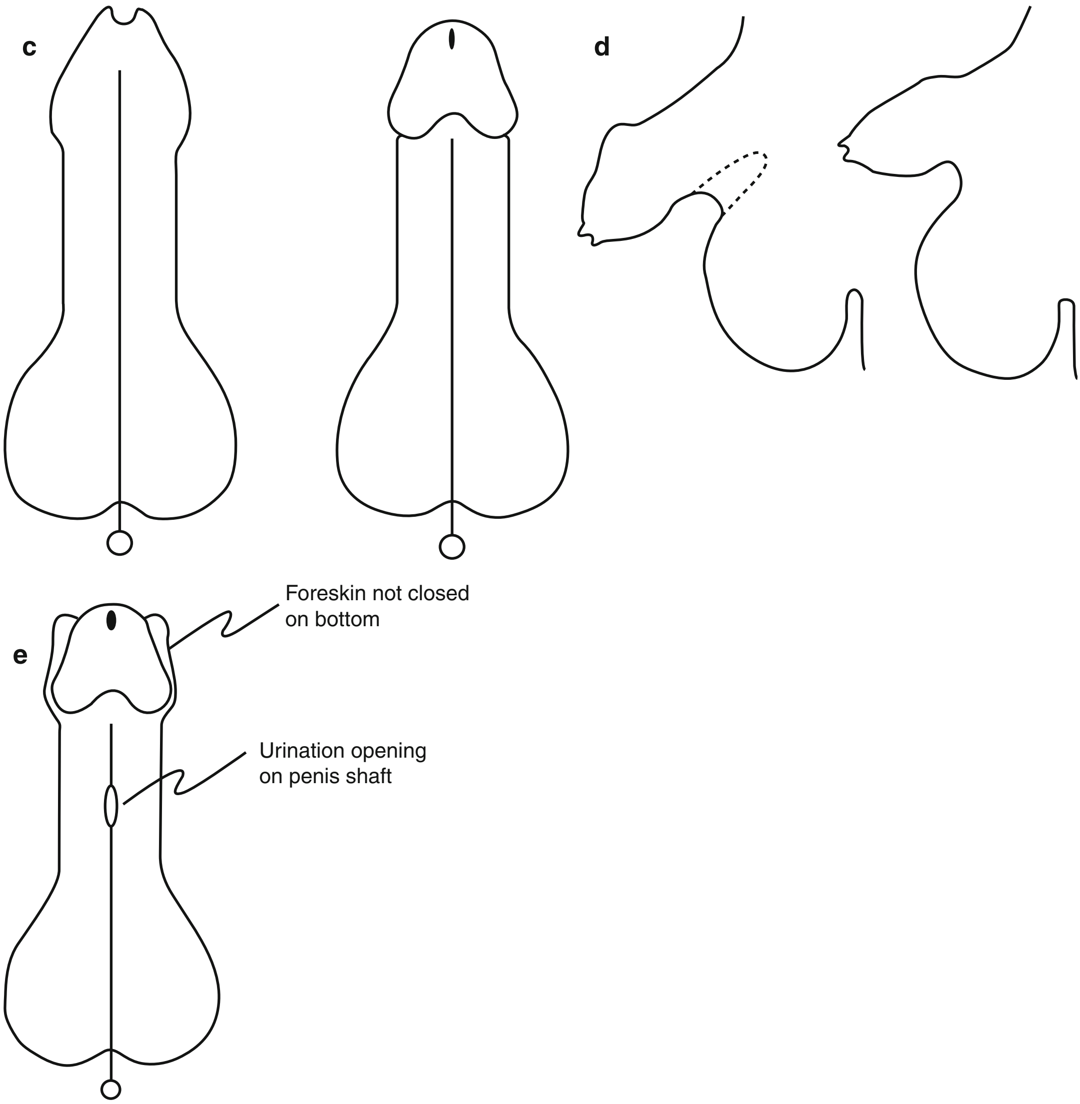

Fig. 4.8 (continued)

ventral junction (Fig. 4.8d). Use callouts when appropriate, for example, see Fig. 4.8e. Keep drawings as simple as possible.

an abnormal condition, be it anatomical or procedural. As you will see in Chap. 5, newborn circumcision is deferred in the presence of most genital anomalies and abnormalities.

Summary

No surgical procedure, even one as simple as newborn circumcision, should be performed without a strong working knowledge of the anatomy involved. Furthermore, a good understanding of "normal anatomy" is the best way to spot

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5 Anatomic Contraindications to Circumcision

Richard S. Hurwitz and Anthony A. Caldamone

Editors' Note

Neonatal circumcision is elective. Thus, only good anatomical candidates should be considered. It is the responsibility of the practitioner to recognize anatomic contraindications and defer circumcision where there is clear genital abnormality and, in many cases, even with more subtle anomalies. Intuition plus a good familiarity of newborn genital anatomy should be your guide. For example, upon first sight, do the penis and scrotum have a "typical" appearance in size, shape, and presentation? If not, a more thorough and focused pre-circumcision exam is in order. Remember, there is no shame in deferring a circumcision for a pediatric urology consult. The same cannot be said for the practitioner who unintentionally denudes a penis or circumcises what is in fact a girl. If you have not done so, you should first review Chaps. 3 and 4 on embryology and anatomy.

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Introduction

Complications of neonatal circumcision may result from poor surgical technique, incorrect postoperative care, or unrecognized penile anomalies that predispose the circumcision to a poor result. Proper patient selection is critical to achieving a favorable outcome [1]. In this chapter, we review the anatomical conditions in which routine neonatal circumcision is contraindicated. It cannot be overemphasized that neonatal circumcision is elective and where anatomic contraindications are present, if circumcision is desired, it should be postponed until such a time when other options or techniques can be utilized.

Other than bleeding, the most common circumcision complications are removal of too much or too little skin, preputial adhesions to the coronal margin or glans, penile skin bridges, and post-circumcision phimosis. When certain anatomic anomalies are present, these complications are more likely to occur. These anatomic anomalies present in an entire range from severe and quite obvious to subtle and easily missed. We will present some helpful hints to spotting the latter.

Finally, and not insignificantly, the foreskin is often needed to correct anatomic abnormalities; thus, its removal may preclude or reduce the available options for subsequent surgical correction. A good rule of thumb is that if genital reconstruction is the recommended course, the circumcision, if desired, should then be part of that repair.

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Anomalies and Abnormalities

Though often used interchangeably, here we will use the term anomaly to refer to something that is mildly unusual and more a problem for circumcision than a functional problem, whereas abnormality is used to imply a structural/functional condition that absence the desire to circumcise requires further assessment and treatment.

Severe abnormalities are usually discovered at delivery and rarely presented for circumcision. It is the more subtle anomalies and rare abnormalities that are hopefully discovered in time at the pre-circumcision exam (see Chap. 8), that is, before the start of a circumcision procedure. A pre-circumcision exam must be done prior to applying surgical drapes lest a more subtle anomaly be obscured.

With that in mind, the anatomic conditions that should alert the clinician to deferring neonatal circumcision may be divided into the following categories:

Primary Penile Abnormalities – including hypospadias, epispadias, chordee without hypospadias, and micropenis

Dartos Fascia Abnormalities – including buried penis (also called concealed penis, hidden penis, engulfed penis, and inconspicuous penis), penoscrotal transposition, and penile torsion

Penoscrotal Anomalies and Distortions – including penoscrotal webbing and significant hydroceles and hernias

Ambiguous Genitalia – and possible indicators, for example, bilateral impalpable testes

Again, the last chance to discover an anatomical contraindication is during the pre-circumcision exam. Thus, to aid the clinician, each condition will be presented below with a *TIP* to help spot the more subtle cases.

Primary Penile Abnormalities

Newborns with a primary penile abnormality are most often easily recognized, and typical circumcision techniques can usually not be employed when these anomalies are present. Some anomalies may be more subtle and require a high index of suspicion to detect.

Hypospadias and Chordee

TIP
Downward curvature of the penis or glans • unfused ventral foreskin with prominent dorsal hood • translucent skin or mucous membrane along the raphe • unusual urine stream

Hypospadias and chordee without hypospadias usually have a dorsal hooded foreskin and variable degrees of ventral bending (curvature) of the penis (Figs. 5.1, 5.2, and 5.3). In hypospadias, the urethral meatus is located proximal to its usual position at the tip of the glans, whereas in chordee without hypospadias (a forme fruste of hypospadias), the meatus is in a near normal position, but the distal urethra may be dysplastic, inelastic, and it may be responsible for the ventral curvature (Fig. 5.4) [2]. In both conditions, there is often a deficiency of the ventral shaft skin. Therefore, in these conditions, the foreskin must be preserved because it may be needed for both urethral reconstruction and ventral penile skin coverage. Ten percent of boys with hypospadias have normally

Fig. 5.1 Hypospadias and dorsal hood. Subcoronal meatus (*arrow*) appears below what may or may not be a patent meatus. Notice how the foreskin is not fused on the ventral surface and has the appearance of a "dorsal hood" (*grasped*) (Image courtesy of Seattle Children's Hospital, Department of Urology)

Fig. 5.2 Scrotal hypospadias and complete foreskin. Since the foreskin is complete, this type of hypospadias is easily missed. The immediate giveaway is the presence of mucous membrane along the raphe. Applying a little lateral tension reveals the meatus (Image courtesy of Seattle Children's Hospital, Department of Urology)

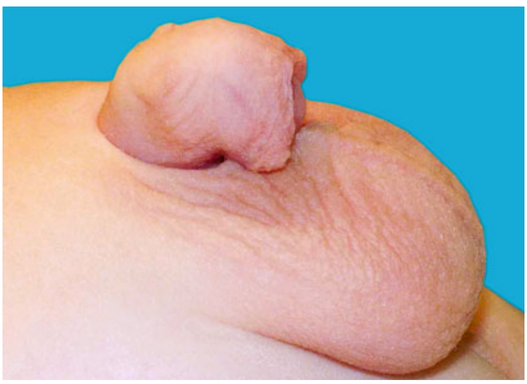

Fig. 5.3 Scrotal hypospadias, lateral view. A quick glance tells you right away that the foreskin is unusual, a sure tip that there may be a ventral defect (Image courtesy of Seattle Children's Hospital, Department of Urology)

formed foreskin and no ventral curvature, masquerading the defect [3]. This is most commonly associated with a very large meatus extending onto the distal shaft of the penis and referred to as megameatus intact prepuce (MIP) hypospadias (Fig. 5.5). Rarely is significant ventral curvature present in this condition. The abnormal urethral meatus is usually discovered after the dorsal slit of the circumcision is done or after the circumcision is completed (Fig. 5.6). This finding can be misconstrued as a complication of the circumcision procedure due to the lack of familiarity by the person who performed it. Fortunately, in the majority of these cases, the defect can be corrected without the need for extragenital skin.

Epispadias

TIP
No dorsal foreskin • any cleft or opening on the dorsum • a cleft or grove palpated where there is a dorsal foreskin

Epispadias is a condition most commonly associated with exstrophy of the bladder, but it may also occur as an isolated entity (Figs. 5.7 and 5.8). In epispadias, the urethral opening is on the dorsum of the glans or shaft, or it may end at the level of the pubis. The proximal forms are associated with sphincteric insufficiency and urinary incontinence. The entire foreskin is located ventrally, and there is a variable degree of dorsal penile curvature. In epispadias, as in hypospadias, foreskin preservation is critical for use in urethral reconstruction and skin coverage. Rarely, there are covered epispadias variants where the prepuce appears completely formed but with a concealed dorsally positioned meatus.

Micropenis

TIP
First rule out the far more common buried penis (see below)

Fig. 5.4 Ventral penile curvature without hypospadias. *Left*, foreskin demonstrating ventral curvature. *Right*, foreskin retracted demonstrating a normal glanular meatus

Fig. 5.5 Megameatus with intact prepuce (MIP) (Image courtesy of Seattle Children's Hospital, Department of Urology)

Micropenis is a normally formed but abnormally short and slender penis that has a stretched length that is at least 2.5 standard deviations below the mean. In the full-term newborn, this corresponds to a stretched penile length smaller than 1.9 cm [4]. In extreme cases of micropenis, there is barely any shaft, and the glans appears to sit almost on the pubic skin. This should be distinguished, however, from the completely hidden or buried penis which may also have very little penile shaft evident above the skin level but have a normally palpated shaft below skin level (see below). The child with micropenis should be evaluated endrocrinologically for a chromosomal or systemic hormonal abnormality. Treatment of micropenis is primarily hormonal stimulation

Fig. 5.6 Megameatus hypospadias variant discovered after circumcision (Image courtesy of Seattle Children's Hospital, Department of Urology)

Fig. 5.7 Epispadias with urethral opening on the dorsum of the penis and no dorsal foreskin

with variable degrees of growth response. Circumcision should be deferred in newborns with a micropenis. Performing a circumcision may create the illusion of making the penis appear even smaller.

Dartos Fascia Abnormalities

The dartos fascia is the subcutaneous layer of the penile skin that is normally fixed to Buck's fascia which in turn is fixed to the corpora of the penile shaft. This close application of the skin, dartos, and Buck's fascial layers is responsible for the usual snug fit of the penile skin to the shaft and the normal protuberance of the penis from the abdominal wall [5]. Dartos fascia abnormalities are often subtle and easily missed during a pre-circumcision exam. Too often the penis is viewed as just small and then circumcised when in fact it was a buried penis and circumcision should have been deferred.

Buried Penis

TIP
At rest, there is less than 1 cm of exposed penile skin • the foreskin feels empty • the glans is present within the foreskin only when erect

A common anatomic variant that is often not recognized is that of a penis whose shaft, and often glans, lie just above or beneath the surface of the penoscrotal skin. This anatomic variant known by the synonyms buried penis, concealed penis, inconspicuous penis, hidden penis, and engulfed penis has abnormally loose or nonexistent dartos attachments to Buck's fascia, which allows the penile skin that would normally be fixed to the

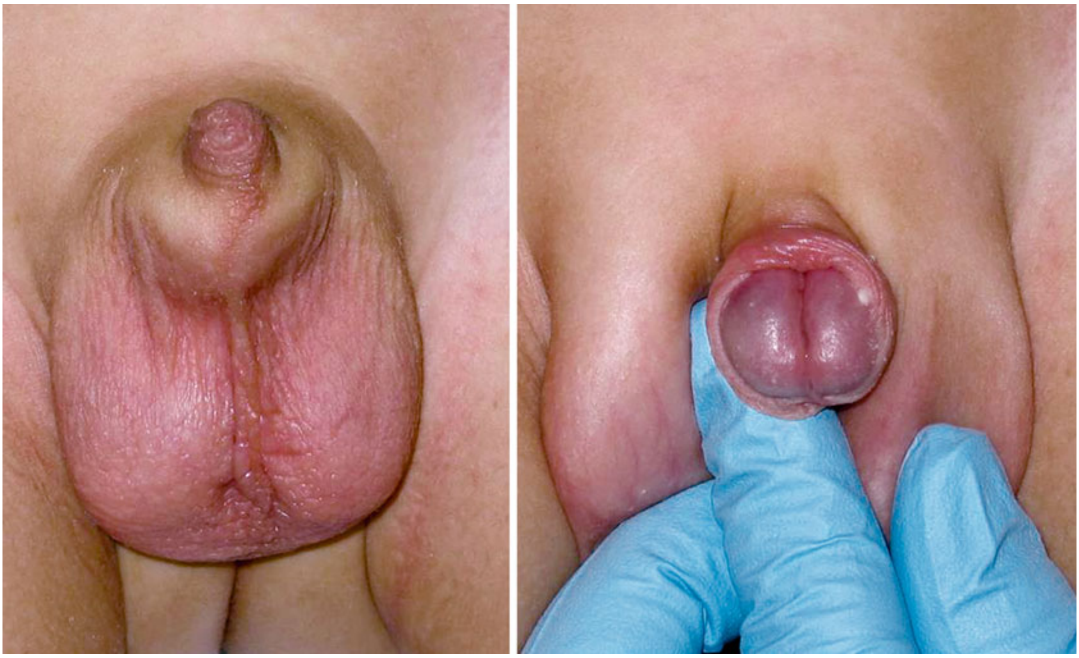

Fig. 5.8 Epispadias hidden by complete foreskin (*Left*) and revealed when the foreskin is retracted (*Right*) (Image courtesy of G. Hudson)

shaft to be pushed up and over the penile shaft. In these cases, there appears to be a small "foreskin cap" on the surface with the penis sunken into the pubic fat (Figs. 5.9 and 5.10). The "foreskin cap" is the foreskin and penile shaft skin combined, and if this is removed in a circumcision, the patient will have no outer penile shaft skin. Physiologic phimosis is invariably present. In addition, other deep dartos attachments commonly adhere to the Buck's fascia, keeping the penile shaft in a buried or trapped position and preventing it from assuming a more protuberant position after the immediate circumcision eliminates the phimosis. The outcome of a circumcision in newborns with this anatomic variation is often excessive removal of the outer penile shaft skin or insufficient removal of the foreskin and a relatively rapid formation of a secondary post-circumcision phimosis. This is an extremely important anatomic variant to recognize and requires circumcision deferral. If the parents prefer circumcision, this anatomical variant should be repaired at the time of circumcision, which is usually deferred to beyond 5 months of age in a healthy full-term infant when a general anesthesia can be administered with reasonable safety in an outpatient setting. Circumcision in combination with complete take down of all tethering dartos bands and tacking the base of the penile skin to the corpora can then be performed. This can be a complex penile skin reconstruction, and for patients with a heavy pubic fat distribution, it may be in their best interest to avoid circumcision until they outgrow their excess pubic fat.

Megaprepuce is a condition at the extreme end of the spectrum of buried, concealed, or trapped penis [6]. What differentiates megaprepuce is the marked trapping of urine inside a large pocket of massively redundant inner preputial skin (Fig. 5.11). Megaprepuce has never been to our knowledge detected in utero, and parents do not recognize it at birth. It presents gradually, rarely before 3 months of age, as a swelling of the upper scrotum that balloons during voiding.

Fig. 5.9 Buried penis in an uncircumcised boy. Note that only the foreskin is evident above the abdominal wall. Palpation would reveal the penile shaft to be deep to the penopubic skin (Image courtesy of Seattle Children's Hospital, Department of Urology)

Fig. 5.10 Moderately buried penis in an uncircumcised boy. Note that a hint of shaft skin may be present. This presentation is often unappreciated, and often, a circumcision is attempted when it should be deferred (Image courtesy of D. Bolnick)

Penoscrotal Transposition

TIP
Penis appears to emerge at the same level as the scrotum • split scrotum

Penoscrotal transposition is a congenital anomaly in which the penis is engulfed in the middle of the scrotum (Fig. 5.12). It may occur as an isolated anomaly but more often is seen in association with other genital abnormalities, such as hypospadias, ventral curvature, or various forms of urethral duplication. When correction is indicated, the reconstruction is complex and all available tissue is needed; therefore, circumcision is contraindicated.

Penile Torsion

TIP
Glans rotation greater than 45° • deviated penile raphe

Penile torsion is a counterclockwise rotational defect that is commonly associated with lesser degrees of hypospadias (Fig. 5.13). The ventrum of the penis (both glans and shaft) is directed toward the patient's left side. The deformity is due to abnormal skin and/or dartos attachments, and not to any defect in the penile corpora. In isolated cases, repair is indicated when the degree of torsion is greater than 90°. It is a good rule of thumb to schedule a pediatric urology consult for any rotation greater than 45°. Neonatal circumcision should be deferred if surgical repair is being considered and can be performed at the time of the repair.

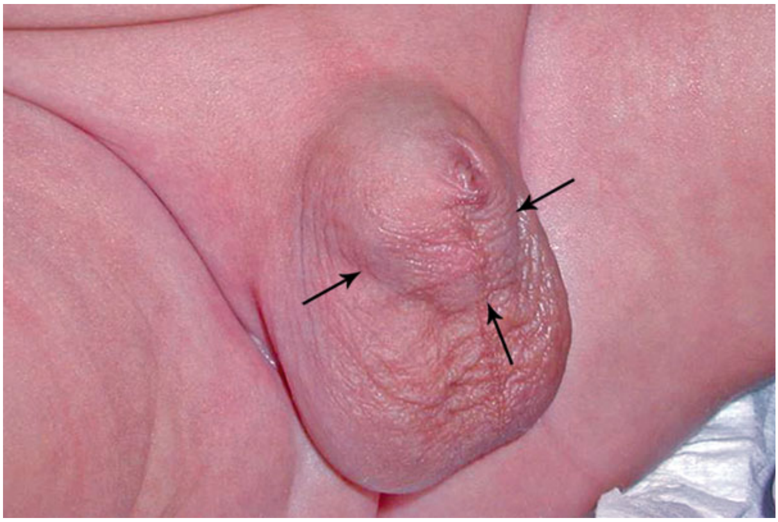

Fig. 5.11 Megaprepuce due to a trapped penis. Note the prepucial pouch filled with urine (*arrows*) (Image courtesy of G. Hudson)

Fig. 5.12 Penoscrotal transposition. Note the engulfment of the penis by the scrotum

Fig. 5.13 Penile torsion. Note abnormal orientation of the meatus, using the scrotal median raphe as the midline reference (Image courtesy of Seattle Children's Hospital, Department of Urology)

Penoscrotal Anomalies and Distortions

Webbed Penis

> **TIP**
> Viewed laterally at rest • the scrotum attaches to the distal one-half of the ventral penis • lack of ventral penile skin • scrotal looking skin on ventral penis • penis may have mid-shaft downward curvature, especially when erect

A webbed penis (penoscrotal webbing) is caused by an abnormally high scrotal attachment onto the ventral penile skin (Fig. 5.14). This condition occurs as a spectrum with mild forms requiring no treatment and posing no contraindication to circumcision (though care must be taken not to remove too much ventral skin or worse, to include the scrotum during circumcision). However, in the more severe forms in which the web extends

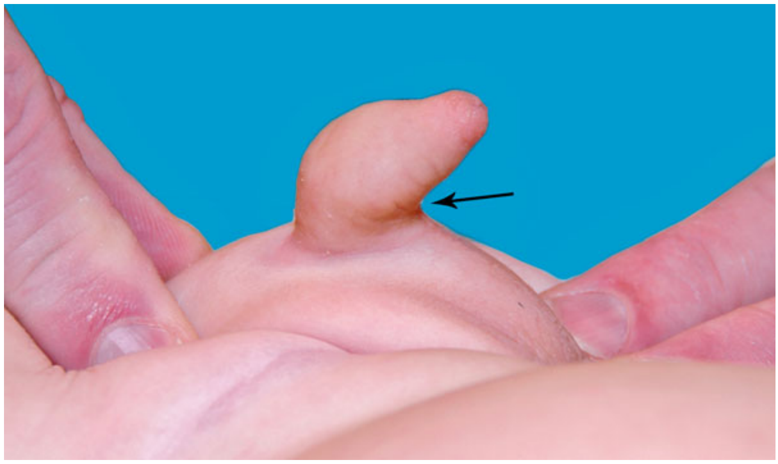

Fig. 5.14 Penoscrotal webbing (*arrow*). Penile shaft appears short with a characteristically greater dorsal length and tethered ventrum (Image courtesy of Seattle Children's Hospital, Department of Urology)

Fig. 5.15 Large bilateral hydroceles in a newborn resulting in a concealed penis (Image courtesy of Seattle Children's Hospital, Department of Urology)

to and is confluent with the distal ventral penile skin, neonatal circumcision should be deferred because it would create an appearance of having no ventral penile skin with glans tethered to scrotum. Circumcision under these circumstances can also lead to secondary phimosis. If the parents prefer circumcision, this configuration should be corrected under general anesthesia after 5 months of age. It should be noted, however, that not all of the severely webbed penises require surgical correction, especially if circumcision is not desired. After the natural preputial adhesions resolve and the foreskin becomes retractable, the point of attachment of the web becomes more proximal with foreskin retracted.

Hydroceles

> **TIP**
> Scrotum appears ballooned and engulfs part or all the penis

Large bilateral hydroceles (Fig. 5.15), which are usually observed for spontaneous resolution during the first year of life if not associated with an inguinal hernia, may engulf the penis, pushing the penile skin upward, mimicking a buried penis. It may be difficult to judge how much skin to remove with this degree of distortion, especially

Fig. 5.16 Genital ambiguity (*Left*) with the appearance of proximal hypospadias and nonpalpable gonads (*Right*), requiring a workup for a disorder of sex differentiation

if the penis is already on the small side. If a circumcision is done, the penis may "sink back inside" and the actual circumcision line may extend beyond the glans and result in a post-circumcision phimosis. Large bilateral hernias may cause similar distortions, but generally need to be corrected earlier.

Ambiguous Genitalia and Disorders of Sex Development

TIP
Bilateral impalpable testes • split scrotum • mid-scrotal orifice • hypospadias with a single impalpable testis

The finding of ambiguous genitalia in the newborn is a medical and social emergency. No surgical procedures should be considered except those related to making the correct diagnosis. All genital skin must be preserved for potential reconstructive procedures. Most often the ambiguity is evident. However, certain conditions in the apparent male should trigger a workup for a disorder of sex development (DSD), such as bilateral impalpable gonads, regardless of the degree of external virilization, or hypospadias, with a unilateral impalpable gonad (Figs. 5.16 and 5.17) [7].

Fig. 5.17 46XX congenital adrenal hyperplasia presenting at 3 months of age with salt wasting crisis. Bilateral nonpalpable testes in spite of complete virilization. Note this female patient had been circumcised at birth

Finally

Since circumcision is an elective procedure and not reversible, it is always better to err on the side of caution. Thus, all questionable genital anatomy should be referred for pediatric urology consult. It is best to defer circumcision where a future surgical correction is warranted. Furthermore, it is sometimes necessary to simply defer circumcision until the penis has had a chance to grow – 6 to 12 months – especially in cases of borderline buried penis. The circumcision then can be carried out as a day surgery.

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6 Complications of Circumcision

Andrew Freedman, Steve Lerman,
and Jonathan Bergman

Elective newborn circumcision remains a common and controversial practice. Increasingly, parents are faced with making this highly personal decision in a context of outspoken advocacy on both sides and few sources of unbiased guidance. The most widely recognized guidelines, the policy statement produced by the American Academy of Pediatrics Task Force on Circumcision, advocate that parents be informed of the relevant risks and benefits and then be allowed to choose within a context of medical, cultural, religious, and ethnic factors. However, how well equipped is the counseling physician to adequately inform the parents? In particular, how well do we understand the incidence of complications, their impact, treatment, or prevention?

The true incidence of complications after newborn circumcision is unknown, in part, due to differing opinions about what constitutes a complication and differing standards for determining when a complication has occurred. Adding to the confusion is the separation of acute complications, such as bleeding or infection, from late complications, such as adhesions, meatal stenosis, and unacceptable cosmetic outcome. Further, how does one adequately factor in the discomfort associated with the procedure or potential changes in penile physiology, particularly as it relates to future sensation or sexual functioning?

Other factors may complicate the decision on whether to pursue neonatal circumcision. The experience in a hospitalized setting with trained personnel may be far different from that practiced in the developing world or by ritual providers. In addition, complications of circumcision, in the non-newborn, have received little attention.

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Epidemiology of Complications

Acute Complications

The most commonly quoted sentiment regarding circumcision complications refers to the minimal risk of bleeding or infection. Most authors report a complication rate of <1% and stop there. Whether knowingly or not, what most proponents are responding to are two large studies evaluating elective newborn circumcision performed by physicians in a US hospital setting.

Wiswell [1] in his classic study reviewed the records of more than 136,000 boys born in US

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Army hospitals. There were more than 100,000 circumcisions, and the overall complication rate was 0.29%. The incidence of bleeding was 0.08% (one-third requiring suturing, and three cases requiring transfusion). Infection occurred in 0.06%, including eight cases of bacteremia. 0.01% had too much or too little skin removed, and there were no deaths.

Christakis [2] reviewed the hospital discharge records of over 350,000 boys born in Washington State from 1987 to 1996. The records demonstrated over 130,000 circumcisions. They were able to identify a complication in 0.22% of circumcisions. The risk of bleeding was the most common with an incidence of 0.18%. A penile injury occurred in 0.04%, while infection was identified in 0.0008%.

However, a significant limitation of both of these studies is that they rely on claims data, specifically hospital discharge coding. Many minor complications may have not been captured underestimating the actual incidence. There is a natural disincentive to report minor complications that are managed simply and immediately, such as minor bleeding. Another limitation is that neither study was able to capture minor complications that may have been treated in an outpatient setting following discharge.

In order to be more sensitive, O'Brien [3] abstracted medical records in a much smaller sample of approximately 1,800 consecutive boys circumcised in Atlanta over 3 months. The overall rate of complications was significantly higher, 3.1%. Bleeding was the most common complication, occurring in 2.1%. The higher incidence may reflect a bias in reviewing a patient's entire record as opposed to coded discharge data. Notations in the physician or nursing notes may record a minor complication that fails to be coded in the final discharge.

Unfortunately, none of these studies include any of the late complications of neonatal circumcision. However, as a measure of acute severe complications, these remain the most relevant studies.

In the non-US experience, the most relevant study is that of Ben Chaim [4], who reviewed the complications of newborn circumcision in Israel. The vast majority underwent circumcision for religious reasons on the eighth day of life. The circumcision was done predominately outside of a medical facility and is performed by nonmedical personnel. Despite being nonmedical, the majority of these providers are trained and professional, and this practice is typically their livelihood. The overall complication rate in a large sample, 19,478, was 0.34%. The most common acute complication was excessive bleeding occurring in 0.08%, and none required a transfusion. Infection occurred in 0.01%, and one patient had a partial amputation of the glans. As the majority of circumcisions occurred outside the hospital, minor complications that were managed at home would not have been captured.

Acute severe complications including glans amputation, urethrocutaneous fistula, ablation of the phallus, and death have been reported [5–19]. Given their fortunately rare nature, it is not possible to determine a true incidence.

Late Complications

Late complications are typically not discussed in consideration of neonatal circumcisions. Late complications occurring in childhood can include excessive residual skin (incomplete circumcision), excessive skin removal, adhesions (natural and vascularized skin bridges), meatal stenosis, phimosis (trapped penis), and epithelial inclusion cysts. In the adult male, there have been significant questions raised as to the effect of circumcision on sexual sensation and functioning.

Van Howe [20] reviewed 468 consecutive boys presenting to a general pediatric practice whose consultation included a genital examination. Late complications included a redundant residual prepuce in 20.1%, adhesions in 25.6%, balanitis 15.5%, skin bridge in 4.1%, and meatal stenosis in 0.5%. Whereas Posnky [21] found that the rate of penile adhesions was related to patient age, children less than 1 year old had a 70% incidence of adhesions. The rate of adhesion in those 1–5 was 28%, those 5–9 was 8%, and those over 9 had a rate of 2%. And Blalock [22] reported a 2.9% incidence of phimosis (trapped penis), following newborn Gomco circumcision.

In a later publication, Van Howe [23] reported a 7.3% incidence of meatal stenosis in Tanner stage 1 boys greater than 3 years old. However, this incidence was based on appearance rather than function and may not reflect a clinical situation that needs surgical treatment.

Unfortunately, the literature remains very sparse in this area, and many reports come from authors who have a demonstrated bias suggested by their published editorial work. Nonetheless, what is clear is that the cosmetic outcome is quite often questioned by parents and primary care physicians, suggesting that parents are unaware of the frequency of these delayed complications. Oftentimes the practitioner who performed the circumcision is not made aware of the late complications and, thus, may not be in a good position to adequately consent families to the potential risks with circumcision at the initial consultation.

Global Experience

The great majority of elective circumcisions performed in infants and young children are performed for religious reasons and are typically beyond the newborn period. In many countries, these circumcisions are provided by traditional, nonmedical providers.

In the Netherlands, a specific device, the TaraKlamp, was used with trained personnel and an incidence of bleeding of 1.4% and infection of 2% [24].

In Turkey, Ozdemir [25] reports bleeding rate of 2.2% and infection rate of 1.3% in children circumcised in the hospital versus a bleeding rate of 3.6% and infection rate of 2.7% in children undergoing nonhospital mass religious procedure despite trained personnel.

Amir [26] reviewed 1,000 neonatal circumcisions using the Gomco clamp in a hospital setting in Saudi Arabia. The overall complication rate was 1.9%. Bleeding occurred in 0.6%, infection in 0.4%, and redundant prepuce in 0.3%.

In Africa, Bailey [27] reported an overall complication rate of 35% in children undergoing circumcision by a traditional provider in Kenya. While Magoha [28], in Nigeria and Kenya, reported a single surgeon series in infants and children with an overall complication rate of 11% which included bleeding in 2%, infection in 2.8%, excessive skin removal in 0.4%, and redundant skin in 0.4%. He also reports 1 death, 4 penile amputations, and 7 loss of penis from injury.

Ahmed [29], using a trained nurses during two circumcision festivals, reported bleeding in 0.6% and infection in 1.5%. Redundant skin was left in 0.3% and a penile injury occurred in 0.04%.

In general, trained medical personnel, physicians or nurses, had significantly lower rates of complications than traditional providers with the exception of traditional providers (mohels) in Israel. Mohels are highly trained and regulated and had comparable outcomes with physicians.

Non-newborn Circumcision

There has been scant research into the complications of non-newborn circumcision in the USA. Wiswell [30] reviewed the records of 476 boys undergoing circumcision during childhood. Complications occurred in eight (1.7%). Three of the eight had anesthetic complications (malignant hyperthermia in two, aspiration pneumonia in one). The most common surgical complication was excessive bleeding in 0.6%. Elmore [31] reported an incidence of excessive bleeding in 0.75% in 267 patients undergoing circumcision using topical glue in place of skin sutures. He also reported an incidence of trapped penis occurring in 0.4%.

There has been no study of late complications in non-newborn circumcisions.

Comparison of Techniques

There are three techniques most commonly used in the USA for newborn circumcision. They are the Gomco clamp, the PlastiBell, and the Mogen clamp. There has been surprising little study comparing the techniques.

Gomco

Amir [26], using the Gomco, demonstrated an overall complication rate of 1.9%. Bleeding occurred in 0.6%, infection in 0.4%, and redundant prepuce in 0.3%. Horowitz [32] demonstrated a high rate of complications, 30% incidence of bleeding, when using the Gomco after the neonatal period.

PlastiBell

Overall complications range from 2.4% to 5% [33–36] with bleeding ranging from 0.8% to 3% and infection of 2.1% [36] in reports from outside the USA. Urinary retention has been reported [37, 38] as have problems with the ring in 3.6% [35].

Mogen

Though there are no series looking specifically at complications of the Mogen, it is evident from the case reports of amputation that the majority, if not all, of amputations in newborn circumcision occur with the Mogen. Improper use of an adult-sized clamp has specifically been reported as a cause of amputation [10].

Comparison

Machmouchi [39] evaluated the use of the Gomco versus the PlastiBell in infants. The incidence of infection was higher in the Gomco, 2% versus 1.3%. Adhesions were also more common with the Gomco, 20% versus 6.6%. While Kurtis [40] showed the Gomco was more painful than the Mogen.

Prevention and Management

Bleeding

Bleeding is one of the most common and important acute complications (Fig. 6.1). While bleeding can occur with any of the techniques, with those techniques that rely on crushing the skin for hemostasis (Gomco and Mogen), it commonly occurs when there is separation of the skin edges. Excessive skin removal, insufficient clamp engagement, or improper clamp size can result in separation and venous oozing. Aggressive separation of adhesions at the 6 o'clock position can injure the frenular artery and result in significant bleeding. An underlying coagulopathy such as hemophilia or von Willibrands factor deficiency can present as significant post-circumcision bleeding. In addition, a mother who is breast-feeding and taking either prescription or nonprescription medicines should check to make sure these preparations are free of anticoagulants.

Fig. 6.1 Subcutaneous hemorrhage

Steps to prevent bleeding include gentle adhesion lysis, careful measuring of skin to be removed with an appropriately sized device, waiting a sufficient time to allow the crushing effect to produce hemostasis.

The majority of bleeds can be controlled by simple pressure. Hemostatic agents such as surgicel or avitin can be of assistance for venous oozing. Pulsatile bleeding, suggesting an arterial source will require a stitch or cautery. A battery-powered eye cautery can be a useful tool in the nursery for minor bleeds. Bleeding from the frenular artery can be best controlled by suture to avoid a cautery injury to the urethra. Such an injury to the urethra can lead to a delayed urethrocutaneous fistula. Fine absorbable sutures (e.g., 6–0 PDS or Maxon) should be applied superficially and judiciously. If bleeding has been profuse or prolonged, a blood count should be obtained as the hemoglobin level can drop precipitously in the newborn and the volume of blood lost can be difficult to accurately measure in the diaper. Excessively tight wraps should be avoided as they are unlikely to resolve an arterial bleed and can result in urinary retention or ischemia of the shaft skin and glans.

Infections

The majority of infections occurring after circumcision are mild and superficial. However, more significant infections with more virulent organisms, including MRSA, can occur and result in sepsis or skin loss. Prevention relies on sterile technique in a hygienic environment. Routine antibiotics are not necessary. Postoperative care will generally include coating the phallus with a barrier ointment such as petroleum jelly or an antibiotic ointment. Routine hygiene should be sufficient to protect the wound from feces. Should an infection occur, the majority can be treated with local treatment such as antibiotic ointment. If there is a more significant skin change or fever, then systemic antibiotics covering skin flora such as a first-generation cephalosporin can be used. Surgical debridement is rarely indicated for devitalized tissue.

Anesthetic/Pain

There no longer is any question as to whether circumcision is painful or if neonates experience pain. The answer is unequivocally yes. Responses to anesthetic-free circumcision include changes in heart rate, blood pressure, oxygen saturation, and cortisol levels consistent with stress [41–43]. Therefore, in order to perform this procedure in an ethical manner, it is imperative that effective measures to ameliorate pain are utilized. See Chap. 7 for a review of this subject.

Glans Amputation

Glanular amputation is one of the most severe and distressing complications of newborn circumcision (Fig. 6.2). Although it can be successfully treated with a prompt primary reattachment with surprisingly good results [44–48], the stress to the family and provider is profound. The keys to prevention are proper adhesion separation to allow downward mobility of the glans and using an appropriately sized Mogen clamp in good working order. If the separation of the blades of the clamp is too lax, it may allow the glans to become engaged. The use of an adult-sized clamp is recognized as a risk for amputation. The other two circumcision devices when used properly should not allow this complication.

Penile Ablation

Penile ablation or severe necrosis has been reported only in the now well-known setting of using an electrocautery with the Gomco clamp. Electric current can then transmit throughout the surface of the clamp, leading to wide-spread necrosis [49]. There is no justification for use of this technique.

Denuded Penis

Excess skin removal during circumcision is a complication feared out of proportion to its

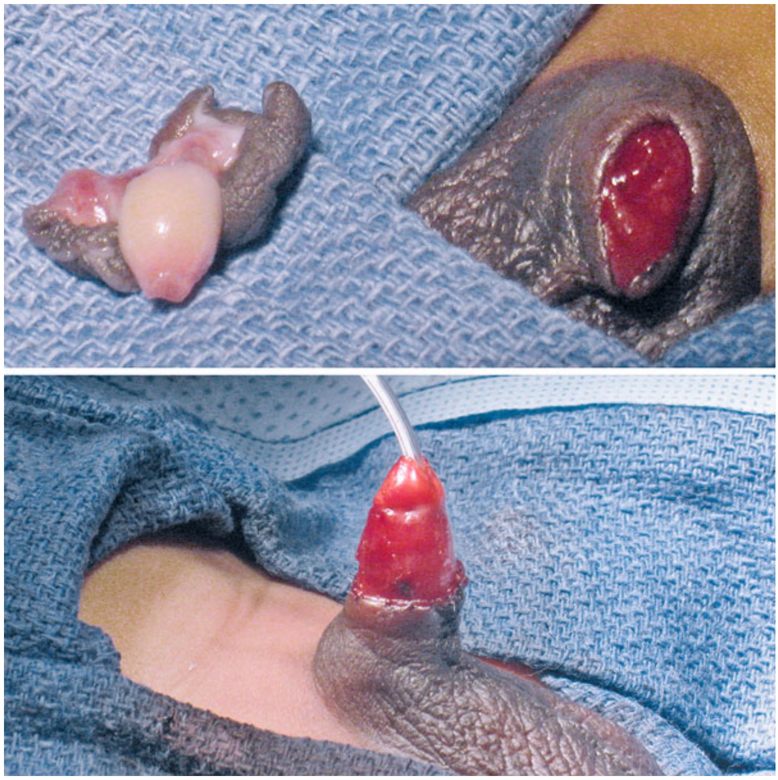

Fig. 6.2 Glans amputation and reattachment (Image courtesy of R. Hurwitz, M.D.)

outcomes. With mild excess removal, there will frequently be separation of the wound. If the skin edges can be easily re-approximated without tension, then many will advocate this to decrease the risk of bleeding. However, if it is difficult to re-approximate, it is preferable to allow the wound to heal by secondary intention. The wound can be cared for by a liberal use of antibiotic ointments. Generally, the wound will heal quickly and without any obvious cosmetic deformity, excessive scarring, or development of secondary chordee. In select cases, a full-thickness skin graft of hairless inguinal skin has been performed with excellent graft take [50, 51]. Removal of excess shaft skin with preservation of too much inner preputial skin will often result in a trapped penis. This will occur most commonly when the practitioner fails to adequately and completely release the adhesions to the glans penis prior to removing the foreskin. Individuals with congenital buried penis, wherein dartos fascial bands or muscle fibers tether the penile shaft, concealing its full length and preventing proper attachment of the shaft skin to the shaft, are at highest risk for this complication [52]. Experience and careful attention to properly sizing the device used and particular attention to how much shaft skin persists below the clamp will help to prevent this complication.

Incomplete Circumcision

Although poorly documented, anecdotally, there appears to be an epidemic of incomplete circumcision. One can only speculate it is due to the fear of excessive skin removal and resulting litigation. Prevention is only through proper training and experience along with using the appropriate sized device. Treatment is divided between parental reassurance and surgical revision. There are no clear guidelines as to how much extra skin is too much, and there likely exists a wide variance in the opinion of physicians and parents

Fig. 6.3 Incomplete circumcision. Skin is clearly covering the greater part of the glans (Image courtesy of Department of Urology, Seattle Children's Hospital)

(Fig. 6.3). One however should be careful to evaluate the contribution of a large suprapubic fat pad and loose attachment of the penile shaft skin before embarking on surgical intervention as many will resolve over time with thinning of the child and growth of the phallus. It is our opinion that this remains the most common complaint from parents when evaluating the late result of their son's circumcision. It is also our feeling that this potential outcome is not adequately addressed with the family prior to the actual circumcision. In most cases, the likelihood of a "hidden" or incomplete circumcision can be predicted (based on anatomy) prior to doing the procedure and thus affords the opportunity for preemptive parental reassurance. A good policy for those who perform neonatal circumcision would be to follow up on at least one occasion 2–3 weeks after the procedure to assess the results and provide consultation for the long-term care.

Phimosis and Trapped Penis

The incidence of recurrent phimosis after circumcision has been described at anywhere from 1% to 10%, and the severity varies significantly [4, 22, 53, 54]. Severe post-circumcision phimosis can manifest as a concealed penis (Fig. 6.4) or as a phallus where the circumcision scar prevents any exposure of the glans, i.e., cicatricial phimosis (Fig. 6.5). Rarely, this can result in an increased risk for infection, painful urination, or urinary retention. Prevention includes care to remove a sufficient amount of inner prepuce by use of an

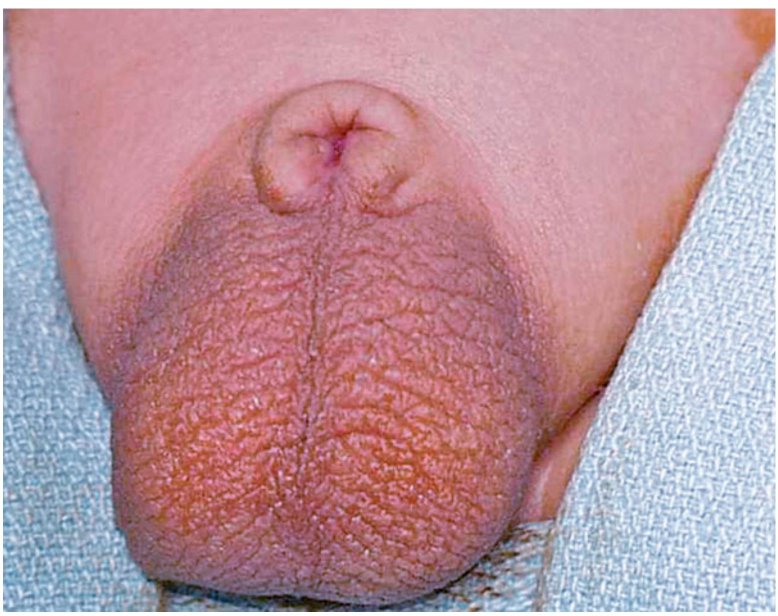

Fig. 6.4 Trapped penis (Image courtesy of Department of Urology, Seattle Children's Hospital)

Fig. 6.5 Cicatricial phimosis (Image courtesy of D. Sowande, M.D. and D. Tomlinson, M.D.)

appropriately sized clamp and proper positioning following a complete separation of the natural adhesions. In addition, parents need to be instructed to make certain that the circumcision incision remains proximal to the glans in the early postoperative period. In many cases, the tight scarring can be expanded by use of a high potency steroid cream such as betamethasone 0.05% (applied BID for up to 6 weeks). Once sufficiently dilated, the ring can be gently retracted into correct position and a revision avoided. Manual dilation of the tight ring with the aid of topical anesthetics in the office has been reported with good success [22]. However, treatment failures, especially when presenting late, require repeat circumcision under general anesthesia to excise the tight circular scar and reposition the incision.

Meatal Stenosis

Meatitis occurs in up to one-third of circumcised boys [55, 56]. It typically occurs when the child is still in diapers, and the urethral meatus, no longer shielded by the prepuce, is exposed to the ammonia on urine-soaked diapers. Bacterial enzymes produce the ammonia, which can lead to meatal inflammation even in the absence of infection. It is unclear how frequently meatal stenosis occurs (Fig. 6.6). Van Howe reported an incidence of 7.3% based on the appearance of the meatus rather than the direction of the urinary flow [23]. Other authors report a rate of 0.4–0.9%, though the length of follow-up is unclear [20, 28, 57]. At present, there are no reported means of prevention. Treatment can be done by a meatotomy in the office under local or a more formal urethromeatoplasty in the operating room. Both methods report a high success with low recurrence rates as long as the caregivers are taught to manually distract the edges of the meatus during routine cleaning on a once-a-day basis. Failure to

Fig. 6.6 Meatal stenosis (Image courtesy of Department of Urology, Seattle Children's Hospital)

distract the edges, especially in the children still in diapers, will often result in restenosis.

Urethrocutaneous Fistula

Fistula formation is fortunately exceedingly rare [6, 58, 59]. Fistulas result from injury to the urethra, typically from excessively aggressive control of frenular bleeding during the circumcision. A well-placed fine suture should provide greater reliability and safety than aggressive cauterization in controlling bleeding. Urethrocutaneous fistulas can be repaired formally 6–9 months after the initial injury following general reconstructive principles [59, 60].

Adhesions

There are two distinct types of adhesions. Frequently, with opposition of the subcoronal ring of former inner prepuce and the glans, reattachment can occur (Fig. 6.7). This is especially common in children with a long subcoronal collar, large fat pad, or increased mobility of the shaft skin. These adhesions, although troubling to parents, are unlikely to result in any morbidity and will generally resolve over time spontaneously. Some physicians encourage the parents to pull back the shaft skin during the healing process [61], though it is unclear whether in the at-risk anatomic setting this is an efficient strategy over time. Treatment is primarily reassurance. High potency steroids such as betamethasone [62] have shown to be very effective in painlessly separating these adhesions. Blunt manual separation, though often tempting, can be very painful, difficult for the parents to manage and maintain, and should be discouraged. This type of separation should only be done in a setting where follow-up will include daily cleaning that includes gently retracting the residual skin to expose the glans penis fully.

The second distinct type of adhesion is a true vascularized skin bridge (Figs. 6.8 and 6.9). Skin bridges represent a true scar between the circumcision incision and the glans. These will not separate spontaneously and do not respond to steroid treatment. Rarely, skin bridges can tether the erect penis, resulting in pain or penile curvature [63]. Gentle retraction of the shaft skin in the early postoperative period to prevent direct contact of the healing incision from the denuded glans should theoretically prevent this complication. Skin bridges are best treated with surgical division. This can be accomplished in the office setting with EMLA cream anesthesia [63], especially in the very young infant or mature adolescent. However, for many children a formal procedure under general anesthesia will be required.

Fig. 6.7 Adhesion (Image courtesy of D. Tomlinson, M.D.)

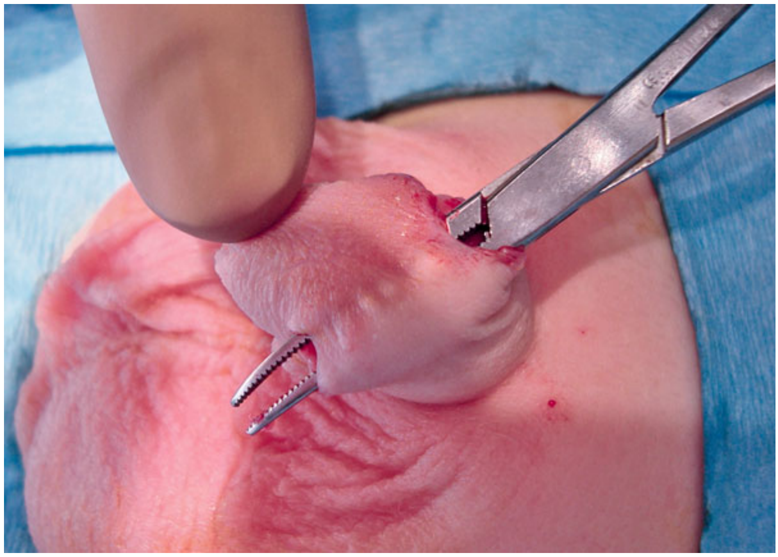

Fig. 6.8 Vascularized skin bridge (Image courtesy of A. Lorenzo, M.D.)

Fig. 6.9 Vascularized skin bridge (Image courtesy of A. Caldamone, M.D.)

Epithelial Inclusion Cysts

Inclusion cysts can form underneath the circumcision line (Fig. 6.10). They are believed to be caused by either implantation of smegma in the circumcision wound or by surgical inversion of the epidermis at the time of circumcision [64]. Epithelial inclusion cysts can enlarge or become infected. Treatment includes conservative observation, with the expectation that the material will eventually extrude spontaneously and the pocket becomes marsupialized, or simple surgical excision. With excision, it is important to excise the entire cystic structure in order to prevent recurrence.

Sexual Functioning

Randomized data obviously cannot be collected on penile sensation after circumcision, yet several advocacy organizations claim that circumcision diminishes sexual sensation and pleasure, and histological studies confirm the presence of nerve tissue in preputial skin [65–67]. The clinical

Fig. 6.10 Inclusion cyst

effect that removing the prepuce exerts on penile sensation has yet to be elucidated. Studies do suggest decreased vibratory sense and a delay in orgasm [68]. Whether this is perceived by men and their partners as a positive or negative remains to be proven. Likewise, studies on the differential pleasure women gain from sexual encounters with men with circumcised versus uncircumcised penes report conflicting results [69–71]. At present there is no unbiased compelling data to answer this question.

Contraindications to Circumcision

Identifying boys who should not be circumcised is as important as mastering the circumcising technique and an important means to preventing complications. Contraindications to neonatal circumcision include significantly premature infants, those with blood dyscrasias, individuals with a family history of bleeding disorders, and those with congenital abnormalities, such as hypospadias, or significant chordee (see Chap. 5). The most often missed abnormalities are those with deficient shaft skin such as newborns with penoscrotal fusion or congenital buried penis. Circumcision in these children often leads to trapped or concealed penis, frequently necessitating revision [52]. In this population of children, if circumcision is desired, it is best to do in an operative setting when the child is closer to a year of life.

Conclusion

Complications after circumcision are somewhat rare, but by no means trivial. While the majority of acute complications can be managed quickly and easily with minimal morbidity, occasionally catastrophic complications can occur. Little attention has been paid to the late complications, and few parents are informed regarding them when considering newborn circumcision. Although, in general, they are mild in nature, many will require a secondary procedure and exposure to general anesthesia. When circumcision is to be performed, it is critical that it be done by a practitioner, skilled and experienced in its technique, attentive to detail, and respectful of the potential for harm.

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Part III

Newborn Circumcision

Pain Control in Infant Circumcision

7

Adrian Bosenberg

Editors' Note
Anyone who has performed circumcisions, medical or ritual, knows that newborn babies respond appropriately to painful stimuli, i.e., they respond to actions that would cause pain like clamping or cutting foreskin. To claim otherwise is disingenuous at best. Furthermore, simple and evidenced based observations have put to rest any notion that newborn circumcision is not significantly painful. Thus, it is incumbent of all medical practitioners who perform circumcisions to do so only after producing appropriate anesthesia.

Introduction

Despite the American Academy of Pediatrics' (AAP) policy statement indicating that routine neonatal circumcision is not medically necessary [1], circumcision continues to be the most frequently performed surgical procedure performed in the newborn period [2–5]. The old maxim that children neither respond to, nor remember, painful experiences to the same extent as adults is simply untrue [2]. Indeed, all of the nerve pathways essential for the transmission and perception of pain are present and functioning by 24 weeks of gestation [6, 7]. Unfortunately, even today, when their pain is obvious, children and particularly neonates frequently receive no treatment, or inadequate treatment, for pain and for painful procedures [8].

Numerous interventions are available to reduce pain during and after circumcision. Pain should be effectively managed for physiological and humanitarian reasons [9]. If untreated, the pain of circumcision can cause both short- and long-term changes in infant behavior [2].

Physiological Impact

Recent research in newborn animals has revealed that failure to provide analgesia for pain results in "rewiring" of the nerve pathways responsible for pain transmission in the dorsal horn of the spinal cord. As a consequence, there is increased sensitivity or pain perception to future painful insults [10, 11]. This has been confirmed in human newborn where failure to provide anesthesia or analgesia for circumcision resulted not only in short-term physiologic perturbations but also in longer-term behavioral changes, particularly during immunization [2, 12].

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Studies show that newborns who experience excessive or poorly controlled pain during the neonatal period have excessive pain intolerance and hyperalgesia later in life [13, 14]. Because infants are not able to communicate verbally, perception of neonatal pain comes from physiological responses to painful stimuli, including decreased oxygen saturation levels and increased heart rate, blood pressure, and cortisol levels [1, 15]. Likewise, behavioral responses to pain can be measured by duration and intensity of crying, grimacing, and flailing [16]. Analgesia during circumcision has been shown to improve comfort scores and improve mother and child interaction during the early postpartum period [17]. Ineffective analgesia can lead to altered sleep cycles and disturbed feeding [18, 19].

Historically, physicians have not used anesthesia during circumcision for several reasons. These include lack of familiarity with regional anesthetic techniques and their side effects, lack of understanding of analgesic and anesthetic drugs in this age group; poor understanding of the neurologic development of the penis that led many to believe such a "minor" procedure in this age group caused little, if any, pain; and, lastly, the belief that pain from injection of anesthetics is as bad or worse than the pain of the surgery [20].

The AAP task force on circumcision recommends the use of environmental, non-pharmacologic, and pharmacologic interventions to prevent, reduce, or eliminate pain during neonatal circumcision [21]. Fortunately, the number of US training programs that teach effective analgesia for neonatal circumcision has increased over the past decade [22, 23]. Despite this improvement, in the family practice, obstetric and gynecologic and pediatric residency teaching programs, incredibly some 20% of these programs still do not instruct their residents in analgesic/anesthetic techniques to relieve neonatal pain during circumcision [22–24].

Circumcision Technique and Pain

The method used for circumcision impacts on the pain caused during circumcision. None other than Nelson Mandela described vividly the pain of his circumcision performed by a traditional surgeon (*ingcibi*) using one swipe of an assegai during the adolescent rite of passage according to Xhosa tribal custom (*umkhwetha*). He felt "disabled by the pain" which felt "as if fire was shooting though my veins – the pain went into the marrow of my bones and into my brain – paralyzed me momentarily" [25].

Neonates have neither the memory nor the capacity to describe the pain they experience in such vivid terms, but the method used can impact on severity and duration of the pain related to circumcision. The most common surgical techniques include the PlastiBell device, Mogen clamp, Gomco clamp, and formal surgery [26]. In two comparative studies, the Mogen clamp was associated with less pain, and surgery was of shorter duration compared to the Gomco clamp [15, 27, 28] or PlastiBell technique – even when performed by pediatric trainees! [28].

Pain Management Techniques

Neonatal circumcision is relatively quick and safe surgical procedure. Any method to relieve pain should be risk-free [29]. A number of studies have shown that the dorsal nerve block of the penis (DPNB) is effective [8, 30]. EMLA (eutectic mixture of local anesthetic) is more effective than placebo and no treatment, but is not as effective as DPNB [31–34]. Both interventions are safe in newborns but do not completely eliminate the pain [8]. Caudal anesthesia can provide equally effective analgesia [30], but has only been directly compared with other techniques, including systemic opioids, in a few trials [35]. Caudal block, usually combined with general anesthesia, provides longer duration of analgesia but has a higher incidence of side effects and technical failures [36, 37]. Ultimately combining techniques that compliment one other provides better pain relief. Acetaminophen is the most widely used analgesic [27].

For same-day surgery, penile block is considered more preferable in children old enough to walk in view of the temporary leg weakness caused by caudal blockade [35]. General anesthesia, with or without local anesthesia, may be considered by some to be an unacceptable risk in neonates for such minor surgery [29]. This is particularly relevant in view of the current concern that some anesthetics may have detrimental effects on neurodevelopment [38, 39].

Penile Neural Anatomy

The pudendal nerve originates from sacral roots S2, S3, and S4 and runs along the ramus of the ischium and then along the inferior ramus of the pubis. It divides into the dorsal nerve of penis (DNP) and the perineal nerve soon after it leaves the pudendal canal. The left and right dorsal nerves of penis (terminal branches of the pudendal nerve) innervate the distal two-thirds of the shaft of the penis. The perineal nerve supplies the skin of the underside of the penis, the scrotum, the anterior part of the perineum, the base of the glans, urethra, and perineal muscles.

The DNP continues over the deep surface of the perineal membrane, passes under the pubic bone, and traverses the subpubic space deep to Scarpa's fascia. The DNP then gives off a small branch that penetrates the perineal membrane to supply the corpora cavernosa. The DNP then enters Buck's fascia and accompanies the two dorsal arteries of the penis close to the corpora cavernosa, terminating in the glans. In its course, small branches supply the dorsal skin of penis, the glans, and the frenulum.

The ilioinguinal (L1) and the genitofemoral (L1-2) nerves supply the skin at the base of the penis (proximal one-third of shaft). The genital branch that accompanies the spermatic cord through the inguinal canal supplies the cremaster muscle, the scrotum, and base of penis. After emergence from under the pubic bones, the DNP and their branches are enclosed in a fat-filled subpubic space. The subpubic space is the optimal site for blockade of the DNP.

Scarpa's fascia is a thin membranous aponeurosis that is continuous with the suspensory ligament of the penis, the fascia of the penis (Buck's fascia), and the fascia covering the urogenital region of the perineum. The subpubic space is bounded by (1) Scarpa's fascia, the deep layer of fascia superficialis, and the suspensory ligament above and anterior; (2) Buck's fascia, the fibrous fascia that invests the corpora cavernosa anteriorly within shaft of penis; and (3) perineal membrane posteriorly. The subpubic space is usually divided in the midline by the suspensory ligament into two noncommunicating compartments. Each DNP lies within these separate compartments. For this reason, local anesthetic needs to be placed into each compartment at the 10 and 2 o'clock positions at the base of the penis to achieve a successful block. The fascia lies 3–5 mm below the skin surface.

Dorsal Penile Nerve Block

Dorsal penile nerve block (DPNB) was first described for neonatal circumcision by Kirya and Werthmann in 1978 [40]. Since that time, numerous studies have documented its safety [41, 42] and efficacy [43–52]. DPNB can be performed at different sites using 1–3 ml of local anesthetic solution.

Neonates

Using gentle traction, the penis is pulled downward with one hand while the block needle is advanced, just above the ventral penile junction, down to about one-half to 1 cm, juxtaposing Buck's fascia (Fig. 7.1). Two injections are made, administering half the full dose at 2 o'clock and half at 10 o'clock. The full dose for most neonates is 0.8 ml 1% lidocaine (plain without epinephrine) or 0.8 ml 0.25% bupivacaine (plain without epinephrine). Always aspirate with each injection to ensure you have not entered a vein. You can almost eliminate any pain of the DPNB

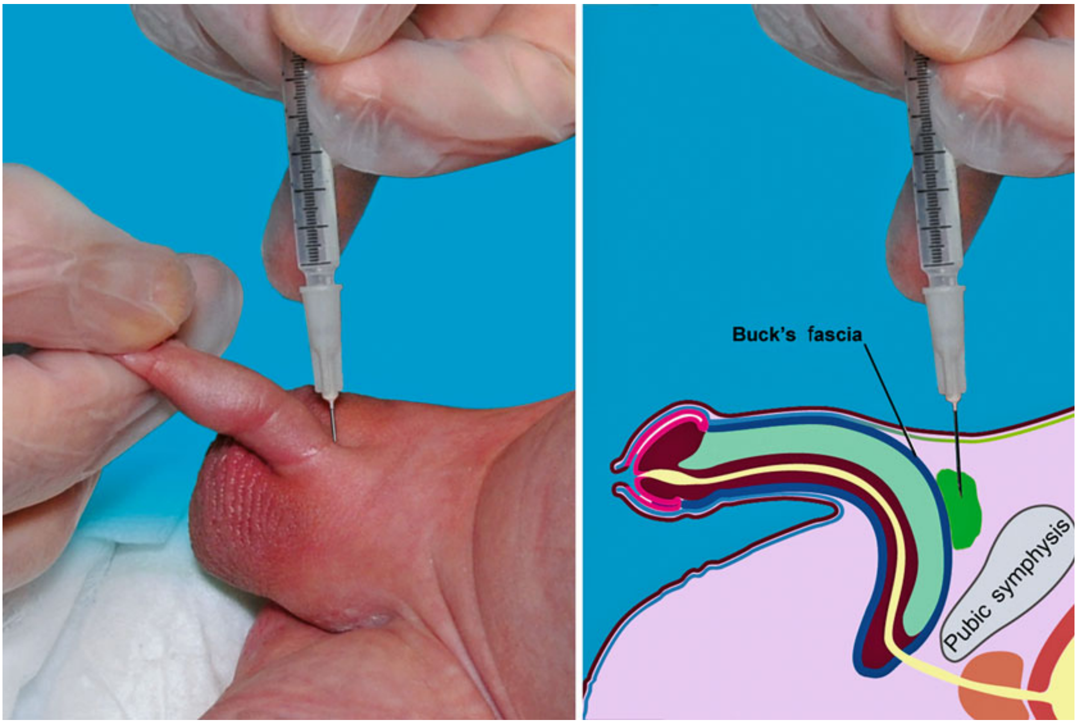

Fig. 7.1 Dorsal penile nerve block (DPNB). Stabilize the penis with one hand while advancing the syringe/needle with the other. The needle should enter just above the dorsal junction and be advanced about ½ to 1 cm in juxtaposition to Buck's fascia. One injection of 0.4 ml should be made at 10 o'clock, as picture on the left, and the other at 2 o'clock. One should aspirate before each injection to ensure that a vein was not entered (Illustration courtesy of R. Cohen (MedicoLens.com))

by using an ultrafine 30-gauge needle if non-preservative (NP) anesthetic solution is used. Bupivacaine has been shown to confer longer analgesia in neonates [53].

Older Children

Using gentle traction, the penis pulled downward with one hand while the block needle is advanced in the midline along the caudal edge of the pubic bone. An initial "give" is felt as the needle pierces the superficial fascial layer followed by another "give" as the needle penetrates Scarpa's fascia and enters the subpubic space. Then administer 1–3 ml 1% lidocaine (plain without epinephrine) or 1–3 ml 0.25% bupivacaine (plain without epinephrine) [50].

Complications include subcutaneous hematomas, which are fairly common, and rarely arterial or urethral puncture. These can be avoided by staying away from the midline.

Ring Block

Ring block is accomplished by injecting local anesthetic subcutaneously and circumferentially around the mid-shaft or base of the penis. Ring block is technically easier, but takes longer to administer [43]. Practitioners who prefer ring blocks cite the inconsistent anatomical position of the dorsal penile nerves at the 2 and 10 o'clock positions. Edema is a drawback that may interfere with surgery [54] but can be prevented by applying pressure to the shaft of the penis prior to

Fig. 7.2 Ring block. Stabilize the penis with one hand while injecting with the other. Advance the needle subcutaneously about 1 cm along the base of the penis. Aspirate to assure a vein was not entered. Push a bleb of anesthetic, and then while slowly withdrawing the needle, push additional anesthetic. Repeat this until the entire circumference at the base is covered

surgery. The acidic nature of lidocaine is at least partially responsible for the burning sensation on injection in awake patients. Warming, buffering with sodium bicarbonate [55, 56] and slow injection through a fine needle (27–30 g) [57] has been shown to reduce the pain of the subcutaneous injection. Injections within Buck's fascia should be avoided as this can lead to compression of the dorsal penile arteries and ischemia of the glans.

Neonates

Ring block is performed by subcutaneous circumferential injection of up to 1 ml local anesthetic around the base of the penis (Fig. 7.2). The local anesthetic may be 1% lidocaine (plain without epinephrine) or 0.25% bupivacaine (plain without epinephrine), the latter having a longer lasting effect. You can almost eliminate any pain of the ring block by using an ultrafine 30-gauge needle if non-preservative (NP) anesthetic is solution is used. Extra care should be given when injecting the ventral surface to avoid the urethra and on the dorsal surface to avoid the dorsal vein. Aspiration to assure that the needle has not entered a vein is highly recommended, especially on the dorsal surface.

Older Children

Ring block is performed by subcutaneous circumferential injection of 2–3 ml local anesthetic around the mid-shaft or base of the penis [58, 59]. Lidocaine 1–2% and bupivacaine 0.25–0.5% are most popular. Ring block has been shown to be effective in maintaining cardiovascular stability under general anesthesia and controlling pain after circumcision leading to faster and smoother recovery [59, 60].

Topical Anesthetics

Topical anesthetics also reduce the pain of circumcision, and have the advantage that they are not painful to apply, but are not as effective as either the DPNB or the ring block [43–45]. Some providers have used topical anesthetics as an adjunct to the DPNB and ring block. Topical anesthetics were first shown to be effective by Mudge and Younger in 1989 [61]. A eutectic mixture of 2.5% lidocaine–prilocaine (EMLA cream; AstraZeneca) has been studied much more extensively than other preparations. Infants pretreated with EMLA cream have significantly diminished pain responses to the painful phases of circumcision [32]. Topical lidocaine 4% cream (LMX4) [61, 62] and tetracaine or amethocaine gels have also been used [34, 63].

The application time determines the depth to which the skin is penetrated by the local anesthetic. Tetracaine gel is as effective as EMLA during cutaneous procedures in children [34] and has the advantage of a shorter application time (30–60 min before the procedure compared with 60–120 min for EMLA) but is associated with more allergic or hypersensitivity reactions.

Methemoglobinemia is a feared side effect as a consequence of absorption of the prilocaine component of EMLA, particularly in newborns [64]. A single application such as for circumcision has been shown to be safe [33, 65, 66]. The level of methemoglobinemia attained is dose related.

Other Interventions

Sucrose

Sucrose may be used to supplement the analgesia provided by local anesthesia but is not effective alone [67, 68]. A review of 17 randomized clinical trials demonstrated that sucrose with and without nonnutritive sucking was modestly effective over placebo in relieving minor procedural pain [69–77]. It has been hypothesized that sucrose analgesic effects are opioid-mediated [70–72], related to its sweetness [73], although measurements of beta-endorphins before and after intraoral sucrose administration do not support this hypothesis [74]. Sucrose is most effective when administered approximately 2 min before the painful stimulus [77]. Kaufman et al. found consistent evidence that sucrose offers some analgesic benefit in circumcision [75]. In this carefully designed randomized controlled trial, sucrose significantly reduced signs of pain when a Gomco clamp was used, but not when a Mogen clamp was used. Topical anesthetic [76] and dorsal penile nerve blocks [67, 77] are both superior to a sucrose-dipped pacifier in reducing pain responses to newborn circumcision. While sucrose may provide some degree of analgesia, it is clearly ineffective as a sole agent for the procedure [77]. Many providers use a sucrose-dipped pacifier or soaked gauze pacifier as an adjunct to the DPNB or ring block.

Acetaminophen

This common and normally safe drug is the only true analgesic that has been used systematically around the time of circumcision. Howard et al. found that when given regularly every 6 h for at least the first 24-h postoperative period, infants demonstrated decreased responses to pain starting at approximately 6 h after circumcision [78]. Likewise, Macke [17] found that acetaminophen positively influenced the postoperative period, improving mother–baby feeding interactions and reducing crying during diaper changes [24]. Neither study showed acetaminophen to have any intraoperative analgesic benefit. A third study reported mixed results; babies who were administered preoperative acetaminophen flailed less but cried more than babies who received no analgesia [24]. All these studies used a low dose acetaminophen 15 mg/kg. Anderson et al. have subsequently shown that 40 mg/kg (orally or rectally) is necessary to achieve plasma levels that provide adequate analgesia for painful procedures [79].

Behavioral Interventions

Swaddling [80], nonnutritive sucking, dimming the ambient light [81], soft music, and intrauterine sounds [81–84] have been suggested as nonpharmacologic interventions to reduce pain of circumcision. Oral ethanol, usually in the form of brandy, was in the past but is now frowned upon [20]. None have been shown to appreciably decrease the neonate's perception of pain based on crying responses and plasma catecholamines [71, 72, 82]. Anecdotally, acupunctural reflexotherapy has been used for circumcision in an adult who requested an alternative anesthesia to general anesthesia [85]. It is logical to assume that by combining these various strategies, one could achieve an additive or synergistic effect.

Ritual or tribal circumcisions are mostly performed without analgesia. The Incas, however, are thought to have used plant products to provide some analgesia [86]. These included chichi, an alcoholic beverage that was used to induce unconsciousness, San Pedro cactus that induces a deep trance and probably anesthesia, Datura espingo that induces anesthesia, and cocoa leaves may have been used as a topical anesthetic. Many other agents, too numerous to describe, have been used for ritual circumcisions worldwide.

Caudal Block

A caudal block can be used for neonatal circumcision and should only be administered by an experienced provider. Caudal anesthesia is one of the most frequently used regional anesthetic techniques in children of all ages [87–90]. Its popularity stems from its simplicity, safety, and efficacy in all age groups and is widely used for postoperative pain relief. It may be used as the sole anesthetic, particularly in "ex-premies" at risk of apnea, but is most commonly used in conjunction with light general anesthesia.

Anatomy

The sacral hiatus is formed by the failed fusion of the fifth sacral vertebral arch. The remnants of the arch are represented by two prominences, the sacral cornu, on either side of the hiatus. The sacral hiatus extends from the sacral cornua to the fused arch of the fourth sacral vertebra. The sacrococcygeal membrane covers the sacral hiatus, separating the caudal epidural space from the subcutaneous tissue. The sacral hiatus always lies at the apex of an equilateral triangle that has the line drawn between the posterior superior iliac spines as its base.

Technique

Caudal block can be performed in the lateral decubitus position with both knees drawn up. The prone knee–chest position can also been used and is particularly useful when performing a caudal block on awake high-risk "ex-premies." The sacral hiatus and cornua are identified, and after skin preparation, a short-beveled needle is introduced approximately 45° to the skin and advanced until it pierces the sacrococcygeal ligament. This can usually be detected by a "give" as it enters the caudal epidural space and confirmed by loss of resistance. Detection of the "give" depends on the size of the needle, the bevel used, the age of the patient, the grip strength, and experience of the operator. Needle advancement, as described in adults, is unnecessary as it increases the risk of dural puncture or bloody tap. Once the needle position is confirmed, and aspiration for blood or CSF is negative, 0.5 ml kg^{-1} of local anesthetic can be injected. The most commonly used drugs for caudal block are bupivacaine 0.25% and ropivacaine 0.2%. Aspiration should be gentle since strong negative pressure may cause the low-pressure epidural vessels to collapse before a positive aspiration test can be elicited.

The duration of analgesia is dependent upon the age of the patient, the drug and dose administered, and whether epinephrine is used [88, 89]. Bupivacaine 0.25% or ropivacaine 0.2% is effective for postoperative pain relief. Increasing the concentration does not offer any additional advantage but may increase the incidence of motor block, urinary retention, and other side effects and/or complications. Concern over motor blockade particularly in the day case setting has lead investigators [91, 92] to seek the optimal concentration with the least motor dysfunction. Some investigators have suggested that 0.125% bupivacaine reduces motor blockade [92], which is important for older children, but the duration of analgesia may be shorter. Adjuvants (clonidine, tramadol, ketamine, and opiates) have been used to extend the duration of caudal block, but the risk-benefit ratio should be considered for both neonates and in the day case setting.

Complications

Dural puncture and subsequent injection of local anesthetic solution may lead to a *total spinal*. Bradycardia, dilated pupils, and respiratory arrest (apnea) herald the onset of a total spinal under general anesthesia. Hypotension is usually not a feature in infants and neonates. *Systemic toxicity* may manifest as arrhythmia, cardiovascular collapse, or convulsions following accidental *intravascular* or sacral *interosseous* injections. *Urinary retention* and *delayed micturition* are related not only to the duration of preoperative starvation but also to the concentration of local anesthetic solution. The incidence is negligible when 0.25% bupivacaine or lower concentrations are used. *Motor blockade* and *inability to walk* is also concentration dependant [91, 92]. *Nerve injury* and *neurological defect* have been reported but are extremely uncommon following caudal blockade. *Intrapelvic injections* have been reported but should not occur [89].

Conclusion

The treatment and alleviation of pain is a basic human right that exists regardless of age. The choice of technique will depend on the skills of the care provider. Local anesthesia, whether used topically, by ring or nerve block or caudally, offers the most effective analgesia. Supplementary analgesia and behavioral intervention add to the infant's comfort.

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8 Pre-circumcision Assessment and Exam

Assaf Yosha

Editors' Note
Newborn circumcision is an elective procedure and should only be done where the risks of complication are negligible. The risks are best determined by a pre-circumcision exam. Where such an exam reveals a significant anatomical anomaly, a pediatric urology assessment should preempt the circumcision. If the health of the neonate is not excellent, the circumcision should be deferred. The key point here is that it is elective. So any pressure to circumcise where conditions are not ideal is foolhardy. Finally, the physical exam is an art that develops with experience. For those learning to do circumcision, it is helpful to examine as many newborn boys as you can, even where circumcision is not desired.

Introduction

The newborn circumcision in the hospital or immediate posthospital setting is considered an elective procedure. While there may be established medical benefits to circumcision, the current standard of care in the USA is that the procedure is done at the discretion of the parent or guardian without recommendation for or against the procedure by the care provider. During the informed consent, emphasis should be placed on this elective nature. Therefore, it should be clear that the baby must be in good health and that there is no urgency to have it done if there are any medical issues. As an elective procedure, it is paramount that the timing and any medical conditions be optimized in order to minimize risk. In other words, if any issues arise, why take any chances when the procedure can safely be deferred?

Before performing an elective procedure, it is proper to make sure that the patient is a good surgical candidate. In the case of newborn circumcision, the operator should make sure that there are no contraindications to the procedure. Just as importantly, the operator should be aware of any precautions in order to be prepared for potential complications. You may notice that some of the recommendations below are conservative. The reason for this is obvious. As already mentioned, newborn circumcision is an elective procedure – even if being done to accommodate religious practice (see Chap. 22). There is little to no justification for excess risk.

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Some hospitals will have standard criteria, such as a pre-procedure safety checklist, before a circumcision can be done. This is useful, especially in the setting where the person performing the circumcision (e.g., the obstetrician) is not the same as the person caring for the newborn (e.g., the pediatrician).

Recommended Prerequisite Conditions for Newborn Circumcision

- *Good general health during the first 24 h of life*
  The transition from intrauterine to extrauterine life involves complex physiologic changes including changes in blood flow, alveolar exchange of gas, glucose homeostasis, and thermoregulation. For a full-term healthy infant, the transitional changes are mostly in place by about 12 h of age [1, 2]. But gestational age, maternal comorbidities, fetal anomalies, and delivery room complications can all delay this time period. Delayed transition can also be caused by transient tachypnea of the newborn, meconium aspiration, persistent pulmonary hypertension, and hypoxic ischemic encephalopathy [3]. Allowing for 24 h gives more time for any problems to present or correct themselves. A 24 h period ensures that the infant has been evaluated by the pediatric provider and should not impact the length of stay in the hospital.
- *Stable body temperature (36.5–37.5°C) for the first 24 h of life*
  As a corollary to the first recommendation above, it is paramount that the infant has achieved thermoregulation. Any disorders of temperature stability may indicate an underlying infection. If a newborn is undergoing a "rule out sepsis" protocol and is not on antibiotics, time should be given for the typical 48 h protocol to near completion.
- *Weight of at least 5 lb or 2.25 kg*
  Lower birth weights are typically associated with prematurity and intrauterine growth restriction.
- *Successful void since birth*
  Normal intrauterine life requires that the kidney functions and the fetus voids during the pregnancy. But there is also a renal transition to extrauterine life as the newborn shifts from utilizing the placenta to excrete wastes to utilizing the kidneys. 95% of newborns will void by 24 h of age [4, 5]. Delay of urination should prompt an evaluation of the kidneys, bladder, and urethra.
- *Absence of risk factors for bleeding complications*
  Chapter 11 discusses how to manage hemorrhage after the circumcision. While the operator should be skilled in managing hemorrhage during neonatal circumcision, certain precautions can be taken to reduce the risk of hemorrhage.
  – Avoid the procedure in significantly premature infants who may have anemia of prematurity or immature clotting function.
  – Conversely, older infants demonstrate a greater propensity for bleeding. There is no strict cutoff. While some practitioners perform office-based circumcisions up to 2–3 months of age, 6 weeks may be a better cutoff for most, given the increased pain response seen at the older age.
  – Neonatal hyperbilirubinemia is a theoretical contraindication to circumcision. Physiologic hyperbilirubinemia is indicative of an immature liver. The liver is responsible for producing the body's clotting factors. That being said, beyond anecdotal observations of a tendency to bleed more, there have been no studies looking at the rate of bleeding complication in circumcision or other neonatal procedure in infants with hyperbilirubinemia or those undergoing phototherapy.
  – In the USA, it is the standard of care for all newborns to receive a vitamin K injection within the first 1 h of life. While the purpose of this is to prevent intraventricular hemorrhage, it may be beneficial for the prevention of bleeding with other neonatal procedures – such as circumcision [6].
  – Take caution if neonatal petechiae are observed, if the mother had autoimmune thrombocytopenia or maternal antiplatelet antibodies. All of these may be indicative of neonatal thrombocytopenia [7]. A family history of hemophilia or maternal use of anticoagulants is also cautionary.

Fig. 8.1 Newborn baby with a rash of unknown etiology. This would be cause to defer an elective circumcision. This child also has scrotal webbing which too would contraindicate a newborn circumcision

- *Absence of infectious rash in the groin/umbilical region*
  Candidal and nonspecific rashes are not uncommon to find when performing outpatient circumcisions. Rashes in the groin area should be treated prior to performing an elective circumcision (see Fig. 8.1).
- *Absence of urogenital anomalies*
  And finally, yet most importantly, the infant should be examined for any urogenital anomalies. The practitioner of a circumcision should be familiar with the normal neonatal anatomy and understand which findings are within normal limits, which ones act as contraindications to circumcision, and which require urology consult. The normal anatomy of a newborn penis is reviewed in Chaps 4 and 5 details the various urogenital abnormalities that can be encountered. *The key is to understand that many anomalies require an intact foreskin for surgical correction.*

The diagram below highlights the important anatomical landmarks (see Fig. 8.2). The

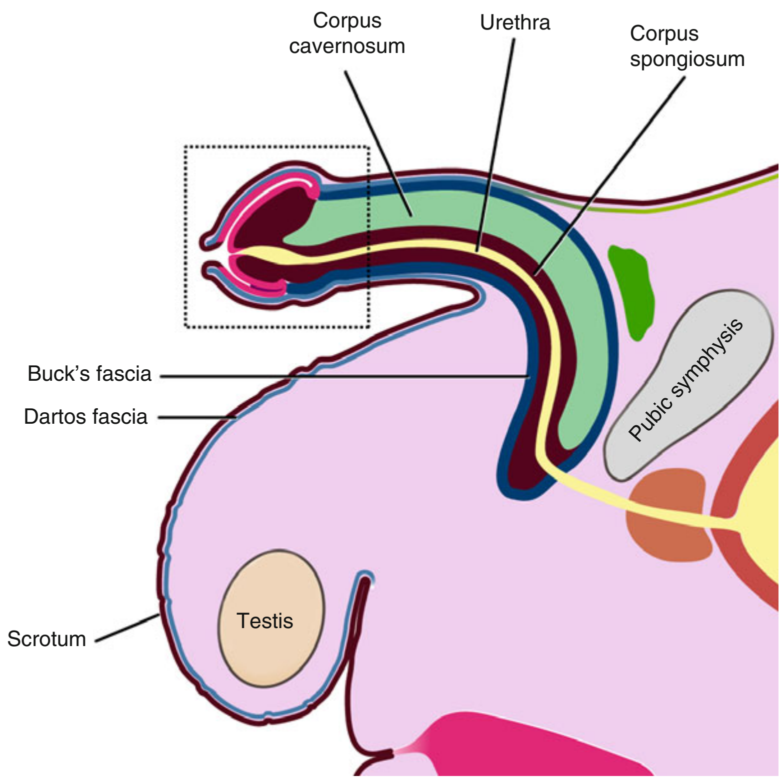

Fig. 8.2 Newborn genitalia illustration (Illustration courtesy of R. Cohen (MedicoLens.com))

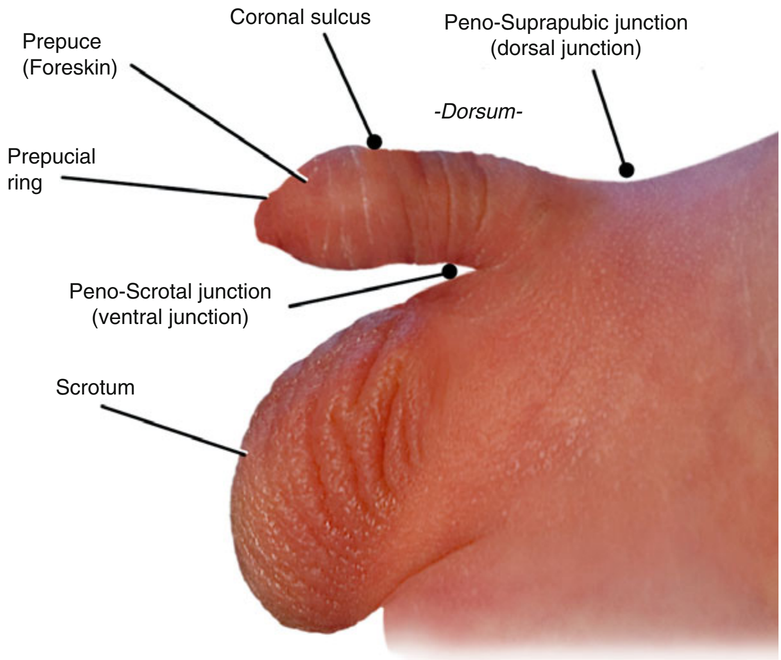

Fig. 8.3 External landmarks of newborn male genitalia. Ball-tipped lines point to landmarks

next image shows the landmarks on the actual penis (see Fig. 8.3).

Examination of the Newborn Male Genitalia

The pre-circumcision exam of the penis should be systematic, keeping in mind the potential anomalies that can be observed. Furthermore, genitalia are not symmetrical and must be examined from all angles. One method is to start from top to bottom. For example, begin with examination of the pubis region, taking note of significant suprapubic fat and burying of the penis. Pushing down the suprapubic fat on either side of the shaft helps to reveal the actual penis size. Then draw your attention along the dorsum of the penis, looking for any epispadias. As you approach the glans region, examine the foreskin. Gently push the foreskin back and forward to get a feel for its laxity and how much is present. Sometimes there is sufficient laxity that the urethral meatus can be easily observed within. Look for any rotation of the penile head and foreskin. One key giveaway that a hypospadia is present is that the prepuce is usually incomplete ventrally, resulting in a "dorsal hood" foreskin. Lift the shaft up and look at the ventral side beginning at the prepucial ring of the foreskin. Follow the raphe down, looking for any abnormalities that would indicate a hypospadias or thinning along the urethra. For example, areas of translucent skin or mucous membrane along the raphe are red flags. Understanding that the raphe is the embryological point of fusion helps to understand that a hypospadia can occur at any point along its course. Sometimes the finding can be as subtle as a dimple-like invagination of the raphe. The raphe should be followed all the way down the ventral shaft, along the scrotum, and to the anal verge. The testes should be palpated and their degree of descent noted. Bilateral undescended and impalpable testis is a contraindication to circumcision as it may indicate ambiguous genitalia, and therefore a urology consult would be in order. Significant hydroceoles in the scrotum may impede proper apposition of the circumcised penis or create the appearance of a buried penis. Lastly, examine the penis from the side, while holding the shaft in a neutral position. This is the best way to evaluate for peno-scrotal webbing (Fig. 8.1). Peno-scrotal webbing is frequently missed on exam and is often the cause of a poor cosmetic result. Also, examine the shaft for any signs of chordee or other structural deviation.

An important point to remember is that the foreskin is composed of two layers – the inner mucous membrane and the outer external skin. Foreskin is not only identified by its location around the glans of the penis, but also by its slightly thicker texture. When performing a circumcision, it is critical that both layers are evenly removed. The inner prepucial skin of a newborn, or mucous membrane layer, is usually attached to the glans of the penis via natural connections, often referred to as adhesions. These are taken down during the circumcision procedure. It is not necessary to retract the foreskin for this exam as that likely will cause swelling, which can complicate the circumcision procedure. Even should you suspect the presence of an epispadias with an intact foreskin (which is very rare), as indicated by a dimple over the dorsal coronal sulcus, it is better to forgo the exam and refer the patient to urology.

It is common nomenclature to refer to the circumference of the penis like the hours of a clock. Twelve o'clock is on the dorsum, midline down the glans and shaft, between where the two dorsal penile nerves run; Six o'clock is at the frenulum on the ventral side. The uncircumcised penis is often naturally rotated. This means that the 12 o'clock position may actually be shifted. A small degree of rotation is acceptable. But greater than 45° of rotation may indicate an underlying anomaly. Sometimes though, the rotation is due to the normal connections between the glans penis and the mucous membrane layer of the foreskin. When separating these connections during the circumcision, the operator may notice a "straightening" of the rotation. In determining the landmarks of the newborn penis, care should be taken in using the raphe to approximate the 6 o'clock position since it embryologically may fuse in a crooked fashion. The location of the frenular arteriole at 6 o'clock is another important anatomical landmark. This is the site that usually is the source of bleeding complications, and manipulation in this region should be avoided.

Summary

The infant pre-circumcision exam should include a review of the gestational age and birth weight, attention to the vital signs and general health of the newborn during the first 24 h, and documentation of the first void. Examination of the skin should pay attention to jaundice, petechiae, and rash in the umbilical or groin region. The genitourinary exam should focus on identifying common urological abnormalities such as hypospadias, peno-scrotal webbing, and undescended testes. A more nuanced exam will focus on foreskin appearance and laxity, glans rotation, and the causes and degree of buried penis that can impact cosmetic outcome.

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9 Newborn Circumcision Techniques

Assaf Yosha and David A. Bolnick

Editors' Note

As mentioned in an earlier chapter, setting aside bad luck, there are two factors that account for a significant number of circumcision complications and poor results; poor understanding of the anatomy and poor understanding of the equipment and its application. This chapter addressed the latter. What is important is not the technique you use but the proper application of that technique. This chapter serves as a guide to good practices – acknowledging that there are acceptable variations in the execution of each technique. The job of the practitioner is to choose one technique and master it.

It's the operator – Not the equipment…
Four separate techniques – Four properly circumcised penises

(Images courtesy of D. Tomlinson, M.D.)

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Introduction

This chapter reviews the steps in neonatal circumcision using the three major devices used in the USA, the Mogen clamp, the Gomco® clamp, and the PlastiBell®, and one emerging device, the AccuCirc™. While each technique has its advantages and disadvantages, in the hands of a skilled operator, each produces essentially the same result. Thus, at the end of the day, the practitioner should use the technique that he or she is most familiar with.

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While there is variation in techniques and even between two practitioners using the same device, certain principles remain the same. First, ensure the parents/guardians are informed about the procedure, the expected outcome, possible complications, and aftercare, that is, complete the informed consent process. Second, make sure the child is a good candidate for an elective procedure, that is, in good health, has adequate anatomy, and has no active infections in the groin area. Third, make sure all needed equipment and supplies are in place and in proper working order. This includes having ready access to supplies for hemorrhage management should they be needed. Fourth, properly and caringly restrain the child. Finally, employ a suitable plan for pain control. Now you are ready to do the circumcision.

This chapter will present a step-by-step guideline to help educate the novice as well as the more experienced clinician. Current literature has mostly focused on pain levels, complication rates, and procedural length of the techniques, and not the actual steps of each procedure. With that in mind, rationale will be provided where appropriate in describing the procedure.

The Gomco and the PlastiBell are the more commonly used devices in the USA for neonatal circumcision. The preference for these techniques is likely based on exposure during training and the ease of supervision required. For example, the Gomco and the PlastiBell require a dorsal slit, thereby exposing the glans penis, ensuring that it is free of adhesions, and allowing its direct examination – affording the advantage to being able to stop the procedure midway if a urethral abnormality is encountered. On the other hand, the Gomco and PlastiBell require increased time and manipulation to prepare the foreskin for excision, which studies have shown to be associated with a greater overall pain response [1–3]. These two techniques result in the removal of a cylindrical sleeve of foreskin. In the case of the Gomco, the "finished product" is readily apparent and can be relieving for the parents to see during the aftercare. The PlastiBell leaves behind a foreign body and a necrotizing tissue band which may cause concern for the parent and in one study showed an increase risk of infection compared with the Gomco [4]. Both techniques run the risk of denuding the shaft if too large a bell is used, or removing too little foreskin if too small a bell is used. Furthermore, introduction of the bell may result in trauma to the frenulum, a common cause of bleeding during and after the circumcision. Though some experts have advocated using the PlastiBell for infants older than 4 weeks of age, who have a higher risk of bleeding, since the hemostatic ligature remains in place for several days, any of these clamp techniques, when properly employed, should produce good results with little chance of hemorrhage. As alluded to above, using the technique most familiar to you will likely produce the most consistent results.

The Mogen clamp, while less commonly used, does provide some distinct advantages. It is quicker and simpler to perform. Because of the decreased procedure time, it has been shown to be associated with decreased overall neonatal pain [1–3]. There is, as an added benefit, a quicker return to hospital or clinic duties for the practitioner and staff. When used correctly, the Mogen clamp is a safe technique with a complication rate similar to the other two techniques. The greatest concern that arises with this technique, especially with novice or inadequately trained practitioners, is the risk of avulsion of part of the urethra/glans complex – as it is a partially blind procedure. This complication is extremely rare and avoidable with proper training and technique. For the same reason, teaching the Mogen technique can be slightly more challenging. While the cosmetic outcome after a couple of weeks is similar between all the devices, the appearance of the clamped skin edges with the Mogen, for some parents may be disconcerting.

New circumcision clamps have emerged over the years and especially more recently with the current interest in using circumcision as a means of HIV prevention in several African countries. Because of their newness, their pros and cons have not been well established. We present here one clamp technique, the AccuCirc™ as an example of emerging circumcision technology. The AccuCirc was introduced in 2008 and attempts to address the shortcomings of predecessor clamp devices. It comes in a complete sterile kit (minus anesthetic), it does not leave retained parts, it prevents mismatched parts from being assembled, it does not require a dorsal slit, it protects against glans avulsion, it is not awkward to apply, and it is easy to master.

Finally, penises come in all shapes and sizes and more importantly wound healing varies from person to person. Regardless of which technique you use, most circumcisions should quickly heal and have an acceptable esthetic appearance. That said, some will not behave as desired and, for example, produce a mane-like collar, or maybe re-adhere, or present some other minor issue. In the vast majority of cases these minor issues resolve on their own by puberty. The most any practitioner can do to favor a good outcome is to provide a well-executed procedure. This chapter is designed for that purpose.

The Procedures

First Things First

Regardless of which technique you choose, prior to beginning the circumcision procedure, the following should be completed:

(a) Informed consent process must be completed (Chap. 2)
(b) Correctly identify the baby being circumcised (this is more of an issue in the inpatient setting; some institutions have a time-out procedure for this)
(c) Examine the newborn and make sure there are no general contraindications or specific urogenital anomalies – remember this is an elective procedure (Chap. 8)
(d) Examine the surgical equipment and confirm that all needed supplies are present (see respective section below)
(e) Infant pain control has been addressed with appropriate and effective anesthetic administration (Chap. 7)

Preparing the Site

All techniques begin the same way with preparing the surgical site.

STEP 1. Using an *antimicrobial wash* (e.g., povidone–iodine, chlorhexidine, or the like) prepare about a one inch area surrounding the penis – essentially prepping all areas the penis can come in contact with. Then, place a surgical drape (Fig. 9.1).

HINT: Chlorhexidine scrubs are suggested as an alternative to povidone–iodine scrubs because they do not discolor the skin – requiring additional cleanup, there is less chance of staining the baby's clothing or provider's shoes, and they are potentially more efficacious in preventing infections [5].

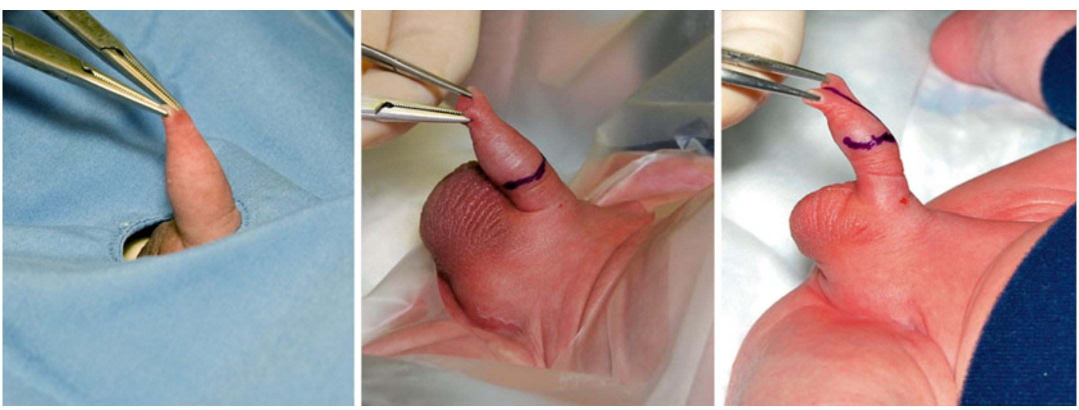

Fig. 9.1 The surgical drape. The *left panel* shows a common fenestrated drape which obscures some of the shaft and the dorsal and ventral junctions. The *middle panel* shows a transparent, adhesive, fenestrated drape which allows full view of the genitalia. The *right panel* shows a circumcision without drapes at all

HAZARD: Using a fenestrated cloth or paper drape can at times cause difficulty in visualizing the entire shaft and the ventral and dorsal junctions of the penis. This can lead to misjudging anatomical landmarks.

HINT: You may find it helpful to use a self-adhesive, transparent, sterile fenestrated drape (*middle panel*, Fig. 9.1). On the other hand, many circumcisions are safely carried out without any drapes at all [6] (*right panel*). A sterile setup for this cutaneous procedure may not even be needed but rather just a clean, uncontaminated, non-sterile field [6].

Up until this point all techniques start pretty much the same way. Now you can skip to each specific circumcision technique to continue with the procedure.

Editors' Note

The Mogen Clamp provides a safe and efficient technique when properly applied and with quality equipment. Unfortunately, many unsafe knockoffs of this device have found their way into general use. A proper Mogen clamp is made of high-grade stainless-steel, with blades that close flush (where light is essentially blocked), and with an aperture no greater than 2.5 mm (Figs. 9.2 and 9.4).

Mogen Clamp Technique

The Mogen clamp is a stainless-steel shield-like clamp which is secured in place with a cam lever (Fig. 9.2) [7]. Its aperture (opening to the slit) should be less than 3 mm.

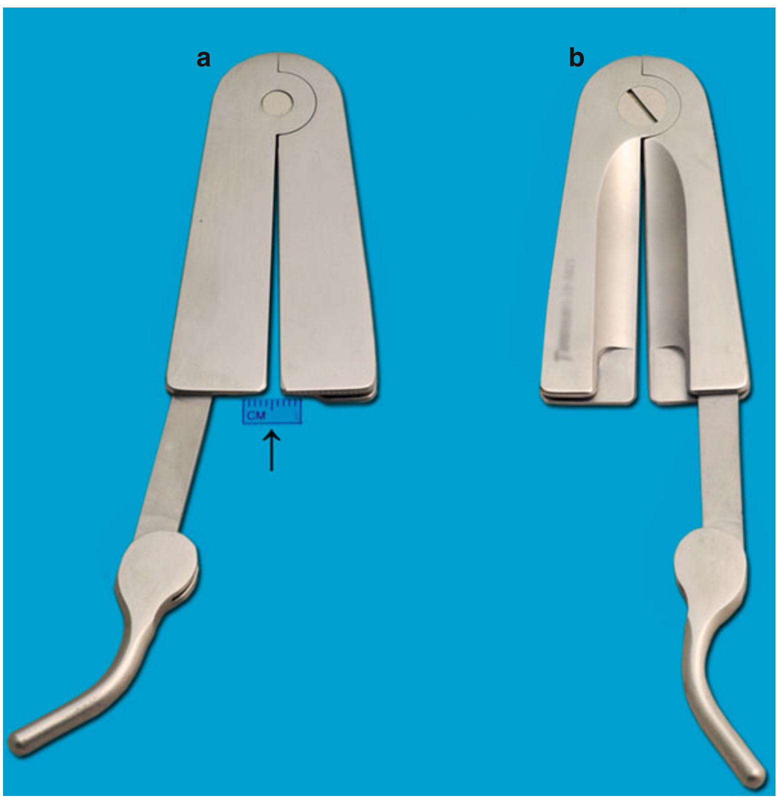

Fig. 9.2 Mogen clamp. (**a**) Front side is flat and against which the foreskin is excised. *Arrow* points to aperture which should be no more than 2–3 mm. (**b**) Back side is concaved to protect the glans. Once the Mogen is placed on the extended foreskin, the lever arm is swung closed and the cam arm is locked down

Fig. 9.3 Typical Mogen clamp setup. *Top row* (LtoR): Transparent fenestrated sterile drape, folded 1″ × 8″ petrolatum gauze, 3″×3″ gauze with Vitamin A&D ointment, chlorhexidine scrub. *Bottom row* (LtoR): Mogen clamp, #10 scalpel, three mosquito hemostats, sterile surgical marker, and extra gauze

Fig. 9.4 The bad Mogen clamp. A proper Mogen clamp will *not* have a fully opened aperture greater than 2½ mm (original manufacturer specification). We have found many bad knockoffs in use and for sale on the Web (like the one pictured here with an 8 mm aperture). These bad Mogen Clamps, even in the hands of an experienced practitioner, may account for the unfortunate reports of glanular avulsion

Advantages: Faster, decreased overall pain, less diversion of physician/staffing from other duties, may be easier with a shorter penis, one size nearly fits all

Disadvantages: Partially blind procedure (associated with a higher incidence of glans avulsion), more difficult to teach/learn, anticipated cosmetic outcome may not be immediately seen

Remember that it takes at least a couple of minutes for the local anesthetic to take effect (longer if it is from a multi-draw vial which contains preservative). Therefore, it is a good opportunity to prepare your sterile field and examine your equipment after the local injection has been given. In the case of the Mogen technique, a dorsal penile nerve block is preferred as it causes less distortion of the anatomy. A subcutaneous ring block in a patient with a short penile shaft may blur the edge of the coronal sulcus.

It is very important at this step to *check your equipment* (Fig. 9.3). When using the Mogen clamp, check to make sure that (1) it does not have more than a 2.5 mm aperture (Fig. 9.4), (2) the cam lever locking mechanism is secure, and (3) the blades of the clamp are flush when secured, so that no significant amount of light passes through the closed device.

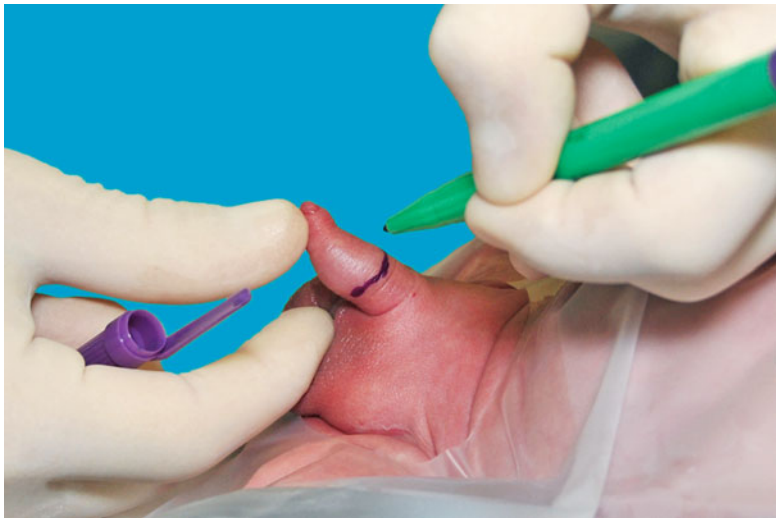

Fig. 9.5 Marking the level of the coronal sulcus with the penis in a relatively neutral position. It is also helpful to mark the 12 o'clock position based on the position of the raphe (i.e., 12 o'clock may not be top-center if the penis is rotated)

STEP 2. At this point, consider using a surgical *skin marker to mark the coronal edge* and 12 o'clock position (Fig. 9.5). This is helpful since the visible landmarks will shift when the foreskin is manipulated during the procedure. The skin marker acts as a continual guideline beyond which denudation of the shaft can occur, and before which an incomplete circumcision can result. It is not a mandatory step, but highly recommended, and it does make the procedure simpler.

HAZARD: Be sure not to simultaneously apply tension on the foreskin, proximally or distally, when marking the corona with the skin marker. You want the mark to be along the coronal sulcus when the overlying skin is neutral. Marking during an erection can lead to too little foreskin being removed and the embarrassment of being urinated upon.

HINT: Since the orientation of the foreskin may change somewhat when the adhesions are released (see below), some practitioners choose to mark the coronal sulcus and 12 o'clock position after the prepucial space has been established.

STEP 3. The first technical step of newborn circumcision that must be performed is *separating the inner mucosal layer of the foreskin from the underlying glans,* that is, creating an open prepucial space. The connections between the foreskin and glans, present in the preadult penis, are often referred to as adhesions though technically they are a normal stage of ontogeny. Nevertheless, these adhesions *must* be taken down in order to successfully and safely perform the circumcision. This is accomplished by one of two commonly used blunt dissection techniques; using a rigid probe (Fig. 9.6) or a hemostat technique. Using a rigid probe is often a quicker, more precise, and gentler approach but it requires a longer learning curve to master so we will focus here on the hemostat technique.

(a) *Grasp the edge of the foreskin* with mosquito size hemostats at the 3 and 9 o'clock positions, taking care not to grasp the glans (Fig. 9.7). Place gentle traction on the foreskin by holding the two hemostats side-by-side in your nondominant hand, palm-up.

(b) Gently *insert a third hemostat* (closed) at the 12 o'clock position between the foreskin and the glans (Fig. 9.8). Once the hemostat has advanced a few millimeters past the prepucial ring, the hemostat should be tipped upward to tent the foreskin, thus demonstrating that it has not inadvertently entered the urethral meatus. When you are convinced that you have not entered the urethra, *advance the hemostat to the level of the coronal sulcus*.

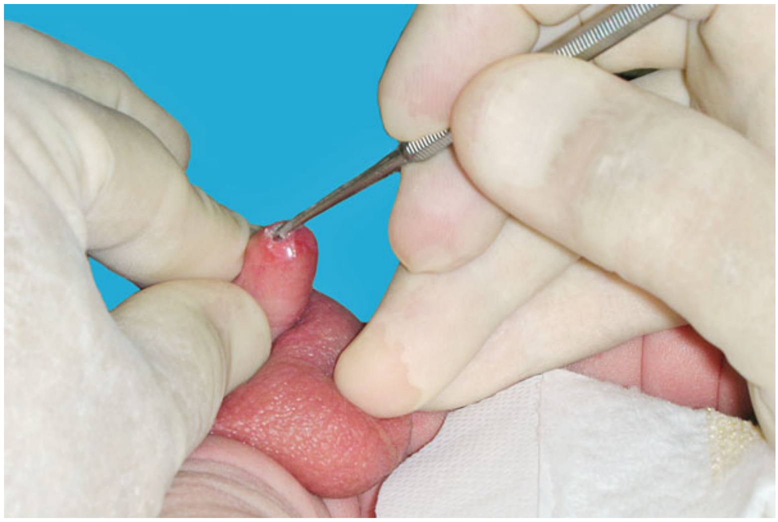

Fig. 9.6 Blunt dissection with a rigid probe. Using downward tension on the foreskin to expose the meatus (dilation is rarely required), advance the probe between 9 and 3 o'clock along the surface of the glans making sure not to enter the urethra. Sweep as you advance. Once you have arrived at the coronal sulcus, begin to sweep the entire space except between 5 and 7 o'clock, avoiding the frenulum

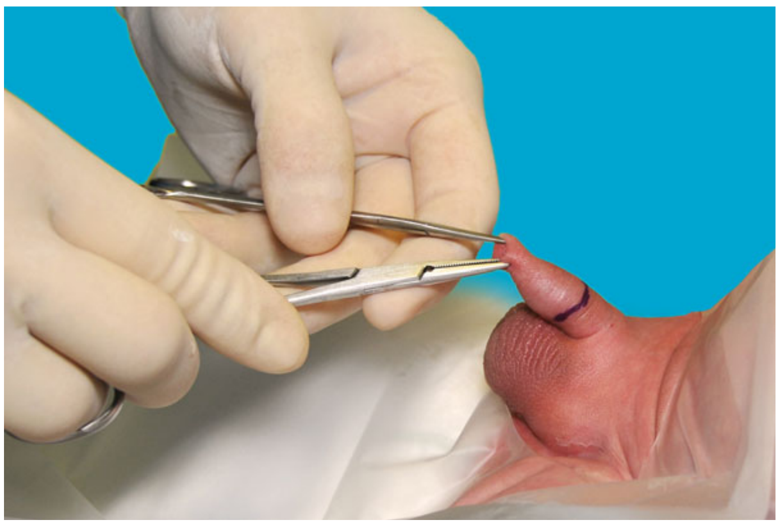

Fig. 9.7 Blunt dissection with hemostats. Grab the prepucial ring at 3 and 9 o'clock. Take care not to include the underlying glans. Use non-dominant hand to hold hemostats with the fingers *below* and thumb *above*

HINT: For greatest control, in your nondominant hand, hold the two hemostats palm-up with the thumb on top overlying them both. The dominant hand holding the third hemostat palm-down can then slide along the thumb of the nondominant hand for steadiness (see Fig. 9.8).

(c) Then, either opened or closed, sweep the hemostat clockwise and counterclockwise to *fully separate any adhesions* between the foreskin and the underlying glans (Fig. 9.9). *The importance of this step cannot be overemphasized.* Usually this takes a few partial rotations at different places around the corona.

HAZARD: Do not dissect beyond the depth of the coronal sulcus and *avoid sweeping at the 5–7 o'clock position*. This region, the frenulum with its frenular arterioles, is a frequent source of procedural bleeding, and does not need to be separated.

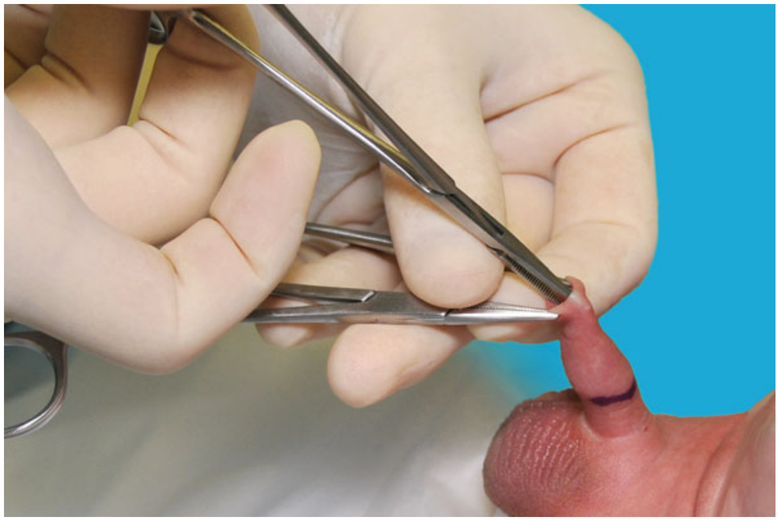

Fig. 9.8 Blunt dissection with hemostats. With your dominant hand, using the other thumb as a stabilizing guide, advance the third closed hemostat into the prepucial ring. Once you have cleared the prepucial ring, angle the hemostat tips to tent the foreskin and confirm you are not in the urethra

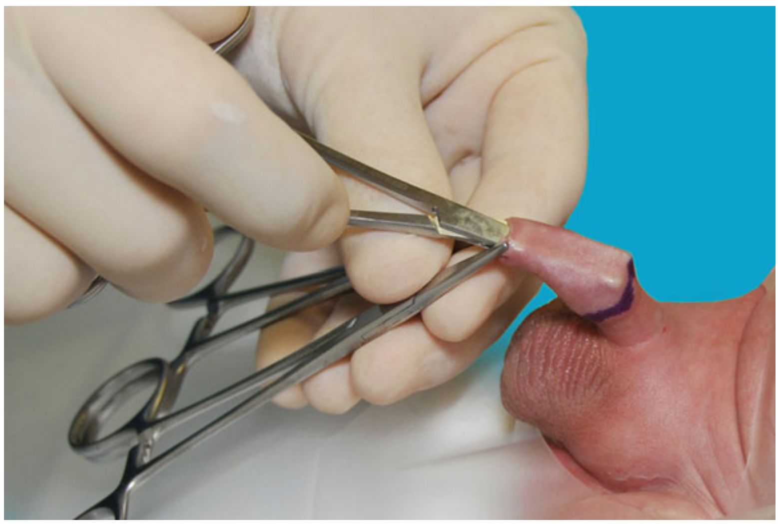

Fig. 9.9 Blunt dissection with hemostats. The hemostat is advanced to the level of the coronal sulcus. The prepucial space is then created using a sweeping motion of the inserted hemostat avoiding the frenulum between 5 and 7 o'clock

HAZARD: In the case of the Mogen clamp, care and confidence are needed to ensure that the connections between the foreskin and glans are separated. If they are not, then later traction on the foreskin may draw forward part of the glans when the Mogen clamp is applied, thereby increasing the chance of glans avulsion.

STEP 4. Continue with the Mogen clamp technique after probing and separating by *creating a dorsal crush*. Advance just the lower blade of the third hemostat at the 12 o'clock position between the glans and foreskin (Fig. 9.10). Advance the hemostat to a position no less than 3 mm distal to the coronal sulcus or the line made by the skin marker, and close the hemostat in place, thereby grasping the foreskin (Fig. 9.11). The purpose of this clamp is to ensure that both the inner mucous membrane and the outer skin of the foreskin are clamped and later excised together. Now remove the two hemostats grasping the foreskin at 3 and 9 o'clock.

HINT: Angle the hemostat up in order to tent the foreskin and ensure that you have not entered the urethra.

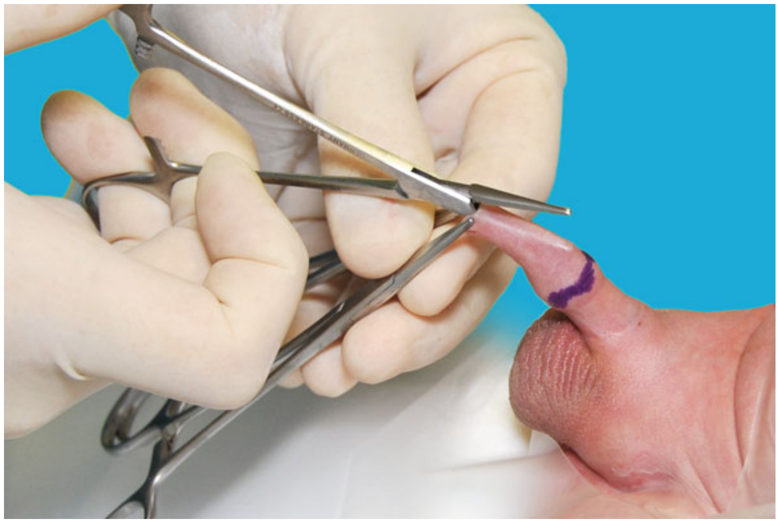

Fig. 9.10 The dorsal crush. Advance the lower blade of the third hemostat into the prepucial space. Gently tent the hemostat and notice the impression of the hemostat demonstrating that the urethra was not entered

Fig. 9.11 The dorsal crush. After you are convinced that you have not entered the urethra, you should close the hemostat completely

HAZARD: If a marking pen was not used, be careful not to pull the foreskin forward as you identify the underlying corona – this may cause you to remove too much foreskin.

STEP 5. Laterally *pinch the unclamped foreskin* beneath the clamped hemostat using the thumb and index finger of your nondominant hand, while curling your other fingers around the handles of the hemostat (Fig. 9.12). The pinch creates a thin edge of foreskin over which the clamp is placed.

HINT: **This pinch should push the glans downward, making sure that it is mobile and is displaced proximally.**

HAZARD: Do not proceed if you cannot identify the glans at a position below (proximal to) where the Mogen clamp will be applied.

STEP 6. While gently applying traction on the foreskin and maintaining the pinch with your thumb and forefinger, *slide the Mogen clamp into place* (Fig. 9.13). The Mogen clamp should be

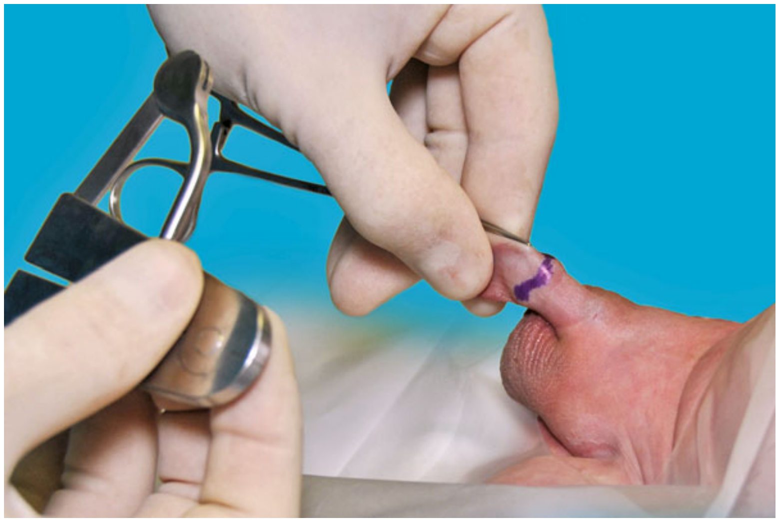

Fig. 9.12 Mogen clamp technique. Grasp the foreskin and hemostat between your thumb and index finger of your non-dominant hand. Squeeze snugly while applying mild traction. Hold the Mogen clamp (flat surface up, concave surface down) with your dominant hand

Fig. 9.13 Mogen clamp technique. Place the aperture of the Mogen clamp at 12 o'clock on the foreskin; i.e., at the tight fold formed by the hemostat. If you have marked the coronal sulcus, it serves as a good guide to follow

opened fully, held so that the aperture is pointing to the child's feet and that the flat surface of the clamp faces the practitioner. The concave surface of the clamp protects the glans penis. With your dominant hand, advance the Mogen aperture onto the foreskin in the 12 o'clock to the 6 o'clock direction, just proximal to the clamped hemostat – ideally along the marked skin (Fig. 9.14). Slide the clamp along the foreskin as far as it will easily go.

HINT: Angle the Mogen as it is advanced so that slightly more foreskin is removed dorsally than ventrally. The angle of the Mogen clamp should mirror the angle of the coronal sulcus.

HAZARD: If you are not satisfied with the position of the Mogen clamp – *do not pull foreskin* through the aperture of the Mogen. Pulling the foreskin can pull the tip of the glans through the aperture. It is safer to remove the Mogen altogether and reapply it.

STEP 7. When satisfied, *lock the Mogen clamp* by moving the bar across the slot and closing the cam lever fully (Figs. 9.15 and 9.16). This may require a fair amount of grip strength. Remove the hemostat.

Fig. 9.14 Mogen clamp technique. Slide the Mogen clamp completely onto the foreskin

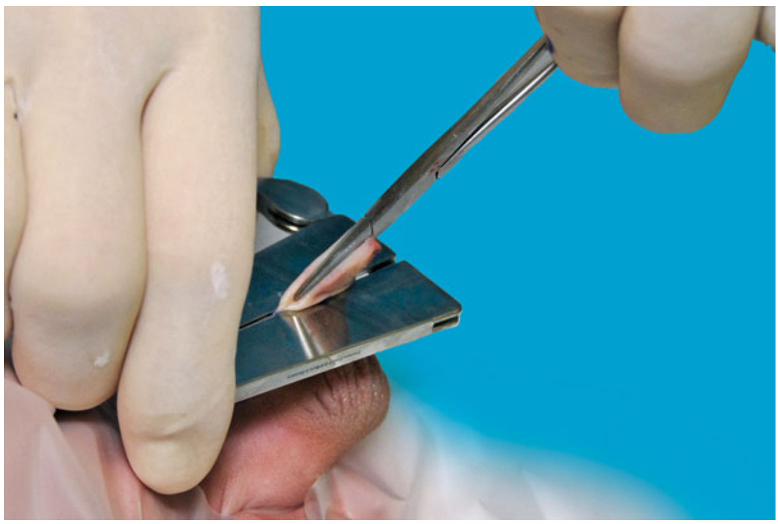

Fig. 9.15 Mogen clamp technique. Just before you close the cam lever arm, the point of no return, reassess the amount of foreskin, the amount of remaining penile skin, and that the glans is where it should be (behind the clamp)

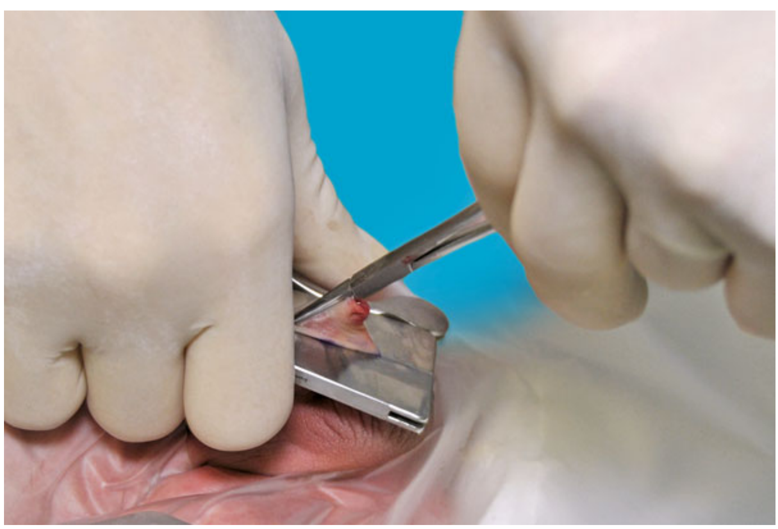

Fig. 9.16 Mogen clamp technique. Close the cam lever arm with your dominant hand. It is sometimes hard to do, especially with a thick foreskin. Close the cam lever arm all the way

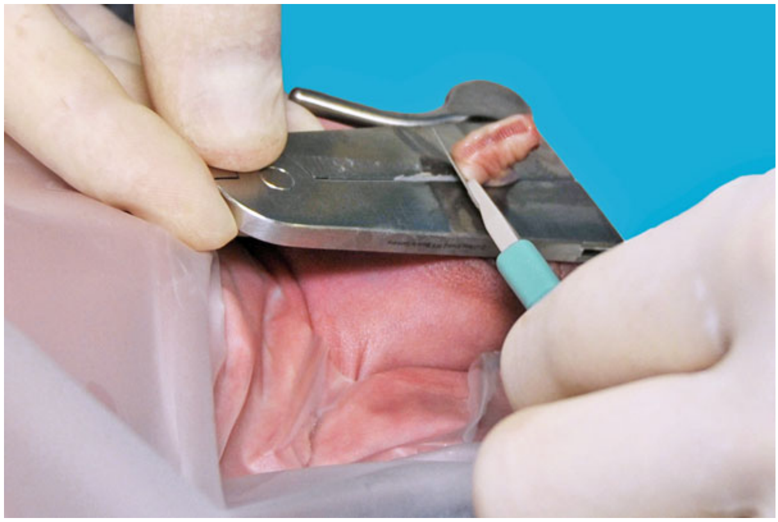

Fig. 9.17 Mogen clamp technique. Once the cam lever arm is fully closed, remove the hemostat and excise the foreskin with a scalpel. This is best done by applying the scalpel with the sharp edge down against the Mogen and the back edge elevated about 15°. Slice from top downward

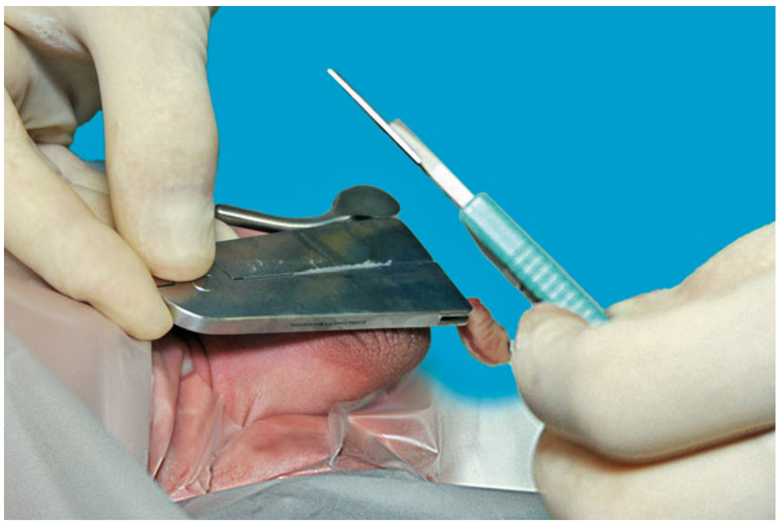

Fig. 9.18 Mogen clamp technique. Foreskin excised

STEP 8. To *excise the* foreskin, use a scalpel angled flush with the flat surface of the Mogen clamp (Figs. 9.17 and 9.18). A #10 blade works well. Discard the foreskin in a biohazard waste container.

STEP 9. Immediately unlock and remove the Mogen clamp. First open the cam lever arm. Then spread the blades apart using both hands. Gently lift the clamp from the penis.

HAZARD: Hemostasis is achieved with the initial clamping of the Mogen. Prolonged clamp time increases neonatal pain and may complicate separation of the crushed edge.

HINT: If the parents are present, warn them that the initial appearance may be misleading and that all will appear shortly (Fig. 9.19).

STEP 10. Using your thumbs and index fingers on each side of the penis, separate the crushed edges of the foreskin with *gentle downward tension to deliver the glans* (Fig. 9.20). Only apply as much pressure as is needed to liberate the glans fully. The dog-eared appearance at the

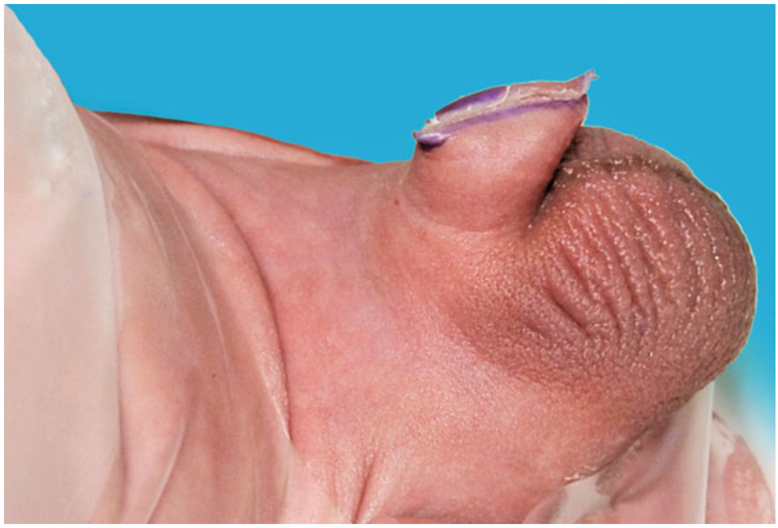

Fig. 9.19 Mogen clamp technique. The appearance of the penis following the immediate removal of the Mogen clamp. The skin edges are still fused and need reducing

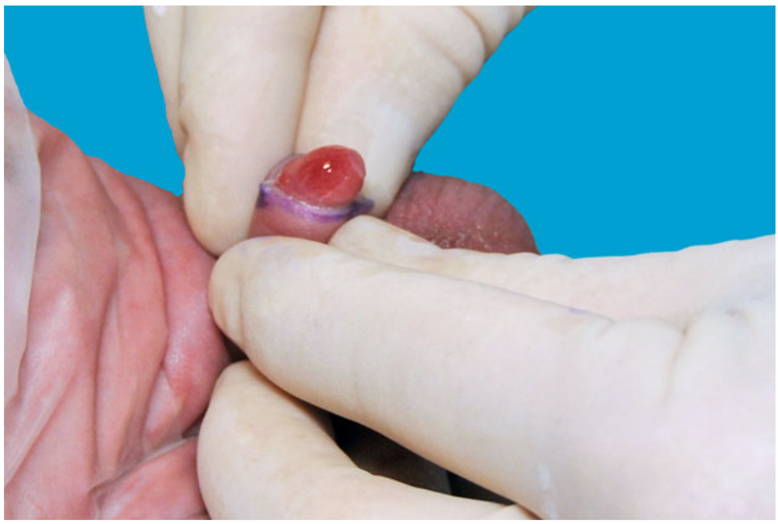

Fig. 9.20 Mogen clamp technique. Using the thumb and index finger of both hands, apply a gentle inward and downward motion causing the glans to emerge fully, but no further

dorsal and ventral regions is normal and naturally heals flush along the penile shaft giving an excellent cosmetic result (Fig. 9.21).

HAZARD: Take care not to apply too much pressure so as to avoid pulling the skin down the shaft of the penis.

HINT: Occasionally, a few remaining attachments between the glans and the mucous membrane along the corona are found. These attachments can be divided with a blunt probe or a closed hemostat by gently running the instrument along the coronal sulcus. As usual, avoid the frenular region at 6 o'clock. These few and thin remaining attachments are not necessary to separate unless they are covering a significant segment of the corona (Fig. 9.22).

HINT: Rarely, the separation of the prepucial mucous membrane follows the wrong plane, creating a false prepucial space and leaving a layer of prepucial membrane

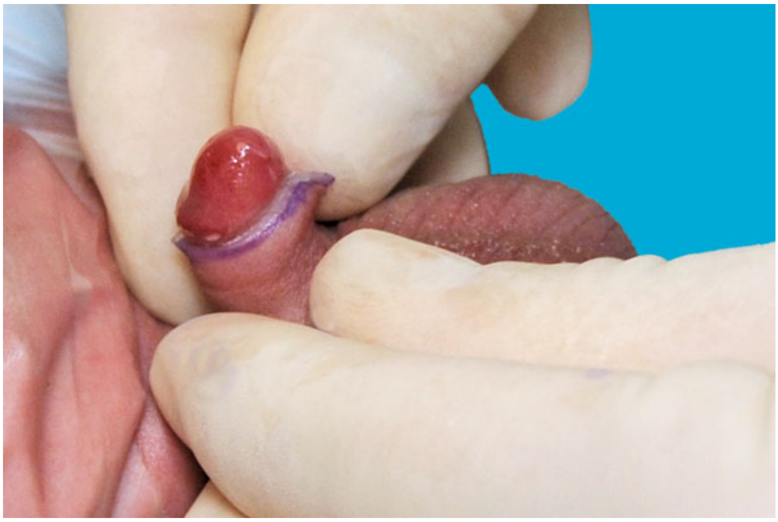

Fig. 9.21 Mogen clamp technique. Notice the characteristic dog-ear on the ventral surface. With normal healing, this resolves on its own and need not be fretted over

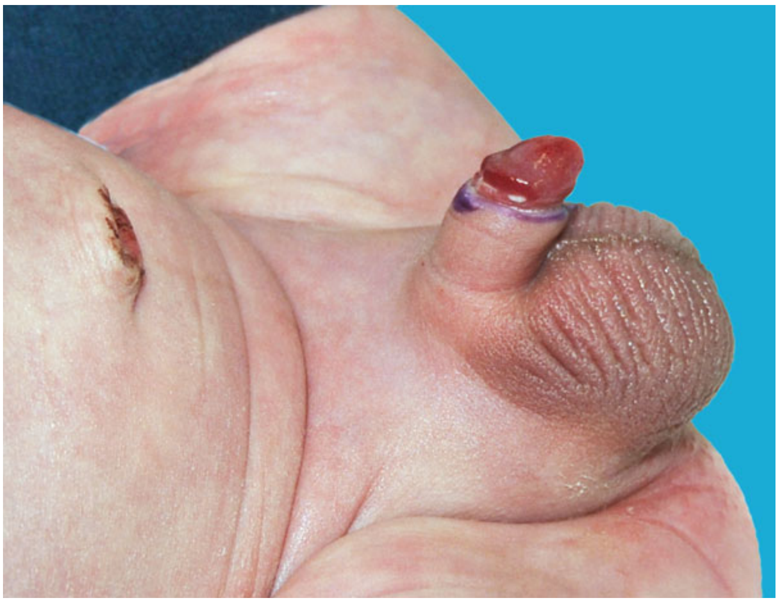

Fig. 9.22 Mogen clamp technique. As with any circumcision, review the final result. The coronal sulcus should be clear of skin and adhesions. Missed adhesions can be taken down with a probe or hemostat if needed

covering the glans. Should this happen, an assessment and immediate plan of action is in order. Some practitioners will split the membrane and roll it behind the coronal sulcus. Some will crush its proximal ridge and then excise it along the crush line. Both seem to work fine. Just do not leave the layer of mucous membrane as is (see Chap 11).

STEP 11. Briefly *check for hemostasis* and then *bandage the penis*. Proper bandaging and the management of hemorrhage are covered in Chaps. 10 and 11.

Note: Should a dorsal slit be required (e.g., where an epispadias must be ruled out), a modified Mogen clamp technique can be undertaken. The dorsal slit should only be made halfway to the coronal sulcus. If the revealed anatomy supports continuation of the circumcision, the level of the coronal sulcus should be marked. With a lateral grasp, stretch the foreskin distally, sufficiently beyond the glans. Then a hemostat is placed perpendicularly, from 12 to 6 o'clock, across the extended foreskin distal to the glans and coronal mark. This flattens the foreskin together. The clamped foreskin is then stretched further so that the marked level of the coronal sulcus is extended distal to the glans. The Mogen clamp can now be placed at the level of the coronal mark from 12 to 6 o'clock (as in Step 6 above). The rest of the technique is the same.

Gomco® Technique

The Gomco clamp is a multipiece chrome-plated device that comes in a variety of sizes and is made by several manufacturers (Figs. 9.23 and 9.24). The components of the Gomco are not interchangeable from size to size and from manufacturer to manufacturer, so care must be heeded to keep complete units together.

Advantages: Visibly protects glans during procedure, more familiar to most providers and hospital staff, immediate desired cosmetic result

Disadvantages: Cumbersome equipment pieces that need to be properly matched and can be awkward to use for the novice, longer procedure with increased neonatal pain

Remember that it takes at least a couple of minutes for the local anesthetic to take effect (longer if it is from a multi-draw vial which contains preservative). Therefore, it is a good opportunity to prepare your sterile field after the local injection has been given (Fig. 9.25).

Prior to beginning the procedure, *choose the appropriate-sized Gomco clamp*. For most newborns this will be the 1.3-cm size. The other available bell diameters are 1.1 and 1.45 cm. The proper size bell has a diameter about that of the glans. The bell should comfortably fit over the glans, covering it completely – but just barely (see, for example, Fig. 9.37).

HAZARD: A bell that is too small may not adequately protect the glans. A bell that is too large may cause denuding of the shaft. Occasionally you will open one size clamp and find that you need a smaller or larger one once the glans is fully revealed.

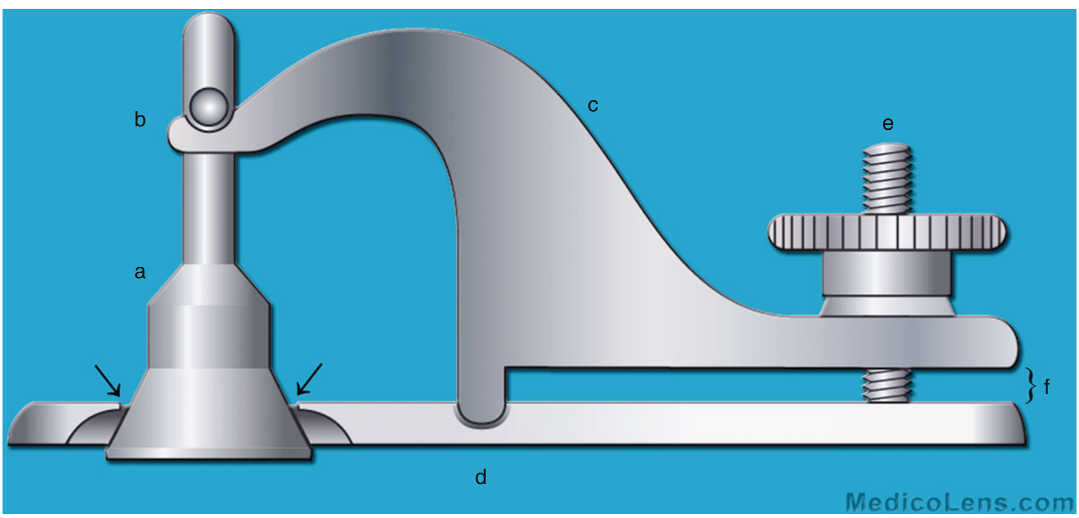

Fig. 9.23 Gomco clamp components. (*a*) Gomco bell, (*b*) arms of bell post rests in yoke of top plate, (*c*) top, rocker, plate, (*d*) base plate with beveled bell hole on *left*, screw post on *right*, and rocker notch in the *middle*, (*e*) nut on screw post, (*f*) during pre-test assembly, tighten nut slightly until the bell just contacts beveled hole – at this point, the top plate should be parallel to the bottom plate with at least 2 mm between them. The bell should form a seal with the base plate (*arrows*, see also Fig. 9.24.)

Fig. 9.24 Gomco clamp inspection. Before using a Gomco clamp it should be completely assembled and inspected. Most importantly, the bell size must match the baseplate. Light should not pass between the bell and its baseplate

Fig. 9.25 Typical Gomco clamp setup. *Top row* (LtoR): folded 1″ × 8″ petrolatum gauze, Gomco clamp (bell, baseplate, rocker arm, and nut), sterile surgical marker, scalpel, transparent fenestrated sterile drape. *Bottom row* (LtoR): chlorhexidine scrub, 3″ × 3″ gauze with Vitamin A&D ointment, three mosquito hemostats, and skin scissors

It is very important at this step to *check your equipment*. When using the Gomco clamp, check to make sure that the bell fits properly into the baseplate and that the entire mechanism screws together securely. Make sure that no light passes around the bell where it meets with the baseplate. The top surface of the baseplate should be flat. Then check for abnormal wear of the baseplate or the lever arm. If there is too much wear, then the gap may be too small to allow for sufficient tightness to be created when screwing down the nut. There should be at least 2 mm between the back of the lever arm and the baseplate beneath the nut before tightening it down (Fig. 9.23-F). There are different size bells and different manufacturing companies of the Gomco clamp. Pieces from different sets can get mixed up, especially during sterile processing. Discovering that you have faulty equipment during the procedure can have disastrous consequences [8, 9].

HINT: Reassemble the entire clamping mechanism each time prior to the clamp's use.

STEP 2. At this point, consider using a surgical *skin marker to mark the coronal edge* and 12 o'clock position (Fig. 9.26). This is helpful since the visible landmarks will shift when the foreskin is manipulated during the procedure. The skin marker acts as a continual guideline beyond which denudation of the shaft can occur, and before which an incomplete circumcision can result. It is not a mandatory step, but highly recommended, and it does make the procedure simpler.

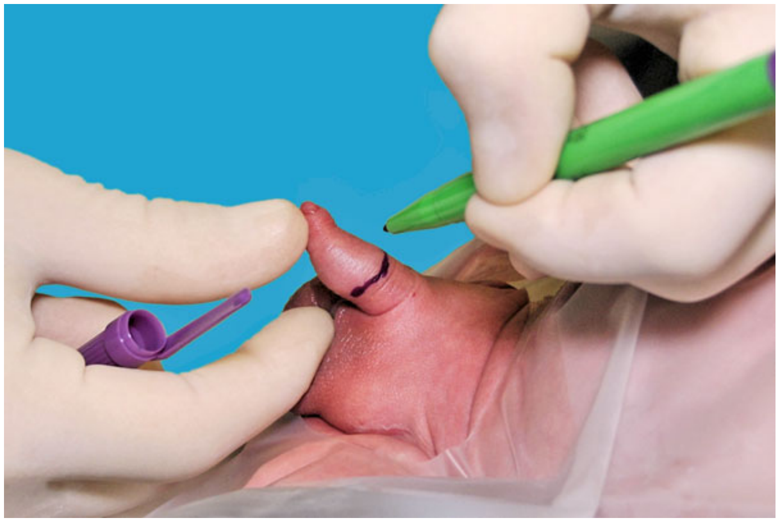

Fig. 9.26 Marking the level of the coronal sulcus with the penis in a relatively neutral position. It is also helpful to mark the 12 o'clock position based on the position of the raphe (i.e., 12 o'clock may not be top-center if the penis is rotated)

HAZARD: Be sure not to simultaneously apply tension on the foreskin, proximally or distally, when marking the corona with the skin marker. You want the mark to be along the coronal sulcus when the overlying skin is neutral. Marking during an erection can lead to too little foreskin being removed and the embarrassment of being urinated upon.

HINT: Since the orientation of the foreskin may change somewhat when the adhesions are released (see below), some practitioners choose to mark the coronal sulcus and 12 o'clock position after the prepucial space has been established.

STEP 3. The first technical step of newborn circumcision that must be performed with each of the three techniques is *separating the inner mucosal layer of the foreskin from the underlying glans,* that is, creating an open prepucial space. The connections between the foreskin and glans, present in the preadult penis, are often referred to as adhesions though technically they are a normal stage of ontogeny. Nevertheless, these adhesions *must* be taken down in order to successfully and safely perform the circumcision. This is accomplished by a three-hemostat technique.

(a) *Grasp the edge of the foreskin* with mosquito-size hemostats at the 3 and 9 o'clock positions, taking care not to grasp the glans (Fig. 9.27). Place gentle traction on the foreskin by holding the two hemostats side-by-side in your nondominant hand, palm-up.

(b) Gently *insert a third hemostat* (closed) at the 12 o'clock position between the foreskin and the glans (Fig. 9.28). Once the hemostat has advanced a few millimeters past the prepucial ring, the hemostat should be tipped upward to tent the foreskin, thus demonstrating that it has not inadvertently entered the urethral meatus. When you are convinced that you have not entered the urethra, *advance the hemostat to the level of the coronal sulcus*.

HINT: For greatest control, in your nondominant hand, hold the two hemostats palm-up with the thumb on top overlying them both. The dominant hand holding the third hemostat palm-down can then slide along the thumb of the nondominant hand for steadiness (see Fig. 9.28).

(c) Then, either opened or closed, sweep the hemostat clockwise and counterclockwise to *fully separate any adhesions* between the foreskin and the underlying glans (Fig. 9.29). *The importance of this step cannot be overemphasized.* Usually this takes a few partial rotations at different places around the corona.

Fig. 9.27 Blunt dissection with hemostats. Grab the prepucial ring at 3 and 9 o'clock. Take care not to include the underlying glans. Use non-dominant hand to hold hemostats with the fingers *below* and thumb *above*

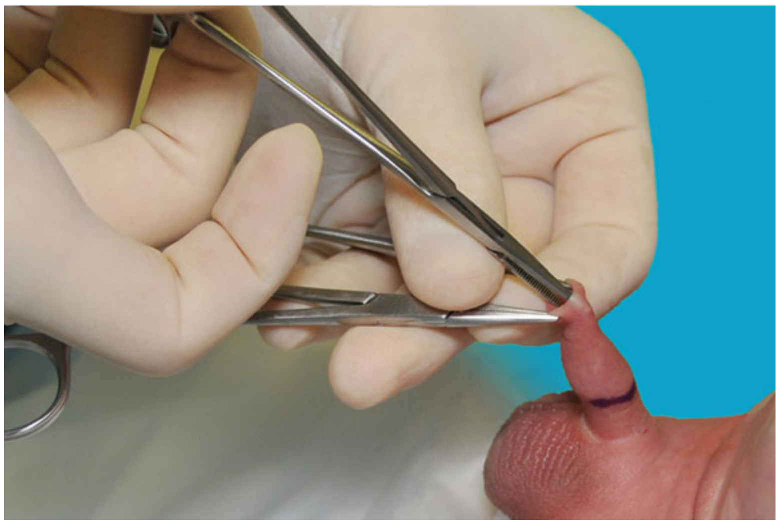

Fig. 9.28 Blunt dissection with hemostats. With your dominant hand, using the other thumb as a stabilizing guide, advance the third closed hemostat into the prepucial ring. Once you have cleared the prepucial ring, angle the hemostat tips to tent the foreskin and confirm you are not in the urethra

HAZARD: Do not dissect beyond the depth of the coronal sulcus and *avoid sweeping at the 5–7 o'clock position*. This region, the frenulum with its frenular arterioles, is a frequent source of procedural bleeding, and does not need to be separated.

HINT: An advantage to using the Gomco or PlastiBell devices is that further separation of any adhesions between the glans and the foreskin can be made once the dorsal slit has been made and the glans is revealed. In fact, an *alternative technique* is to simply separate enough of the connecting tissue at the 11–1 o'clock dorsal surface of the glans to allow for the creation of the dorsal slit. After the dorsal slit is made, the rest of the head of the penis can be revealed while the connections between the foreskin and glans are taken down with a probe or hemostat.

STEP 4. Continue with the Gomco clamp technique after probing and separating by *creating a dorsal crush*. Advance just the lower blade of the third hemostat at the 12 o'clock position between the glans and foreskin (Fig. 9.30). Advance the hemostat to a position no less than 5 mm

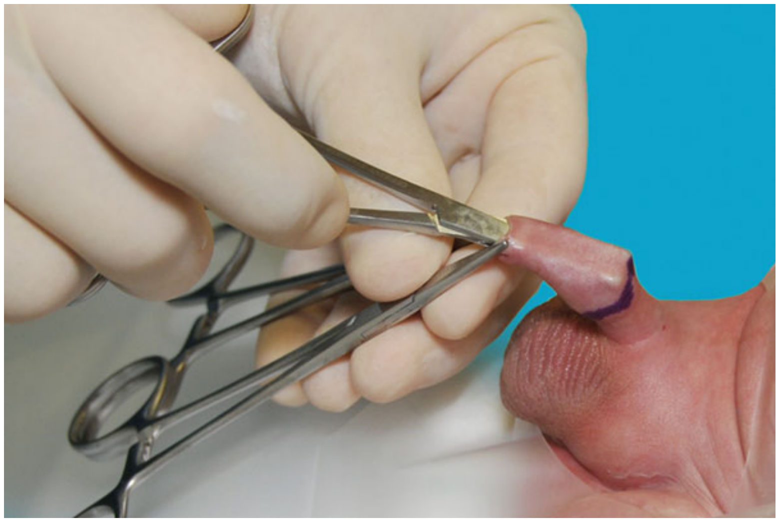

Fig. 9.29 Blunt dissection with hemostats. The hemostat is advanced to the level of the coronal sulcus. The prepucial space is then created using a sweeping motion of the inserted hemostat avoiding the frenulum between 5 and 7 o'clock

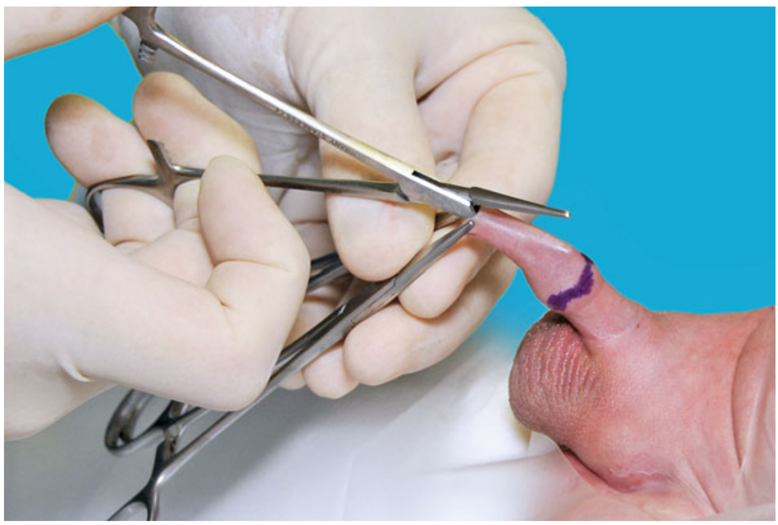

Fig. 9.30 The dorsal crush. Advance the lower blade of the third hemostat into the prepucial space. Gently tent the hemostat and notice the impression of the hemostat demonstrating that the urethra was not entered

distal to the coronal sulcus or the line made by the skin marker, and close the hemostat in place, thereby creating the dorsal crush (Fig. 9.31). Once the dorsal crush is applied, hold it for a few seconds then remove the hemostat. This will reveal a crushed area of foreskin that has been devitalized and should not bleed when cut.

HINT: Angle the hemostat up in order to tent the foreskin and ensure that you have not entered the urethra.

HAZARD: If a marking pen was not used, be careful not to pull the foreskin forward as you identify the underlying corona – this may cause you to remove too much foreskin.

STEP 5. Using small straight scissors with one blunt tip, insert the blunt tip between the glans and foreskin, tent up the lower blade, and *cut a dorsal slit* through the center of the crush line (Figs. 9.32, 9.33, and 9.34).

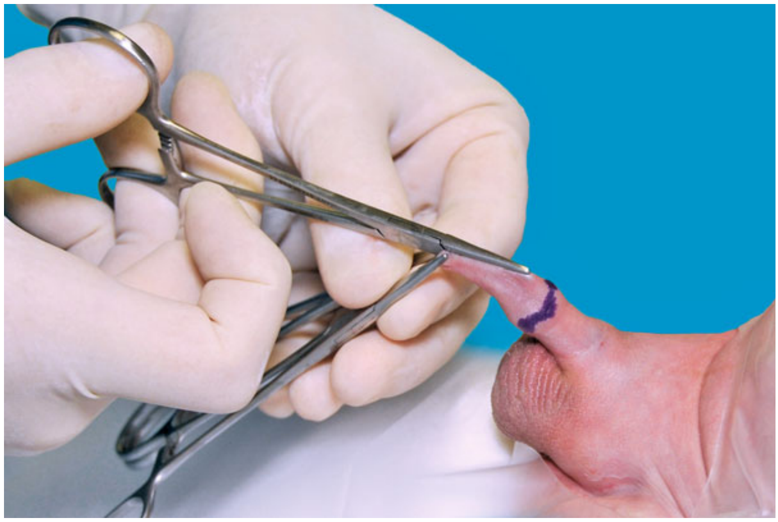

Fig. 9.31 The dorsal crush. After you are convinced that you have not entered the urethra, you should close the hemostat completely

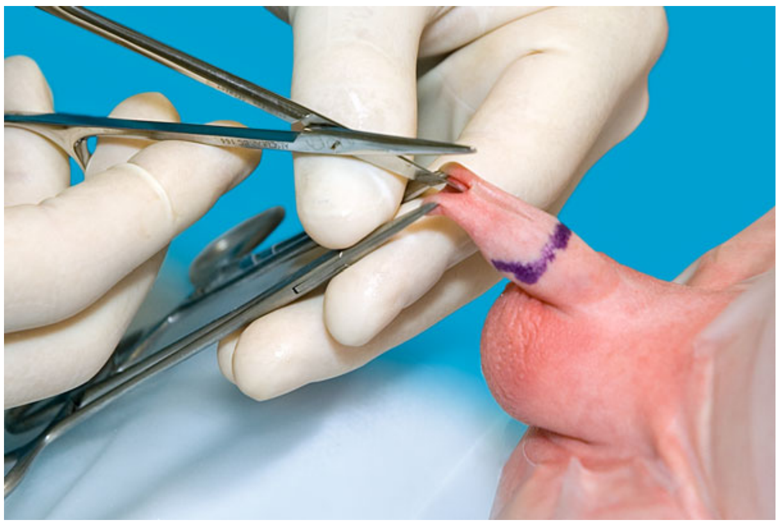

Fig. 9.32 Gomco clamp technique. The dorsal cut. After the third hemostat is removed, a crushed bloodless zone remains. The lower blade of the scissors is then inserted through the prepucial ring along this crushed zone. As before, care must be taken to ensure that the glans is not involved

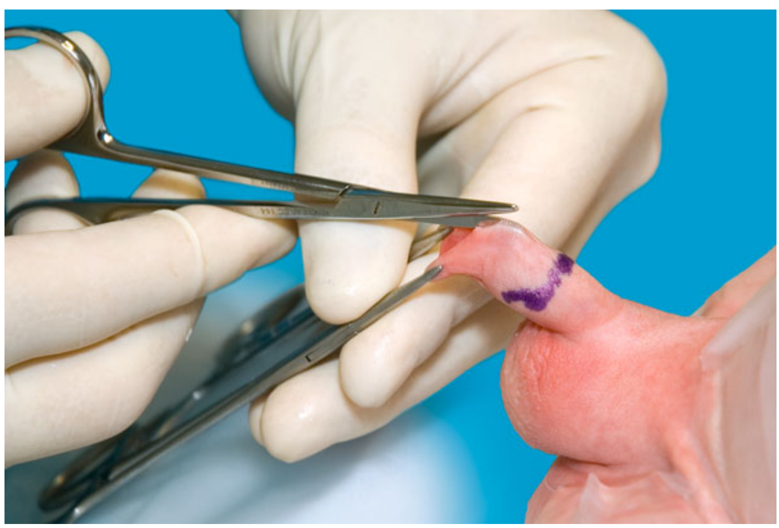

Fig. 9.33 Gomco clamp technique. Once the outline of the scissor blade is visible, the cut is made down the middle of the crush zone

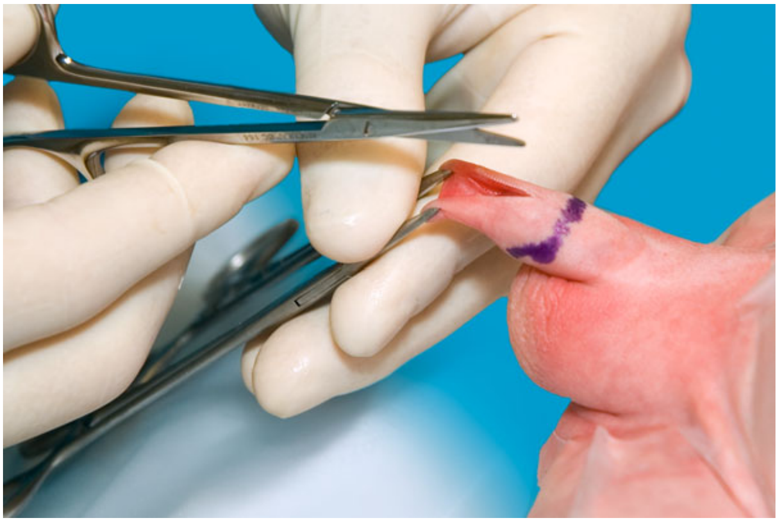

Fig. 9.34 Gomco clamp technique. A dorsal cut along a good crush zone is usually bloodless. If there is oozing or bleeding an additional localized crush can resolve this. There is no need to work in a bloody field

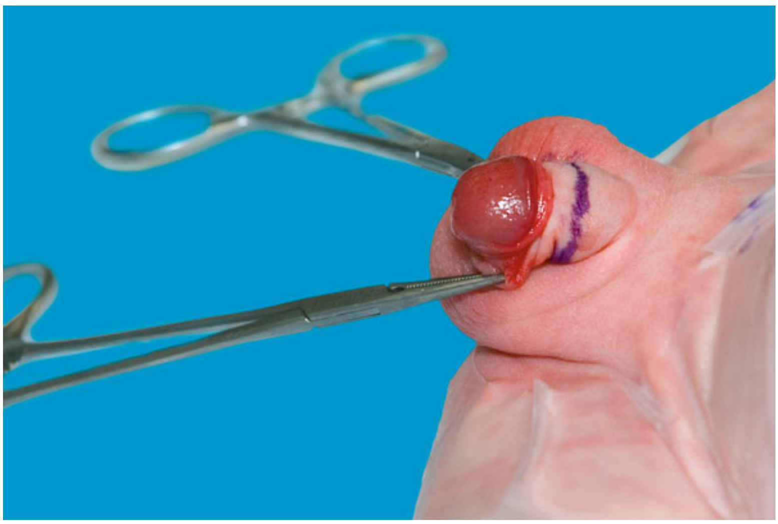

Fig. 9.35 Gomco clamp technique. Following a dorsal slit, the foreskin is pealed back to expose the entire glans. Examine the glans for anomalies

HAZARD: Do not stray laterally or beyond the apex of the crush line, as this will result in bleeding. If there was excessive handling of the foreskin prior to this step, then it may have become edematous and can be oozy from the cut edge of the dorsal slit.

HINT: Additional, localized crushes may be applied to control oozing or bleeding from the dorsal slit. It is always easier to work in a bloodless field.

STEP 6. Retract the foreskin back from around the glans (Fig. 9.35). Divide any remaining adhesions between the foreskin and the glans with a blunt probe or the closed tips of a hemostat (Fig. 9.36). You should fully reveal the coronal sulcus. Avoid dissection in the frenular region, between 5 and 7 o'clock.

HINT: Sometimes the foreskin cannot be fully retracted. When this happens, extend the dorsal slit by crushing an additional couple of millimeters proximally. Then, using the scissors as in Step 5, extend the dorsal slit.

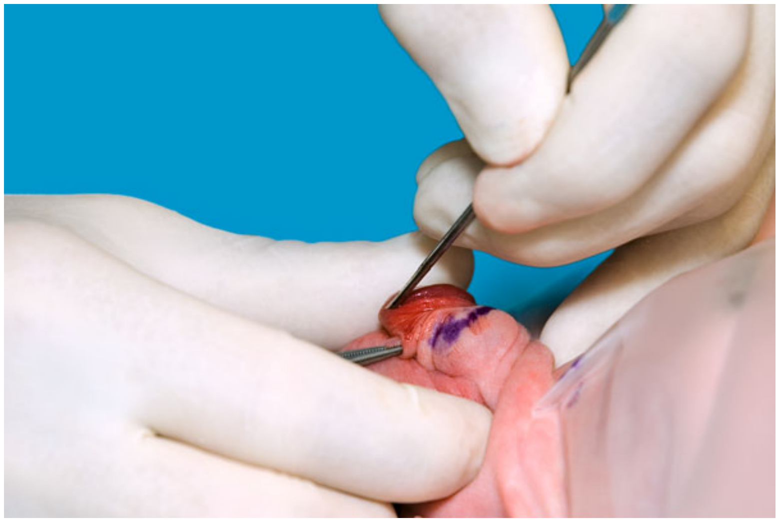

Fig. 9.36 Gomco clamp technique. Often an adhesion or two may remain. You can use a probe or hemostat to free any remaining adhesions

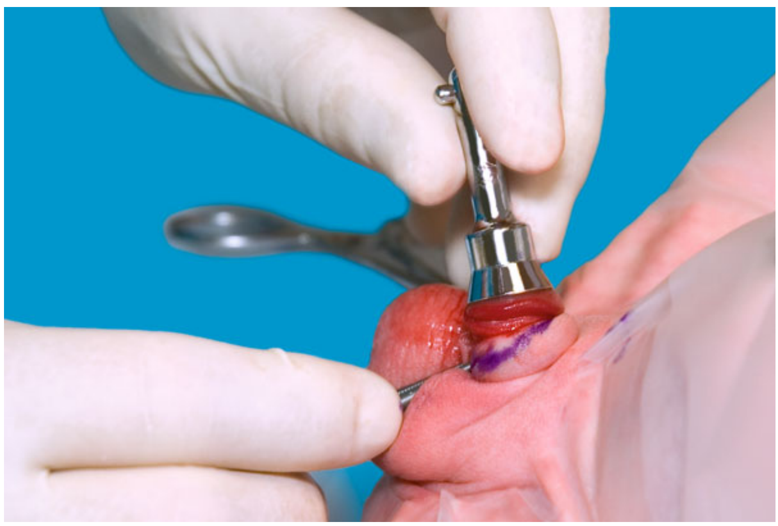

Fig. 9.37 Gomco clamp technique. Position the bell on the glans. The bell should cover the greater part of the glans but not the corona. Be prepared to swap out Gomco sets should the bell size be too small or too large (i.e., always have a complement of Gomco sizes available – 1.1, 1.3, and 1.45 for newborn circumcision)

HINT: At this point, if any urogenital anomalies are discovered, then abort the procedure. Repair of hypospadias may sometimes require use of the foreskin. Obtain hemostasis and nothing further should or needs to be done. Sewing close the dorsal slit is unnecessary and only increases risk. A pediatric urology consult should be scheduled.

STEP 7. Now the foreskin and glans are ready for the Gomco clamp assembly. *Place an appropriately sized bell on the open glans* (Fig. 9.37).

STEP 8. Use the still-attached hemostats on the edges to *re-approximate the foreskin around the bell*, while applying gentle downward pressure on the stem of the bell (Fig. 9.38). The bell should occupy the space between the glans and the foreskin, sitting snugly on top of the glans.

Fig. 9.38 Gomco clamp technique. While holding the bell in place, extend the foreskin. Use the marked skin to lineup the foreskin to be excises with the rim of the bell apparatus

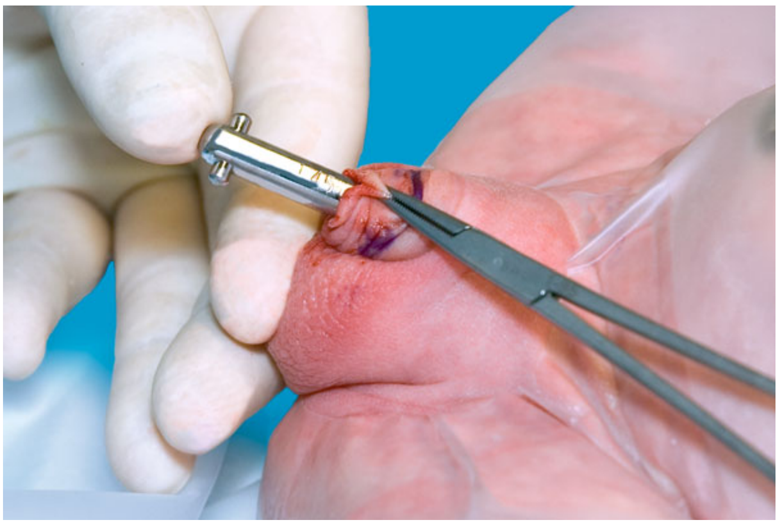

Fig. 9.39 Gomco clamp technique. Use a hemostat to grab the distal 12 o'clock edges of the split foreskin. Some practitioners use a safety pin to accomplish this step. The goal in either case is to create a handle to pass the split foreskin through the baseplate of the Gomco clamp

HAZARD: Be careful not to drive the bell downward on the ventral side of the penis into the region of the frenulum, where bleeding can result.

STEP 9. Grasp both sides of the dorsal slit near the middle of the incision, with the tips of a hemostat (Fig. 9.39). This re-approximates the foreskin around the stem of the bell. Make sure that both layers of the foreskin are being re-approximated. An alternative technique at this point is to use a sterile safety pin or suture to hold the dorsal slit edges together (extra attention should be paid here as this can increase the risk of puncture injury to the provider). Now the two edge hemostats can be removed from the foreskin.

STEP 10. Place the end of the stem through the hole in the baseplate of the Gomco device (Fig. 9.40). Reaching through the baseplate hole with another hemostat, re-grasp the foreskin just above the tips of the lower hemostat. This will continue to maintain the re-approximation of both cut edges of the foreskin. Remove the lower hemostat and pull the stem fully up through the

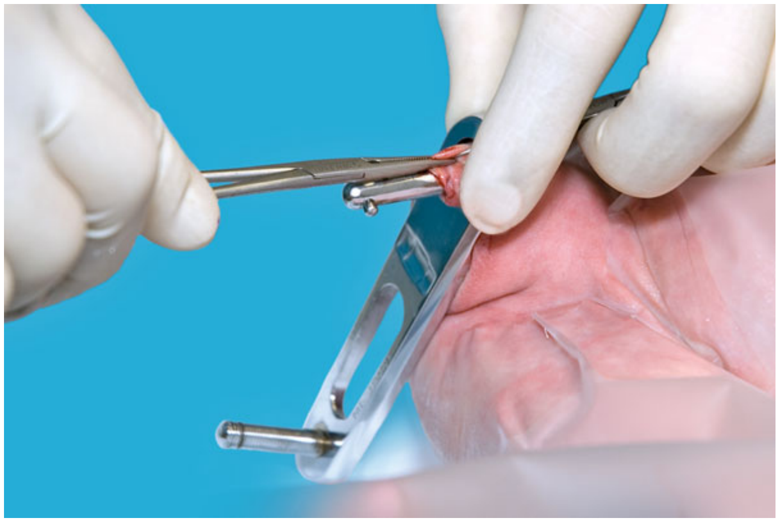

Fig. 9.40 Gomco clamp technique. Place the baseplate over the bell post, pulling the foreskin through with it. Use a second hemostat to tightly and evenly secure the foreskin around the post of the bell. This step is important. Care must be taken not to distort the gathering of the foreskin lest an uneven circumcision can result

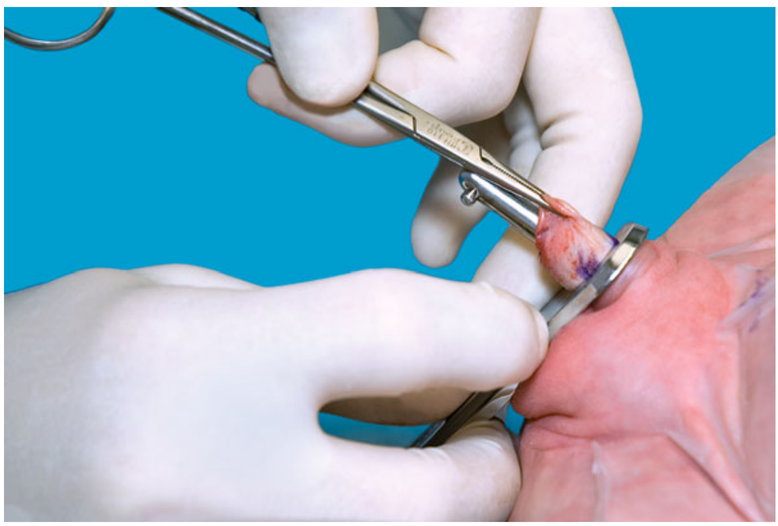

Fig. 9.41 Gomco clamp technique. Carefully advance the bell into place, repositioning the skin so that the pen mark is just at the level of the baseplate. This mark is an essential part of the procedure since the skin is now distorted

baseplate hole (Fig. 9.41). If you are using a safety pin, pull the entire pin along with the bell through the baseplate hole. In order to do this, the pin needs to be turned parallel to the stem. The safety pin remains in place through the remainder of the procedure.

STEP 11. *Assemble the Gomco clamp* as shown. The wings of the stem are grasped by the rocker arm's yoke (Fig. 9.42). The rocker arm is seated in the baseplate's notch. The *tightener* (*nut*) *is then loosely screwed* on (Fig. 9.43).

STEP 12. *Examine the assembly and foreskin*. It is important to make sure that the foreskin has been drawn through the hole in the Gomco base evenly around the entire circumference of the stem (Fig. 9.44). Once you are satisfied that the foreskin is evenly pulled through and the apex of the dorsal slit is visible above the baseplate, very firmly *screw down the tightener of the Gomco* device (Fig. 9.45). The hemostat may be removed.

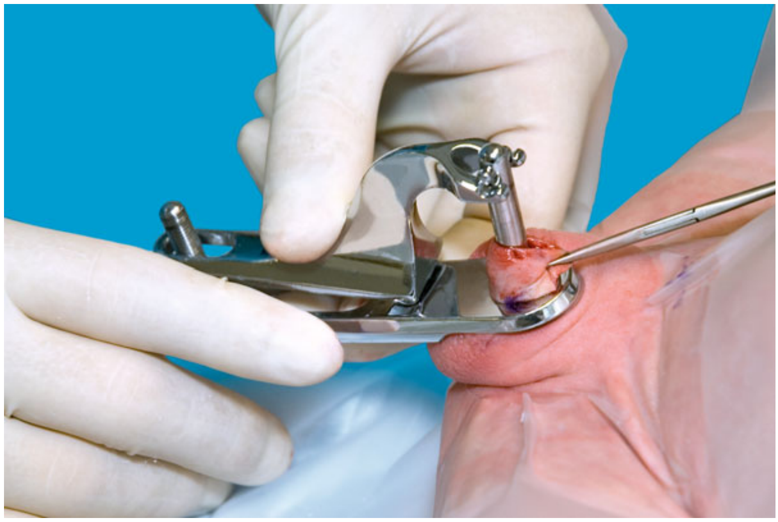

Fig. 9.42 Gomco clamp technique. The arm is now attached with its yoke suspending the bell post, its rocker seated in the baseplate notch, and the baseplate bolt in position

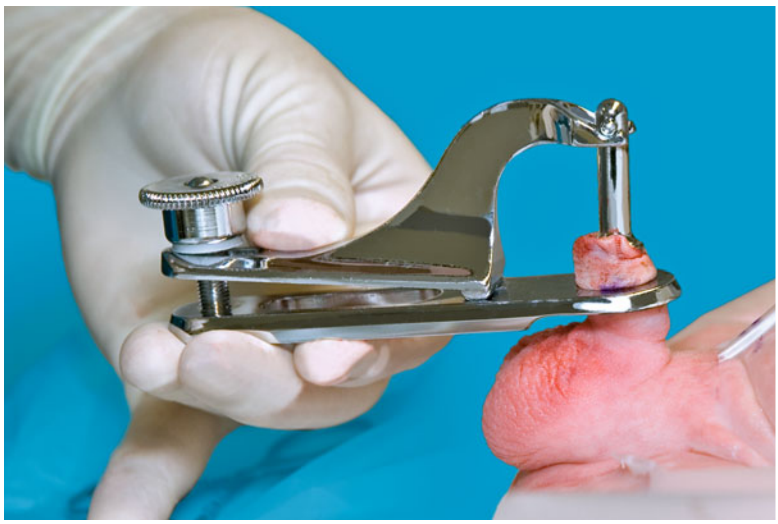

Fig. 9.43 Gomco clamp technique. The nut is positioned just enough to check all skin alignment one last time before tightening

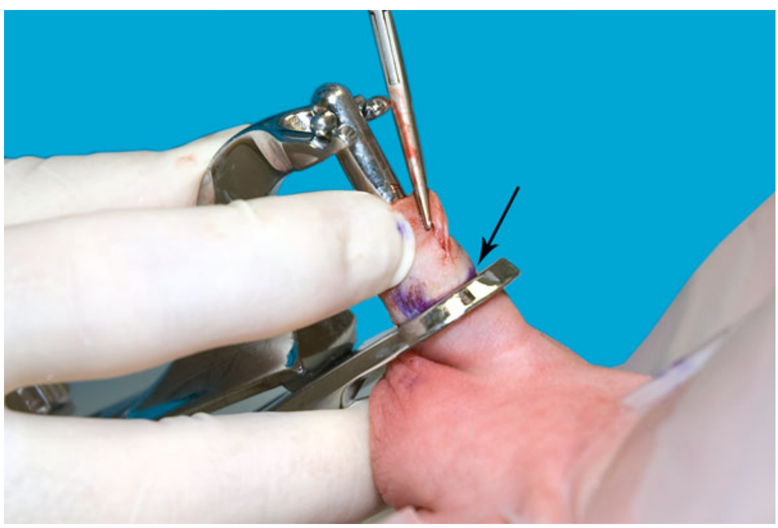

Fig. 9.44 Gomco clamp technique. Before the nut is tightened, the foreskin can be repositioned so that the skin mark (*arrow*) is just at the level of the baseplate

Fig. 9.45 Gomco clamp technique. Once you are confident that the appropriate amount of skin is in place, the nut is tightened completely. This is the point of no return

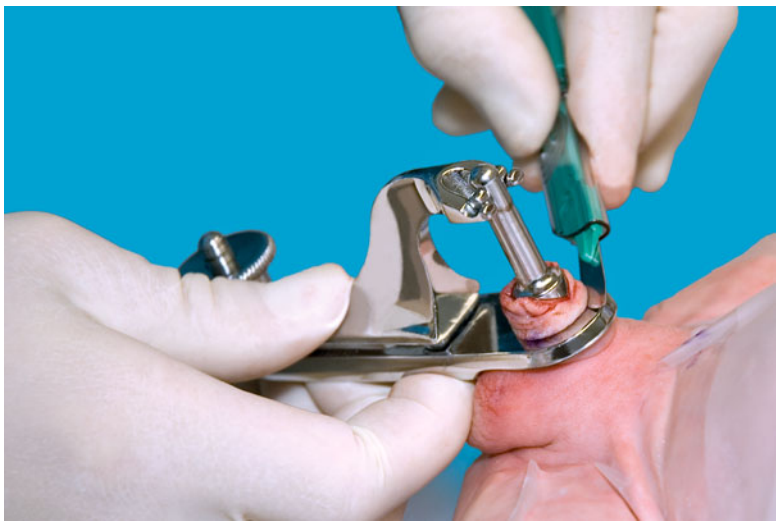

Fig. 9.46 Gomco clamp technique. Once the Gomco apparatus is fully secured, the foreskin may be excised. Using the baseplate as a guide, lightly draw the scalpel blade along the foreskin against the bell

HINT: It is crucial that the apex of the dorsal slit *and* crush be positioned through the baseplate. Using a hemostat, pull on the mucosal edge of the dorsal slit to be sure that the mucosal apex of the slit is also above the baseplate.

STEP 13. Using a scalpel (#11 works well), *excise the foreskin* at the junction between the baseplate and the bell (Fig. 9.46). Any remaining tissue above the clamp will become necrotic and may act as a possible source of infection. Cut the foreskin away from the stem with scissors and dispose of it in a biohazard waste container (Fig. 9.47).

STEP 14. Immediately *loosen the Gomco clamp and disassemble it*. Hemostasis is achieved with the initial assembly and screwing tight of the Gomco device.

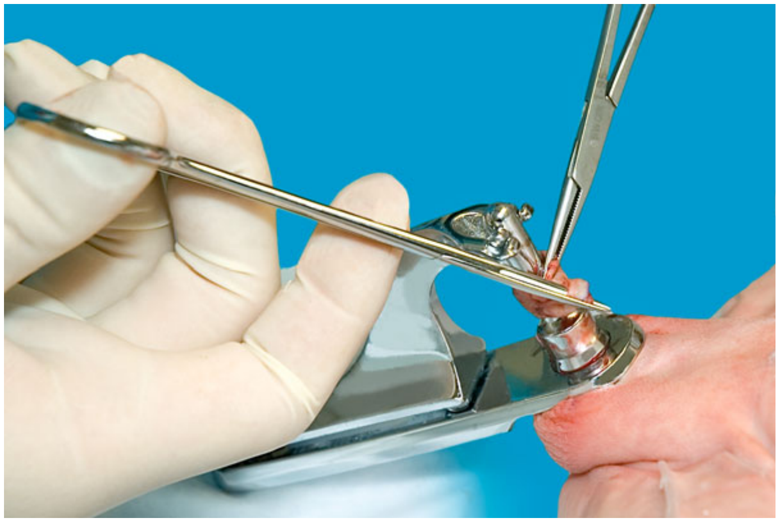

Fig. 9.47 Gomco clamp technique. Cut away the ring of foreskin

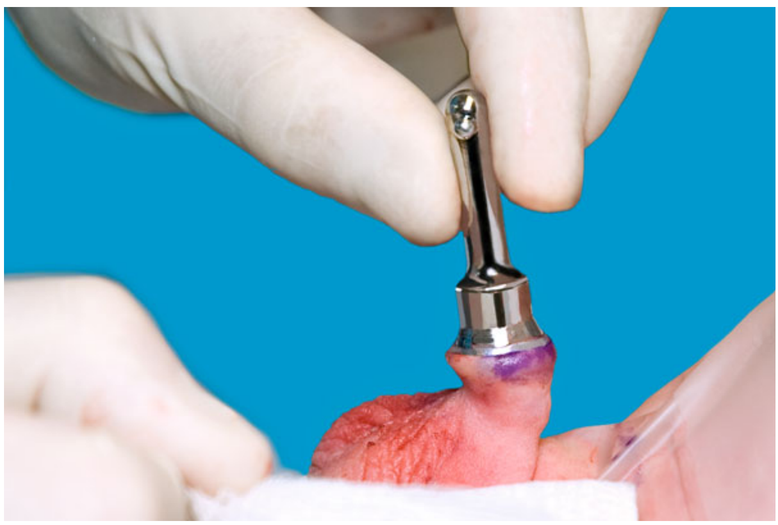

Fig. 9.48 Gomco clamp technique. Carefully disassemble the Gomco apparatus leaving the bell in place. Then, gently tease the bell from the skin edges

HINT: Many practitioners will wait up to 5 min because they feel that added time provides better hemostasis. Prolonged clamp time only serves to increase neonatal pain. Just as there was minimal bleeding with the dorsal slit, which was created after a momentary crush, there should be good hemostasis if the Gomco clamp is disassembled as soon as the foreskin is removed.

STEP 15. Once the clamp is removed, the foreskin edge will be adherent to the bell (Fig. 9.48). In order to *remove the bell*, gently tease away the foreskin using a piece of gauze if necessary. Ensure that the cut foreskin edge lies beneath the coronal sulcus (Fig. 9.49).

STEP 16. Briefly *check for hemostasis* and then *bandage the penis*. Proper bandaging and the management of hemorrhage are covered in Chaps. 10 and 11.

Fig. 9.49 Gomco clamp technique. As with any circumcision, review the final result. The coronal sulcus should be clear of skin and adhesions

PlastiBell® Technique

The PlastiBell is a plastic disposable single-unit device that has been in use since the early 1960s (Fig. 9.50). It is a tried and true device that delivers a good cosmetic result.

Advantages: Visibly protects glans during procedure, popularity makes it familiar to many providers and hospital staff, simple procedure to master, no bandaging required, disposable, cheap, easy to stock sufficient supplies without need for sterilization (where many circumcisions take place in a day).

Disadvantages: Rarely, but significantly the tip of the glans may protrude completely through the ring and entrap the glans, slightly increased rate of infection compared to the other techniques, risk of bell falling off prematurely causing hemorrhage, slightly longer procedure with increased neonatal pain, unsettling to some parents to have a foreign object attached to their child's penis on discharge from the hospital

Fig. 9.50 PlastiBell circumcision device. Each packet contains a PlastiBell device and a ligature. Note the size designation in the upper right corner (All PlastiBell images courtesy of Michele Ebbers, M.D., Pediatric Urologist, Swedish Pediatric Specialty Care, Seattle, WA)

Fig. 9.51 Before

The basic concept of the PlastiBell device is that it is a plastic bell with a groove in it. The bell covers the glans while the foreskin is brought over the bell. A ligature is placed along the groove, thereby cutting the circulation to the distal foreskin. Within days the foreskin and bell fall off [10].

Remember that it takes at least a couple of minutes for the local anesthetic to take effect (longer if it is from a multi-draw vial which contains preservative). Therefore, it is a good opportunity to prepare your sterile field and examine your equipment after the local injection has been given. The surgical field for the PlastiBell is similar to that of the Gomco: sterile drape, surgical scrub, sterile surgical marker, A&D ointment, three hemostats, one skin scissor, and some square gauze (see Fig. 9.25).

Prior to beginning the procedure, choose the appropriate-sized PlastiBell. The PlastiBell comes in six different bell diameters, from 1.1 to 1.7 cm. The one most commonly used for newborns is 1.3 cm. Each PlastiBell device is disposable and only costs about 1 dollar (USD). Do not hesitate to open a new package to obtain the appropriate-sized covering for the glans. The proper size PlastiBell is one whose bell fits more than halfway down the glans.

HAZARD: A bell that is too small may not adequately protect the glans. A bell that is too large may cause denuding of the shaft or, more seriously, a large bell may allow the glans to slip through and become entrapped, leading to urinary retention or necrosis of the glans. Occasionally, you will open one size PlastiBell and find that you need a smaller or larger one once the glans is fully revealed.

STEP 2. At this point, consider using a surgical *skin marker to mark the coronal edge* and 12 o'clock position (Figs. 9.51 and 9.52). This is helpful since the visible landmarks will shift when the foreskin is manipulated during the procedure. The skin marker acts as a continual guideline beyond which denudation of the shaft can occur, and before which an incomplete circumcision can result. It is not a mandatory step, but highly recommended, and it does make the procedure simpler.

HAZARD: Be sure not to simultaneously apply tension on the foreskin, proximally or distally, when marking the corona with the skin marker. You want the mark to be along the coronal sulcus when the overlying skin is neutral. Marking during an erection can lead to too little foreskin being removed and the embarrassment of being urinated upon.

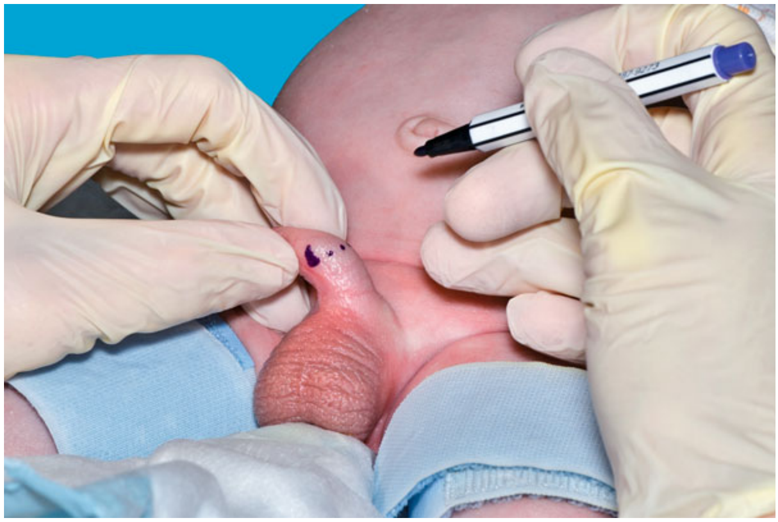

Fig. 9.52 Mark the coronal ridge. Use a surgical marking pen to mark the coronal ridge. This serves as a guide but not an absolute location

HINT: Since the orientation of the foreskin may change somewhat when the adhesions are released (see below), some practitioners choose to mark the coronal sulcus and 12 o'clock position after the prepucial space has been established.

HINT: It is helpful at this point to slackly place the ligature with a loose, two-throws surgeon's knot. This decreases the chances of fumbling for it later and makes the procedure easier since the knot is already in place.

STEP 3. The first technical step of newborn circumcision that must be performed with all of the clamp techniques is *separating the inner mucosal layer of the foreskin from the underlying glans,* that is, creating an open prepucial space. The connections between the foreskin and glans, present in the preadult penis, are often referred to as adhesions though technically they are a normal stage of ontogeny. Nevertheless, these adhesions *must* be taken down in order to successfully and safely perform the circumcision.

(a) *Grasp the edge of the foreskin* with mosquito-size hemostats at the 3 and 9 o'clock positions, taking care not to grasp the glans (Figs. 9.53 and 9.54). Place gentle traction on the foreskin by holding the two hemostats side-by-side in your nondominant hand, palm-up.

(b) Gently *insert a third hemostat* (closed) at the 12 o'clock position between the foreskin and the glans (Fig. 9.55). Once the hemostat has advanced a few millimeters past the prepucial ring, the hemostat should be tipped upward to tent the foreskin, thus demonstrating that it has not inadvertently entered the urethral meatus. When you are convinced that you have not entered the urethra, *advance the hemostat to the level of the coronal sulcus*.

HINT: For greatest control, in your nondominant hand, hold the two hemostats palm-up with the thumb on top overlying them both. The dominant hand holding the third hemostat palm-down can then slide along the thumb of the nondominant hand for steadiness.

(c) Then, either opened or closed, sweep the hemostat clockwise and counterclockwise to *fully separate any adhesions* between the foreskin and the underlying glans. *The importance of this step cannot be overemphasized.* Usually this takes a few partial rotations at different places around the corona.

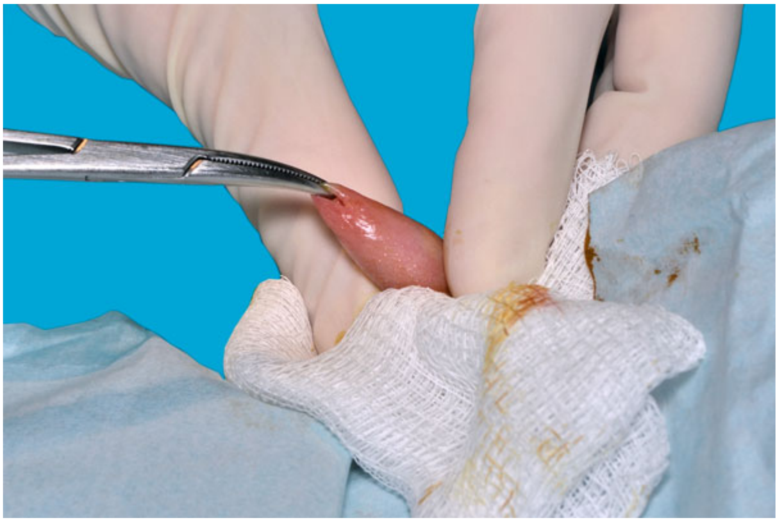

Fig. 9.53 Grab the prepucial ring at 9 o'clock. Take care not to include the underlying glans. Use non-dominant hand to hold hemostats with the fingers *below* and thumb *above*

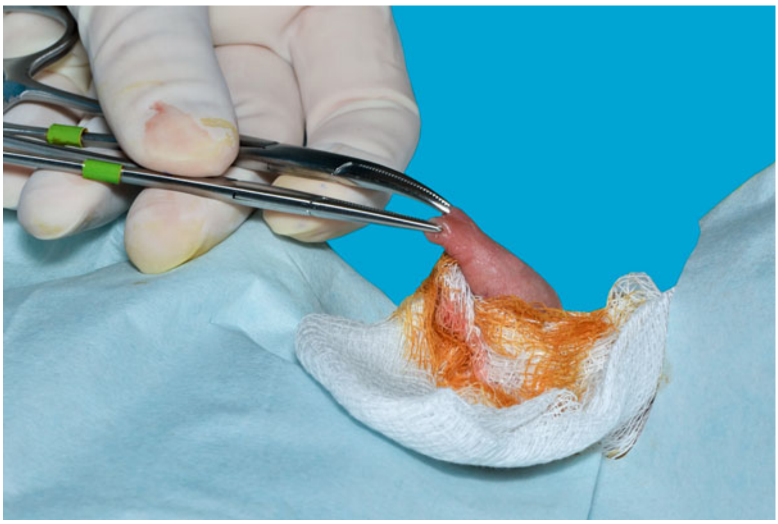

Fig. 9.54 Grab the prepucial ring at 3 o'clock with second hemostat. Take care not to include the underlying glans. Use non-dominant hand to hold hemostats with the fingers *below* and thumb *above*

Fig. 9.55 Blunt dissection with hemostats. The hemostat is advanced to the level of the coronal sulcus (note skin mark). The prepucial space is then created using a sweeping motion of the inserted hemostat avoiding the frenulum between 5 and 7 o'clock

Fig. 9.56 The dorsal crush. Advance the lower blade of the third hemostat into the prepucial space. Gently tent the hemostat and notice the impression of the hemostat demonstrating that the urethra was not entered. Close the hemostat to make the dorsal crush

HAZARD: Do not dissect beyond the depth of the coronal sulcus and *avoid sweeping at the 5–7 o'clock position*. This region, the frenulum with its frenular arterioles, is a frequent source of procedural bleeding, and does not need to be separated.

HINT: An advantage to using the Gomco or PlastiBell devices is that further separation of any adhesions between the glans and the foreskin can be made once the dorsal slit has been made and the glans is revealed. In fact, an *alternative technique* is to simply separate enough of the connecting tissue at the 11–1 o'clock dorsal surface of the glans to allow for the creation of the dorsal slit. After the dorsal slit is made, the rest of the head of the penis can be revealed while the connections between the foreskin and glans are taken down with a probe or hemostat.

STEP 4. The next step in the PlastiBell technique is to *make the dorsal crush*. Advance just the lower blade of the third hemostat at the 12 o'clock position between the glans and foreskin. Advance the hemostat to a position no less than 5 mm distal to the coronal sulcus, or about half the distance to the sulcus, and close the hemostat in place, thereby creating the dorsal crush (Fig. 9.56). If you marked the coronal sulcus, then go to a point 5–8 mm distal from the level marked off. Once the dorsal crush is applied, hold it for a few seconds then remove the hemostat. This will reveal a crushed area of foreskin that has been devitalized and should not bleed when cut.

HINT: Angle the hemostat up in order to tent the foreskin and ensure that you have not entered the urethra.

HAZARD: If a marking pen was not used, be careful not to pull the foreskin forward as you identify the underlying corona – this may cause you to remove too much foreskin.

STEP 5. Using small straight scissors with one blunt tip, insert the blunt tip between the glans and foreskin, tent up the lower blade, and *cut a dorsal slit* through the center of the crush line (Figs. 9.57 and 9.58).

HAZARD: Do not stray laterally or beyond the apex of the crush line, as this will result in bleeding. If there was excessive handling of the foreskin prior to this step, then it may have become edematous and can be oozy from the cut edge of the dorsal slit. Since active bleeding makes the process more difficult, any points of bleeding can usually be curtailed by applying a small localized crush with a hemostat.

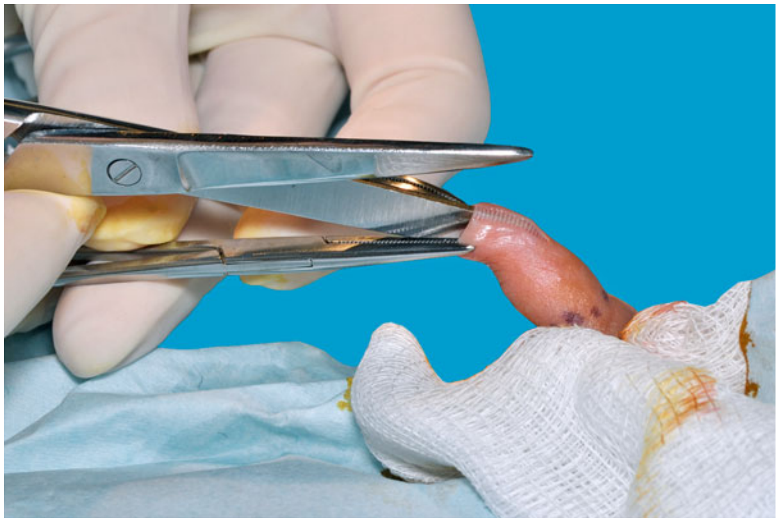

Fig. 9.57 The dorsal cut. After the third hemostat is removed, a crushed bloodless zone remains. The lower blade of the scissors is then inserted through the prepucial ring and tented up along this crushed zone

Fig. 9.58 The dorsal cut. Once the outline of the scissor blade is visible, the cut is made down the middle of the crush zone. A dorsal cut along a good crush zone is usually bloodless. If there is oozing or bleeding an additional crush can resolve this. There is no need to work in a bloody field

STEP 6. Retract the foreskin back from around the glans (Fig. 9.59). Divide any remaining adhesions between the foreskin and the glans with a blunt probe or the closed tips of a hemostat. You should fully reveal the coronal sulcus. Avoid dissection in the frenular region, between 5 and 7 o'clock.

HINT: Sometimes the foreskin cannot be fully retracted. When this happens, re-crush a couple of millimeters dorsally. Then, using the scissors, extend the dorsal slit to allow for easier manipulation of the foreskin.

HINT: At this point, if any urogenital anomalies are discovered, then abort the procedure. Repair of hypospadias may sometimes require use of the foreskin. Obtain hemostasis and nothing further should or needs to be done. Sewing close the dorsal slit is unnecessary and only increases risk. A pediatric urology consult should be scheduled.

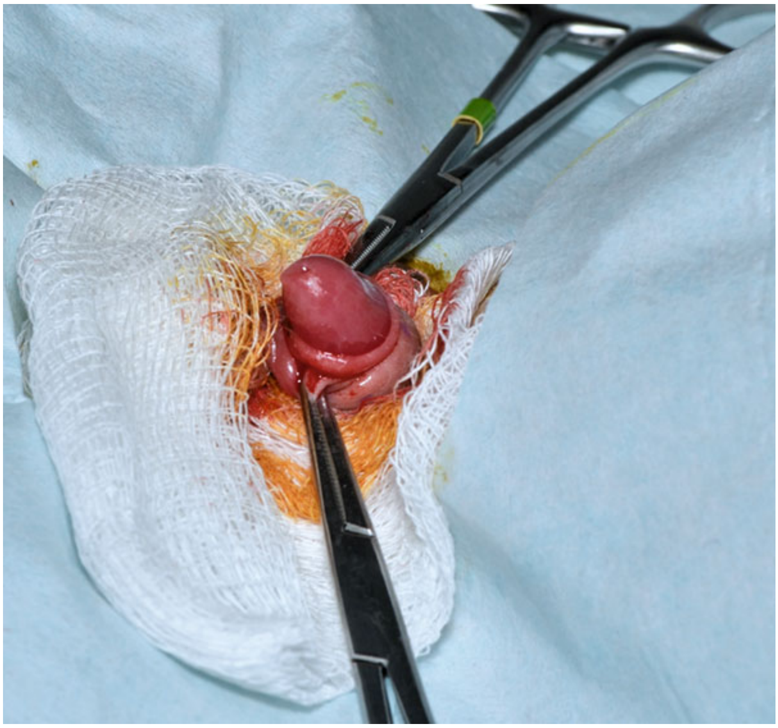

Fig. 9.59 Peel back the foreskin. Following a dorsal slit, the foreskin is pealed back to expose the entire glans. Additional release of adhesions can be done at this point. Examine the glans for anomalies

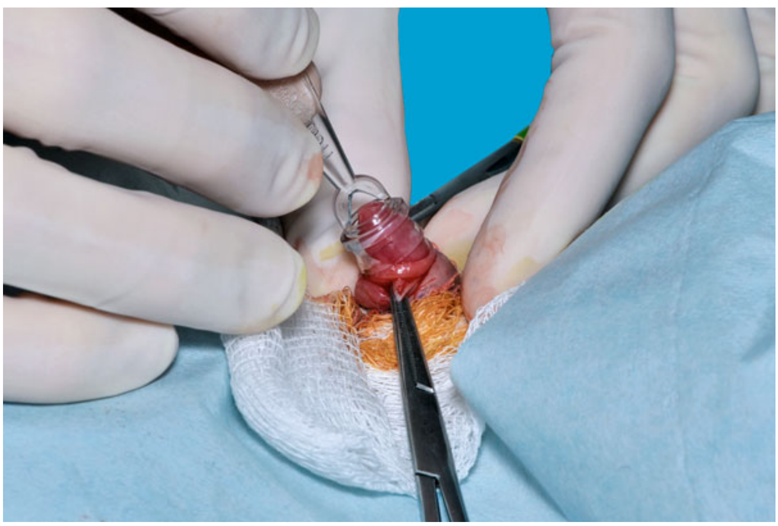

Fig. 9.60 Position the Plastibell on the glans. The bell should cover the greater part of the glans but not the coronal ridge. Be prepared to swap out PlastiBell should the bell size be too small or too large

STEP 7. Place an appropriately sized PlastiBell over the glans with the stem in a vertical position and the bell's edge approaching the coronal ridge (Fig. 9.60). Always have a complement of PlastiBell available – at least 1.1, 1.3, and 1.5 for newborn circumcision.

STEP 8. Re-approximate the foreskin around the PlastiBell stem with the two attached hemostats. Make sure that the groove on the PlastiBell is below the apex of the dorsal slit and at the correct location on the foreskin (Fig. 9.61). If a surgical marking pen was used at the start of the procedure, then this marked line should now lie near the level of the groove in the PlastiBell.

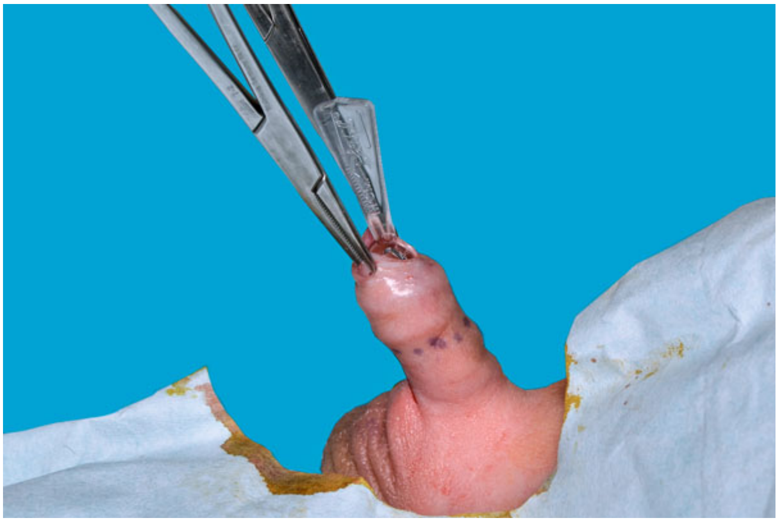

Fig. 9.61 Position the foreskin over the PlastiBell. Using the attached hemostats, position the foreskin over the PlastiBell. The PlastiBell stem can be held in place between the two hemostats or by clamping the distal rim of the foreskin and PlastiBell stem with a separate hemostat

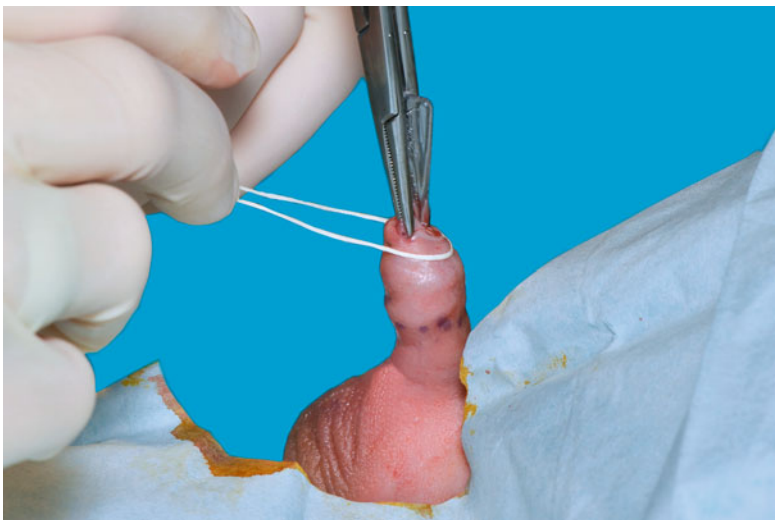

Fig. 9.62 Place the ligature. Position the Plastibell so that a sufficient amount of foreskin will be removed. Then position the ligature over the groove in the PlastiBell

HINT: If the bell slips out of the foreskin, there are a few handy maneuvers that can keep it in place.

(a) Probably easiest, a third hemostat can be cross-clamped to include the foreskin on either side of the dorsal slit and the stem itself (see Fig. 9.69).
(b) Or, wrap the foreskin over the PlastiBell using the two hemostats grasping the foreskin edges and cross the hemostats over each other.
(c) Or, using a third hemostat, grasp both edges of the dorsal slit in the midline of the incision and re-approximate the foreskin around the PlastiBell stem and then remove the first two hemostats. The PlastiBell covering the glans, with the foreskin wrapped around it, should all be held in place with the third hemostat.

STEP 9. Move the string with the beginnings of a knot so it lies over the groove of the Plastibell (Fig. 9.62). Begin to tighten the string, but not fully.

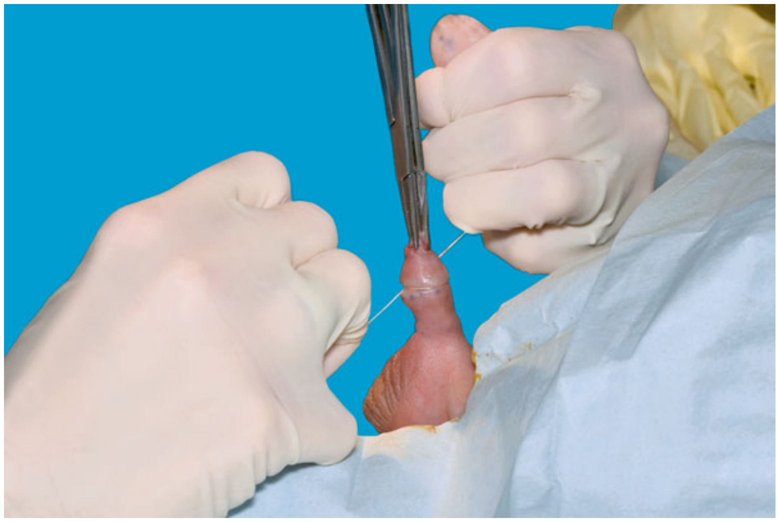

Fig. 9.63 Tighten ligature. Once you have determined that an appropriate amount of skin has been tied down and that the ligature is absolutely within the PlastiBell groove, the ligature is then tied permanently with significant opposing tension. This is the point of no return

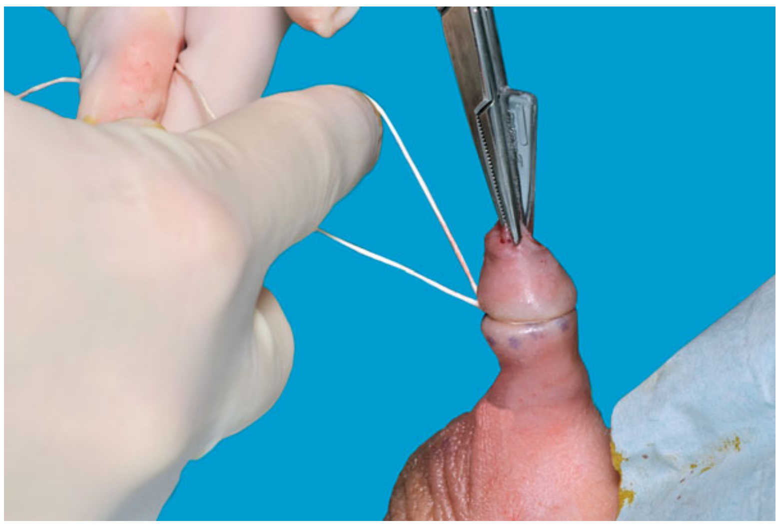

Fig. 9.64 Plastibell technique. Make another throw with the ligature to complete the surgeon's knot

HINT: Check the placement of the string on the bell and, importantly, assure that the apex of the dorsal slit is distal to the string.

STEP 10. Now secure the knot by *tightening the string as hard* as possible (Fig. 9.63). Make another throw with the ligature to complete the surgeon's knot (Fig. 9.64).

STEP 11. Cut the excess string to ¼ of an inch (Fig. 9.65) and *detach stem* from the body of the PlastiBell. To do this, hold the body of the PlastiBell between your index finger and thumb, and with the other hand bend the stem back and forth until it snaps off from the bell.

STEP 12. Using small scissors, *trim the foreskin* to within a few millimeters of the string (Fig. 9.66). Dispose of the foreskin properly.

STEP 13. Inspect your work. Confirm that the *PlastiBell moves freely along the glans* but does not slide beneath the coronal sulcus and that the urethral meatus is visible (Figs. 9.67 and 9.68).

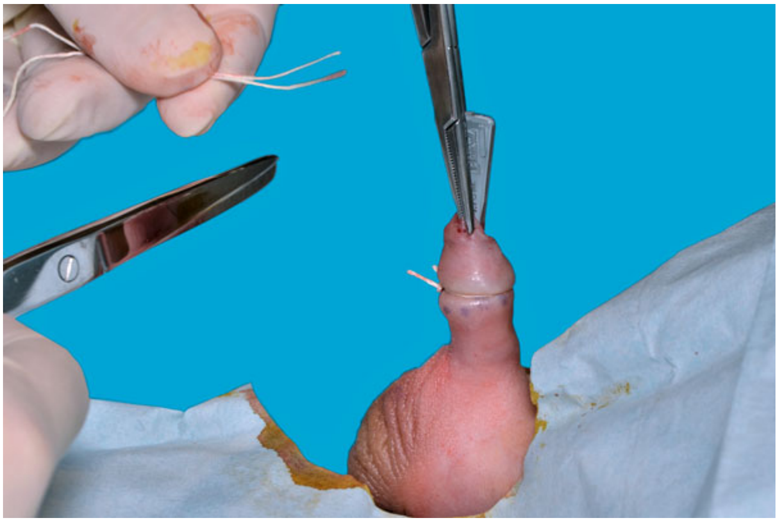

Fig. 9.65 Plastibell technique. The excess ligature is trimmed, then the stem of the Plastibell is removed by stabilizing the penis with one hand and rocking the plastic stem loose with the other

Fig. 9.66 Plastibell technique. With the knot firmly secured, the excess distal skin should be excised with a scissor leaving at least a couple of millimeters of remnant skin

Fig. 9.67 After. As with any circumcision, review the final result. If all is in order, then place a 3″ × 3″ bandage with ointment to protect the exposed penis tip from rubbing on the diaper

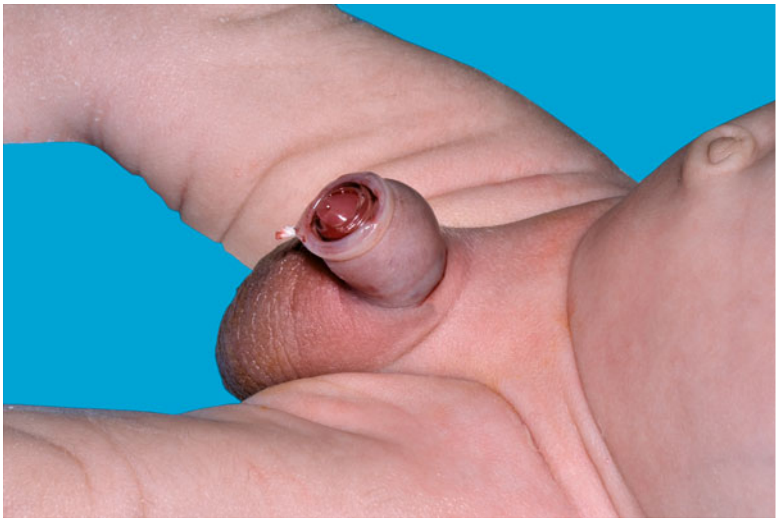

Fig. 9.68 After. Notice that the urethral meatus is visible through the PlastiBell ring

Fig. 9.69 Cross-clamp maneuver. If you are working without an assistant, you can use a separate hemostat to clamp the prepuce to the PlastiBell stem (*Left*) and then prop it in place while the ligature is tied (*Right*)

STEP 14. Briefly *check for hemostasis*. Chap. 11 describes how to specifically manage bleeding with the PlastiBell technique. Bandaging is not typically required after the PlastiBell circumcision. A piece of gauze saturated with A+D ointment can be used to cover the entire glans/PlastiBell. Parents of infants going home with the PlastiBell device should receive unique aftercare instructions (see Chap. 10).

AccuCirc™ Technique

The AccuCirc device (Clinical Innovations, LLC, Murray, UT, USA) was introduced in 2008 [11], and is currently approved for healthy boys up to 10 days old (Figs. 9.70 and 9.71). Each kit comes with all of the materials necessary to perform a newborn circumcision (i.e., sanitizing wipe and iodine swabs, fenestrated drape, marking pen, two disposable hemostats, gauze, lubricating jelly, and petrolatum dressing) [12].

Fig. 9.70 AccuCirc kit and clamp. AccuCirc comes as a complete disposable kit (AccuCirc images courtesy of David Tomlinson, M.D., Department of Family Medicine, Brown University Medical School)

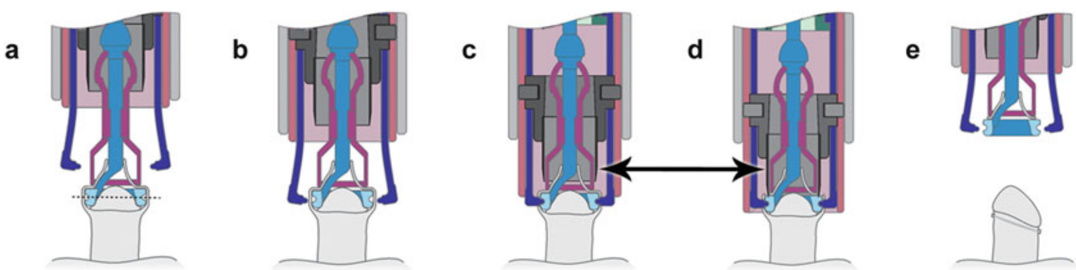

Fig. 9.71 Steps of an AccuCirc circumcision: the clamping/crushing, cutting mechanism. (**a**) AccuCirc device positioned over foreskin holder, (**b**) as the lever arm is closed, the circumferential clamp tightens, (**c**) Circumferential clamp is in crush position, blade is up (*arrow*), (**d**) circumferential clamp is in crush position, blade is down (*arrow*), foreskin is excised, (**e**) the lever arm is opened, releasing the crush, exposing the circumcised penis

A group of researchers at Brown University (where the device was developed) presented preliminary results of a small series at an international meeting in 2009. The group compared circumcisions performed with Mogen, Gomco, PlastiBell, and AccuCirc devices. They reported no complications using any device, and aesthetic outcomes at 2 weeks were comparable among all devices [13]. To our knowledge, no other published reports exist of comparisons between AccuCirc and other methods of neonatal circumcision.

Advantages: Complete disposable surgical kit – prevents reuse, simple procedure to master, no dorsal slit, no retained parts, prevents mismatching device parts, easy to stock sufficient supplies without need for sterilization (where many circumcisions take place in a day)

Disadvantages: Partially blind technique – must have full confidence in equipment, no prior visualization of glans, setup of the device is quick but a 5-min crush period is recommended by the manufacturer (but not required)

STEP 2. At this point, use a surgical *skin marker to mark the coronal edge* (Fig. 9.72). This is helpful since the visible landmarks will shift when the foreskin is manipulated during the procedure. The skin marker acts as a continual guideline beyond which denudation of the shaft can occur, and before which an incomplete circumcision can result.

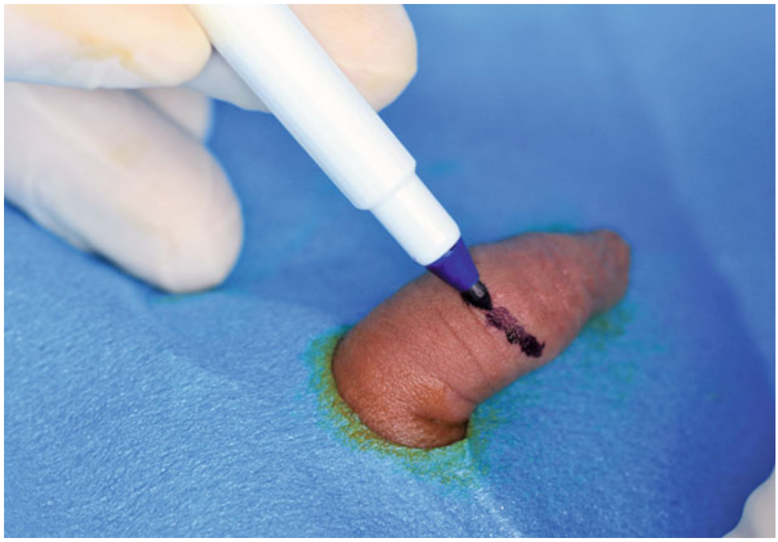

Fig. 9.72 AccuCirc circumcision: make circumferential surgical pen mark at coronal margin

HAZARD: Be sure not to simultaneously apply tension on the foreskin, proximally or distally, when marking the corona with the skin marker. You want the mark to be along the coronal sulcus when the overlying skin is neutral. Marking during an erection can lead to too little foreskin being removed and the embarrassment of being urinated upon.

HINT: In planning a circumcision using this technique, it is important that the ventral aspect of the marking be taken more distally, as the ventral shaft skin is less pliable. Removal of excess of ventral skin may result in iatrogenic penoscrotal webbing.

STEP 3. The first technical step of newborn circumcision that must be performed with each of the clamp techniques is *separating the inner mucosal layer of the foreskin from the underlying glans,* that is, creating an open prepucial space. The connections between the foreskin and glans, present in the preadult penis, are often referred to as adhesions though technically they are a normal stage of ontogeny. Nevertheless, these adhesions *must* be taken down in order to successfully and safely perform the circumcision.

(a) Grasp the edge of the foreskin with the supplied hemostats at the 3 and 9 o'clock positions, taking care not to grasp the glans (Fig. 9.73). Place gentle traction on the foreskin by holding the two hemostats side-by-side in your nondominant hand, palm-up.

(b) Lubricate and gently insert the blunt end of the probe at the 12 o'clock position between the foreskin and the glans (Fig. 9.74). Once the probe has advanced a few millimeters past the prepucial ring, it should be tipped upward to tent the foreskin, thus demonstrating that it has not inadvertently entered the urethral meatus. When you are convinced that you have not entered the urethra, *advance the probe to the level of the coronal sulcus*.

HINT: For greatest control, in your nondominant hand, hold the two hemostats palm-up with the thumb on top overlying them both. The probe can then be slid along the thumb of the nondominant hand for steadiness.

(c) Then, using an up and down (distal to proximal to distal) motion use the probe to *fully separate any adhesions* between the foreskin and the underlying glans. *The importance of this step cannot be overemphasized and repetition is in order to ensure thoroughness.*

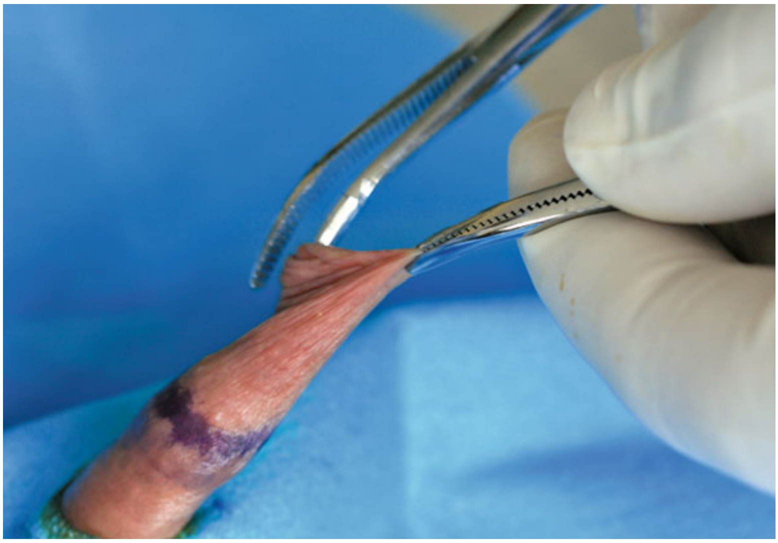

Fig. 9.73 AccuCirc circumcision: grasp prepucial ring at 3 and 9 o'clock with supplied hemostats

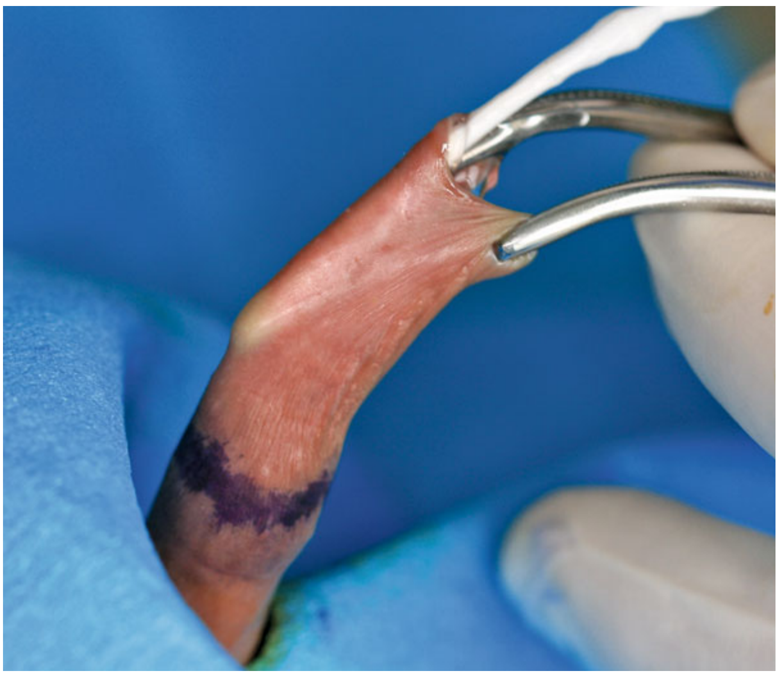

Fig. 9.74 AccuCirc circumcision: use top, blunt end of probe to remove adhesions circumferentially. Care must be taken not to traumatize the frenulum (at about 6 o'clock)

HAZARD: Do not dissect beyond the depth of the coronal sulcus and *gently probe the area between 5 and 7 o'clock*. This region, the frenulum with its frenular arterioles, can be a source of procedural bleeding.

STEP 4. The shielding ring is then insinuated beneath the foreskin and advanced until it rests on top of the glans (Fig. 9.75). Note that no dorsal slit is performed. You may now remove the hemostats.

HINT: If needed, the prepucial ring can be dilated with a hemostat. Insert the closed hemostat through the prepucial ring about a half centimeter, making sure you have not entered the urethral meatus. Then open the hemostat to expand the prepucial ring.

STEP 5. Once the shielding ring is in the desired position, the foreskin holder is advanced down onto the foreskin (Fig. 9.76) until it clicks into place (Fig. 9.77).

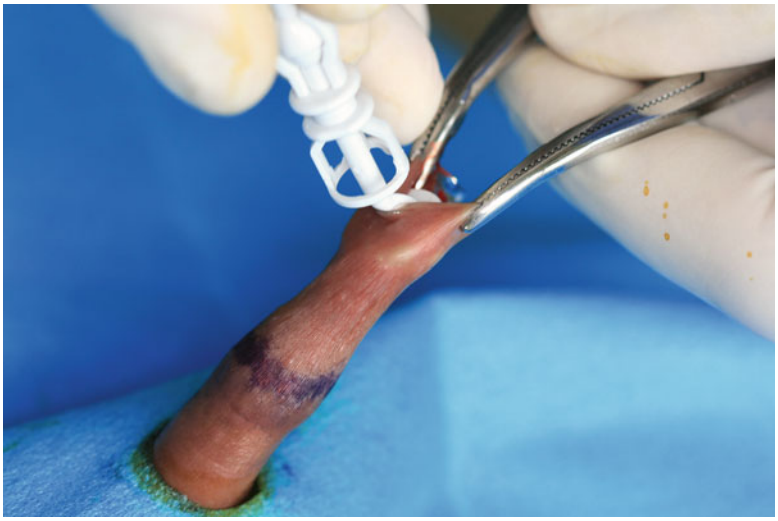

Fig. 9.75 AccuCirc circumcision: insert shielding ring – no dorsal slit is required. If needed, the prepucial ring can be dilated with a hemostat. Advance shielding ring onto the glans pulling foreskin up distally

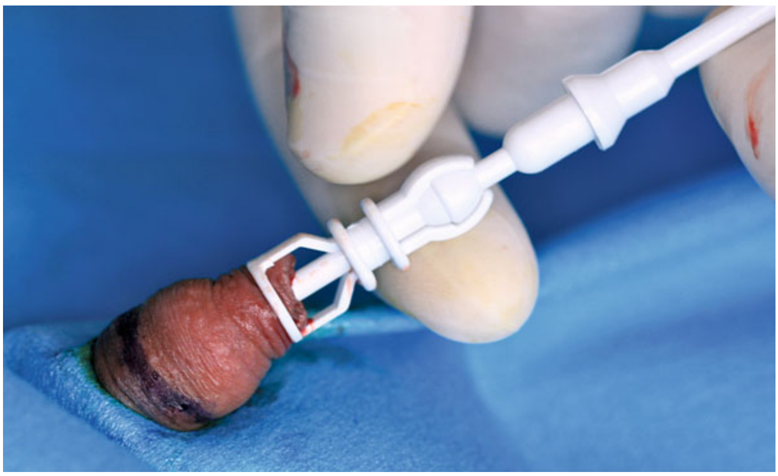

Fig. 9.76 AccuCirc circumcision: lower foreskin holder down onto foreskin

Fig. 9.77 AccuCirc circumcision: foreskin holder will snap into place

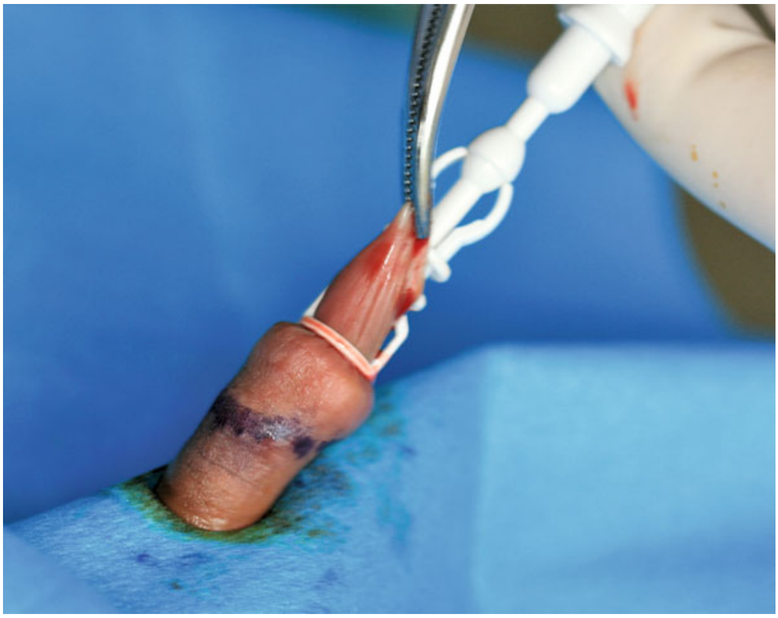

Fig. 9.78 AccuCirc circumcision: align pen mark with top of shielding ring

Fig. 9.79 AccuCirc circumcision: pen mark aligned circumferentially with top of shielding ring

STEP 6. Using hemostats, apply traction on the foreskin until the foreskin holder (and internally the shielding ring) is circumferentially aligned with the pen mark (Figs. 9.78 and 9.79).

STEP 7. Once the ring and foreskin holder are in the desired position, the clamp is placed over the probe, and advanced until it locks in place with an audible click (Fig. 9.80).

HINT: Once this click is heard, the clamp should not be removed from the probe. If abortion of the procedure is indicated from this point forward, the clamp/probe assemble should be removed as a single unit from the penis and discarded.

STEP 8. After confirmation that the device remained appropriately aligned with the pen mark, the lever arm is depressed and locked in place. This activates a protective sleeve, a clamping

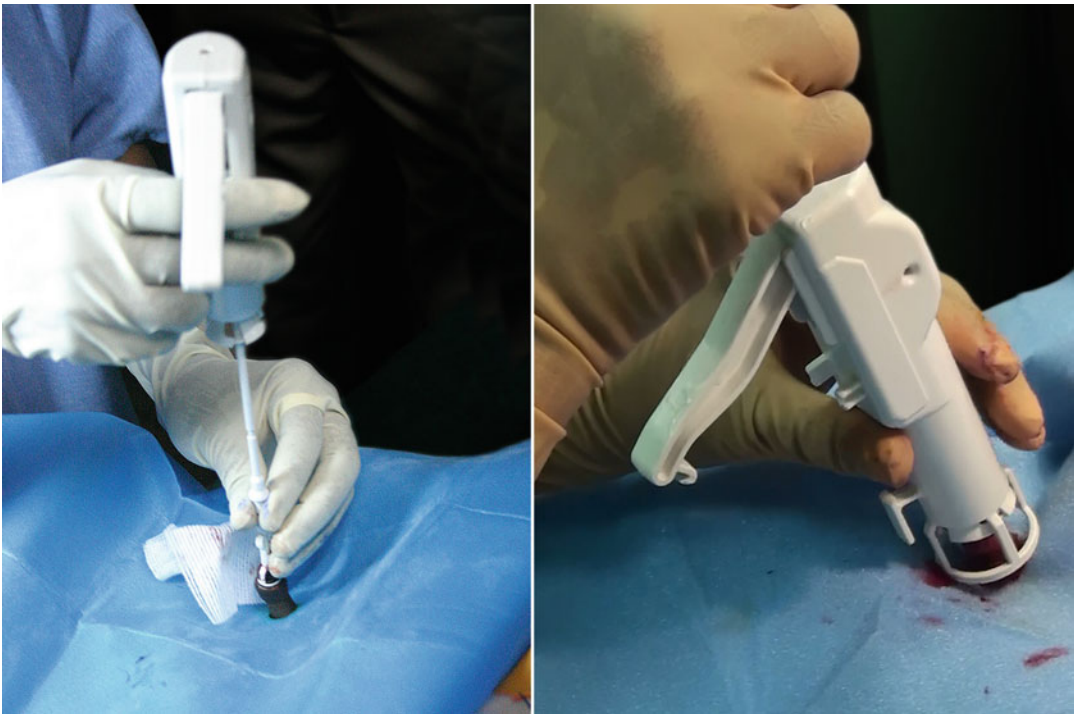

Fig. 9.80 AccuCirc circumcision: Place AccuCirc clamp over probe (*left*) advancing until it locks into place with an audible click (*right*)

Fig. 9.81 AccuCirc circumcision: close (activate) lever arm downward and lock in place. Leave locked for 5 min

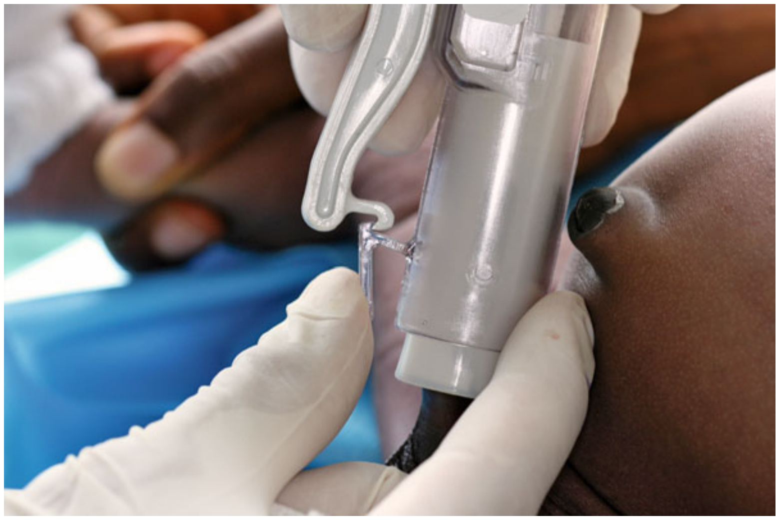

Fig. 9.82 AccuCirc circumcision: after 5 min, release lever arm and lift it completely back to its up position. Gently remove clamp

Fig. 9.83 AccuCirc circumcision: circumcision outcome with the AccuCirc clamp

action, and an internally protected circular blade that incises the foreskin just distal to the crushed area (Fig. 9.81). This clamp should be left in place for at least 5 min to ensure adequate hemostasis.

STEP 9. After 5 min, the locking clip is released (Fig. 9.82) and the arm lifted completely back to its up-position to release the clamp. Gently remove the clamp to reveal a circumcised penis (Fig. 9.83).

STEP 10. Briefly *check for hemostasis* and then *bandage the penis*. Proper bandaging and the management of hemorrhage are covered in Chaps. 10 and 11.

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Healing, Bandaging, and Aftercare 10

Assaf Yosha and David A. Bolnick

Editors' Note

Many practitioners view the circumcision as the whole of the procedure. In fact, it is just the most controlled part of the process. Parental care of the newly circumcised penis and the course of healing play a big part of the final result. Setting reasonable expectations, providing as good an experience for the parents as possible and diligent aftercare will increase the likelihood of an excellent result.

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After the Newborn Circumcision

Considering that newborn circumcision is relatively easy and safe to perform, oftentimes what comes after the procedure is overlooked. This happens for various reasons. The provider doing the procedure may have to run off to the office or surgery and not be available for the immediate issues that can arise. That same provider often does not normally care for newborns and may not be familiar with the healing process, and therefore may not be able to adequately instruct a parent on proper aftercare. Or, what frequently happens, the person managing a complication is not familiar with the procedure itself, such as in an Emergency Department. Having a fundamental understanding of the healing process, proper bandaging, and the aftercare needed, can help set parental expectations – lowering their anxiety, prevent complications, or better yet, prevent an unnecessary intervention.

Healing Phases of the Newborn Circumcision

During the first week following the circumcision, it is not uncommon to get calls from concerned parents about the appearance of the healing skin. Usually the question pertains to the possibility of infection or the position of the remaining foreskin near to the coronal sulcus. Much of this concern, and many of these phone calls, can be

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Fig. 10.1 A typical looking penis before circumcision

prevented by properly educating the parent on what to expect. In a situation like this, a picture speaks a thousand words.

Images of Healing Process

This first picture shows the penis immediately before and after the circumcision (see Figs. 10.1 and 10.2). Notice the glossy reddish appearance of the glans. This is normal. Remember that the glans tissue prior to the circumcision was unexposed to the external environment. Now that it has been revealed, it will undergo a process of epithilialization. The skin transforms from a mucous membrane like the inside of the cheek, to regular skin like the outside of the cheek.

You should always review with the parents/guardians the look of the newly circumcised penis along with the bandaging applied to set initial expectations and as a prelude to aftercare (see Figs. 10.3 and 10.4).

Within hours to a day, the ventral side of the penis swells (see Fig. 10.5). This swelling peaks in 48 h and mostly resolves by 2 weeks. Yellowish fibrinous exudative patches appear over the glans penis and other mucous membrane tissue. These exudative patches are a type of scab that begin to clear by about day 4 and are gone by week 2.

Fig. 10.2 A typical looking penis just after circumcision. The mucous membrane covered glans is glossy red, and the cut skin edge lies near the coronal sulcus. A surgical marker (*purple line*) was used prior to circumcision to mark the level of the coronal sulcus

As the swelling begins to subside, the border between the glans and mucous membrane becomes more apparent – revealing the coronal sulcus. This is apparent by the end of the first week (Fig. 10.6). By the end of the second week, the swelling is mostly resolved, the exudative patches are usually gone, and the penis takes on a more "typical" appearance (Fig. 10.7). In the mature penis, after puberty, the mucous membrane remnant flattens and becomes the thin

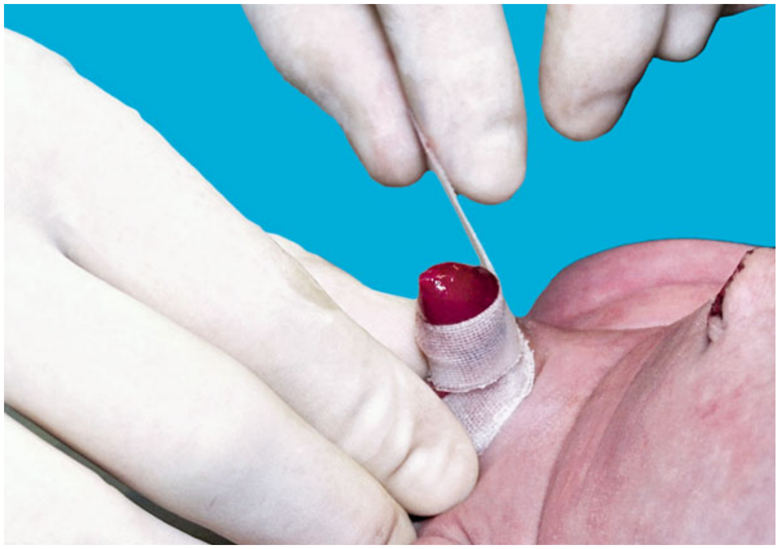

Fig. 10.3 Stabilizing bandage. With a newborn circumcision, where the skin edge is not sutured or glued, it is advantageous to wrap a 0.5 × 8 (folded 1 × 8) in. petrolatum gauze around the shaft to stabilize the wound. This has an added advantage of quelling any postcircumcision hemorrhage

Fig. 10.4 Protective bandage. With a newborn circumcision, a protective cotton gauze with ointment (e.g., Vitamin A&D ointment) for the first 24 h helps prevent additional irritation from diaper movement and messy bowel movements

lighter skin just behind the corona. The border between the mucous membrane and the penile shaft skin appears as a darker band in the mature penis. Minor phases of healing will continue for the next few months.

Overall, the healing of a newborn circumcision is a rapid process that is mostly complete by the time the child is brought in to his primary care provider at 10–14 days.

Remember, healing is not a precise process and can vary widely from patient to patient over time. A circumcision that looks perfect with a smooth mucous membrane remnant on the second week could have a fluffy remnant by the second month or may have formed new attachments to the glans. For the most part, circumcisions heal over time and by the end of puberty most are in very good shape.

Fig. 10.5 Two days post circumcision. Most swelling is seen in the ventrum and a yellowish translucent exudate has formed on exposed mucous membrane

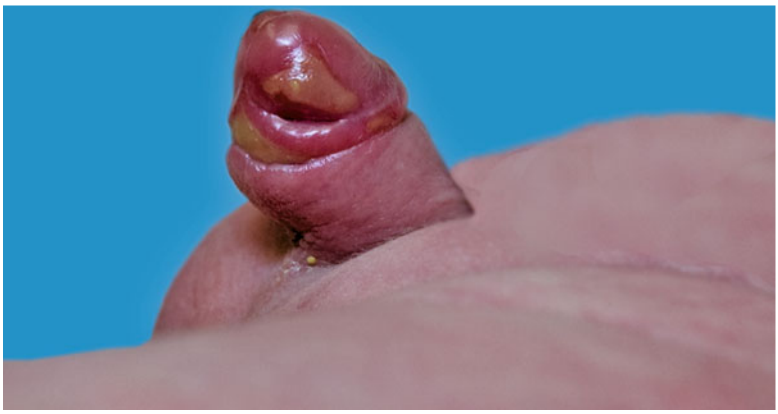

Fig. 10.6 One week post circumcision. Much of the swelling has subsided and islands of solidified exudate remain

Fig. 10.7 Two weeks post circumcision. A further reduction in swelling. Essentially all exudative patches are gone

Bandaging After the Newborn Circumcision

The bandaging and dressing placed after a newborn circumcision is another important step in the procedure. There are three objectives to proper bandaging:

- To promote the correct apposition of the cut edge of the foreskin along the penile shaft
- To prevent and monitor for hemorrhage
- To optimize infant comfort with diaper changes

The correct apposition means that the cut edge of the foreskin lies along the penile shaft just below the coronal sulcus. This is the purpose of the circumcision – to remove the foreskin such that the entire glans penis including coronal sulcus is revealed. To achieve this desired cosmetic result, the correct amount of foreskin needs to be removed. The correct amount of foreskin is the same regardless of the parent's request, the child's religion, or the practitioner's technique. It is the amount that just reveals the glans in its entirety, but does not denude the shaft of the penis.

Sometimes, even when the circumcision is done well, the cut edge of the mucous membrane will heal above the corona over the coming weeks. It may even seem that the mucous membrane is regrowing. Sometimes, despite proper technique or because too large a bell was used with the Gomco, the cut edge of the foreskin and the penile shaft skin hang loosely on the shaft, bunched up near to the base; essentially, partially de-gloving the penis. Proper bandaging can help to minimize these issues.

After circumcision with a Gomco, Mogen, or AccuCirc clamp (this does not apply to the Plastibell) a 0.5 in. (1 in. folded over) by 8 in. petroleum gauze is wrapped around the shaft of the penis (see Fig. 10.3). Leave a tail to the gauze so that it can easily be removed later (see Fig. 10.4). The key concept here is to wrap it snugly around the shaft of the penis only so as to provide some pressure and encourage the cut edge of the foreskin and mucous membrane to heal in the proper location beneath the corona of the glans, that is, it serves to initially stabilize the wound. This long, thin strip of petrolatum gauze does not need to lay on the glans itself. Note, this strip of gauze should not be wrapped too tightly so as to cause ischemia or obstruct urination. Some older texts discuss the use of sutures to address the issue of a partially de-gloved penis. While using sutures is acceptable, it should only be done if the practitioner has experience with suturing the newborn penis. Sutures can frequently leave fistulas – especially if the urethra is transected ventrally [1]. Proper bandaging can avoid the need for suturing.

The other advantage of placing the 0.5 in. by 8 in. petroleum gauze along the shaft is that it provides one of the first lines for the management of post-circumcision hemorrhage. By wrapping the bandage around the shaft, as opposed to the glans, a moderate amount of pressure is applied. Also, the petroleum acts as a thick barrier that slows the bleeding, particularly at the ventral frenulum.

The petroleum gauze usually falls off on its own but should be removed after 24 h. Oftentimes it falls off with one of the initial diaper changes. If there were no issues with skin apposition or hemostasis, then it does not need to be replaced, which is almost always the case. If the gauze does need to be replaced, do so with a bit more tension so that it does not dislodge again.

After the petroleum gauze is wrapped around the penile shaft up to the coronal sulcus, a 3 × 3 (or 4 × 4) in gauze with a goodly amount of a petroleum ointment (e.g., Vitamin A&D ointment) is placed over the penis. This serves as a protective bandage to prevent unintentional irritation from diaper movement or the unpleasant management of a messy bowel movement. The purpose of the ointment is to provide a moist environment for healing and to prevent irritation to the glans when the gauze is removed. A 3 × 3 or 4 × 4 in. gauze is used so that if there is any significant amount of bleeding it will collect and form a clot within the gauze. If no gauze is used and there is bleeding, the blood may mix with urine and appear to be a greater quantity than it actually is. Alternatively, without gauze, if there is significant bleeding, it can be rapidly absorbed into the diaper and mislead the practitioner to underestimate the actual blood loss. Once again, the ointment acts as a natural barrier that enhances hemostasis and eases infant discomfort with diaper changes.

Note: Routine use of antibiotic ointment is not necessary and only encourages bacterial resistance to antibiotics. We recommend non-perfumed Vitamin A&D ointment or plain petrolatum (e.g., Vaseline) ointment. We encourage parents/caretakers to use ointment from a new small tube and not from an old tube or tub for wound care. To that end, along with written care instructions, we provide the parents with ointment packets for the aftercare.

Aftercare to the Newborn Circumcision

Consistent aftercare instructions to the parents by nursing and medical staff, as well as written instructions can help reduce a lot of anxiety surrounding the care and course of healing of the recently circumcised newborn penis. Setting proper expectations of how the stages of healing proceed following a circumcision can prevent unnecessary and inappropriate use of emergency services. In order to be able to set these expectations, it is fundamental to have a proper understanding of the healing phases of a circumcised penis as discussed earlier in this chapter.

Regardless of which technique – Mogen, Gomco, PlastiBell, etc. – was used to circumcise the infant, the goal immediately after the procedure is to achieve and maintain the comfort of the newborn. Once bandaging is complete, remove the leg restraints and place a snug disposable diaper on the child. Disposable diapers are preferred during the first week because they absorb urine and minimize contamination of the circumcision site. Then dress the child and place him in a private room with the parent. Encourage the parent to feed the child immediately after the procedure if the child is not calm.

A Word on Soothing the Infant

Often, a good outcome is related to a parent's experience as much as it is to the quality of the circumcision. A screaming, inconsolable baby may leave something to be desired souring confidence in the practitioner. Thus, being able to administer an effective block, making use of a sucrose pacifier (before, during, and after the procedure), and knowing how to sooth an infant are part and parcel of a good circumcision. The first two are covered in Chapter 7. Soothing a baby is an art form that must be taught from generation to generation. The parents must be taught and the practitioner, nurse, or medical assistant must teach. Not all babies are the same but here are some good places to start:

- Most babies like to be swaddled (stretch cotton thermal blankets are particularly effective) especially following circumcision as excessive leg movement can irritate the fresh wound. Likewise, do not put the baby in a sitting position for 24 h (except in the car seat for the ride home); this only tugs on the penis.
- Nurse the baby soon after the procedure (unless he prefers to sleep – then let him sleep). Sometimes it is helpful to continue using the sucrose pacifier until the nursing begins. Remember, once the baby is worked up, it is difficult to initiate nursing.
- Sing or hum to the baby in a soft low tone; even a well said poem will work. This is something that seems to have fallen out of favor due to modern sensitivities – but it works, has been practiced for millennia, and should be encouraged.
- Hold the baby away from the body in a prone football hold or in a supine two-handed hold. While doing this, rock the baby in a very slow, purposeful pitch motion (do not increase or decrease the frequency in response to crying). This is very effective since the rocking is slow and not based on the parent's anxiety (and is why the baby is held away from the body), that is, most parents of a crying baby seem to rock to sooth themselves, at their pace, as much as to sooth the baby.

Immediately Following the Circumcision

- Aim to keep the infant comfortable.
- Examine for bleeding at 20–30 min after the procedure. Do this gently to minimally disturb the child and the bandaging. Simply look in

from both sides of the diaper at the level of the thigh and visualize the gauze to see if it is blood soaked. Do not open the diaper unless the gauze is blood soaked. By opening the diaper, the bandage and any healthy clot formation may be disturbed. The infant will also experience greater discomfort. Alternatively, if there is any concern about ongoing hemorrhage, do not hesitate to open the diaper and remove the dressing. To open the diaper, carefully peel the top front rim back with one hand while you anchor the gauze with the other. Only remove the gauze if there is a sign of active bleeding lest you risk dislodging a good clot.
- Optionally, provide acetaminophen if not already done prior to the circumcision (see Chap. 7).
- Review the aftercare instructions with the parent (e.g., something that covers the essentials of the following two sections).

During the First 24 h Following the Circumcision

- It is not necessary to have the infant observed until successful urinary void. It is sufficient to advise the parents that if a wet diaper has not been produced within 12 h of the procedure, to notify their provider [2]. If the circumcision is performed after the first 4 days of life, the infant should be expected to void within 6–8 h.
- Acetaminophen may be administered prior to circumcision and may be repeated for up to 24 h after the procedure [3]. While not based on any studies (as it has not been studied), we do not suggest further dosing with acetaminophen; that is, within the first 24 h it is unlikely that an infection will develop, so acetaminophen would not mask the symptoms of hyperthermia. After 24 h, the infant should no longer require acetaminophen for pain control, and though rare, infection is a possibility.
- On the first day, maximize comfort by keeping the legs swaddled as much as possible. Time in the infant car seat should be minimized to the drive home from the clinic or hospital.
- *Proper wound care in the first 24 h entails*: Changing of the gauze that is sitting on the glans penis should happen about every 4 h. Ideally this can coincide with a routine diaper change. With each dressing change instruct the caregiver to:
  1. Wash their hands thoroughly.
  2. Squeeze a mound of ointment (the size of a quarter) onto the center of a sterile 3 × 3 in. cotton gauze square. Non-fragranced ointment should ideally be provided by the clinic or hospital. Over-the-counter ointment may be perfumed and could irritate the healing penis.
  3. Remove the old diaper by pealing it back with one hand while using the other to secure the current gauze pad, clean any mess (except around the penis itself), and place a new diaper. Avoid using premoistened towelettes that contain alcohol and can irritate the penis.
  4. Remove the old gauze square by gently pulling up and out on any one of its four corners. Explain to parents that the first couple of gauze squares will be stained red. This is normal and represents only a drop or two of dried blood reconstituted with urine.
  5. Apply the new 3 × 3 gauze with the mound of ointment placed directly over the head of the penis. Gently squeeze to spread out the ointment.
  6. Close the diaper and relax.

This type of aftercare requires that the parent or caregiver is sent home with adequate supplies of ointment and gauze squares. Usually six of each should suffice.

Also explain to the parent that the 8 in. petroleum gauze wrapped around the shaft is likely to fall off on its own during the first few diaper changes. If it is still in place after 24–48 h, they can easily unwrap it. Warm water may help if the gauze has hardened.

If the infant has a bowel movement soon after a dressing change (within 2 h), simply change the diaper without touching the dressing. It is unlikely that any fecal matter will penetrate the large barrier of ointment.

On Days 2–7 Following Circumcision

- The penis should no longer be tender to touch.
- Parents should be looking for signs of infection (hypo/hyperthermia, poor wound healing, streaking erythema, frank pus).
- Acetaminophen should no longer be routinely administered.
- With each diaper change, instruct the caregiver to:
  1. Wash their hands thoroughly.
  2. Remove the old diaper, clean any mess, and place a new diaper.
  3. A very thin layer of ointment should be applied over the entire glans penis. This keeps the healing glans member from sticking to the diaper. Gauze is no longer needed.
  4. Close the diaper.
- Sometimes, when the apposition of the skin or mucosal edge of the circumcision is encroaching onto the coronal sulcus, especially in children with significant suprapubic fat pads, it is necessary to instruct the parent to reduce the remaining foreskin to just below the sulcus by placing gentle downward pressure at the base of the penis and then dabbing some petrolatum ointment on the coronal sulcus. While there are no data to support this, it may encourage the cut edge to heal properly below the corona.

All infants should ideally follow-up with the provider who performed the circumcision, or primary care provider, in 10–14 days to ensure appropriate healing.

Bandaging and Aftercare for the PlastiBell Technique

When bandaging the newborn penis that has just undergone circumcision with the PlastiBell, all that is necessary is a 3 × 3 in. gauze with ointment. Similar to the Mogen and Gomco techniques, having it in place allows for easy assessment of blood loss in the immediate post-circumcision period when a routine check for hemorrhage is performed. The ointment touching the exposed glans penis also provides a moist environment for healing and minimizes discomfort with diaper changes. After 24 h, all that is needed is a bit of ointment directly on the glans penis until it has healed.

Discharge the infant with the bell part of the device still attached. The remaining foreskin, having lost its blood supply, will fall off with the bell in 5–8 days, completing the procedure. If the device does not fall off during this interval, the parents should notify the provider promptly. Sometimes edema will trap the plastic ring on the shaft of the penis, making it necessary to cut the ring off using a guide and ring cutter. Venous congestion and necrosis can occur if the ring slips behind the glans onto the penile shaft. Parents should notify the physician immediately if this occurs. Another potential complication is knot-slippage prior to 48 h, which can result in early separation of the device and bleeding.

While it may seem that there is less involved in the aftercare of a PlastiBell circumcision, this does not necessarily put parents more at ease. Going home with a part of the circumcision device still attached can be discomfiting to some caregivers.

All infants should ideally follow-up with the provider who performed the circumcision, or primary care provider, in 10–14 days to ensure appropriate healing.

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11 Management of Acute Complications

Assaf Yosha, David A. Bolnick, and Martin Koyle

Editors' Note
Most complications of newborn circumcision can be satisfactorily remedied with proper management. Therefore, it is our opinion that all practitioners of neonatal circumcision should have at least one pediatric urologist, with their contact information readily available, that they can consult in an emergency.

This chapter is intended to serve as a guide to the prevention and management of acute complications in newborn circumcision. There are no absolute right or absolute wrong answers, although common sense can usually point to the correct direction. Sometimes complications are foreseeable and preventable and sometimes compounding factors present with undesirable consequences. Furthermore, management of acute complications is rarely supported by evidence-based data, given the rarity of these events. Rather, the recommendations herein are primarily based on the accumulated years of experience of the authors.

The overall rate of complications with routine newborn circumcision is extremely low at 0.2–0.34% [1–4]. The most common complications include hemorrhage and infection, as with any cutaneous procedure. Additionally, there are some procedure-specific complications that include glans avulsion, equipment failure, shaft denudation, the discovery of underlying anomalies, and others. The practitioner of newborn circumcision should be familiar with the complications of the procedure and the initial steps in the management of these complications.

Hemorrhage

If one does enough circumcisions, eventually one will run into a case of excess bleeding from the circumcision site. Before reviewing the treatment of these cases, we will review some of the basic

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steps in *preventing* hemorrhagic complications of the newborn circumcision. Most bleeding can be prevented by good technique, review of the circumcision equipment, and patient selection (see Chap. 8).

Prevention

Vitamin K Injection: Owing to the immaturity of the newborn liver, it is standard practice in the USA that all newborns receive a vitamin K injection. The evidence supported purpose of this injection is to prevent cases of vitamin K–deficient bleeding such as intraventricular hemorrhage, gastrointestinal bleeding, and cutaneous bleeding. This has even been studied in the setting of newborn circumcision with a protective effect having been found [5].

Hyperbilirubinemia: Following the same logic as with vitamin K, an immature liver puts a newborn at risk for hemorrhagic complications. Depending on the pathophysiology, most hyperbilirubinemia in neonates is at least partially due to the liver's inability to handle a higher load of circulating bilirubin. Therefore, high bilirubin levels can be a marker of liver immaturity, or if dealing with the conjugated type of bilirubin, a marker of a liver disorder. Yet any correlation between an increased propensity to bleed associated with hyperbilirubinemia when using a clamp techniques is anecdotal. That said, one can take the approach to avoid the procedure in the setting of significant hyperbilirubinemia – at least as a precautionary measure. A good rule of thumb is to delay a circumcision if the hyperbilirubinemia requires phototherapy or has been deemed non-physiologic. Most hyperbilirubinemias resolve well within the 6-week window of a safe newborn circumcision.

Evidence of Clotting Disorder: The presence of neonatal petechiae, a family history of hemophilia, maternal autoimmune thrombocytopenia, or maternal antiplatelet antibodies, all confer risk to the child of bleeding in the neonatal period. These newborns, should have laboratory evaluations prior to circumcision looking for an underlying coagulopathy.

Avoid the Frenulum: When dissecting the adhesions between the inner mucous membrane layer of the foreskin and the glans penis, avoid the region of the frenulum (around 6 o'clock). The frenulum contains some arterioles that are notorious for bleeding. A circumcision with a good cosmetic outcome does not need to have this region instrumented.

Proper Review of Equipment: The main hemostatic action of the Mogen and Gomco clamps is derived from their ability to completely crush the skin within the clamp. The two blades of the Mogen clamp should align perfectly without allowing light to pass through when in the clamped position. For the Gomco clamp, it should be assembled prior to application on the penis to make sure that (a) the pieces all match and (b) there is no light passing between the bell and the baseplate. The Gomco is known for wearing down and changing in size slightly with time, as metal is malleable and there is considerable pressure placed on it with each use. The hemostats should be checked as well, especially if a dorsal crush is to be made. The PlastiBell and AccuCirc devices are disposable and, hence, do not require as careful an inspection. That said, one should make sure the packaging and content look in order and that the proper size unit is selected for the patient.

First 6 Weeks of Life: Though some practitioners can safely perform a newborn circumcision up to about 12 weeks, it is the recommendation, based on the experience of the authors, that most circumcisions be performed before the sixth week of life. After that, circumcisions tend to be complicated more often by bleeding, inadequate pain control, and child movements/awareness.

Proper Bandaging: There is no one-size-fits-all to bandaging. The authors have found that with the clamp techniques, the application of a petrolatum (Vaseline®) gauze wrapped around the penile shaft along the cut edge provides an initial pressure for clot formation to occur. It serves as a nominal pressure bandage. Other techniques, such as the use of Dermabond® like sealants are gaining popularity. If nothing else, a square gauze bandage with a petrolatum ointment serves to protect the exposed wound from adhering to the movable diaper.

Management

The following section covers how to deal with bleeding once it has occurred. It is advisable to be prepared for any potential problem and have proper equipment/supplies available in anticipation of circumcision complications prior to beginning the procedure itself. For example, the authors keep a separate hemostasis packet in the procedure room where the circumcisions are performed. It can also be helpful to post a step-by-step protocol for other providers and nurses on how to manage the bleeding circumcision. A sample protocol can be found at the end of this chapter. What you will notice below is that use of silver nitrate sticks are not mentioned as these have been reported to cause tattooing of the skin. If a metallic clamp is positioned on the penile structure, electrocautery and thermocautery should be avoided at all costs. If no clamp is present, either can safely be applied on localized bleeders. We describe the use of suturing, but this should be a last resort. If hemostasis is not achieved with the techniques described below, a coagulopathy workup should be considered.

Direct Pressure (Clamp Techniques)

The first step with bleeding at any site is always direct pressure. This stems the actual flow of blood and allows time for the patient's innate clotting system to take effect. Remember that the newborn has relatively low pressure and, hence, a simple pressure dressing often suffices in controlling a bleeding wound. Additionally, most bleeding will be at the undersurface of the glans from the frenular artery, so ideally the site of bleeding can be identified.

For minor bleeding, a 0.5 × 8 in. (1 × 8 in. folded) petrolatum (Vaseline®) gauze can be wrapped snugly around the shaft of the penis, making sure to cover the cut skin edge and the frenular region (Fig. 11.1).

Next, if needed, pressure can be applied directly by holding the penis between the thumb and index finger. Hold pressure for at least 2 min and reevaluate without removing the underlying dressing, so as to not disturb any formed clots. If on reexamination bleeding continues, then reapply pressure for a longer period of time, even up to 10–20 min. This simple step should effectively address most minor bleeding after circumcision.

If successful, leave the petrolatum-wrapped gauze and cover with a square gauze with a generous helping of petrolatum ointment, for example,

Fig. 11.1 Petrolatum wrap. This is a standard wrap that works well for all clamp circumcisions. To control bleeding or in the case of degloving, the wrap should be applied a little tighter – but not so tight to prevent urination

Fig. 11.2 Petrolatum cover. Using a protective cover between the fresh wound and a moving diaper helps to prevent additional swelling and bleeding

Vitamin A&D ointment (Fig. 11.2). This prevents a clot from sticking to the diaper and disruption of a clot from diaper movement.

Direct Pressure (PlastiBell Technique)

The use of the PlastiBell technique provides a unique challenge to achieving hemostasis by direct pressure. With the PlastiBell, bleeding is invariably frenular. Unfortunately, the plastic ring itself may prevent direct pressure onto the frenular region.

Qazi et al. describe a simple technique for achieving hemostasis after the use of a PlastiBell. The penis is stabilized by gentle traction over the PlastiBell. Using forceps, a strip of ribbon gauze, about 1 × 2 cm, is introduced between the PlastiBell ring and the dorsal aspect of the glans. The dorsally placed gauze pushes the ventral aspect of the glans against the ring and compresses the frenular vessels. Bleeding should stop immediately. The gauze usually falls out when the child passes urine. The temptation to pack an excessive length of gauze should be resisted lest the urethral meatus become obstructed [6].

Applied (Chemical) Hemostasis

Surgicel®, Gelfoam®, and BioSeal® or WoundSeal® (was QR®) are various agents that have been successfully used in the circumcision setting to provide hemostasis. These agents should be applied directly to the bleeding site. Pressure can and should be applied on top of the hemostatic product. With Surgicel, take care not to apply the agent circumferentially around the penis. With BioSeal powder, take care not to accidentally introduce it into the urethra. Fibrin glue products have been used in the setting of hemophiliac patients.

Topical epinephrine is another form of applied hemostasis. Epinephrine 1:1,000 or lidocaine with epinephrine can be applied to the bleeding edge using a cotton tip applicator or moistened gauze. This is perfectly safe and effective to use on the penis in this topical manner. Make sure not to leave the glans penis covered in epinephrine-soaked gauze for an extended length of time as this has been associated with heart failure, and make sure to keep epinephrine vials separate from lidocaine vials used for the local block. Topical epinephrine is not only effective but also cheaper than the other forms of applied hemostasis. For those who are experienced in this method, injecting a small bleb of lidocaine with epinephrine 1:200,000 (or 1:100,000) into the frenular region can be very effective at quenching a frenular bleed.

Local Crush

If the bleeding is from a localized area on the edge of the cut skin, away from the frenulum, you can try to apply a small (<2 mm) 30 s crush with a hemostat.

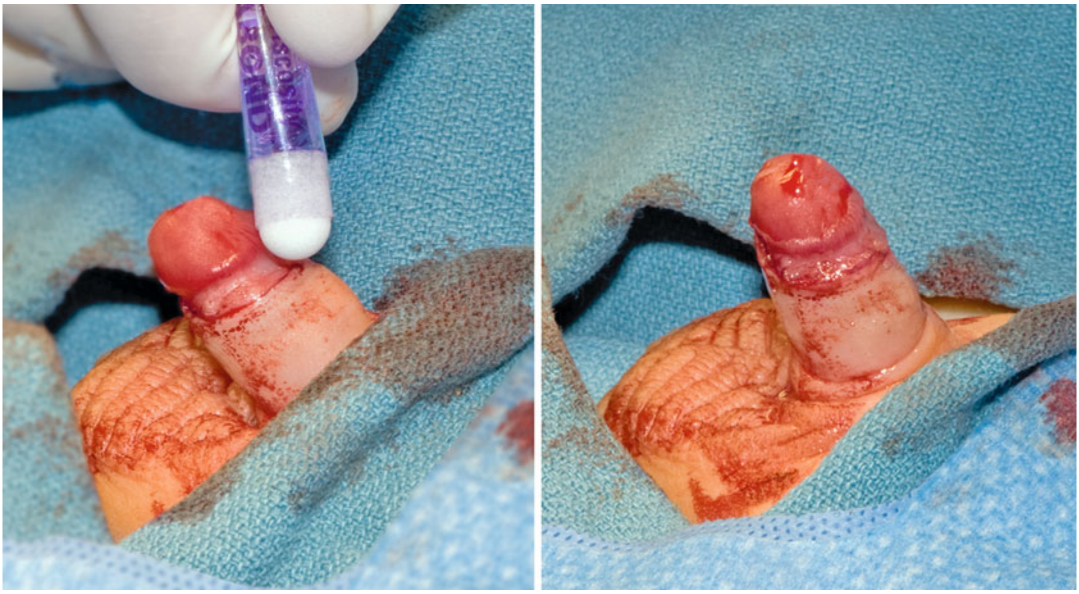

Fig. 11.3 Application of Dermabond® sealant. (*Left*) Dermabond is being applied circumferentially to seal the circumcision wound and suppress bleeding. (*Right*); Circumcision wound is sealed without further bleeding

Sealants

Caveat: Agents such as Dermabond® and Histoacryl® have grown rapidly in popularity in recent years. They are now commonly used in emergency departments, operating rooms, and pediatric providers' offices. Their safety and efficacy have been demonstrated for use on skin incisions and trauma-induced lacerations of low skin tension. Their use has also gained popularity with urologists performing circumcisions on children and adults (Fig. 11.3). Below we describe the use of tissue sealant as a way to achieve hemostasis for neonatal circumcision. Due to its ease of application and positive experience in the hands of practitioners it has been included here – despite the lack of studies confirming its safety and efficacy for this purpose and in this neonatal age group. From our standpoint, use of a tissue sealant for hemostasis is preferred to suturing – which has been associate with not infrequent complications.

2-Octyl cyanoacrylate (Dermabond®) or other sealants like *n*-Butyl-2 Cyanoacrylate (Histoacryl®) can be effectively used to suppress bleeding and seal a circumcision in the following manner:

(a) Pinch the shaft skin on the opposite side of the bleeding so that the skin, where the blood is emerging, lies taut and in the desired end location (i.e., just proximal to the coronal sulcus). (b) Clean the area of blood with gauze. If the site is still bleeding, pinch the skin tighter to apply more pressure. (c) Once the skin remains clean of blood apply a thin layer of sealants over one-fourth the circumference of the cut edge where the bleeding took place. (d) In 30 s, apply another layer. (e) Now gently release the pinched side and coax it into position. Once in position, apply a layer of sealant to the remaining three-fourths circumference of the cut edge. (f) In 30 s, apply another layer circumferentially around the entire cut edge. Care should be taken not to apply so much that it will drip down the penis. (g) Apply a gauze wrap and square as illustrated in Figs. 11.1 and 11.2.

Compression Bandage

A compression bandage can be achieved with any gauze that can be wrapped around the distal shaft circumferentially. Coban™ bandaging is convenient for this purpose (Fig. 11.4). Care should be taken to avoid compression of the urethra, in order to avoid urinary obstruction. Also, excessive compression can cause penile ischemia. Look for

Fig. 11.4 Application of compression bandage. Here the penis is wrapped in gauze (with a petrolatum ointment barrier) and then the Coban™ compression bandage is wrapped around that. Red Coban should be avoided

adequate perfusion to the glans complex after application of the bandage and monitor for urination. Consider also catheterizing temporarily with a 5–8 Fr catheter (a small feeding tube, suction catheter, or Foley all works well). This can be useful if bleeding has been excessive despite usual measures, or if waiting transportation until definitive evaluation and management by a specialist.

Sutures

Caveat: Suturing has long been practiced as a method of controlling post-circumcision bleeding. Yet suturing the penis comes with the potential of its own complications that must be weighed before considering this approach. First, if you have no experience in suturing the penis, we recommend that other techniques should take priority. Second, extra care must be taken when suturing near the frenulum and urethra as piercing the urethra or too much tension from a suture may lead to an urethrocutaneous fistula. Lastly, well placed, properly applied sutures can and do leave tracks (Fig. 11.5).

Placement of a few interrupted sutures can adequately achieve hemostasis, in particular, for frenular artery bleeding that persists despite attempting the above regimens of conservative management. A 6-0 (5-0 if 6-0 is not available) rapidly absorbable suture should be used. It is important to clear the field of blood as much as possible, since great care must be taken to avoid perforating into the urethra. Suturing along the penile shaft and around the glans complex should only be performed by experienced clinicians.

Infection

While not an immediate post-procedural complication of neonatal circumcision, infection is a subacute complication that is rare, but can be serious and even fatal if a necrotizing infection (Fournier's gangrene or necrotizing fasciitis) were to occur. More often than not, an inexperienced physician has mistaken the normal healing

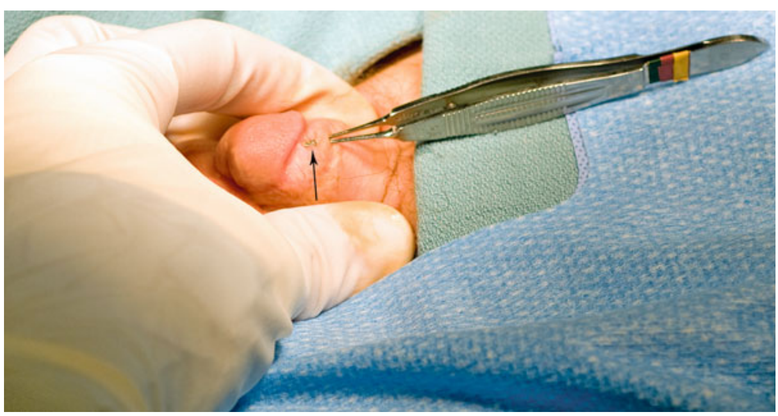

Fig. 11.5 Suture track. The track is demonstrated with the tip of the forceps passing through the track and emerging at the distal end (*arrow*)

process, which is marked by swelling and fibrinous exudates, as evidence of infection [7]. Chap. 10 reviews the normal healing phases of the newborn circumcision and is accompanied by photographs.

Nevertheless, while rare, the complication of infection is extremely serious as it can lead to sepsis, which itself can be fatal, necrotizing fasciitis, and meningitis in the neonate with a susceptible immune system [8]. There is some concern that circumcision with the PlastiBell device is associated with a higher rate of infection because its mechanism of action involves induced necrosis with a foreign body that remains in place after the procedure. One comparison article published in *Pediatrics* in 1976 demonstrated an infection rate of 0.72% for the PlastiBell, compared to 0.14% for the Gomco device. Both have very low and acceptable rates of risk [3]. Of note, the prophylactic use of topical antibiotics for the prevention of cutaneous infection is not recommended as it has not been proven to be effective and increases the rate of antimicrobial resistances.

Common Signs of Infection

- Significant or prolonged swelling, delayed healing, erythema (especially spreading), streaking, pus, malodor (Fig. 11.6)
- More ominous is a newborn child with evidence of necrotizing skin infection or systemic symptoms of sepsis; hypothermia or fever, lethargy and poor feeding, hypoglycemia

When an infection of the circumcision site is suspected, a physician should evaluate the patient without delay. If the degree of infection is mild and localized, then topical antibiotics and dressing changes are sufficient for treatment. If more severe, or if systemic illness is suspected, then a sepsis workup and administration of parenteral antibiotics is warranted. Though serious infections like the cases presented in Figs. 11.6 and 11.7 are rare, when they do happen, treatment delay is the enemy. Furthermore, any evidence of gangrene or spreading infection should prompt early pediatric urological involvement, since necrotizing infections may require surgical debridement (Fig. 11.7).

Urinary Retention and Tight Bandaging

Rarely after neonatal circumcision do we observe urinary retention from local compression secondary to site swelling or from excessively tight bandaging. That said, if an infant fails to urinate for 12 or more hours and/or at any time there are signs of ischemia of the glans, then any circum-

Fig. 11.6 Infection, status/post PlastiBell circumcision. Note the significant swelling, including the scrotum, the spreading erythema, and the pus at the circumcision site. This is an urgent situation that requires immediate action and a pediatric urology consult (Images courtesy of I. McAleer, M.D.)

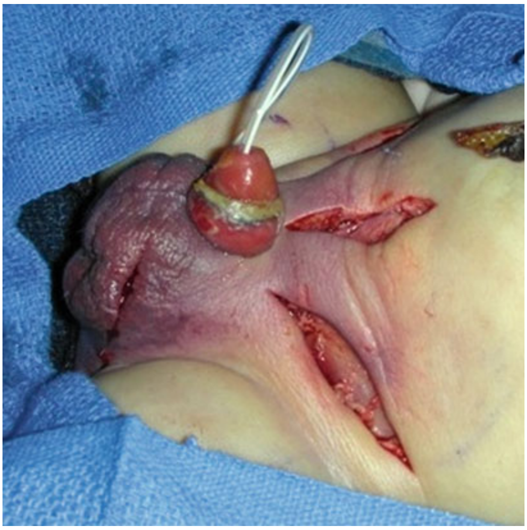

Fig. 11.7 Infection, debridement. Spreading infections often require urgent surgical interventions (Images courtesy of I. McAleer, M.D.)

ferential bandages must be removed immediately. If the glans does not pink up within minutes, a pediatric urology consult is in order.

If a newborn has not urinated for more than 12 h following circumcision (average time is 5.3 h, ± 2.5 h [9] and up to 12 h for breast-fed babies [10]), a physician should evaluate the child promptly. Make sure the child is not dehydrated and has been fed adequately; otherwise parenteral fluids may be necessary. Palpation, assessing for a full bladder, and, nowadays, a bladder scan, will determine the necessity for catheterization, a rare requirement.

Revealing Underlying Anomalies

With hypospadias alone occurring at a rate of one in 250 newborn males, along with other common urogenital anomalies (chordees, megameatus, torsion, etc.), it is inevitable that at some point during one's career that the practitioner of neonatal circumcision will come across one of these abnormalities. As discussed in Chap. 5, the presence of any significant anomaly should result in the deferral of circumcision and a referral to pediatric urology.

With a careful examination, most significant urogenital anomalies should be detected prior to circumcision. Nevertheless, many providers are shocked when they find hidden anomalies, like a subcoronal hypospadias, in the presence of a normal looking foreskin and external genitalia either during or after completing a circumcision. Usually, with an intact complete foreskin the variant of hypospadias will be a relatively minor form, such as a megameatus, where the defect is not noted until after the circumcision. In such cases, the circumcision does not lead to any harm. This variant represents only 4% of all hypospadias. We have also seen variants of epispadias, where the urethra opens on the dorsum of the penis and glans in patients with a completely formed foreskin. Virtually all other hypospadias variants have only a partial foreskin, that is, a dorsal hood, and hence the defect should be easily identified upon physical exam. Circumcision should not be attempted in these circumstances, even if the urethra is distal, as the urethra may be relatively rudimentary and lack spongy tissue. Circumcision in such a patient could lead to urethral damage. Moreover, the foreskin may be useful in subsequent urethroplasty.

While each pediatric urologist may have their own preferences, two recent small studies provide reassurance in this matter [11, 12]. In these studies, prior circumcision done on penises with a normal, intact prepuce did not complicate the repair of the revealed distal penile hypospadias or megameatus.

Management When Discovered

After a Dorsal Slit: If a dorsal slit has been made and reveals the underlying abnormality, STOP at this point. Attend to any issues of hemostasis, leave the prepuce divided, inform the parents, and refer to pediatric urology. Though not urgent, the child should be seen within a couple of weeks should the parents prefer to complete the circumcision if cleared by the urologist.

After the Circumcision: If the circumcision has been completed and an underlying mild abnormality is detected (e.g., megameatus), then refer the infant to pediatric urology once the circumcision has healed. If a significant defect (e.g., hypospadias or epispadias) is detected, consult urology urgently and maintain the excised foreskin in iced saline (place the foreskin in a container of saline that is packed in ice).

Injury to Glans Penis (Accidental Crush or Amputation)

Amputation is one of the more dreaded complications of newborn circumcision and one that many parents fear most when contemplating the procedure for their child (Fig. 11.8). In the largest recent study looking at complications from neonatal circumcision, the rate of all penis- and glans-related injuries from all the techniques combined was 0.04% (56 cases of 130,475, only one of which required penile reconstruction) [3]. Injury to glans is most prevalent with the Mogen clamp technique compared to the other techniques, but still rare. This is because the Mogen clamp technique does not allow for visualization of the glans penis prior to circumcision.

Management of an injury to the glans complex depends on the extent and location of laceration or amputation. The first step in management is to control any bleeding with direct pressure and then to assess the severity of the damage. If the urethra or its meatus is found to be injured, a pediatric urology consult should be obtained as soon as possible. If a large or significant portion of the glans has been avulsed and may require reconnection or reconstruction, then again, a STAT pediatric urology consultation should be obtained. A urologist may attempt to repair the amputation at the time of injury. Preserve the amputated portion of the glans in iced saline (within a saline container packed on ice).

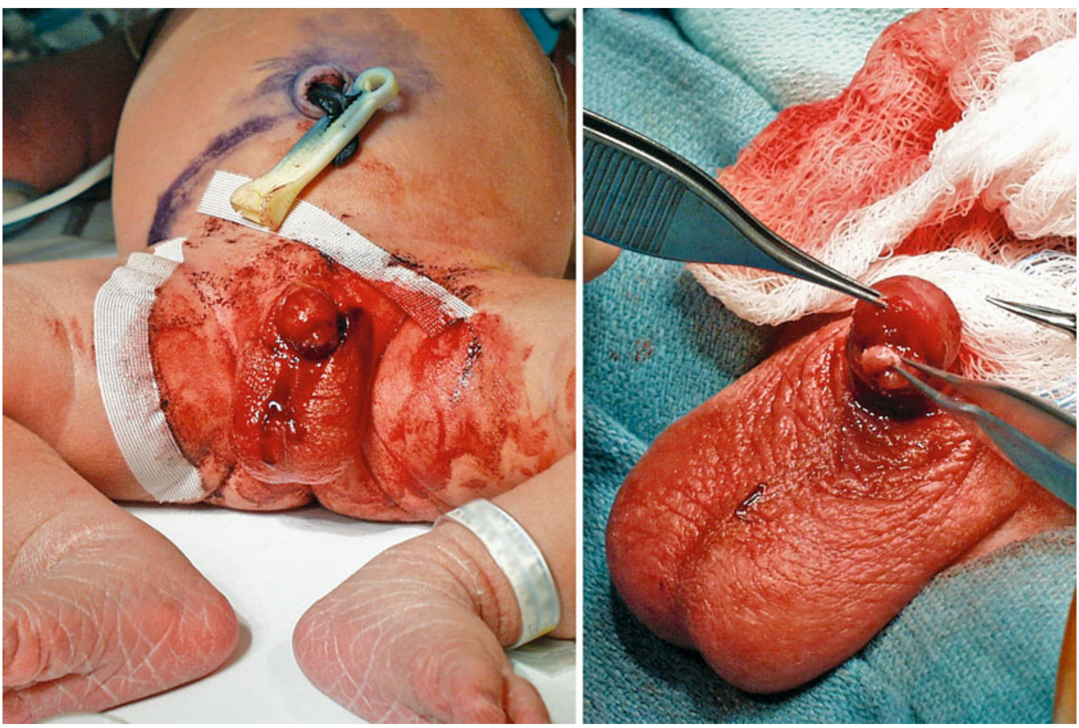

Fig. 11.8 Complete glans amputation, status/post Mogen clamp circumcision. Requires urgent pediatric urology consultation (Images courtesy of Seattle Children's Hospital, Department of Urology)

Crush injury to the urethra by a misplaced hemostat should be referred to a pediatric urologist for evaluation and any needed correction.

Degloving, Denuding, and Avulsion of the Scrotum

Degloving and denuding are often used interchangeably. Here, we view degloving, sometimes referred to as the "baggy pants" phenomenon, as the consequence of loosely attached penile skin, where following a proper circumcision, the skin drops like a pair of unbelted pants. In contrast, we view denuding as the removal, beyond the foreskin, of penile skin leaving the underlying fascia bare.

Degloving

Degloving occurs after a properly performed circumcision where, when the clamp device is removed, the cut edge of the foreskin seems to slip partway down the shaft of the penis giving the appearance of excess foreskin removal. In an attempt to achieve proper skin apposition of the cut foreskin edge to just below the coronal sulcus, a 0.5 × 8 in. (1 × 8 in. folded) petrolatum gauze may be wrapped snugly around the shaft of the penis to hold the penile shaft skin in place long enough to fix itself at an acceptable position. Take care not to make the bandaging excessively tight.

Alternatively, you might consider using a skin sealant. More and more specialists are using sealants like 2-octyl cyanoacrylate (Dermabond®) or *n*-Butyl-2 Cyanoacrylate (Histoacryl®) to obtain the desired apposition with excellent results [13]. Gently manipulate the cut edge to obtain good apposition just below the coronal sulcus. Apply a single thin circumferential layer of sealant over the cut edge, wait about 30 s, and then apply another layer.

Some practitioners have placed sutures to "tack up" the cut edge high on the penile shaft, but this should not be routine or done by inexperienced personnel. Additionally, it is not clear that this immediate adverse outcome translates into an undesirable cosmetic outcome after puberty. Indeed, most of the time, the shaft and mucosal tissue heal fine without sequelae.

Denuding

Denuding is truly the removal of cutaneous (and sometimes fascial) penile tissue beyond the foreskin to include the skin covering the penile shaft (Figs. 11.9 and 11.10). If mild denudation (less than 1 cm with at least 1 cm of penile skin remaining) has occurred, then bandage the penis and

Fig. 11.9 Denuded penis, status/post Gomco clamp circumcision. This can usually be prevented by marking the level of the coronal sulcus in advance and then aligning the crush zone with the mark (Image courtesy of D. Tomlinson, M.D.)

Fig. 11.10 Denuded penile shaft. About 1 cm of penile skin has been removed and about 1 cm remains. Pediatric urology consultation is in order (Image courtesy of G. Hudson, M.D.)

Fig. 11.11 Urethral Fistula following circumcision by Gomco clamp with avulsion of frenular region. Pediatric urology consult recommended. (Image courtesy of G. Hudson, M.D.)

make sure to keep the denuded area moist with topical antibiotics or petrolatum ointment. The child should have follow-up to assess the formation of cicatricial or secondary phimosis. Penile shaft skin that has healed by secondary intension is often indistinguishable from the normal skin of the penis [7]. In the case of a more severe denudation of the penile shaft skin, a pediatric urology consultation should be obtained as soon as possible. Treatment may include possible skin grafting. The foreskin should be kept in iced saline (within a saline container packed on ice).

Avulsion

Another variation of denuding comes with the avulsion of excess shaft skin and possibly even scrotal tissue on the ventral side of the penis in the setting of penoscrotal webbing or the avulsion can be limited to as small an area as the frenular region and still cause a significant fistula (Fig. 11.11). The presence of penoscrotal webbing, an often overlooked urogenital anomaly, is discussed in more detail in Chap. 5. The treatment of this type of avulsion is similar to penile shaft denuding and depends primarily on the extent of the injury. Thus, when in doubt, consult pediatric urology.

Missed Excision of Inner Mucous Membrane Layer

The foreskin is comprised of two layers; the external skin and the inner mucous membrane (see Chap. 4). Occasionally, during the process of separating the foreskin from the glans, rather than dissecting into the prepucial space, a false space is created between the two layers of the foreskin; leaving behind a mucous membrane layer on the glans (Fig. 11.12). If this goes unrecognized early in the procedure, then later, when the foreskin has been excised, the inner layer may be left behind. This is not appreciated until the clamp device is fully removed. The question becomes, what does one do at this point? There are a few options and it truly depends on the operator's level of experience and comfort. What should not be done is to assume that the procedure is complete without further intervention. The inner layer will keratinize and

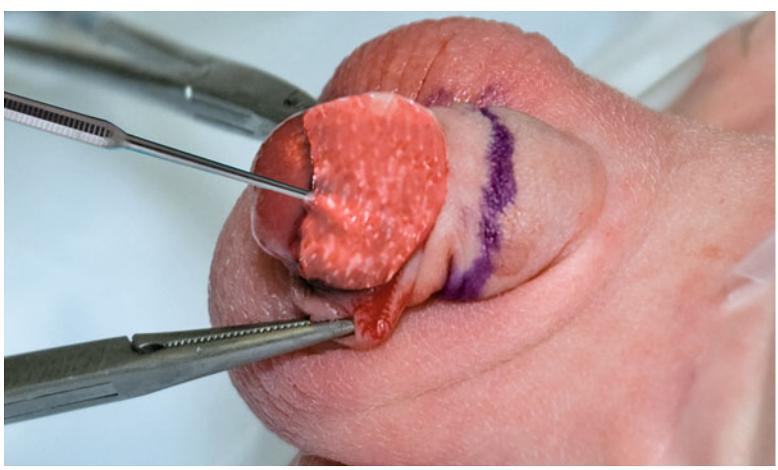

Fig. 11.12 Remnant mucous membrane. This must be dissected free and removed before circumcision is complete

take on the appearance of foreskin if left untouched. Therefore, one of the following options should be considered:

(a) If the procedure was less than straightforward to begin with, and the operator is less experienced, then it would be prudent to consult a pediatric urologist either at the time of the procedure or for correction after the newborn has healed from the initial procedure.
(b) Another option is to create a dorsal slit in the remaining mucous membrane layer of the foreskin and then simply roll it down behind the coronal sulcus without excising it. This is the routine practice for newborn circumcision in some cultures.
(c) Or lastly, if the provider feels competent, one can re-circumcise the inner layer immediately after it was discovered to have been missed with the initial procedure. This can be done with reapplication of the Gomco or Mogen clamp. It can also be done freehand with a circumferential crush with a hemostat and excision with scissors.

PlastiBell-Related Issues

The use of the PlastiBell device is associated with a few unique management issues. One of the biggest issues is that parents are often not given clear care instructions with warning signs of the complications unique to the PlastiBell. Since the patient goes home with the PlastiBell in place, it is imperative that parents/caretakers know how to care for the wound, what to expect (changes associated with the necrotizing remnant), and most importantly what to watch out for – since the latter may require an urgent response.

Management of hemorrhage with the PlastiBell is discussed in the first section of this chapter.

Immediately after completion of the circumcision with the PlastiBell device, the remaining ring should be inspected to assure that it will not slide behind the glans penis. Should the ring slide behind the glans, a paraphimosis-like situation may occur where normal swelling of the glans then prevents the plastic ring from sliding back (Fig. 11.13). This can lead to venous congestion and ischemia of the glans penis and must be urgently rectified. Again, parents must be instructed about this potential complication and what to watch for.

On average, the ring of the PlastiBell should separate between days 3 and 8 after the circumcision of a newborn. If the ring has not separated by 12 days, then it may have to be removed by splitting it with a scissors or ring or bone cutter. On the flip side, the ring may separate early, prior to 48 h, which may result in hemorrhage or in incomplete necrosis of the tissue distal to the string (Fig. 11.14). In the latter case, a referral to a pediatric urologist for correction is recommended.

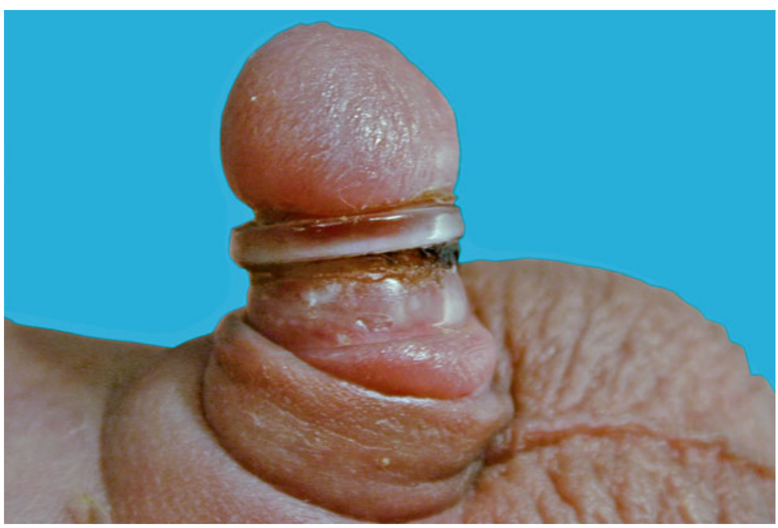

Fig. 11.13 PlastiBell complications. PlastiBell ring has slipped behind the glans. Penile shaft skin has separated from PlastiBell ring and is now midshaft and the underlying exposed fascia is swollen. Pediatric urology consult recommended (Image courtesy of A. Caldamone, M.D.)

Fig. 11.14 PlastiBell complication. PlastiBell ring has separated early leaving behind an unfinished circumcision. Pediatric urology consult recommended (Image courtesy of G. Hudson, M.D.)

Paraphimosis

Paraphimosis is a true urologic emergency that primarily affects the *uncircumcised* penis or the incompletely circumcised penis. It occurs when the foreskin is trapped in a retracted position behind the glans penis and cannot be easily reduced, causing a tourniquet affect (Fig. 11.15). This condition can occur at the time of circumcision when manipulation of the foreskin causes it to be retracted behind the glans and then the glans begins to swell. Initial manual reduction with gentle traction should be attempted by squeezing with sustained pressure on the glans. This can be particularly painful and, hence, sedation and/or local anesthesia are necessary. If this fails, then contact a urologist urgently to consider alternative methods for reduction before glans edema becomes severe and ischemia ensues [14]. Occasionally, wrapping the penis with Coban or gauze after applying granulated sugar (to create a hypertonic external environment to draw out the tissue fluid) will reduce the paraphimotic distal swelling prior to the pediatric urologist arriving. Furthermore, injection of hyalurionidase into the edematous prepuce has been reported to be successful and may avoid a dorsal slit.

Fig. 11.15 Paraphimosis. Notice the foreskin is rolled back and swollen. If unable to quickly resolve or there are signs of glanular ischemia, a pediatric urology consult is recommended (Images courtesy of Seattle Children's Hospital, Department of Urology)

Injection of the Penis with Epinephrine

Epinephrine injection is contraindicated in any anatomical region that lacks collateral circulation, such as the penis (nose, fingers, and toes). In the case of circumcision, this most often occurs when lidocaine with epinephrine is injected (instead of plain lidocaine). These lidocaine mixtures usually contain low concentrations of epinephrine (e.g., 1:200,000 or 1:100,000) and are not likely to create an urgent condition – though monitoring for an hour is recommended. On the other hand, accidental injection of a high concentration of epinephrine (e.g., 1: 1,000) can potentially be serious and demands more attention and monitoring (Fig. 11.16). Phentolamine, an alpha-blocker, has

Fig. 11.16 Epinephrine injection. Clear signs of ischemia. Pediatric urology consult recommended (Image courtesy of G. Hudson, M.D.)

been shown, on ischemic fingers, to reverse the vasoconstrictive effects of epinephrine [15]. Thus, if a high dose of epinephrine is accidentally injected into the penis, phentolamine should be utilized followed by a urology consult.

Adhesions, Inadequacies, and Retractions

Most complications of circumcision are likely not true complications and will resolve in time. Remember, penises come in all shapes, sizes, and constitutions, and individual healing is just as varied. Often the best treatment is parent education and reassurance.

Adhesions

Immediately following circumcision there may be a few adhesions left in the coronal sulcus. Some practitioners like to be fastidious and reduce these with a probe or hemostat tip. Others will just leave them and let nature do the work. There are no studies demonstrating an advantage of one approach over the other – yet too much probing an already sensitive mucous membrane may be more adverse than a few adhesions. That said, the presence of significant adhesions should be reduced.

Inadequacies

Many things can lead to an inadequate appearing circumcision (Fig. 11.17). Initially, too little foreskin may have been removed. No attempt should be made to correct this shortcoming until after the first surgical site has healed; and even then, most cases do not require addition surgery – just patience. Sometimes, a proper amount of foreskin is removed but the remnant mucous membrane regrows, thus, forming a new foreskin. This can happen even months after the circumcision. In most cases, these can be left and will resolve nicely after puberty; that is, once the penis starts to grow. A second circumcision may be requested by the parents, especially among Jews and Muslims where circumcision is a religious obligation; the latter being more demanding that the coronal sulcus be completely clear. Where this is reasonable it is fine to re-circumcise the child. Where this might lead to a shortage of penile skin, the practitioner should decline the re-circumcision.

Fig. 11.17 Foreskin remnant. Skin is clearly covering the greater part of the glans. As long as the penis can be easily revealed and the parents don't mind, no further surgery is required. Notice the characteristic fluffiness of the inner mucous membrane. This is seen in many circumcisions and usually resolves at puberty as the penis matures in size

Retractions

You finish a proper well-executed circumcision and at the 30 min exam to check for active bleeding, the penis has all but disappeared. You have a retracted penis (Fig. 11.18). At this time,

Fig. 11.18 The retracted penis. Here is a healthy penis in size and function that spends much of its day retracted

the best that can be done is to reveal the penis by gently placing downward pressure on both sides of the penis, and then rewrapping it as described in the bleeding section above. The goal is to have the penis heal without becoming stuck in a retracted position. Instruct the parents/caretaker how to reveal the glans penis for at least a month and to apply a petrolatum ointment with each diaper change. See the child within 10 days to determine the status of the healing circumcision. If at any time the penis is not easily revealed, or a secondary phimosis forms, the child should be referred to pediatric urology for assessment.

A comment about the retracted penis: Retraction can occur whether the penis is circumcised or not; it is just more apparent when circumcised. It is mostly a combined factor of the width/length ratio and the amount of suprapubic fat. Penis retraction occurs more so upon sitting, since that pulls in the penis. It occurs less as the penis starts to grow, following puberty, but can still occur into adulthood. Parents should be reassured, if the penis is easily revealed, that all is fine.

Sample ***CIRCUMCISION HEMORRHAGE PROTOCOL*** *Sample*

Note: Avoid use of electrocautery and silver nitrate (this can permanently stain the penis)

Step 1: Bandage Penis with Gauze Wrap

Wrap the penile shaft and circumcision edge (but not so tight as to inhibit urination) with a ½ x 8 inch petrolatum gauze (e.g., 1 x 8 inch Vaseline® gauze folded). ***Proceed to Step 2 if needed***

Step 2: Direct Pressure

Apply direct, continuous pressure for 2-3 minutes. Then inspect for hemostasis. If bleeding persists reapply pressure and hold for 10-20 minutes. ***Proceed to Step 3 if needed***

Step 3: Applied Hemostasis

The following may be used individually or in combination:

Surgicel or Gelfoam: Apply a small piece of Surgicel or Gelfoam to bleeding site (do not apply circumferentially). Hold in place with ½ x 8 inch petrolatum gauze or regular gauze and apply pressure.

Topical Epinephrine: Dab cotton stick swab soaked in 1:1,000 epinephrine to bleeding site (do not hold swab to wound and do not apply to areas where there is no bleeding). This is perfectly safe as long as NOT injected or applied to the bandaging.

BioSeal or WoundSeal Powder (was QR): Pour the powder on bleeding site (avoid the urethra). Apply direct pressure for 60 seconds on top of QR powder or apply a ½ x 8 inch petrolatum gauze around the penis. Circumferential application of QR is acceptable.

Proceed to Step 4 if needed

Step 4: Compression Bandage

Apply compression bandage around entire shaft. Coban™ bandage is particularly effective. Regularly check glans for adequate perfusion to avoid penile ischemia. Consider inserting catheter into urethra to prevent urinary obstruction, especially if tight application or prolonged use anticipated. Catheter can be a 5-8 Fr feeding or suction tube, or 6 Fr Foley.

Step 5: Suture

Use 6-0 rapidly absorbable suture (e.g. chromic).

CAUTION: Great care must be taken when suturing the ventral surface because of the high risk of urethrocutaneous fistula formation. Do not use sutures unless you are experienced in suturing the penis.

At this point, if bleeding persists, consult pediatric urology

Monitoring

Once hemostasis is accomplished, monitor the neonate for continued bleeding. Gently open the diaper by anchoring any bandaging with one hand while pealing back the diaper with the other. Looking for active bleeding or clot formation on gauze (without disturbing existing bandaging).

With an uncomplicated circumcision: one check at 20-30 minutes is adequate

With difficult hemostasis, monitor at 15, 30, and 60 minutes:

If active bleeding:

- Apply pressure directly over bandaging (Step 2, above).
- Notify physician
- Monitor vital signs now and at 15, 30, and 60 min
- Consider workup for anemia as well as coagulopathy.

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Part IV

Pediatric Circumcision

12 Pediatric Circumcision

Jonathan D. Kaye, Hal C. Scherz, and Andrew J. Kirsch

Editors' Note
Most infant circumcisions are performed in the first month or two of life with one of the common clamp techniques. In older infants, a freehand technique done in the operating room under general anesthesia is preferred. The common sleeve technique is described here. This technique requires adequate hands-on training in addition to its description here.

Introduction

Various surgical techniques can be used to achieve a safe, functional, and cosmetically acceptable circumcision. We view these techniques in two groups: (a) the neonatal techniques, which can be performed in the clinic setting in the first days to weeks of life (see Chap. 9), and (b) infant techniques, the subject of this chapter, which should be performed in the operating room setting on children who are at least a few months of age.

As with any surgical procedure, consent must be obtained from the patient's parents or guardian. This discussion must consist of the risks, benefits, and alternatives to circumcision. The American Urological Association's Policy Statement on Circumcision states that complications include bleeding, infection, and penile injury, as well as complications recognized later that may include buried penis, meatal stenosis, skin bridges, chordee, and poor cosmetic appearance [1]. Urethral injury and excessive skin removal [2–4] and rare but devastating injuries such as glans amputation [5, 6] or penile dismemberment [7] have been reviewed. Other potential problems include epidermal inclusion cysts [8], prepucial adhesions, skin bridges, concealed penis, and prepucial redundancy [9]. We have anecdotally noted these problems to occur less commonly when circumcision is performed by an individual experienced in the procedure.

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Sleeve Technique

The sleeve circumcision technique is probably the technique most commonly used by urologists [10]. Countless permutations of this technique have been described since Abraham circumcised Isaac almost 4,000 years ago [11, 12]. We perform this technique on all children beyond the neonatal period. If we see a child in consultation for circumcision after the immediate neonatal period, we typically schedule the circumcision to be performed in the operating room after 6 months of age, due to the theoretically – albeit modestly – increased safety of general anesthesia after this age [13]. Because of the more robust vascularity and thicker skin of older babies, clamping action alone should not be relied upon for hemostasis; electrocautery is almost always necessary. Either sutures or adhesive agent should be employed to effect adequate approximation between the prepucial collar and shaft skin.

We recently reviewed our experience with 1,008 infant circumcisions and circumcision revisions over a 27-month period [14]. The sleeve technique (described below) was utilized in all patients, and 2-Octyl Cyanoacrylate (2-OCA, Dermabond®) was used for tissue approximation in 74% of these patients and 26% were sutured with chromic sutures.

There were no intraoperative complications. Three patients from the 2-OCA group (0.4%) and two from the sutured group (0.8%) were readmitted for bleeding. All were taken back to the operating room for hemostasis. No patients received blood transfusions. This extremely low rate of hemorrhagic complications likely owes to our use of needle-tipped electrocautery for all incisions in all cases. However, incisions can safely be made with a scalpel provided that meticulous care is given to hemostasis before tissue approximation is performed.

Despite our practice of not administering intravenous or oral antibiotics, no patients experienced infections. Mean operative time using 2-OCA was 8 min, and that for sutured circumcision was 27 min.

At mean follow-up of 18 months, one sutured patient (0.8%) was taken back electively at parents' request for correction of unsatisfactory cosmesis, and one 2-OCA PC patient (0.2%) underwent reoperation for synechiae. While parental satisfaction was equally high in all groups, the absence of suture tracks and suture sinuses in the 2-OCA groups gave this group higher surgeon satisfaction. Patients with buried penis were excluded from this series.

Unlike with the previously described neonatal techniques, local anesthetic is not essential in older babies, as these circumcisions are performed under general anesthesia. However, anesthesiologists frequently perform a caudal block; otherwise, we frequently perform a ring block or dorsal nerve block, in order to decrease intraoperative and postoperative analgesia requirements.

To prepare for a sleeve circumcision, the foreskin is retracted. If necessary, a dorsal slit is made. After retracting the foreskin and removing all smegma and debris from beneath the prepuce, the lines of incision are marked (Fig. 12.1). In making

Fig. 12.1 Sleeve circumcision: markings for inner and outer circumferential incisions

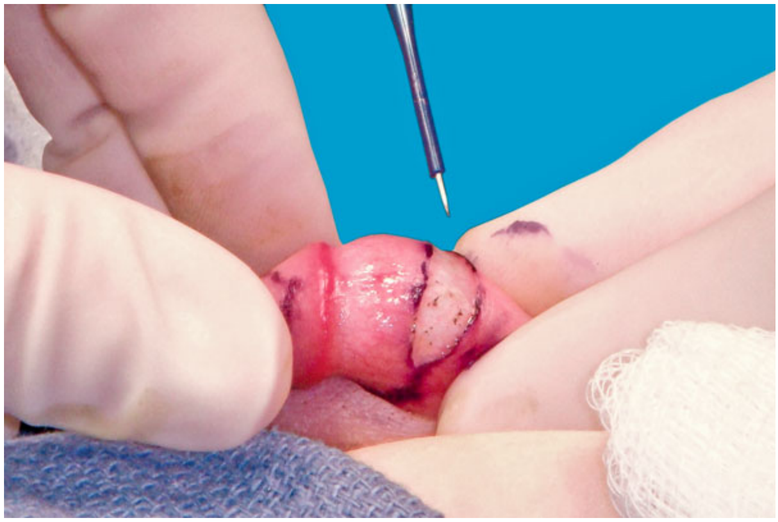

Fig. 12.2 Sleeve circumcision: inner incision with electrocautery

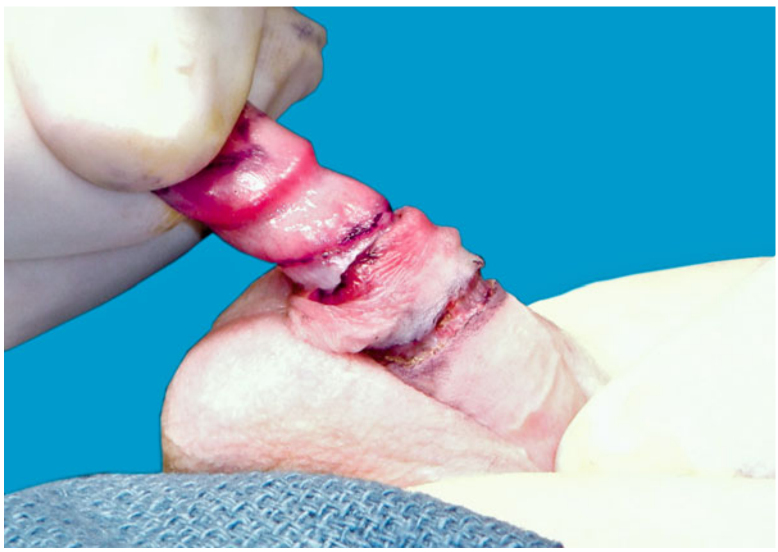

Fig. 12.3 Sleeve circumcision: inner and outer circumferential incisions completed before excision of foreskin

these marks, care is taken to ensure that they would result in a tension-free apposition of the shaft skin with the prepucial collar after all skin is excised. (Note that we rarely find it necessary to place a holding suture in the glans.) Next, with the line of incision made taut with digital compression, a circumferential inner incision is made using electrocautery on pure cutting current (Figs. 12.2 and 12.3). We use the ¾″ IMA-ENT needle electrocautery (Weck Inc, Research Triangle park, NC), but a scalpel could also be safely used, provided that meticulous care is given to hemostasis. For smaller children, we set electrocautery to 8 W/Ω, whereas a setting of ten is used for larger children. The prepuce is then pulled distally beyond the glans, the glans is pinched downward, and the outer incision is made (Fig. 12.4), excising the foreskin. We then address all points of bleeding with electrocautery.

For the sutured cases, we use 5-0 or 6-0 chromic, in interrupted fashion. Many other fast-absorbing sutures could be used in interrupted or running, simple or buried fashion. If we elect to use 2-OCA, the shaft skin is pinched and pushed

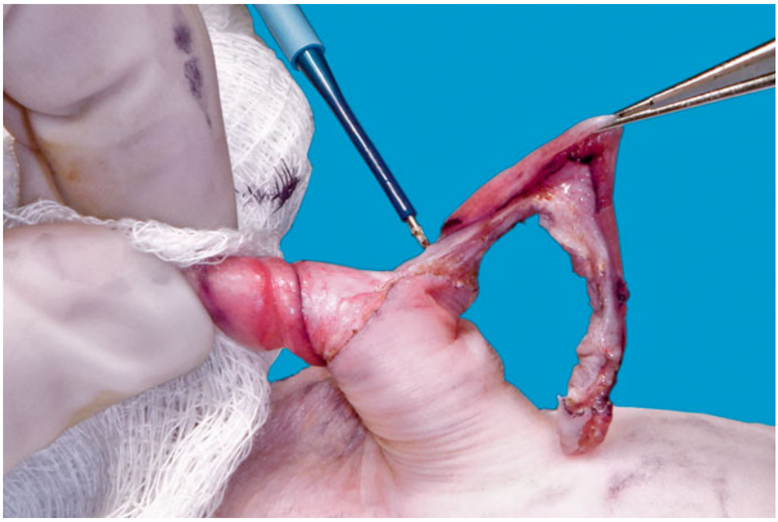

Fig. 12.4 Sleeve circumcision: excision of foreskin with electrocautery

Fig. 12.5 Sleeve circumcision: skin alignment before application of 2-OCA

distally toward the prepucial collar (Fig. 12.5). A thin layer of 2-OCA is applied dorsally, then intermittently in circumferential fashion. (Other tissue sealants, such as n-Butyl-2 Cyanoacrylate (Histoacryl®), could alternatively be used.) Once this first layer dries (approximately, 30 s), 2-OSA is then applied continuously around the apposed skin edges (Fig. 12.6). Care is taken to dispense sufficient 2-OSA that the applicator tip is moist, but not so much that excess 2-OCA runs down the penile shaft. Last, antibiotic ointment is liberally applied to the entire penis, scrotum, and general area in order to prevent the 2-OCA from sticking (Fig. 12.7).

Regardless of whether we use sutures or tissue adhesive for tissue approximation, parents are instructed to reapply this ointment after 48 h with diaper changes or twice daily for the first postoperative week. They are also instructed to push the shaft skin proximally toward the penile base a few times a day, in order to prevent adhesions and skin bridges. Because we rarely apply dressings, intraoperative hemostasis is crucial. This is especially true if 2-OCA is used for tissue approximation, as sutures cannot be relied upon in these patients for hemostasis. We allow all circumcision patients to bathe 48 h postoperatively.

Fig. 12.6 Sleeve circumcision: application of 2-OCA

Fig. 12.7 Sleeve circumcision: final result, after application of antibiotic ointment

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Dressings and Care After Surgical Circumcision

13

Marc Cendron and Martin Koyle

Editors' Note
Sometimes the successful outcome of a surgery, be it the physical outcome, meeting patient/parent expectations, or garnering patient/parent compliance, has as much to do with the aftercare as anything else. A presentable dressing, clear and written patient/parent care instructions, and a description of the course of healing will go a long way toward patient/parent compliance and reducing the number of unscheduled follow-ups.

Principles of Care After Circumcision

Recommendations regarding the care of the penis after surgical circumcision vary widely. This chapter will summarize generally accepted recommendations as they apply to local care and dressings of the circumcised penis in infants and adolescents.

As the penis is a well-vascularized organ, the healing process is quite rapid and is usually not associated with high rates of infection. It follows that principles of sterility and asepsis may not have to be strict. In fact, circumcision is considered a clean-contaminated procedure indicating that bacteria may be present in the field of surgery. However, basic principles of hygiene should certainly be adhered to.

It is postulated that, in childhood, healing of the wound proceeds rapidly and the incision is usually watertight within 12–24 h [1]. Given the laxity of the skin and good healing characteristics of the penile shaft skin, contraction of the skin is usually not an issue. However, providing a mechanical barrier for outside contaminants and urine is certainly considered to be beneficial. It is controversial as to whether covering the penis with a protective dressing in infants prevents fecal contamination. No doubt that a dressing does create a barrier between a healing wound and the diaper, and as such, prevents adherence to the diaper. Psychologically, it also prevents a barrier to the parent/caregiver from looking at the penis.

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Neonatal Wound Care of the Circumcised Penis

In general, given the size of the penis, in the pediatric age group, few dressings seem to be amenable for long-term use (more than 24 h) after neonatal circumcision. In the USA, where PlastiBell® circumcisions predominate, no dressing is applied. With the Mogen or Gomco® clamps, arbitrarily various short-term dressings are placed. Probably in newborns and infants, it is more important to recommend a petroleum-based jelly with or without the addition of antibiotic to the penis applied at each diaper change, regardless of the technique used (Fig. 13.1). Application of the petroleum-based jelly should be carried out for at least a few days, or longer if necessary, in order to prevent the raw healing surfaces from adhering to the diaper. A small, petroleum-based impregnated gauze pad can also be used to cover the shaft of the penis and proximal glans in non-PlastiBell circumcisions. A compressive dressing may be applied if concerns arise for potential bleeding as noted in the chapter by Yosha and Bolnick (Chap. 10). Use of gauze impregnated with petroleum jelly (e.g., Xeroform™ Petrolatum gauze) may help heal the glans if the glans appears to be quite raw following separation of the prepucial adhesions.

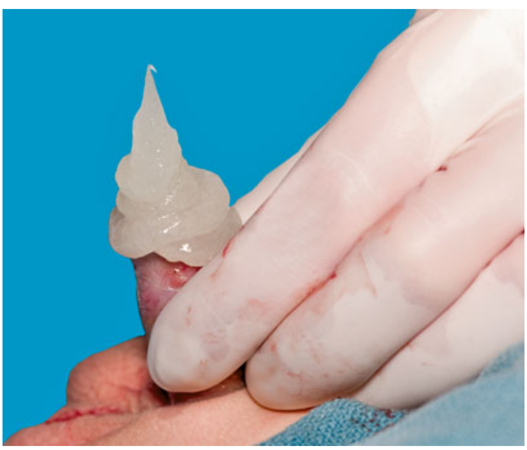

Fig. 13.1 Application of petroleum based jelly. A generous amount of petroleum based jelly can protect the healing wound from adhering to the diaper

Most of the data related to penile dressings have been gleaned from experience from more complicated procedures such as hypospadias. In fact, a true prospective of boys undergoing hypospadias repair concluded that with and without dressing, outcomes were similar in the repair as were adverse events. With a mean age of 2.2 years, it was found that the downside of dressings was that 29% of parents were not psychologically prepared to remove the dressing and 12% were so reluctant, that they returned to the hospital for dressing removal. In the group without a dressing, there were significantly more unscheduled visits to the surgeon, primary provider, or ER [2].

Types of Dressings Used After Circumcision Beyond the Newborn Period

There are a wide variety of available dressings used after surgical circumcision in children. A liquid dressing using cyanoacrylate can be applied and may alleviate the use of skin suturing [3]. Once dry, the liquid dressing will stay in place over the incision for several days and fall off spontaneously. It is usually well tolerated, although patency of the urethra and anus needs to be assured. Liquid dressings have been shown to be slightly less expensive when compared to suturing wounds [4]. One minor drawback of the liquid dressing is that it may not allow blood to seep out from the incision, thus increasing the risk of a hematoma.

Traditional taped dressings are usually reserved for patients who are older and have undergone surgical circumcision. A tape dressing is applied circumferentially over the penile shaft and the lower portion of the glans with the urethral opening left open and free. Silk tape is not recommended given the fact that it is somewhat rigid and will not remain well applied. In addition, it does not have any elasticity, thus potentially causing distal edema and pain. Foam tape (3M™ Microfoam™ Medical Tape) is more elastic; expense and availability are issues. It can

Fig. 13.2 Foam tape bandage. 3M™ Microfoam™ medical tape can be creatively shaped to better conform to a particular anatomy. Here the "octopus" dressing nicely anchors the penis

be cut in a way to provide a daisy or octopus dressing (Fig. 13.2). The strips at the base of the penis will allow the dressing to stay in place nicely for at least 24–48 h. A transparent film (3M™ Tegaderm™) dressing, with or without underlying Dermabond® (Fig. 13.3) is often used in modern hypospadias surgery and thus has been applied to other penile surgery, including circumcision (Fig. 13.4). This dressing is easily removed and benefits by having some degree of elasticity. In addition, it allows visualization of the penis.

A self-adhesive wrap (3M™ Coban™) dressing can also be applied in older patients where more compression to prevent swelling and bleeding may be advisable (Fig. 13.5).

Postoperative Care of the Penis Status Post-circumcision

In general, if the dressing has been placed after the circumcision, the dressing should be left in place for 24–48 h, although many leave it longer. In older children and adolescents it would be recommended to keep the dressing on for at least 48 h so as to prevent further bleeding. In older males who are circumcised post-puberty, the dressing might be left on for longer than 48 h as repeated erections at night may, indeed, cause

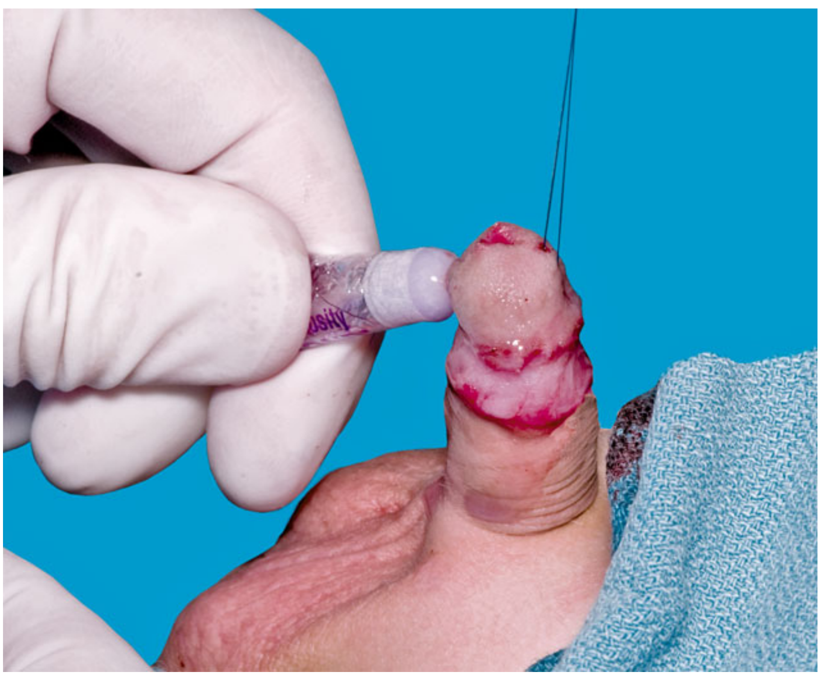

Fig. 13.3 Cyanoacrylate sealant. Sealing the outer skin with a cyanoacrylate like Dermabond®

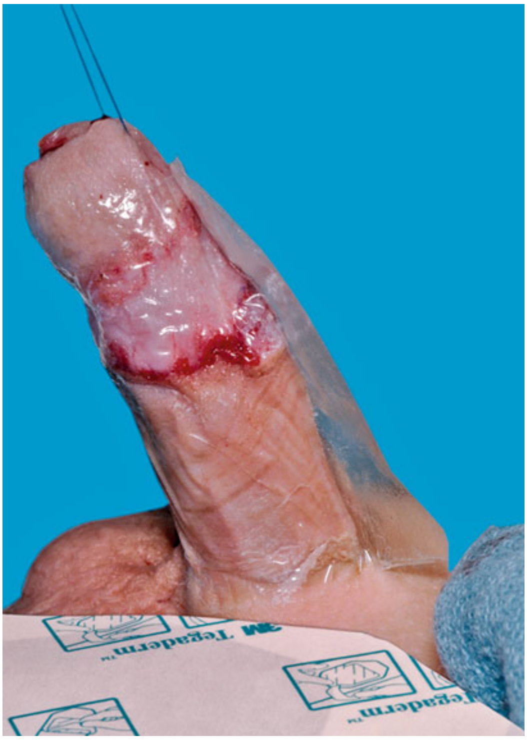

Fig. 13.4 Transparent film dressing. The penis can be wrapped with an adhesive transparent film like 3M™ Tegaderm™

Fig. 13.5 Elastic, self-adhesive tape. The penis can be wrapped in gauze with a petroleum ointment and secured in place with an elastic, self-adhesive tape like 3M™ Coban™ tape

excessive bleeding. The dressing can be removed in the bath tub after soaking for 15–20 min. As noted earlier, the application of petroleum-based jelly until raw surfaces have healed and keratinization has occurred will provide a mechanical barrier. Bathing or recommendations (against it) like dressings are based on tradition, but in general early bathing does make the dressing fall off with more ease and may provide some relief as well. Activities for the young boys are often limited for the first 2–3 days after surgery with no straddling of toys, but in general most activities need not be restricted as it is unrealistic to keep a toddler under shackles.

Parents should be warned that some swelling and bruising is to be expected, which is worse in the older patient. It should be emphasized that they should not expect the child to have any difficulties urinating, although occasionally with circumcision alone, but more so if a caudal block has been employed, temporary urinary retention can occur. Parents should expect the swelling to decrease over a period of 2–3 days starting about 5–7 days following the procedure. In older children, the subcutaneous hematoma and edema may persist for up to 2 weeks. The hematoma may migrate down into the scrotum. If suture material has been used, the suture should dissolve (chromic catgut or Monocryl™ by Johnson & Johnson) quickly. Today subcuticular sutures and/or Dermabond® are often used and, hence, sutures are not visible.

Pain Management After Circumcision

The reader is referred to Bosenberg's chapter on pain control (Chap. 7) for more detail, but most prepubertal patients who have received local anesthetic for penile surgery of any kind require much more than acetaminophen and a nonsteroidal anti-inflammatory. In general, in the neonatal period no pain medication is needed. Parents can administer Tylenol for the first 24–48 h.

In the older child or post pubertal male, oral Ketorolac or even narcotics may be necessary, especially if painful erections occur. Proper preparation and counseling prior to surgery is important in this group as often the psychological trauma trumps the physical, but is still perceived as pain. One must assure that patients who do receive narcotics are not constipated beforehand and, if taking these medications for a longer period, that a bowel program is instituted.

In the older patient, consideration should be given to preventing nighttime erection which besides inciting pain also could trigger bleeding. Amyl nitrite, diazepam, and ketoconazole have been reported to prevent erections. However, some of the evidence for use of these medications has not been proven to be entirely convincing [5].

Conclusion

The basic principles of dressing the penis are derived primarily from training, bias, and tradition, rather than true evidence. Thus, like the history of circumcision itself, dressings and their use have been based on folklore. When used, the dressing should be elastic and be able to stretch and provide some degree of compression so as to prevent postsurgical bleeding. It should be easily removed and should allow the child to void with no difficulties. Whether it truly provides a barrier to urine and feces, especially given the rapid healing in children, is conjectural. Of more importance is the assurance that a barrier jelly, with or without antibiotics, is used while healing of the raw surfaces is being completed. Given these points, the provider should keep simplicity and cost in mind (Table 13.1).

Table 13.1 Type of tape versus relative cost. This is provided for comparison. The cost of these items varies according to location and purchase volume

Type of tape	Relative cost
Silk tape (3M™ Durapore™)	$4 per roll
Foam tape (3M™ Microfoam™ Medical Tape)	$11–$31 per roll
Elastic, self-adhesive tape (3M™ Coban™ Tape)	$5–$8 per roll
Clear film tape (3M™ Tegaderm™ Tape)	$38 box of 100

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Part V

Adult Circumcision

Adult Circumcision

14

Chris McClung and Bryan Voelzke

Editors' Note

Adult circumcision is most often performed for true medical necessity, at least in Western societies. Although reported complications are few, they can be significant, and hence expertise is necessary. Unlike newborns, the adult will have already maximized his penile growth after puberty. Thus, it becomes more important to assure that adequate shaft skin is protected when doing a circumcision. There are many variations of available techniques and, hence, most urologists and surgeons will incorporate their own preferences when performing adult circumcision. Today, with more adults requesting foreskin preservation, prepucialplasties might be offered in select cases. Proper informed consent, of course, becomes essential.

Introduction

The incidence of circumcision varies widely depending on location, socioeconomic and educational status, and religious affiliation. Globally, the prevalence of circumcision is thought to be about 30% [1]. In the USA, it is estimated that 75% of men are circumcised; however, as few as 6% of men are circumcised in the UK [1].

Historically, circumcision has been significantly influenced by culture and especially religion. Whereas the Greeks believed that the foreskin was sacred and circumcision was viewed as a form of self-mutilation, Jewish and Muslim communities viewed it as a religious obligation [1]. Historically, Christianity has had periods of both pro and con, but today they take a neutral position with only the Coptic sect continuing to practice religious circumcision. In most societies, males are circumcised at birth; however, there are certain cultures where circumcision is deferred into later in life. In the Philippines and Korea, many males are not circumcised until they are close to puberty, 10–14 years of age [1, 2]. In the USA, circumcision varies with socioeconomic status. An increasing number of insurance companies will no longer cover circumcision, viewing it as an elective or cosmetic procedure. A study of 4.7 million newborn circumcisions in New York between the years of 1988 and 2000 showed that circumcision rates were higher among the privately insured and in those of higher socioeconomic status [3]. Clearly, the scope in

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this chapter is well beyond the current debate where anti-circumcision supporters are advocating legislation to ban circumcision altogether.

The goal of this chapter is to describe the indications, technical aspects, and complications of adult circumcision. In addition, the role of circumcision for STD prevention will be discussed.

Indications

General Indications

Whereas the indication for neonatal circumcision is a controversial topic, there are several common medical indications for adult circumcision. The most common of these is phimosis. Phimosis represents a condition in which the retractable portion of the foreskin (prepuce) is unable to be reduced over the glans penis. This can result in pain with erection and intercourse. Diabetes is a risk factor for phimosis and has been documented to occasionally be the presenting feature of the disease, especially in middle-aged men [4].

A retractile foreskin can also lead to paraphimosis. In such cases, the prepuce is able to be manipulated proximally to the glans. When there is a partially phimotic band and the foreskin does not reposition or reduce itself over the glans, the band acts like a tourniquet. This creates edema of the distal foreskin and as this increases, retraction of the foreskin becomes even more difficult. Furthermore, the glans will subsequently become edematous, causing reduction of the retracted foreskin to become even more difficult. This can become a urologic emergency when the edema and tightness are of such severity that the foreskin cannot be reduced. In rare cases, this can result in severe pain, urinary retention, and, infrequently, glans ischemia if this situation is not dealt with promptly. If the foreskin cannot be reduced using medical techniques with sedation and local anesthesia, an emergency dorsal slit might be necessary in order to maintain the integrity of the glans penis.

Balanitis is also a well-recognized indication for circumcision. Balanitis is inflammation of the glans penis. This may occur with or without inflammation of the foreskin, where the combination is termed balanoposthitis. As with phimosis, diabetes is once again a recognized risk factor for this disorder [4]. Causes of balanitis include both infectious and noninfectious. Preexisting phimosis is highly associated with balanitis, as urine may become trapped within the phimotic foreskin, potentiating inflammation and worsening of the balanitis. Candidal fungal species are a common infectious source in such a scenario. However, aerobic, anaerobic, and STD bacterial causes are well documented [5, 6]. Noninfectious causes include allergic dermatitis, trauma, and Zoon's balanitis. Circumcision along with medical treatment is beneficial in preventing recurrent episodes for all of these conditions except for trauma and allergic dermatitis. Chronic inflammation of the glans can serve as a nidus for squamous cell carcinoma (SCC); therefore, any suspicious lesions of the foreskin or glans should be biopsied.

STD Prevention

With the discovery that circumcision is preventative in the spread of HIV and AIDS, many studies have been conducted in Africa to examine the effect of circumcision on HIV virus transmission [7–9]. The inner prepucial skin is rich in Langerhans cells, which contain CD4 receptors and other co-receptors for the HIV virus. As such, removing the bulk of the Langerhans cells on the penis, via circumcision, was theorized to be efficacious in preventing the spread of HIV. In vitro, it has been shown that Langerhans cells display a significant affinity for the HIV virus [10, 11]. Furthermore, immunofluorescence and image analysis studies quantifying cells which display HIV co-receptors have shown that the inner prepucial skin is more susceptible to HIV infection than the penile shaft skin and cervical mucosa. Additionally, the inner prepucial skin contains little to no keratin relative to the outer foreskin, rendering it less mechanically resistant to injury than the keratinized outer layer and more likely to serve as a nidus for HIV transmission [12].

Between 2005 and 2007, three prospective, randomized, controlled studies were published that showed a significant decrease in HIV transmission among circumcised men [7–9]. These studies were conducted in South Africa, Kenya, and Uganda. All three trials were stopped early, secondary to the positive effect of circumcision in reducing HIV transmission. In 2009, a Cochrane meta-analysis was published, looking at the pooled data from these studies. A 54% reduction in HIV transmission was seen at 24 months [13].

Concerns about HIV acquisition from sexual contact early after circumcision have also been examined. Mehta and colleagues analyzed pooled data from all three African studies [14]. No increase in HIV transmission was seen at 3–6 months for men having sexual contact less than 42 days after circumcision.

With the discovery that circumcision was preventative for HIV transmission, further investigations were conducted to examine the correlation between circumcision status and the acquisition of other sexually transmitted infections. Data from the South African trial showed a 7.5% decrease in the prevalence of HPV infections in the circumcised group relative to the control group [15]. This finding remained statistically significant when controlling for confounding factors such as ethnicity, age, education level, condom use, and marital status. A 9.9% reduction was also seen for HPV status in the Ugandan trial [16]. Further studies from this trial also revealed a 2.5% decrease in seroconversion of HSV2 infection in circumcised males [16]. Data from the Kenyan trial showed no difference in the prevalence of Chlamydia, Gonorrhea, or trichomonas infection among their cohort [17]. In summary, circumcision appears to lessen the transmission of many but not all sexually transmitted infections.

The above data have changed our perspective on circumcision. Efforts are now underway to circumcise men in Africa, which has the highest HIV rate in the world, as a means to prevent HIV transmission. While not medically necessary, the benefits of circumcision from a preventative health perspective are obvious and may continue to expand with further analyses. At a bare minimum, this information gives pediatricians, pediatric urologists, and obstetricians more data to counsel parents on the pros and cons of circumcision in the setting of HIV or patients with high-risk sexual activity with an uncircumcised phallus, but caution should be exercised in assuming that there might be a significant benefit in preventing such infections by performing mass circumcision in non–third world countries.

Lichen Sclerosis

Lichen sclerosis (LS) can affect both pediatric and adult populations. LS has been known by many names, including lichen sclerosis et trophicus and balanitis xerotica obliterans (BXO). To simplify the nomenclature, in 1995 the American Academy of Dermatology recommended that this disease be referred to as lichen sclerosis. A single nomenclature would better help to track the true incidence and natural history of this disease.

LS is seen in both sexes; however, it is 6–10 times more common in females [18]. Anal involvement is common in women and rarely seen in men [18]. Common ages of presentation represent a bimodal distribution, with one peak at 8–10 years of age and a second peak in the 30–50-year-old age group [19].

The physical appearance can be variable; however, the classic appearance is that of atrophic white papules or plaques (Fig. 14.1). Purplish scaly plaques, telangiectasias, purpura, bullae, erosions, and ulcerations have also been described [20].

The most common site of involvement is the foreskin; however, it can affect the glans, meatus, and anterior urethra (penile and bulbar urethra). To better define the distribution of LS, Valazquez and colleagues examined 60 cases of affected individuals [21]. LS was most common on the foreskin (50%), followed by a combination of the foreskin–glans–coronal sulcus (17%). The foreskin–coronal sulcus combination was the next most common location at 13%, followed by the glans only at 12%. Given the different areas of involvement, symptoms can vary.

Fig. 14.1 The classic appearance of *Lichen sclerosis* in an adult male. Note the *white* atrophic plaques

LS is usually asymptomatic; however, symptoms can include burning, itching, bleeding, pain with erections, and even hemorrhagic blisters [20]. Foreskin involvement can progress to phimosis or paraphimosis in severe cases. With meatal or urethral involvement, the patient may report obstructive voiding symptoms and even experience urinary retention secondary to associated meatal stenosis or anterior urethral strictures.

Characteristic findings on histology are an epithelial and stromal lesion with squamous atrophy or hyperplasia, band-like infiltration, hyalinization of the papillary dermis with loss of rete pegs, hyperkeratosis, pigment incontinence, and dermal edema. LS has further been subclassified based on histological severity [21]. These categories are designated as slight, moderate, and severe. The severity of the histology has been used by some for operative planning of urethroplasty for anterior urethral involvement [22]. The "slight" and "moderate" cases have been repaired in a single stage, whereas severe cases required a two-stage repair.

The etiology of LS is largely unknown; however, several theories exist. The first theory is that it has an autoimmune origin; 20–60% of patients with LS will have an associated autoimmune disease [23]. Common coexisting autoimmune illnesses include alopecia areata, vitiligo, hyperthyroidism, hypothyroidism, pernicious anemia, and diabetes. Histological studies have shown a dermal infiltration of lymphocytic, T-cell rich cells [24]. The associations with various HLA-associated antigens suggest a genetic basis [25]. Interferon recruitment of cytotoxic lymphocytes has also been shown to occur in LS, which also occurs in other autoimmune diseases such as discoid lupus and lichen planus [26]. In familial cases of LS, there appears to be an association with antithyroid peroxidase autoantibodies [25]. All of these findings appear to point to an autoimmune process.

Trauma is another hypothesized etiology of the disease. LS has been documented to occur at sites of injury, piercing, and surgical scars [18]. LS can recur at the site of circumcision scars and has also been documented to occur at the site of full-thickness skin grafts [18]. It is also known to display the Koebner phenomena, in which disease spread occurs outward from affected areas when injury occurs [18]. Various authors cite these observations as indicative of a traumatic etiology.

Infection as the etiology of LS is the final hypothesis. Experimental studies have failed to uniformly confirm this source. Proposed infection sources are acid fast bacilli, spirochetes, borrelia, and HPV [18].

The mainstay of medical treatment has entailed the use of topical steroids. A potent topical steroid such as clobetasol has shown to be most effective. A typical treatment course would be twice daily for 2 months followed by a short tapering period [18]. This treatment should be conducted under close supervision due to potential for local side effects.

Androgen gels have been used historically for LS; however, a randomized trial in females failed to show a benefit over placebo [27].

Based upon the autoimmune theory of LS, the effect of topical immunosuppressive drugs has been examined. In a phase II multicenter trial in Europe from 2006, topical 0.1% tacrolimus was used twice daily for 16 weeks. Complete resolution was seen in 43%, and another 34% showed partial resolution of the disease [28]. Pain and puritus were the most common side effects. Increasing erythema was common in the first 8 weeks of treatment; however, most of these symptoms were self-limited and resolved shortly with continuation of treatment.

When medical treatment fails, surgery is indicated. Although anecdotal reports exist of LS recurring at the site of circumcision scar, the exact incidence of this is unknown. The best study defining the surgical success of circumcision to treat LS was by Barbagli and colleagues. In this retrospective study, 215 cases were reviewed with an average follow-up of 56 months [22]. In 34 cases of foreskin-only involvement, the success rate of circumcision was 100% with no disease recurrence. In patients with foreskin and meatal involvement, the success for circumcision and meatotomy during the follow-up period was 100%. In patients with histological evidence of slight or moderate LS, the success of a one-stage pendulous urethroplasty was 100%. Patients with severe LS requiring a two-stage repair had a success rate of 73%.

Whereas LS in females is accepted as a risk factor for vulvar SCC, the association between LS and penile carcinoma has been widely debated. Nasca reported five cases of penile carcinoma in 86 patients who were treated for LS [29]. The incidence of penile SCC in this cohort was 5.8%. In 2003, Valazquez and colleagues sought to better define the correlation between LS and penile carcinoma [21]. LS was found in the tissues adjacent to penile SCC in 33% of their specimens (68/207 specimens). When LS was associated with SCC, it was often found to contain low-grade squamous intra-epithelial lesions, leading the authors to speculate that LS may be a premalignant precursor to SCC. In this study, LS was preferentially associated with non-HPV-related SCC of the penis. Based on these findings that LS may undergo malignant degeneration, a biopsy should always be performed to confirm the diagnosis of LS and to rule out concomitant SCC.

Surgical Techniques

Although circumcision is usually performed as an ambulatory procedure, on the premise that circumcision is preventative for HIV transmission in sub-Saharan African men, more attention has been focused on refining circumcision techniques. Circumcision is a low-risk surgical procedure at least as reported in the literature; however, the surgeon should rule out a history of bleeding abnormalities and all medications affecting platelet function should be stopped 7–10 days prior to elective surgical circumcision (NSAIDS, aspirin, clopidogrel, warfarin, etc.).

Anesthesia

The first consideration with circumcision is anesthesia. Circumcision can be done via local or general anesthesia. An anxiolytic may be beneficial in many cases in preparation for the procedure if done under local anesthetic. Kirya and Werthmann originally described the dorsal penile block in 1978 [30]. The discovery of this technique has allowed practitioners to do circumcision and other minor penile procedures in an ambulatory setting. The dorsal penile block involves local infiltration of the dorsal nerve of

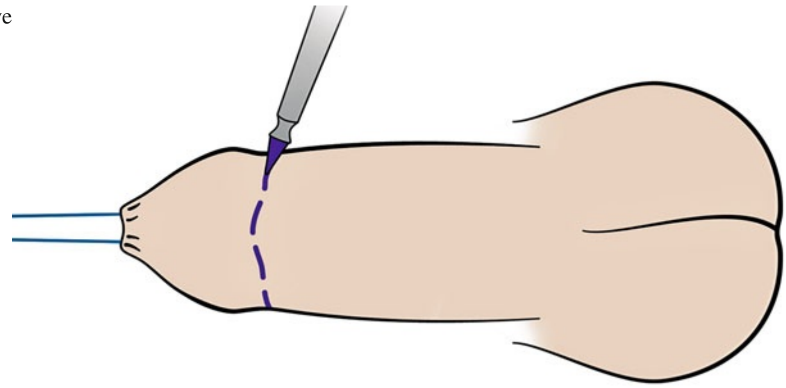

Fig. 14.2 Circumcision – sleeve technique. The penis is on stretch – glans is tethered with 3-0 polypropylene. The coronal sulcus is marked (Image courtesy of Randall Cohen (MedicoLens.com))

the penis with local anesthetic, typically lidocaine or a longer acting agent such as bupivacaine. As the penis is a terminal extremity without distal collateral blood flow, it is suggested that no sympathomimetic (e.g., epinephrine) is used, in order to prevent the theoretical complication of penile ischemia.

The dorsal nerve to the penis originates as one of the branches from the pudendal nerve, which arises from the S2–S4 nerve roots. The pudendal nerve trifurcates in the pudendal canal into the following branches: the dorsal penile nerve, the perineal nerve, and the inferior rectal nerve. The dorsal penile nerve runs through the suspensory ligament of the penis and continues distally below Buck's fascia, passing lateral to the penile arteries and terminating on the glans penis.

A dorsal penile block is done by infiltrating the distribution of the dorsal nerve. The subcutaneous tissue is infiltrated with local anesthetic below the pubic symphysis and above the corporal bodies. Many practitioners will also do a ring block at the base of the penis in conjunction with the dorsal block. Confirmation of appropriate local anesthesia is important prior to proceeding with the circumcision. More reliable anesthesia can be achieved by also infiltrating the distal penile tissue near the area of the frenulum [31].

Other authors have advocated the use of EMLA cream in addition to this local block [32]. The main benefit of EMLA cream applied 1 h prior to circumcision was that patients found the dorsal block to be less painful.

Sleeve Technique

After understanding the mechanics of local anesthetic, the only remaining issue is the technical procedure of performing the circumcision. The most common method that remains to this day is called the sleeve technique. A 3-0 polypropylene suture is placed in the glans as a traction stitch with care taken to avoid the meatus when placing this stitch. Data from Wessells and colleagues have shown that the stretched length of the penis is the equivalent length of the erect penis [33]. With the penis on traction, the proximal incision is marked on the penile shaft skin which overlies the coronal sulcus (Fig. 14.2). By having the penis on stretch, care is taken to make sure that no excessive skin is excised, which would result in penoscrotal tethering due to ventral skin deficiency. After defining the incision line, the incision in made (Fig. 14.3). The foreskin is then reduced, and a second circumferential incision is marked and made several millimeters proximal with the coronal sulcus (Figs. 14.4 and 14.5). This newly demarcated sleeve is then excised by incision of the underlying attachments to dartos fascia with electrocautery or sharp dissection (Figs. 14.6 and 14.7). The underlying tissues are next examined for hemostasis, which can be done

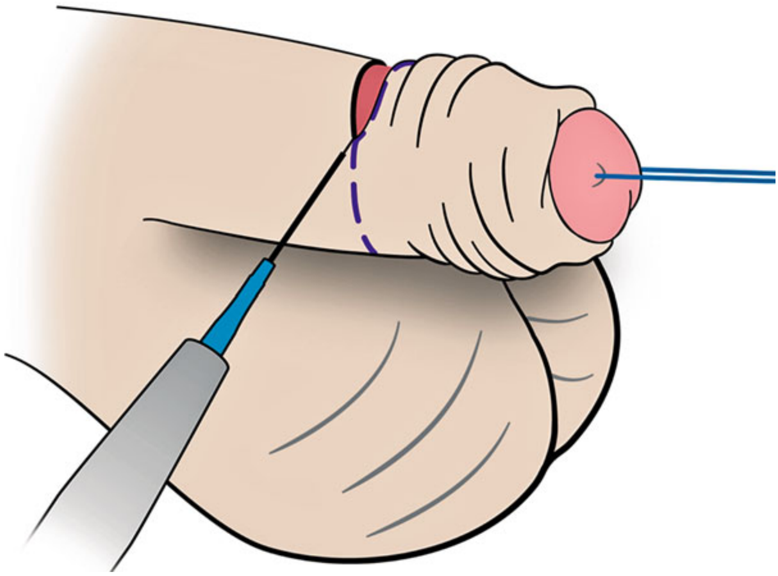

Fig. 14.3 Circumcision – sleeve technique. The external incision is made through the penile skin (Image courtesy of Randall Cohen (MedicoLens.com))

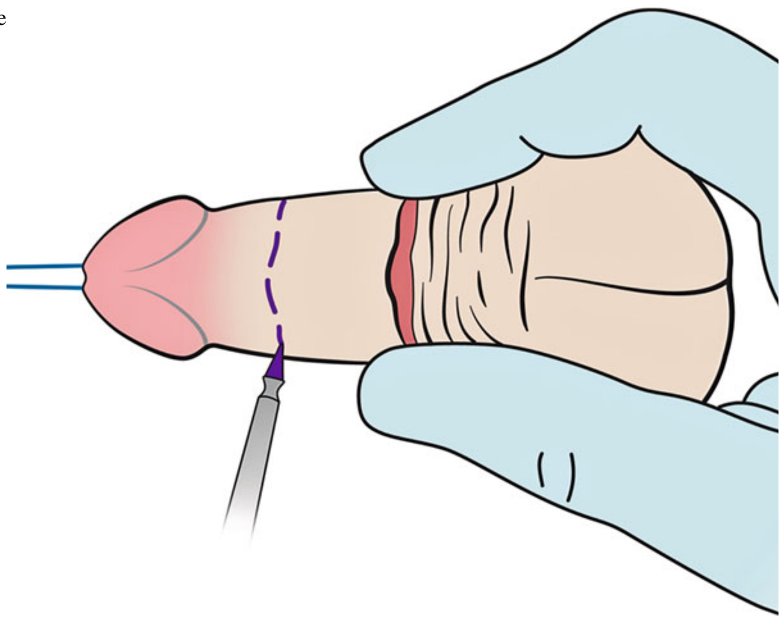

Fig. 14.4 Circumcision – sleeve technique. The foreskin is then reduced and marked proximal to the coronal sulcus (Image courtesy of Randall Cohen (MedicoLens.com))

with either sutures or electrocautery. The next step is re-approximation of the distal and proximal skin edges (Fig. 14.8). The authors prefer rapidly absorbable sutures such as chromic or monocryl, but polyglactic acid sutures can be used as well. We also prefer re-approximation in an interrupted manner with simple interrupted or interrupted horizontal mattress sutures. A sterile dressing is applied and the patient is told to take it down in 48 h at home.

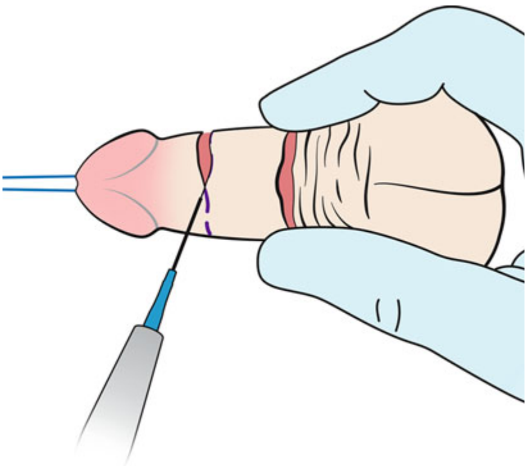

Fig. 14.5 Circumcision – sleeve technique. The foreskin is excised – producing the sleeve (Image courtesy of Randall Cohen (MedicoLens.com))

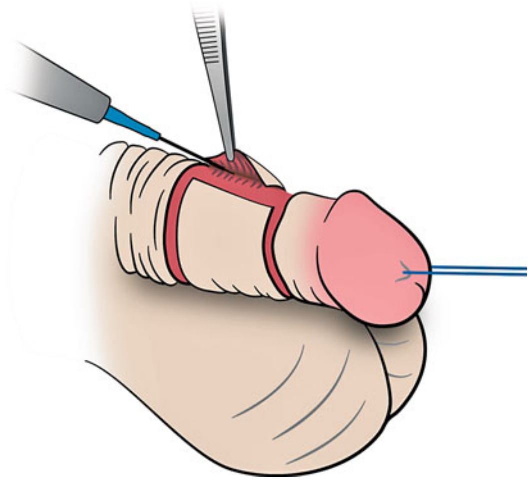

Fig. 14.7 Circumcision – sleeve technique. The sleeve is dissected free (Image courtesy of Randall Cohen (MedicoLens.com))

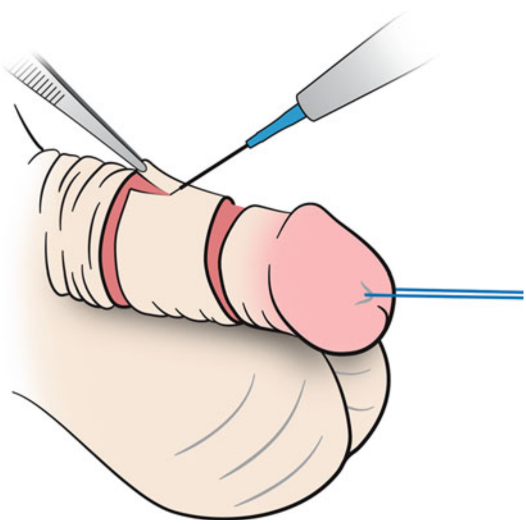

Fig. 14.6 Circumcision – sleeve technique. The sleeve is excised open (Image courtesy of Randall Cohen (MedicoLens.com))

Forceps-Guided Technique

There is no doubt that the sleeve method of circumcision requires the most surgical skill of the available methods. With the advent of the African studies on circumcision and HIV prevention, considerable thought was taken to find a simpler method for the primary practitioner to employ. Hence, the South African and Kenyan trials used the foreceps-guided method, or guillotine technique. This method is performed by grasping the foreskin and placing it on traction [1]. A clamp is then placed on the foreskin distal to the glans, and the foreskin is excised sharply. The skin is the re-approximated in the standard manner. The disadvantage of this method is that it leaves 0.5–1.0 cm of mucosal skin proximal to the corona. Variations on this method have been published that mainly differ on the type of clamp or forceps used, but the general principle is the same.

Dorsal Slit

Lastly, the final topic that should be mentioned when considering adult circumcision is the dorsal slit. A dorsal slit is performed by making an incision in the foreskin at the central (12 o'clock) dorsal position. After the incision, the skin edges are re-approximated. A dorsal slit only relieves tight phimosis, and is generally reserved for men with multiple medical comorbidities that make them an unsuitable surgical candidate. It generally leaves the patient with a cosmetically unacceptable outcome.

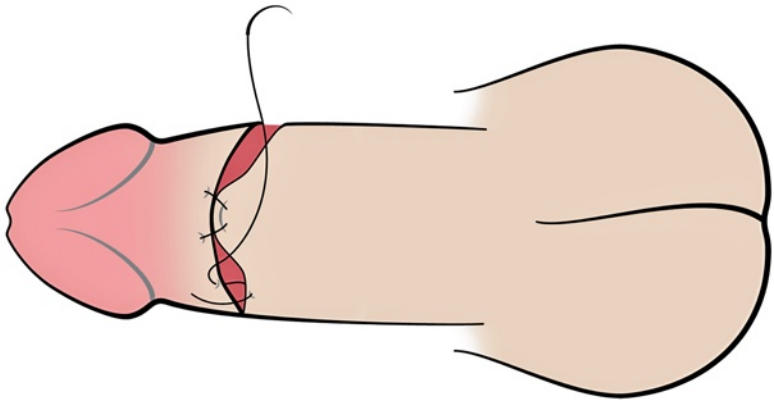

Fig. 14.8 Circumcision – sleeve technique. The frenular area is first sutured followed by circumferential closure (Image courtesy of Randall Cohen (MedicoLens.com))

Complications

Numerous complications have been reported for the adult circumcision, but the two most common are bleeding and infection. The exact incidence of postoperative bleeding or hematoma is unknown due to poor documentation and variability of the definition, but the reported ranges are between 0.1% and 35% [34]. This highlights the importance of maintaining good hemostasis during the surgical procedure. Postoperative bleeding, when present, can be dealt with by gentle manual compression; however, if the bleeding is emanating from the skin edges, placement of a hemostatic stitch under local anesthesia can be performed. If the wound appears slightly prone to bleeding at the completion of the circumcision, a gentle compressive dressing can also be applied. Care should be taken in not making the dressing too occlusive as difficulty voiding, wound ischemia, and, rarely, urinary retention can occur [35].

Infection has been reported to occur in approximately 10% of circumcisions [35]; yet, in general, antibiotics are not necessary. It is surprising that infection is not more common with penile surgery as not only are skin organisms present, but perineal colonization exists as well. Most infections are self-limited, resulting in local inflammation and erythema, but purulence and systemic manifestations can be present. With evidence of a local wound infection, the patient should receive systemic antibiotics with coverage against gram-positive flora, such as a first-generation cephalosporin. Local wound infection is generally self-limited; however, case reports of necrotizing fasciitis occurring after circumcision have been published [35].

An urethrocutaneous fistula is a rare but dreaded complication of circumcision [35]. Such a complication usually occurs during suture ligation of a bleeding vessel located at the frenulum. Concomitant ligation of the underlying urethral inadvertently occurs, increasing the possibility of a fistula. Burn injuries from cautery causing urethral necrosis and localized infection are other sources of fistula formation. Urethrocutaneous fistula management is beyond the scope of this chapter. A referral to a reconstructive urologist is indicated in such circumstances.

Removal of excess foreskin during circumcision can be a source of frustration among patients undergoing circumcision. This can result in penile-scrotal webbing, chordee, or frank shaft skin loss. Removal of excess foreskin highlights the importance of placing the penis on stretch to aid in the decision of incision lines. Whereas neonatal penile skin loss can often be managed with local wound care, this is not necessarily true with adult patients. Options for penile skin loss management include local skin flaps, and full- or split-thickness skin grafts. Management of this complication can be challenging. As such, referral to a reconstructive surgeon is indicated. In our experience, we prefer a meshed, nonexpanded, split-thickness skin graft [36].

Removal of too little foreskin is chiefly a cosmetic problem. Rarely, revision of the circumcision will be medically necessary (i.e., phimosis or balanitis). Patient satisfaction will frequently influence the decision to perform a circumcision revision.

Sexual Dysfunction

Alteration in sexual function after circumcision is controversial. Studies investigating this topic are often flawed due to a variety of reasons. These include the shortcomings of self-reported variables, nonvalidated questionnaires, small sample sizes, and the investigation of subjects with prior penile pathology. A review of this subject is covered in Chap. 20.

Conclusion

Adult circumcision is a safe procedure with infrequent but measurable complications. Unlike neonatal circumcision, where the procedure is largely elective, there are several concrete indications including phimosis, paraphimosis, balanitis, and LS. Recent studies in Africa also indicate that circumcision can be preventative in HIV transmission and some sexually transmitted infections. Several methods of performing an adult circumcision exist, but the sleeve method remains the most common. Although sensation appears to be diminished in circumcised adults relative to their uncircumcised cohorts, studies have not discovered a difference in sexual function when compared to uncircumcised men.

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Foreskin Reconstruction

15

Warren T. Snodgrass

Editors' Note
Many urethroplasty procedures result in circumcision. Where circumcision is not desired, alternative techniques should be entertained as described herein. In addition to those directly interested in this topic, this chapter also serves as a good reference for the primary care provider who is often tasked with setting patient (and parental) expectations and with the tending of wound healing.

Introduction

Various congenital anomalies of the penis include mal-development of the foreskin. Although most boys undergoing surgical correction in the USA have circumcision to correct the prepucial defect, some families prefer reconstruction of the foreskin to give a natural, un-operated appearance.

In other circumstances, surgical intervention is needed in patients with complete foreskins. For example, a minority of boys with distal hypospadias has a normal prepuce, which can be preserved during urethroplasty. Pathologic phimosis failing steroid treatment typically leads to circumcision, although alternative procedures exist to correct phimosis while preserving the foreskin and can be offered in select circumstances.

This chapter reviews both foreskin reconstruction and repair with its preservation.

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Foreskin Reconstruction Indications and Contraindications

Congenital ventral prepucial deficiency occurring in association with hypospadias or as the sole finding in other boys with normally formed urethras is the most common indication for foreskin reconstruction. Asymmetric development exposes the glans ventrally while the dorsal aspect is partially covered by a triangular hood of foreskin, giving an appearance that is neither natural nor circumcised. Options to correct the anomaly include either circumcision or foreskin reconstruction.

Prepucioplasty is an option for nearly all boys undergoing hypospadias repair. The only contraindication is the occasional finding of a relatively large glans with deficiency of the dorsal foreskin hood that precludes ventral approximation without creating secondary phimosis.

The foreskin is dorsally deficient in epispadias. A PubMed search revealed no publications concerning foreskin reconstruction for this anomaly.

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Abnormal foreskin development also occurs in the congenitally concealed penis, characterized by deficient outer prepuce and shaft skin and excessive inner prepucial skin. To date, there is no description of successful foreskin reconstruction in this condition.

Surgical Technique

Stay sutures are placed in the corners of the stretched dorsal prepucial hood (Fig. 15.1). A "V" incision is then made extending from these corners ventrally, joining below the hypospadias meatus or in the midline below the glans in those patients without hypospadias. Subcutaneous dissection separates these skin edges, allowing their later approximation into separate inner and outer prepuce. Closure of both inner and outer layers is done avoiding iatrogenic phimosis. Outer approximation sometimes begins at the corners of the dorsal hood adjacent to the stay sutures, but if the resulting ring does not easily retract over the glans, this stitch is removed and the distal approximation is made from a lower point that does allow retraction.

Typically, dorsal inner prepucial incision, as done in circumcision, is not needed during foreskin reconstruction. The primary indication for dorsal incision is to facilitate dorsal plication for straightening ventral curvature. However, dorsal plication is used for bending less than 30°, which is not clinically significant based on reports of adult men presenting with curvature resulting from Peyronie's disease [1–3]. Greater extents of ventral curvature, usually found in proximal hypospadias, can be corrected with ventral dissection alone [4].

Hypospadias urethroplasties that use either ventral shaft or dorsal prepuce may preclude foreskin reconstruction, or increase complications if prepucioplasty is attempted, as discussed below. The author prefers TIP (tubularized incised plate) urethroplasty involving tubularization of the urethral plate without skin flaps for all distal and most proximal urethroplasties, which makes foreskin reconstruction an option. In those proximal hypospadias repairs in which the urethral plate cannot be tubularized, the author excises the plate, creates a proximal urethrostomy, and then uses oral mucosa grafts to make a neo-urethral plate that is tubularized at a second operation 6 months later when the graft has vascularized (Figs. 15.2 and 15.3).

Foreskin reconstruction in boys with proximal hypospadias may require incision along the penoscrotal junction from medially to approximately 4 and 8 o'clock to partially release shaft skin from the scrotum. This maneuver allows

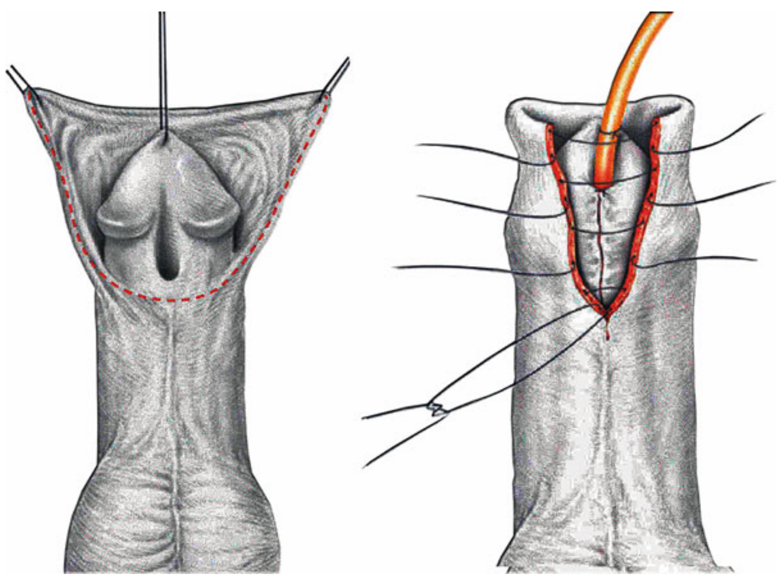

Fig. 15.1 (*Left*) Foreskin reconstruction – dorsal corners of the prepuce are held with stay stitches. The line for incision extends ventrally below the meatus in a boy with distal hypospadias. (*Right*) Foreskin reconstruction – after hypospadias repair, the inner layer of prepuce is sutured together, and then the outer layer is approximated, avoiding closure with secondary phimosis

Fig. 15.2 Foreskin reconstruction with two-stage hypospadias repair – result after first stage repair of proximal hypospadias with oral mucosa grafting. The preserved dorsal hood is held by forceps. Ventrally, the well-vascularized buccal graft is seen extending from a penoscrotal meatus distally to the end of the glans, ready to be tubularized into the neo-urethra

Fig. 15.3 Foreskin reconstruction with two-stage hypospadias repair – intraoperative appearance after hypospadias repair and foreskin reconstruction

ventrally deficient penile shaft skin to move distally to cover the ventral glans.

The foreskin should be left covering the glans during the initial postoperative recovery. Attempts to retract the skin within the first 6–12 weeks after surgery can result in disruption of the healing suture lines.

Results

Foreskin reconstruction most often creates natural-appearing skin coverage, illustrated in Figs. 15.4 and 15.5. By 6 weeks the repaired foreskin retracts, although inner prepucial adhesions to the glans can be seen, as in normal boys without or following circumcision. In others, postoperative edema delays retraction, but by 6 months few reconstructed foreskins still do not retract. The author has not found visible scar in these cases, which can either be treated with topical steroids (betamethasone 0.05% applied BID for 6–12 weeks) or observed expectantly – as are boys born without penile anomalies whose uncircumcised foreskin does not retract.

In general, foreskin reconstruction does not affect either urethroplasty or skin closure outcomes from hypospadias repair [5, 6]. In the author's experience with 388 consecutive distal TIP hypospadias repairs, of which 80% had circumcision and 20% foreskin reconstruction, urethroplasty complications occurred in 2% and 3%, respectively. Similarly, skin complications resulting in reoperation occurred in 2% after circumcision versus none with prepucioplasty (unpublished data).

Factors impacting complication rates after foreskin reconstruction include urethroplasty technique and postoperative manipulation of the prepuce. For example, a retrospective analysis of outcomes in boys operated for distal hypospadias

Fig. 15.4 Appearance of the reconstructed foreskin – natural-appearance after distal hypospadias repair with foreskin reconstruction

Fig. 15.5 Appearance of the reconstructed foreskin – similar un-operated appearance following proximal hypospadias repair with foreskin reconstruction

with prepucioplasty found significantly greater complications when Mathieu or Barcat procedures – which incorporate ventral shaft skin into the neourethra – were used versus urethral plate tubularization or urethral advancement without skin flaps [7]. Use of ventral shaft skin for urethroplasty makes subsequent foreskin approximation more difficult and tension on the suture lines can result in fistulas or dehiscence of the foreskin.

Early attempts to retract the reconstructed foreskin may also lead to skin disruption. One study recommending parents begin retracting the repaired foreskin 10 days after mostly Mathieu urethroplasties reported a 21% rate of dehiscence or gaps in the prepuce [8], whereas another series of Mathieu urethroplasties delaying retraction until the surgeon performed it first at 3 weeks postoperatively had only a 2.5% incidence of disruption [9]. Foreskin retraction before postoperative edema subsides likely increases partial or complete wound disruption.

Failure of the foreskin to retract is usually reported as phimosis, occurring in from 4% [7] to 29% [6]. However, different series report this phimosis at different time points. For example, Suoub et al. [6] prescribed steroid cream when the foreskin did not retract at 6–8 weeks after surgery, whereas Shimada et al. [10] apparently did not use steroids and found the two patients with nonretractile foreskins at 6 months could retract the prepuce at 1 year. Assuming reconstruction was done avoiding too tight approximation preventing retraction, true secondary phimosis requiring steroids or surgical revision should be uncommon.

Skin whorls sometimes are noted in the dorsal prepuce, leaving an unnatural appearance despite foreskin repair. The author has excised these, but the resulting dorsal incision is also unsightly. It is possible these could be improved by excising underlying dartos tissues from the skin and/or removing dorsal skin to smooth the whorls, although there are no reports concerning these maneuvers.

Foreskin Preservation

A boy found to have hypospadias when the normal-appearing foreskin becomes retractable can undergo urethroplasty without circumcision by tubularizing the urethral plate.

Two techniques have been described to correct symptomatic phimosis: vertical incisions through the phimotic ring with transverse closure [11–13] or circumferential excision of the ring preserving the outer prepuce for subsequent re-approximation to the inner prepucial layer [14]. A report of outcomes in 128 boys after “triple incision” through the phimotic ring with transverse closure stated 6% had persistent or recurrent phimosis, while 98% of parents were satisfied with the cosmetic appearance [12].

Foreskin Reconstruction After Prior Circumcision

No technique has been described to successfully reconstruct a prepuce after it has been surgically removed [15].

Editors’ Note

Foreskin reconstruction remains an ongoing surgical challenge for pediatric and reconstructive urologists. As noted by the author, an experienced hypospadiaologist, no reliable techniques have been described to replace the circumcised foreskin. Even when there is a partial foreskin, such as with hypospadias, attempts at reconstruction may yield a less than ideal cosmetic outcome or worse a secondary physiological complication. Expectations need to be fully addressed prior to foreskin reconstruction as although many will enjoy superb results, a significant minority may require or request further surgery, most often a secondary circumcision.

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Part VI

The Case Against Circumcision

16 Circumcision: Case Against Surgery Without Medical Indication

Annette Schröder

Introduction

> At this time, there is insufficient data to recommend routine neonatal circumcision. Although there are potential benefits and risks, the procedure is usually not essential to the child's well being (Shapiro [39]).

Circumcision is the most frequently performed operation in the world. This circumstance is due to the fact that it is mostly performed for cultural and religious reasons in many countries. The controversies on whether or not it should be performed without a sound medical indication are immense, as is the spectrum of different opinions what actually constitutes such an indication, even in countries not performing it routinely. Equally diverse are the beliefs regarding a possible benefit of routine circumcision including hygiene, UTIs, transmission of STDs, penile cancer, and many papers that actually take sides in these matters are followed by several editorial comments and correspondences.

Gairdner stated in 1949 that the foreskin actually may have the important function of covering the glans and protecting it from urine at an age when the baby is incontinent, and the glans otherwise would be constantly exposed to sodden diapers [15].

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Considering that circumcision, regardless how commonly performed, is a surgical procedure that can potentially have severe complications, the benefits should be in balance with the risks.

What Is a Physiological Phimosis?

The decision whether or not a phimosis is physiological and will resolve without intervention can be difficult, even for health care professionals, as clear-cut parameters cannot not always be applied [26]. In a British study, only 25% of the boys referred for circumcision actually required surgery [19]; a group from Canada only operated 14.4% of the 284 referred boys [13].

Physiological Phimosis

The presence of phimosis naturally depends on the boy's age, the incidence decreasing without intervention to 8% at reaching school age and 1% at puberty [15].

The term "physiological" could simply be defined as nonretractile foreskin in the absence of problems such as pain, infections, and scars at prepubertal age. Even ballooning of the foreskin does not constitute a pathology, as long as the stream is sufficient [15]. When retracting a physiologically phimotic foreskin, it will exhibit a "flowering"; the meatal orifice is rarely visible [25].

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Pathological Phimosis

Abnormalities and scars of the prepucial opening constitute a pathological condition. Often the meatal orifice is visible even without retracting the foreskin. At retraction, the prepucial opening will not widen but stretch to a white fibrous ring, nor does the "flowering" occur [27]. The most distinct form of a pathological phimosis is the lichen sclerosis (see Chap. 17), which will be described in detail below.

Indications for Treatment (Not Necessarily Circumcision)

There are purported reasons for circumcision including balanitis, paraphimosis, painful erection, and smegma retention. In addition, over the past years many claimed that the positive effect of circumcision on transmission of STD constituted a medical indication for circumcision. However, these are mostly relative indications, not written in stone.

In the light of the availability of topical steroids for effective treatment of phimosis, defining the indication for surgical intervention is difficult. Generally spoken, it can be said that a conservative approach by application of steroids is justified in all cases, except for lichen sclerosis and circumcision for prevention of recurrent infection.

Balanoposthitis is an inflammation of glans and foreskin, whereas balanitis is confined to the glans. Reddening, severe swelling, and often putrid discharge may cause dysuria and can in severe cases cause the child to retain urine. Most cases are self-limited or can be treated by simple local measures as bathing or antibiotic ointment; in some cases, systemic antibiotic treatment is needed. However, it rarely reoccurs or leaves scars, therefore only recurrent attacks or severe scarring justify circumcision [13].

Trapping of the glans behind the corona by a withdrawn phimotic foreskin can cause severe swelling of the distal penis, leading to paraphimosis. Manual reposition is mostly possible; only rarely a dorsal slit is needed. Circumcision should not be performed at the time of the incidence, as cosmetic outcome maybe poor due to the severe edema. As the foreskin usually continues to develop normally after the incident, circumcision is not routinely indicated, in particular, as the cosmetic outcome of a dorsal slit is usually satisfactory [8, 9, 27].

If erection hurts, usually a phimotic band causes pain during erection. Almost invariably it can be treated successfully by local steroids [22, 23, 28, 31, 34, 35, 53].

Smegma retention cysts, also referred to as prepucial pearls, often worry the parents [29]. However, they are common, physiological, and are actually contributing to the separation of the foreskin from the glans [27, 30]. Furthermore, Smegma in childhood is sterile, so there is no indication for circumcision.

Indications for Circumcision

Lichen sclerosis or balanitis xerotica obliterans (BXO) is a chronic inflammatory disease of unknown etiology that can affect the foreskin, glans, frenulum, meatus, and urethra [36]. The clinical appearance is usually easy to recognize, mostly being a severe phimosis with white sclerotic scarring of the prepuce (see Chap. 17) [5].

Apparently, the incidence of BXO in children has long been dramatically underestimated, being considered a rather rare event, an assumption being proven false by several recent studies [16]. A British group found histological confirmation of BXO in 12.1% of the boys referred to their clinic [51]; an earlier study from Hungary found BXO in 1,178 boys as often as in 40% of the cases [20].

A similar degree of underestimation appears to exist regarding the risk of penile cancer development in context with BXO. A prospective study found BXO in 28% of men operated for penile cancer [33].

After circumcision and confirmation of BXO, a close and long-term follow-up is needed as progression of the disease is possible, causing meatal stenosis in the short run and penile cancer in the long run. Topical application of tacrolimus ointment (off-label) shortly after surgery was shown to be a safe measure of preventing progression of the disease in 20 boys [11]. In light of the possible progress, the availability of preventive measures, and the possible malignant degeneration, it is advisable to always perform histological investigation of the tissue [5].

Recurrent balanitis/balanoposthitis is one of the rare medical indications for circumcision [25].

Considerations Besides Phimosis

In 1982, Ginsburg reported that the occurrence of UTI in boy was significantly decreased after circumcision [17]. Several studies by Wiswell et al. confirmed this finding [48–50]. However, a meta-analysis comprising the data of more than 400,000 children revealed that only those children profit from circumcision who have a significantly increased risk for recurrent UTI, that is, children with abnormalities of the upper urinary tract, in particular dilating vesicureteral reflux (VUR), or those with recurrent UTI [40]. The newly released AUA guideline on VUR suggests circumcision of boys with VUR of any degrees merely as an option [32]. After surgical correction of the VUR, however, Kwak et al. found no difference in the occurrence of UTI comparing boys circumcised during antireflux surgery with those not circumcised [21].

Three large RTC in South Africa, Kenya, and Uganda were terminated, as interim analysis showed a significant protective effect against transmission of HIV after circumcision [2, 3, 18]. However, it has to be taken into consideration that AIDS in those countries has endemic proportions and the degree of education, knowledge of ways of transmission of and protection from STDs (i.e., condom use: avoidance of risky sexual practices and promiscuity) cannot be compared with that in most societies.

Therefore, the degree of benefit demonstrated in these studies can hardly be readily applied to the rest of the world, neither should it be even suggested that circumcision "protects" from HIV transmission as safe sex practices do.

The assumption that circumcision evidently protects from HPV infection is subject to much debate. Van Howe contradicted that claim in a meta-analysis, reasoning that there was a significant sampling error in those studies supporting this assumption [45]. However, his appraisement is controversial, and further RCT have to be awaited [6].

It is unarguably true that penile cancer occurs less often in circumcised men; however, the mere presence of the foreskin does not constitute a risk of developing penile cancer. Several factors other than not being circumcised after birth appear to contribute to the incurrence of penile cancer, including smoking, promiscuity, HPV infection, history of penile rush, and penile tear. The study suggesting the above risk factors included 42% previously circumcised men at some point in their lives with penile cancer [10, 24]. Even cases of penile cancer after neonatal circumcision were published [37].

The wrong assumption that children do not suffer from pain in the neonatal period was partly based on the publication of Swafford and Allan in 1968, who stated that "pediatric patients seldom need medication for relief of pain. They tolerate discomfort well." [41]. Neonatal circumcision is, therefore, even nowadays often performed without anesthesia. In a prospective randomized placebo controlled study, Taddio et al. found that neonatal circumcision performed with and without local anesthesia compared to uncircumcised children, resulted in a long-lasting effect in pain response; at the time of vaccination later in life, there was an increasing pain score, which was lowest in the uncircumcised group, and highest in those circumcised with placebo only [42]. The American Academy of Pediatrics and the International Evidence-Based Group for Neonatal Pain both recently strongly recommended the use of one of the following anesthetic techniques during newborn male circumcision: local anesthesia including application of a lidocaine or prilocaine cream such as EMLA® before the procedure, a dorsal nerve block, or a subcutaneous ring block [39].

Being operated on without anesthesia (even under local anesthesia) can cause severe distress at any age [47]; in most European countries, sedation at the least or general anesthesia, therefore, is common practice.

One of the most vigorously discussed subjects is regarding the effect of circumcision on penile sensitivity and sexual satisfaction. Most studies on sexual function after circumcision concern patients being circumcised as adults, showing small differences in either way. Some men had a longer ejaculatory latency time and considered it beneficial after being circumcised as adults [38].

A comparative analysis was conducted on 125 men (62 uncircumcised/63 neonatally circumcised) using a battery of quantitative somatosensory tests including vibration, pressure, spatial perception, and warm/cold thermal thresholds. The authors concluded that circumcision status does not significantly alter the quantitative somatosensory testing results at the glans penis [4]. An experimental study showed that the foreskin, being a double invagination of skin that covers the glans and unfolds with intromission, facilitates intromission significantly (measured by force in g), compared to the exposed glans [43]. However, there are many factors influencing sexual satisfaction, so far – to the author's knowledge – no study has convincingly proven a benefit in sexual function, justifying neonatal circumcision.

Complications of Circumcision

Circumcision is considered by many the teaching case per se and is, therefore, often performed by inexperienced surgeons. Sadly, in many countries it is performed by medical laypersons. However, considering the impact of complications, no matter how insignificant from the medical point of view, they can cause the need of further operation and can be devastating for the child. Therefore, circumcision must not be regarded as trivial.

The overall complication rate of 1.5% is low, but given the number of circumcisions performed worldwide, the number of affected children is enormous. Most complications are rather harmless, such as minor hemorrhage, inadequate skin excision, skin bridges or meatal stenosis, but many of these cases nonetheless require additional surgery [46]. In infants, meatal ulceration is not uncommon; it is hypothesized that with the missing protection of the foreskin, the glans becomes susceptible to injury from contact with sodden nappies [14]. The incidence of meatal stenosis after neonatal circumcision can be as high as 7.29% [44, 52].

Serious complications include amongst others severe hemorrhage, sepsis, urethral fistulas, glans necrosis, penile denudation, penile loss, and Fournier gangrene [1, 7, 12, 47]. Although the majority of the severe complications occurred in the hands of inexperienced operators who were neither urologists nor surgeons [12, 46], complete attention to the details of this procedure has to be paid.

Contraindications

In case of an anatomical anomaly, circumcision should be avoided, as usually more complex surgical procedures are required. This applies particularly to hypospadias and the concealed penis (see Chap. 5).

Summary

Currently, there are insufficient data to justify surgical intervention just because of the mere presence of a foreskin, nor that of a phimosis in most cases. Harmless symptoms as ballooning or smegma retention cysts do not indicate surgery. The popular arguments of a protective effect from STDs or benefits regarding sexual function are controversial and these arguments need to be brought forward in a realistic and objective way, considering that circumcision is after all a surgical case, causing pain and possible complications.

The few medical indications for circumcision include recurrent infections and lichen sclerosis.

Editors' Note
Many young boys who are referred for circumcision have already been incorrectly labeled as having a pathological condition. The family, thus, often brings their child to

the urologist/surgeon with the expectation that circumcision is required. Even with reassurance that smegma is normal or that an asymptomatic 1-year-old boy with an incompletely retractile foreskin does not have true phimosis, many families (and their referring doctors) still want circumcision to be performed. In the USA, there has been poor education of the primary care provider as to what normality of the foreskin truly is, and how to care for the retained foreskin. Because of centuries of American circumcision, the patient and/or family also has had little experience with care and appearance of the penis with an intact prepuce. As subspecialists, it can often become uncomfortable when discussing why perhaps a circumcision may not necessarily be required in many of these young boys.

Most complication articles deal with acute complications after neonatal circumcision. As pediatric urologists, we often are seeing the full spectrum of complications after circumcision, especially in USA, where this procedure is done more frequently than other countries. Most indeed are cosmetic and are minor, but some truly are severe and devastating. The majority of such complications are seen months or years after a neonatal circumcision, not acutely. I thus would hazard a guess that the true complication rate for circumcision is far, far higher than those reported in the literature. The costs of repairing those complications are extraordinarily high, as most require a general anesthetic and day surgical procedure. Thus cost-benefit analyses can be very inaccurate when looking at the issue of circumcision.

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Care and Conditions of the Uncircumcised Phallus

17

Prasad P. Godbole and Duncan T. Wilcox

Editors' Note

Understanding of the natural history of separation of the inner surface of the intact prepuce from the glans is paramount to the care of the uncircumcised penis. As emphasized by the authors, all too often, the child (and over anxious parent) is referred to specialists by even the most knowledgeable medical practitioner for circumcision due to inability to retract, residual adhesions, infection of cyst (almost always smegma). In Western countries like the USA, where historically circumcision has been the norm, educating the families about this natural process of prepucial separation right from birth, and essentially reassuring them that time and a hands-off approach for the foreskin is all that is necessary in the long run, should be reinforced. Whether families and referring physicians will concur, is conjecture.

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Introduction

The prepuce or foreskin has long been a topic of much controversy both in the lay and medical literature, especially when there is discussion with respect to its removal. The prepuce is a common anatomical feature in all mammals [1]. In certain cultures, excision of the prepuce (circumcision) is the norm, whilst in other cultures the external genitalia are accepted as normal. This chapter will discuss the embryology and management of conditions affecting the foreskin.

Embryology

As described in more detail earlier in this textbook (Chap. 3), in its early development, the tip of the genital tubercle destined to become the glans becomes exposed and at approximately 12-weeks gestation a fold of skin forms at the base of the glans. This fold of skin then migrates distally to cover the glans, initially being more prominent on the dorsal aspect. With further development, the fold of skin migrates ventrally to form a median raphe. By 5-months gestation, the inner layer of the prepuce fuses with the epithelium of the glans itself [2]. Subsequent keratinization occurs between these two layers and the "sloughed" deposits of keratin, when visible grossly, are sometimes referred to as epithelial "pearls" or smegma [3].

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The clitoral prepuce develops similarly to that in the male [4]. The prepuce of the clitoris forms independently of the urogenital and labioscrotal folds that form the labia majora and minora, respectively. The urogenital groove on the ventral surface of the clitoris prevents circumferential development of the prepuce, giving it a dorsal hood-like appearance.

Natural History of the Foreskin

The natural history of the foreskin has been well described. Gairdner [5] found that 96% of newborn males have a nonretractile foreskin at birth due to fusion of the epithelium of the glans and the inner layer of the prepuce. This fusion separates gradually over the years as a spontaneous biological process. Topical steroid and nonsteroidal anti-inflammatory agents are known to accelerate the glans–prepuce separation [6, 7].

Oster [8] confirmed in a large study that prepucial non-separation is very common in children and that prepucial separation is complete by the age of 17 years with a change from 8% nonretractility to 1% between 6 and 17 years of age. Gairdner [5] found nonretractability in 80% of boys at 6 months, 50% at 1 year, 20% at 2 years, and 10% at 3 years. Between 6 and 17 years of age, visible smegma production increases from 1% to 8% by puberty.

Phimosis, a term derived from the Greek term meaning "to muzzle," describes a foreskin which is nonretractile. The term phimosis can lead to a lot of confusion as it is used in various circumstances from the healthy nonretractile foreskin of childhood to the foreskin affected as a result of pathological scarring secondary to balanitis xerotica obliterans (BXO). It is, therefore, extremely important to differentiate between the two types of phimosis into the physiological variety and the pathological variety or primary and secondary, respectively. The author prefers to use the term phimosis for a foreskin affected by BXO. The so-called physiological or primary/developmental phimosis can be described as a healthy but nonretractile foreskin, thereby eliminating the confusion.

Conditions Affecting the Uncircumcised Phallus

Nonretractility

The natural history of the fused foreskin is for spontaneous separation. Many parents, and even medical practitioners, have the belief that the foreskin should be retractile at all ages in all boys and, hence, a nonretractile foreskin is abnormal. As a result, the inappropriate recommendation is made that the foreskin should be forcibly retracted to allow proper hygiene. Lack of information or knowledge about the natural history of the foreskin and its retraction may lead to unnecessary referral for circumcisions. Requests for circumcision in these situations require strong reassurance about the normality of the foreskin and explanation of the natural history of its retraction. Forcible retraction of the foreskin should be avoided. The healthy nonretractile foreskin can be gently retracted to see the pouting of the inner epithelium and when pulled forward a patent channel is visible (Fig. 17.1). With time, this will retract without treatment. When medically indicated, or when especially anxious families wish the prepuce to retract more quickly, the topical application of steroid creams can be a useful adjunct [6, 7].

Fig. 17.1 Normal, physiological phimosis with a pouting prepuce and no scar tissue

Fig. 17.2 Ballooning of the foreskin with urine stored within the inner prepuce

Ballooning on Micturition

As the foreskin separates from the glans, a potential space may be created within the prepucial sac (Fig. 17.2). This space may fill up with urine on voiding leading to ballooning on micturition especially if the tip of the foreskin is narrow and does not allow retraction. This too is a normal phenomenon and in the presence of a healthy foreskin does not require intervention. Once the foreskin becomes retractile, the ballooning resolves or can be corrected by gently easing back the foreskin over the glans, thereby eliminating the potential space on voiding. It is important to emphasize, that in cases such as of megaprepuce (see Chap. 5), where massive amounts of urine can be trapped, intervention may be necessary.

Smegma

As the foreskin separates, a variable amount of keratin deposition occurs. This in some instances can be quite significant and may present as white/yellowish oval "pearls" located most commonly in the subcoronal space. These are washed out when the foreskin separates completely and does not require any intervention. All too often, lack of familiarity with smegma deposition, especially large collections, leads to the misdiagnosis and overtreatment for infection and inclusion cysts.

Inflammatory Conditions

Balanoposthitis

Balanoposthitis [9, 10] describes a condition of inflammation of glans and prepuce seen in boys with a nonretractile foreskin. It is also seen in circumcised boys. Posthitis may occur in isolation and is the foreskin component, while balanitis refers to inflammation of the glans. The exact etiology is unknown but it occurs in up to 4% of the uncircumcised boys between 2 and 5 years of age after potty training.

The onset can be sudden and dramatic with redness and swelling of the tip of the foreskin. There may be a yellowish discharge and dysuria or bleeding from the foreskin. Very rarely, the pain and swelling may be sufficiently severe enough to cause urinary retention.

Management of balanoposthitis is almost always initially conservative. In most instances, simple bathing is all that is required. For recurrent episodes, topical steroids may be utilized. On infrequent occasions, antibiotics may be necessary, topical or enteral. Circumcision may be considered for those individuals in whom the symptoms are recurrent and disabling despite conservative measures. The natural history, however, is for these episodes to reduce with time.

Balanitis Xerotica Obliterans

This is an inflammatory cutaneous lesion akin to lichen sclerosus et atrophicus [11] and is a cause of true or pathological phimosis. The etiology is not clear but it may be of viral origin. It was initially thought to be rare under 5 years of age [12] but has been described even in the very young. The clinical symptoms are those of a nonretractile foreskin with ballooning, spraying, dysuria, bleeding from the foreskin or poor urinary stream. An obvious white sclerotic nonretractile and non-pouting margin of the foreskin is pathognomic of BXO (Fig. 17.3).

Historically, the gold standard for BXO was circumcision. However, other alternative strategies including topical and intralesional steroid injection [13] with or without prepucioplasty [14, 15], long-term antibiotics [16], carbon dioxide laser therapy [17] have all been described. However, there are no randomized controlled trials or other good evidence to ascertain the efficacy and long-term outcome of any of these techniques.

Fig. 17.3 With BXO a typical white sclerotic non pouting foreskin is observed

Structural

Paraphimosis

This is a condition where the narrow tip of the foreskin is forcibly retracted over the glans following which it cannot be manipulated back into its normal position due to edema of the glans and foreskin around the coronal sulcus (Figs. 17.4 and 17.5). In most cases of paraphimosis, reduction can be performed either under a local anesthetic or general anesthetic [18, 19]. In some cases, the constricting ring has to be divided to allow manipulation of the foreskin back into its normal position. Paraphimosis itself is not an indication for circumcision.

Fig. 17.4 Paraphimosis with the foreskin trapped behind the glans (infant) (Image courtesy of Seattle Children's Hospital, Department of Urology)

Hooded Foreskin

This typically occurs with hypospadias (Fig. 17.6). The hooded foreskin is a cosmetic abnormality and management of this is often conservative. If part of hypospadias repair, the hooded foreskin may be reconstructed or removed (circumcision) for cosmetic purposes.

Buried Penis

Buried penis is also known as concealed penis, volcano penis, teapot penis, and sometimes related to a megaprepuce [20]. This can result due to excessive amount of inner prepuce associated with abnormal dartos fascia which tethers the penis down into the suprapubic fat pad. There is scrotal encroachment to the tip of the foreskin in severe cases. When voiding occurs,

Fig. 17.5 Paraphimosis with the foreskin trapped behind the glans (adult)

Fig. 17.6 A hooded foreskin with the majority of the foreskin dorsally and only a small amount ventrally. Foreskin is pulled back to reveal glans (Image courtesy of G. Hudson, M.D.)

Fig. 17.7 In a buried penis the shaft of the penis appears hidden within the scrotum (Image courtesy of Seattle Children's Hospital, Department of Urology)

this fills in the space created by the excessive inner prepuce and the foreskin may balloon to the size of a golf ball, obscuring the penis completely (Fig. 17.7). In severe cases, urine has to be expressed from the prepucial sac by milking the swelling.

In minor forms, conservative treatment may be offered; however, in most cases, a modified circumcision is required to remove the excess inner prepuce and release the penile shaft from the tethering dartos fascia for which several techniques have been described [21, 22].

Conclusion

Most conditions affecting the uncircumcised phallus are relatively minor and do not need surgical intervention. Inflammatory conditions can be managed conservatively apart from BXO where circumcision is the gold standard. Some structural abnormalities of the uncircumcised phallus may be evident at birth and the management should be tailored to the individual.

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A Comment on Informed Consent

18

Kirk Pinto

Circumcision is an ancient procedure and, despite its long history, there remain significant doubts as to its medical benefits. Honest advocates on either side of this issue have to temper their enthusiasm based upon the lack of overwhelming medical evidence with which to definitively silence dissenters.

As is eloquently pointed out in Chap. 2, informed consent is a shared decision between the patient – or the patient's guardian – and the physician. It is assumed that both parties have the patient's best interests at heart. Several studies have shown that, with regards to neonatal circumcision, parents' perception of what is best for the child often has little to do with medical realities [1, 2]. It is the duty of the physician, however, to always be a champion for the best medical care of their patients. In light of parents' misconceptions of the risks and benefits of circumcision, the fulfillment of that role becomes all the more important.

Outside of the USA, elective neonatal circumcision is rarely performed. Several factors contribute to this.

First, regulatory bodies have spoken out against the practice. In places like Australia and England, the relevant medical bodies have been demonstrative in their opposition to circumcising newborns electively. The United Nations Convention on the Rights of a Child (to which the USA is a signatory) condemns female genital mutilation and, given the paucity of evidence supporting long-term medical benefits for neonatal male circumcision, critics say the same proscription should be extended to males. Second, in most of the rest of the world, where state-funded medicine is the norm, governments simply refuse to pay for neonatal circumcision. And, third, there have been legal cases brought not questioning circumcision itself, but, rather, the very important issues surrounding who can give informed consent for this elective procedure [3].

In the USA, policy statements from the various medical entities, from which parents and physicians alike seek medical guidance, are vague in their instruction. The American Academy of Pediatrics suggests that physicians present all of the risks and benefits of neonatal circumcision so that the parents may make an informed decision [4]. This scenario abdicates the physician's primary responsibility of being a dispassionate medical adviser. Given the virtual deadlock as to the benefits and risks of neonatal circumcision, any guidance from the physician will, de facto, be driven by their personal bias. Conversely, if the physician is truly neutral in this matter, it seems disingenuous for them to perform a procedure they have not recommended.

There are also nonmedical forces marshaling against routine neonatal circumcision in this country. The focus on the finances of health care

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in the USA may prompt regulatory review of elective procedures [5]. There is legitimate question if the pro-circumcision arguments will be convincing enough to sustain reimbursement for this procedure in the future. In addition, there are well-established anti- circumcision groups who continue to campaign aggressively against circumcision. In the USA, too, law suits have been directly and tangentially related to the subject of circumcision. Cases have focused on a parent's ability to consent for a procedure that may have no medical benefit, while others have been brought to seek reparations for the "harm" visited upon a defendant circumcised as an infant. While none of these have succeeded in abolishing the practice of neonatal circumcision in the USA, physicians should be aware of these developments [3].

Since it was first performed thousands of years ago, circumcision has been a controversial topic. The USA remains the world leader in the number of neonatal circumcisions performed. The global community, in practice, has come to very different conclusions than their American colleagues about the wisdom of elective neonatal circumcision. Physicians have a responsibility, when obtaining informed consent, to be sure that the expected benefits of the procedure to be performed outweigh the risks. Though it is true that, in experienced hands, circumcision is a routine and safe procedure, the physician's role in obtaining informed consent is not diminished by the ease or difficulty of the operation to be performed. Given the continued controversy regarding this short piece of foreskin, doctors who perform circumcision and dismiss the procedure as low risk both from a medical and or legal standpoint do so at their peril.

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Part VII

The Case for Circumcision

19 Current Medical Evidence Supports Male Circumcision

Brian J. Morris and Guy Cox

Introduction

Circumcision has a wide array of potential benefits over the lifetime of males, and relatively few risks. Up to one in three males worldwide, if not circumcised, may suffer a medical condition caused by their foreskin [1–3]. In contrast, the risks of the procedure itself are less than 1% in infancy and less than 5% in older children and adults. The benefits have been calculated by some, to exceed risks by over 100 to one [1–3]. Figure 19.1 illustrates why the foreskin represents a risk to health.

Hygiene

Hygiene has always been a major reason for circumcision. It is well known that microorganisms accumulate under the foreskin, and can foster inflammatory processes leading to balanitis/balanoposthitis (see reviews: [1, 2] and discussed in more detail in inflammatory dermatoses section below). Moreover, fimbriated bacteria can migrate up the urethra to cause urinary tract infections (UTIs), especially in infancy.

Smegma tends to accumulate under the foreskin. Smegma is secreted by Tyson's glands and contains neutral lipids, fatty acids, and sterol. Its initial function is lubrication and protection of the glans, but if it is not removed by regular washing it becomes mixed with epithelial cells and infected by bacteria, forming solid aggregates. The bacteria (especially *Mycobacterium smegmatis*) can produce an offensive odor accounting for the common perception that smegma is unclean [4]. The incidence of yeast fungi was found in one study to be 44% in uncircumcised boys and 18% in circumcised boys (ages 8 months to 18 years; mean 6.4 years) [5]. A much lower prevalence of penile candidiasis has also been noted in circumcised men in Australian studies [6–8]. In boys (mean age 5.8 years, range 0.01–13) colonization of the glans penis by yeast was 12% just prior to circumcision and 1% 1 month later [9]. The species found were *Candida albicans* (50%), *Malasserzia furfur* (40%), and *Malassezia sympodialis* (10%).

Inflammatory Dermatoses

Lack of circumcision increases the risk of inflammation of the glans (balanitis) and foreskin (posthitis). In boys the incidence in the uncircumcised is twice as high as in those who are circumcised [10, 11]. In men balanitis is

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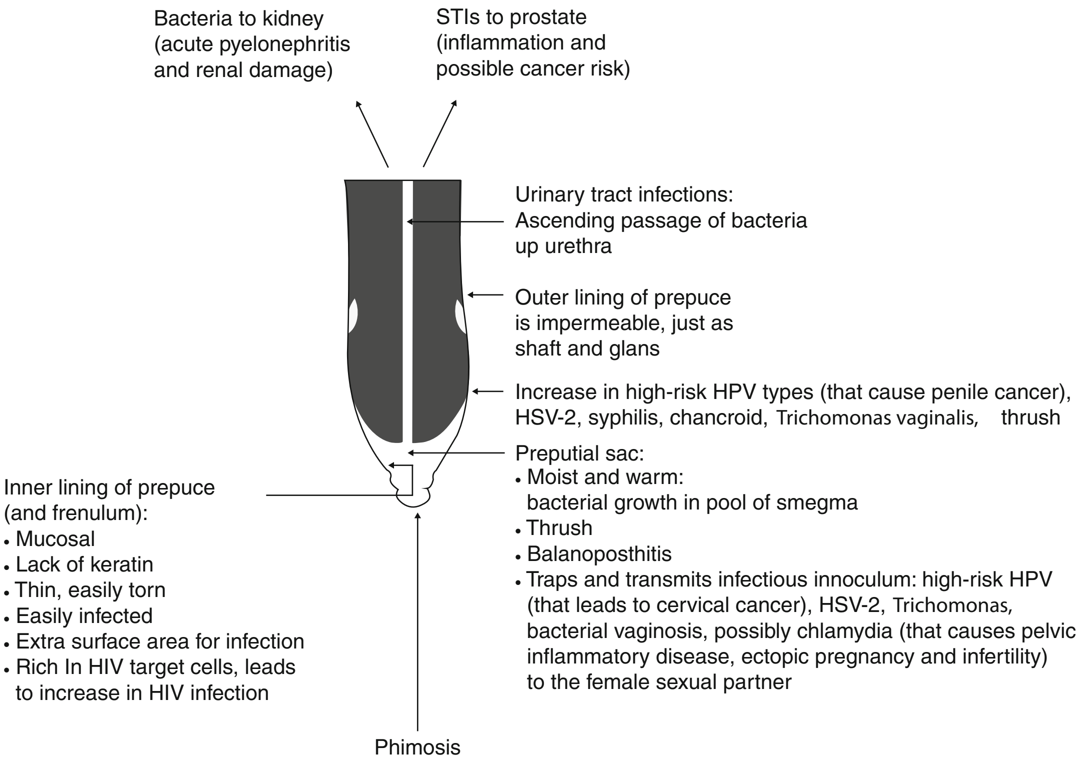

Fig. 19.1 Anatomical relationship of foreskin to the main body of the penis, showing features that lead to increase in infection risk, and the mode of infection by various microorganisms

seen in 11–13% of those not circumcised, but in only 2% of those who are [12, 13]. In uncircumcised diabetic men, the incidence may be as high as 35–40% [13]. In fact, in such men, whose diabetes was previously undiagnosed, a new case of balanoposthitis should alert the practitioner to test for diabetes. During balanoposthitis, the distal penis becomes red, painful, and swollen, and is often accompanied by a purulent discharge [14].

Other penile skin conditions higher in frequency or completely confined to uncircumcised males include psoriasis, ones arising from penile infections, lichen sclerosis, lichen planus, schorrheic dermatitis, plasma cell (Zoon) balanitis, bowenoid papulosis, and nonspecific balanoposthitis [13, 15–17]. *Mycobacterium smegmatis* has been implicated in Zoon balanitis [16], which presents as erythrema (in 100%), swelling (in 91%), discharge (in 73%), dysuria (in 13%), bleeding (in 2%) and ulceration (in 1%) [13].

Phimosis

Historically, protection against phimosis is one of the best known benefits of circumcision. The preputial constriction, in severe cases to a pinpoint, is an impediment to passing urine normally and prevents retraction of the foreskin [18]. Chronic infection and inflammation in men with phimosis may ultimately lead to them having a higher risk of squamous cell carcinoma.

Severe phimosis can in some instances lead to UTIs, localized skin infections, pain when passing urine, retention of urine, kidney stones, and sexual dysfunction [19]. The prevalence of phimosis beyond childhood is approximately 10–30%. This includes "physiological" phimosis (see next paragraph) as well as pathological phimosis. The most common cause of the latter is *balanitis xerotica obliterans* (BXO) or lichen sclerosus et atrophicus. It first presents in boys aged 8–10 years [20] and in the UK it was seen

Table 19.1 Prevalence of phimosis in various studies in different countries

Location	Study group	Prevalence (%)	Reference
UK	5–13 year-olds	20	[26]
UK	Soldiers	14	[27]
New York	Men	9	[28]
Denmark	8 years old	8	[29]
Germany	Youths	9	[30]
Germany	Men	9	[31]
China	3–23 year-olds	12	[32]
China	7–10 year-olds	12	[33]
China	11–18 year-olds	7	[33]
Japan	Men	50	[34]
Japan	11–15 year-olds	23	[35]
Japan	13 year-olds	16	[36]
Taiwan	10–13 year-olds	37	[37]
Bali	Men	50	[38]

in 5% of uncircumcised boys aged under 18 years, and in 6% of uncircumcised boys aged under 15 years [21, 22]. In a study involving men aged 24–70 years with phimosis, lesions were found on the foreskin and glans of 59%, foreskin only in 23%, and glans only in 18% [23]. In pediatric patients, 37% with severe phimosis had *lichen sclerosus* [24]. *Lichen sclerosus* has been found in 4–19% of all foreskins, and, in older patients, progressive *Lichen sclerosus* or other inflammatory changes lead to phimosis [25]. Phimosis in older men is found to be associated with 44–85% of cases of penile cancer [19].

The rates of phimosis (mostly physiological) reported in various studies vary by geography and age, as depicted in Table 19.1.

In a large study in China of 10,421 males aged 0–18 years, apart from the statistics for phimosis itself that are shown in Table 19.1, partial phimosis was seen in a further 20% of the 7–10 year olds and in 9% of the 11–18 year olds [33]. Adhesions were apparent in 29% and 25%, respectively, and a foreskin that could be retracted normally was apparent in only 24% and 42% of each respective age group. The circumcision rate was 15% in the 7–10 year olds and 17% in the 11–18 year olds. Of all of these children, 13% had undergone forced foreskin dilation in the past, 77% of these forced retractions having been performed prior to school age. Despite having had this procedure carried out, in 13% the phimosis persisted and most of these had scar tissue on the distal foreskin.

Urinary Tract Infections

The higher prevalence of UTIs in uncircumcised boys was first noticed in a retrospective analysis in 1982 when 95% of UTIs in boys aged 5 days to 8 months were found to be in those not circumcised [39]. In a series of prospective analyses based on data mining, commencing the same year [40], this was confirmed. In a subsequent study, Wiswell and colleagues found that amongst 5,261 infants born at one US Army hospital, 4% of UTI cases were in uncircumcised males, but in only 0.2% in those who were circumcised [41]. They then went on to examine the records for 219,755 boys born in US Armed Forces hospitals from 1975 to 1979 and found an 11-fold higher incidence of UTIs in the uncircumcised [42]. Then in 1993, their study of infants born between 1985 and 1990 in US Army hospitals worldwide found 496 boys got UTI in their first year of life and 90% of these were uncircumcised [43]. Among the uncircumcised boys younger than 3 months, 23% had bacteremia caused by the same organism responsible for the UTI. The UTIs were, moreover, recurrent in 19% of uncircumcised boys, but in none of the circumcised [44].

A meta-analysis in 2005 noted 1,222 UTIs in 107,873 uncircumcised infants, that is, 1.1%, and a summary OR for the protective effect of circumcision against UTI of 0.13 (95% CI 0.08–0.20), that is, circumcision reduced UTI 7.7-fold [45]. In Sweden (where infant circumcision is rare), cumulative incidence of UTI was 2.2% by age 2 years [46]. In a study of 2,000 boys circumcised by Plastibell in the first month of life and 1,000 uncircumcised infants, culture of urine obtained by suprapubic bladder catheterization at four time points (1.5, 3, 9, and 15 months) found not one UTI in the circumcised group, but 2% of the uncircumcised boys had a UTI [47]. A meta-analysis published in 2008 found that amongst febrile male infants aged less than 3 months (the age group with highest prevalence of UTI), UTI was the cause of the fever in 20.1% of uncircumcised boys, but only in 2.4% of boys who were circumcised [48]. "Low-risk" criteria were not sufficiently reliable to exclude a serious bacterial infection, which was seen in 19% of febrile neonates, 80% of these having a UTI [49]. The authors recommended that all febrile infants be hospitalized, undergo a full sepsis evaluation, and receive i.v. antibiotics. By the age of 7 years, 2% of boys were confirmed as having had a UTI and another 5% had probably had at least one UTI [50]. In the "Pediatric Research in Office Settings Febrile Infant Study" of 219 US practices, being uncircumcised was the strongest multivariate predictor of UTI, with an odds ratio of 11.6 (95% CI 5.9–22.6) [51].

Imaging studies have shown that 50–86% of children with febrile UTI and presumed pyelonephritis had renal parenchymal defects [52], which persist after treatment and these children may have acquired renal defects. Nuclear scans following the treatment of UTI in febrile infants noted scarring in 10–30% of cases [53]. Of those with acute pyelonephritis, 36–52% will subsequently develop renal scarring [54–57]. In boys with high-grade vesicoureteral reflex not only was UTI reduced by circumcision, but new permanent defects were halved [58].

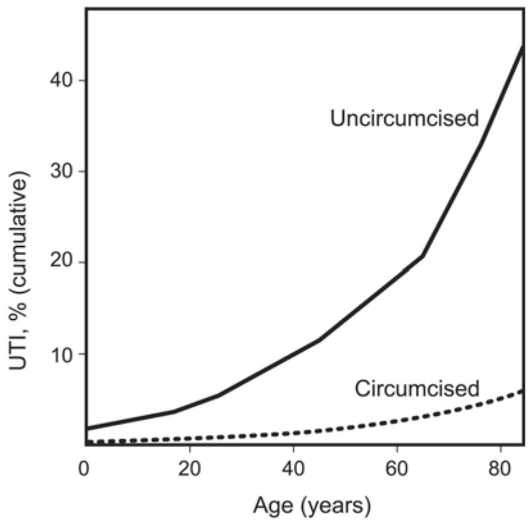

Fig. 19.2 Cumulative prevalence of urinary tract infections over the lifetime of circumcised and uncircumcised males. (Kindly provided by J.H. Waskett, Manchester, UK, from unpublished calculations based on the literature)

The protective effect of circumcision against UTIs continues into adulthood, with a 5.6-fold higher rate of UTI in the uncircumcised having been observed in a study in Seattle of men of average 32 years, and matched for race, age, and sexual activity [59]. Lifetime prevalence of UTI was 13.7% in a large, nationally representative US study of men aged 18–85+ years [60, 61]. Since overall rate of circumcision is 79% in the USA [62], a meta-analysis of all studies has estimated that up to 24% of uncircumcised males, compared with 8% of the circumcised will get a UTI over their lifetime (Fig. 19.2). UTI is the most costly (over $1 billion in men [60]) and resource-intensive urological condition in the USA, and involves 1.8 M physician visits annually [63].

Much is now known about the bacteria and other microorganisms that proliferate under the foreskin (reviewed in [1, 2]). The fact that fimbriated strains of the bacterium *Escherichia coli*, which are pathogenic to the urinary tract and pyelonephritogenic, have been shown to be capable of adhering to the foreskin satisfies one of the criteria for causality [64–69].

Common Sexually Transmitted Infections

Syphilis, Chancroid, HSV-2, Trichomonas, and Sexually Transmitted Urethritis

Reports that circumcision could prevent sexually transmitted infections (STIs) started with syphilis in the mid-1800s [70], though since this involved a comparison of Jews with gentiles the study was not properly controlled. Reports of protection against syphilis and other STIs have continued over the years, including one in 1947 of 1,300 consecutive patients in a Canadian Army unit that showed lack of circumcision to be associated with a ninefold higher risk of syphilis and three times higher gonorrhoea [71]. Many of these studies have been reviewed [1, 2, 72].

A meta-analysis in 2006 of ulcerative STIs that examined 26 research articles (from the USA, UK, Australia, Africa, India, and Peru) found circumcision protected against syphilis (by 39%) and chancroid (by 0–88%), but genital herpes (HSV-2) was only 12% lower in circumcised men [73].

The partial prevention of ulcerative STIs is now supported by data from randomized controlled trials (RCTs), regarded as the "gold standard" in epidemiology. An RCT in Uganda found that the protective effect of circumcision against genital ulcer disease was 48% [74]. Subsequently, large RCTs have found lower genital herpes in men in the circumcised arm of each trial. HSV-2 seroprevalence was 45% lower in a trial involving 2,974 men in South Africa [75] and was 30% lower in an initial trial involving 6,396 men in Uganda [76]. Further Ugandan data from two trials found HSV-2 to be 23% and 41% lower in the men who had been circumcised [77]. But when seroprevalence was examined, a longitudinal study in New Zealand found no difference in HSV-2 between circumcised and uncircumcised men [78]. The twofold higher incidence of genital ulcer disease (GUD), including herpetic lesions, in uncircumcised men led to suggestions that circumcision may reduce the *recurrence* of genital lesions arising from HSV-2 infection [79]. Circumcision also reduced recurrence of genital herpes by 20-fold and prolonged the interval between bouts [80].

An added benefit of circumcision in reducing HSV-2 is that it should also contribute to a lowering of HIV infection [79], even though the latter appeared independent of HSV-2 serostatus [75]. A synergy between HIV and HSV-2 infections has also been reported by the latter group of researchers [81]. In that study, conducted in South Africa, HSV-2 infection per sex act was 0.013 in uncircumcised men, compared with 0.0074 in circumcised men (RR 0.56; $P=0.005$) [81]. HSV-2 suppressive therapy failed to decrease HIV acquisition, as seen in a RCT of female Tanzanian workers, and in a RCT that included women in Africa as well as MSM in Peru and the USA [82]. The persistence and enrichment of HIV receptor-positive inflammatory cells in biopsies from healed genital lesions caused by HSV-2 might explain why anti-HSV-2 therapy does not reduce HIV acquisition [83].

In Black heterosexual men aged 18–25 years who were attending an STI clinic in the USA, HSV-1 seroprevalence was 2.8 times higher in the uncircumcised [84]. HSV-2 seroprevalance did not differ, however.

Circumcision alters the microbiome of the penis [85]. The anoxic microenvironment under the foreskin supports growth of pro-inflammatory anaerobes capable of activating Langerhans cells. These cells present HIV to CD4 cells in draining lymph nodes. Circumcision reduces the anaerobic bacteria, and in so doing helps protect against various STIs, including HIV.

In an RCT in South Africa, the prevalence of gonorrhoea was only 9% lower in circumcised men [86]. In this trial, Chlamydia was 42% lower and *Trichomonas vaginalis* was 46% lower in the men who had been circumcised. In an as-treated analysis, *T. vaginalis* was 51% lower, with an adjusted OR of 0.41 [86]. This explained why women with circumcised male partners have been found to be less at risk of *T. vaginalis* infection [87]. In the Kenyan RCT, however, circumcision did not show protection against either gonorrhoea, Chlamydia or Trichomonas [88]. The data on gonorrhoea and Chlamydia are consistent with most earlier observational findings, and is to be expected because the preferred host site for these bacterial STIs is the internal urethral cuboidal or columnar epithelium. In this regard, although the Kenyan RCT data differed from the South African RCT data for Chlamydia and Trichomonas, the prevalence of Trichomonas in the Kenyan study was lower than in other African countries.

In men who have sex with men (MSM), a Sydney study found that in those who were circumcised, syphilis was ten times lower in the 33% who only ever engaged in insertive anal intercourse [89]. Similarly, a study of MSM in Seattle, found diagnosis of syphilis to be 2.0 times higher in uncircumcised men, and was completely absent from the 11% who said they were insertive-only [90].

Penile Cancer and HPV Infection

A link between lack of circumcision and penile cancer has been known for a very long time. A report in 1932 noted that not one man with invasive penile cancer had been circumcised neonatally [91], and this was followed by similar findings over the years [92]. In one, involving 213 cases in California, only 2 of 89 men with invasive penile cancer had been circumcised in infancy, and based on these data, the authors calculated that uncircumcised men had a 22 times higher risk of this disease [93, 94].

The predicted lifetime risk of penile cancer for an uncircumcised man is approximately 1 in 600 in the USA and 1 in 900 in Denmark [95]. It accounts for less than 1% of all malignancies in men in the USA and 0.1% of cancer deaths. The 5-year survival rate has been stated as approximately 50% [96] and others point to it being the cause of death in 25–33% of cases [91, 95]. In less-developed countries the rate can be much higher. In Brazil, for example, penile cancer represents 2–6% of all male neoplasias, with 7% of cases being in men aged less than 35 years, and 39% in men older than 66 years [97]. In Balinese men, most of whom being Hindu, are not circumcised, penile carcinoma is the second most frequent carcinoma [38].

In the 1970s, Harald Zur Hausen in Germany identified a link between HPV infection and cervical cancer, and for this discovery he won the Nobel Prize in 2008. HPV is highly infectious. The transmission probability per heterosexual partnership for the 14 common high-risk types ranges from 45% to 94% [98]. The sexually transmitted nature of genital HPV led to the identification of oncogenic HPV types in penile cancers (see review [99]).

In 2002, a large multination study that involved sampling from the urethra and glans penis/coronal sulcus found HPV in 19.6% of 847 uncircumcised men, but only 5.5% of 292 circumcised men (overall odds ratio after adjusting for potential confounding factors = 0.37) [100]. Two Mexican studies are noteworthy: one involving men attending vasectomy clinics found HPV to be five times lower in those who were circumcised [101], and the other, involving healthy military men, found persistent HPV was ten times lower in the circumcised [102].

The distribution of HPV on the penis is important to consider. A study in Hawaii in 2008 of primarily heterosexual men found HPV infection of the glans/coronal sulcus to be higher in uncircumcised men (46%) compared with circumcised men (29%) [103]. The uncircumcised men were 2.5 times more likely to harbor oncogenic HPV types and 3.6 times more likely to be infected with multiple types. In the uncircumcised men, HPV prevalence on the foreskin (44%) was comparable to that on the glans/corona beneath it. A comparison of circumcised and uncircumcised men found the difference between each in HPV prevalence was greater for proximity to the tip of the penis. In the uncircumcised high-risk HPV was 5.3 times higher in the urethra, 1.6 times higher on the glans/coronal sulcus and 1.8 times higher on the shaft [103]. In the HIM study, involving men in the USA, Mexico, and Brazil, high-risk HPV types were lower in circumcised men (OR 0.70), as were low-risk HPV types (OR 0.63) [104]. HPV prevalence ranged from 41% on the shaft to 4.7% in semen [105]. In this study, the strength of the association between circumcision and reduced HPV decreased with distance from the prepuce/urethra. The adjusted OR was

0.17 for the urethra, 0.44 for the glans/corona, 0.53 for the shaft, and there was no difference for scrotum, peri-anal area, anal canal, and semen [105]. In Kisumu, Kenya, high-risk HPV prevalence in 2,705 uncircumcised men aged 17–28 years was glans/coronal sulcus 31% and shaft 12.3% ($P < 0.0001$) [106]. HPV16 was the most common type, and 29% were infected with more than one type. Not surprisingly, men with HPV were also more likely to have other STI(s), but genital warts were uncommon (1%).

A meta-analysis in 2009 of 14 studies, involving 5,880 circumcised and 4,257 uncircumcised men, found circumcision to give 1.9-fold protection against high-risk HPV types (95% CI 0.33–0.82) [107]. There was, however, little protection against low-risk HPV types, which manifest as visible warts and tend to occur on the shaft of the penis, a site of infection less likely to be affected by circumcision [107].

Data for two RCTs became available in 2009. One of these, in Rakai, Uganda, found that at 24 months, high-risk HPV in swabs from the coronal sulcus of the penis was 35% lower in circumcised men (18%) compared to uncircumcised (28%) [77]. When confining the analysis to samples certain to contain DNA, HPV was 45% lower in the circumcised men. Protection against acquisition over the 24 months was 42% [108]. Circumcised men were, moreover, 65% less likely to be infected by multiple high-risk HPV types. Another RCT in Uganda found 33% lower acquisition of high-risk HPV over 2 years in the same genital site [109]. Infection by multiple high-risk HPVs was 55% lower, but there was no difference in single infections. An RCT in South Africa found a 34% lower prevalence of high-risk HPV in urethral swabs from the circumcised group at 21 months after surgery [110]. The authors stated, moreover, that owing to the fact that some men would have already been infected with HPV before inclusion in the trial, the true effect of circumcision would have been higher than this. Sampling at the urethra rather than the glans, coronal sulcus or shaft might, moreover, have underestimated the efficacy of circumcision in preventing HPV infection [111]. For HIV-positive men, the RCT found 60% lower acquisition of new high-risk HPV in the men who received a circumcision [112]. High-risk, but not low-risk, HPV is, moreover, associated with a 3.8-fold higher HIV incidence [113]. High-risk HPV is more likely to produce a persistent infection and, by generating an immune response in basal epithelial cells would cause recruitment of HIV target cells, could increase cytokines which stimulate HIV transcription and replication, and could increase inflammation and immune activation, meaning a causal mechanism is possible [113].

As mentioned above for HSV-2, seroprevalence of HPV was also found not to differ according to circumcision status in the same longitudinal cohort of New Zealand men [114]. The explanation for this finding was revealed in another longitudinal study, this time in Tuscon, Arizona, which found that circumcised men clear penile oncogenic (but not non-oncogenic) HPV infections six times faster than uncircumcised men [115]. Interestingly, men who had had 16 or more lifetime sex partners were 4.9 times more likely to clear oncogenic HPV infection. Perhaps their immune system was better primed by years of repeated exposure. Higher clearance from the glans/coronal sulcus of circumcised men was also seen in a Hawaiian study, being 41% for any HPV, 64% for high-risk HPV, and 50% for HPV types other than high-risk ones [116]. In Uganda, an RCT found 39% higher clearance of high-risk HPV over 2 years in HIV-negative men [109]. A parametric frailty model then showed clearance of different types was highly correlated, and was 60% faster if a man was circumcised [117]. In men who were HIV-positive, although circumcision reduced the prevalence and acquisition of high-risk HPV, it did not affect their ability to clear the virus [112]. An editorial discussed these findings [118].

Condoms were found in a US study in 2007 to provide about 50% protection against oncogenic HPV infection of men [119].

Another factor that might be involved is smegma [120–123], possibly by causing chronic inflammation and recurrent infections that lead to preputial adhesions and phimosis [124, 125].

Chronic relapsing balanitis of bacterial, mycotic, or viral origin might increase risk of invasive penile cancer [126, 127]. A history of balanitis has been reported in 45% of penile cancer patients compared with 8% of controls [94, 128]. Penile lichen sclerosus (BXO) is associated with penile cancer (reviewed in [19]). Incidence of BXO in penile carcinoma patients is 28–50% [129–132]. HPV infection was 2.6 times higher amongst patients with penile lichen sclerosus [133]. Lichen sclerosus is not always associated with the presence of HPV and it could be that lichen sclerosus acts as a catalyst in the onset of penile cancer [134]. Although oncogenic HPV is higher in patients with genital lichen sclerosus (17% vs. 9%), other data suggest that lichen sclerosis is a pre-neoplastic condition unrelated to HPV infection (reviewed in [19]). A review in 2008 suggested that approximately half of penile squamous cell carcinomas (which represent 95% of penile neoplasms) are associated with lichen sclerosus and half with HPV [17].

A co-carcinogenic role of recurrent HSV-2 in penile cancer has also been suggested [135, 136].

There is no correlation between penile cancer and frequency of bathing or method of cleaning the anogenital area before or after sexual intercourse [124].

Invasive penile carcinoma is associated strongly with a history of phimosis (adjusted odds ratio = 16 in one study [124] and 11 in another [137]). Such a history is seen in 45–85% of men with penile cancer [97, 124, 128]. Phimosis causes dysplastic changes in the skin of the preputial sac [125]. Although length of the foreskin had been suggested as a factor, the evidence for this is weak [28]. In the latter study 52% of penile cancer cases with a long foreskin had phimosis. Circumcision in early childhood, by eliminating phimosis, may help prevent the majority of penile cancer cases [137].

Prostate Cancer

Risk of prostate cancer has been found to correlate with a history of STIs [138–145], but the causative agent remains unclear. Such infections may establish in the prostate a state of chronic active inflammation, which is associated with a variety of cancers [143]. Uncircumcised men have a 1.6- to 2.0-fold higher incidence of prostate cancer [138, 146–148]. Because of the high prevalence of prostate cancer, if the association of the protective effect of circumcision were confirmed, circumcision could provide substantial health and economic benefits [149].

HIV: The Virus Responsible for AIDS

Acquired immune deficiency syndrome (AIDS) was first identified in the early 1980s. Unlike other STIs, risk of transmission of the virus responsible (HIV) during a single heterosexual exposure is relatively low [150]. In 1988 a threefold higher rate of positivity for HIV was noted in men in Nairobi who were uncircumcised [151]. In 1989, a further study in Nairobi examining a wide array of variables found HIV prevalence to be tenfold higher in uncircumcised men [152]. Higher HIV in uncircumcised men was reported in the same year in the USA [153]. These early reports were followed by an enormous number of studies in sub-Saharan Africa and elsewhere. A large systematic meta-analysis published in 2000 [154] that examined 27 studies, found that 21 had found risk to be lower in circumcised men. In 15 studies that were adjusted for potential confounding factors, the association with circumcision was 0.42, that is, rate in uncircumcised men was 2.4-fold higher. In high-risk men, the protective effect was 3.7-fold.

The findings have now been confirmed by three large RCTs involving thousands of men. The first, in South Africa, was published in 2005 [155], and the other two, in Kenya and Uganda, were published in 2007 [74, 156]. In each case, so striking was the benefit of circumcision that each trial was stopped by the monitoring boards so that the control group could be offered circumcision without delay. “As-treated” analyses found the protection to be 76% for the South African trial and 61% for the other two. Follow-up of the Kenyan trial has shown a rise in the protective effect to 65% at 3.5 years [157]. A meta-analysis of the RCT results indicated a similar protective effect as seen in observational studies [158]. Over

99% of the men were, moreover, "very satisfied" with their circumcision. Only 1.5% [156] and 3.6% [74] experienced an adverse event and these resolved quickly. In two of the trials there was, moreover, no behavioral risk compensation after circumcision [74, 156].

Circumcision also protects men who engage in insertive-only anal sex with other men. This was fivefold in a study in Soweto, Africa [159], 1.3- and 2.1-fold in Black and Latino men, respectively, in the USA [160], and ninefold in a study in Sydney, Australia [161]. A meta-analysis of 18 studies found HIV was 29% lower in insertive-only MSM [162]. It seems, not surprisingly, that it is only those MSM who are insertive-only who are at lower risk of HIV infection [163]. Modeling by these authors in a resource-rich setting (Sydney, Australia) showed that circumcision of MSM, especially those who were insertive-only, would be cost-effective for HIV prevention, with one infection prevented for every 118 circumcisions for men in the insertive-only category [164].

The risk to women posed by a male infected with HIV is 20% lower if he is circumcised, according to a meta-analysis in 2009 [165]. Later, a study involving seven sites in eastern Africa found a 40% lower risk [166]. An analysis in 2010 found that circumcision provides a 46% protective effect against male-to-female HIV transmission [167]. One study found, moreover, that protection of women is greatest for those whose male partner was circumcised in childhood [168]. If an HIV-infected man gets circumcised and resumes sex before the wound heals properly, the risk he poses to his female partner is, not surprisingly, higher, by 49% [169].

In 2007, the World Health Organization [170] and in 2009 the Cochrane review committee [171] accepted the protective effect of circumcision against HIV infection. Various cost-benefit analyses have pointed to the millions of lives and billions of dollars that will be saved by substantial increases in circumcision [74, 172–185]. The greatest cost-benefit in the long term will come from universal neonatal male circumcision [186]. Neonatal circumcision for HIV prevention is also cost-effective in the USA [187]. The Center for Disease Control & Prevention (CDC) has recognized the need to promote male circumcision for HIV prevention in the USA and to inform parents and physicians of its many benefits [188]. Ethical analyses have concluded that it is unethical to deny safe male circumcision services in high HIV settings [189–192]. Cultural practices have been seen as an impediment, but these do change, especially when there is a survival advantage [193].

The reason why the foreskin is an infection risk is because it retracts up the shaft during an erection, so exposing its thin, mucosal inner surface to HIV during sexual activity [194]. It then traps the infectious inoculum when the penis becomes flaccid again [152]. The mucosal inner lining is only lightly keratinized [195–197] and is rich in Langerhans cells [196]. Dendrites from these project to just under the surface [195]. The susceptibility of the inner lining to infection by live, tagged HIV has been demonstrated in cultured tissue [196]. Internalization of HIV involves the presence on Langerhans cells of the c-type lectin, Langerin, which can bind HIV, internalize it, and is then involved in its transport to regional lymph nodes [198]. In the inner, but not the outer, foreskin, TNF-α can activate Langerhans cells and stimulatory cytokines cause an influx of CD4+ T-cells into the epithelial layer [199]. The higher permeability of the inner foreskin is associated with increased interaction of HIV target cells with external factors, such as HIV. HIV can, moreover, infect T-cells independently of Langerhans cells [200]. HIV's success in establishing a systemic infection might, nevertheless, depend on its early interaction with Langerhans cells [200, 201]. At low viral levels, Langerin is able to clear HIV, shunting it to intracellular granules for degradation, but this mechanism becomes overwhelmed at higher viral loads [202, 203]. By confocal imaging microscopy and mRNA quantification, abundant and superficially present potential HIV target cells (CD3+ and CD4+ T-cells, Langerhans cells, macrophages, and submucosal dendritic cells) has provided anatomical support for the protective effect of circumcision [204]. There was no difference between positive and negative HSV-2 serostatus. In 2010, it was found that HIV infected cells, but not free HIV, form viral synapses with apical foreskin keratinocytes, followed by rapid internalization by Langerhans cells in the inner foreskin within 1 h [197, 205]. The Langerhans cells then formed conjugates with T-cells, thereby transferring the HIV. The thick keratin layers in the outer foreskin prevented infection [205]. The two novel models established in these experiments led the authors to reject as artifacts earlier claims that there is no difference in keratin thickness [205].

Ulcerative disease and tearing are more common in uncircumcised men, and add to the risk of HIV entry [206]. A large 2-year RCT found significantly lower penile coital injuries amongst men in the circumcised arm of the trial, adjusted odds ratio being 0.71 for soreness, 0.52 for scratches/abrasions/cuts, and 0.62 for bleeding [207]. HSV-2 infection increases HIV risk in men and women by threefold [208]. Men with a higher foreskin surface area are more likely to be infected with HIV [209]. Inflammation of the epithelium of the foreskin is another factor that can increase infection risk and has been noted in 4.2% of men with neither HIV nor HSV-2, 7.8% of men with HSV-2 only, 19% of men with just HIV, and 32% of men with both [210]. For stromal inflammation, the figures were 14%, 30%, 33%, and 61%. Both epithelial and stromal inflammations were more common in men with smegma. Even in the absence of visible lesions, the mucosal tissue can show histological signs of inflammation [204]. Wetness under the foreskin is an indicator of poor hygiene and is associated with a 40% increase in risk of HIV infection [211]. A wet penis may enhance attachment of infectious virions for longer, reduce healing after trauma, or may lead to balanitis under the foreskin and consequent micro-ulcerations [211].

Condoms, when *always* used, reduce HIV infection by 80–90% [212]. Consistent condom use remains unacceptably low, however [169, 213–223]. Even when made available widely, the impact on HIV has been negligible [224]. A review of ten studies from Africa showed there was no association between condom use and reduced HIV infection [225, 226].

Opponents of circumcision have attempted to deny these findings, but such arguments have been refuted in a 48-author commentary [227]. It has been pointed out that "anti-circumcision groups resemble other anti-science and anti-medicine extremists including AIDS denialists who refute public health realities to maintain entrenched belief systems" [228].

Prevention of Cervical Cancer in Women

Cervical cancer is ten times more common than penile cancer. Based on observations such as the rarity of this disease in nuns, but its frequent occurrence in prostitutes, the role of a sexually transmitted agent was long suspected (reviewed by [14]). Moreover, because cervical cancer is less common in populations with high male circumcision rates, a role for lack of circumcision was long suspected.

In 1947, Plaut reported that smegma, found under the foreskin, was capable of causing cervical cancer in mice [229], but the finding remains equivocal [123]. Observational studies in human populations that have implicated the uncircumcised male started in the early 1980s (see review: [72]). In the mid-1980s, as a result of the work of Zur Hausen in Germany, high-risk types of HPV, transmitted during sexual intercourse, were implicated as the causative agents in over 99% of cervical cancer cases [230–232]. These were the same agents responsible for penile intra-epithelial neoplasia (PIN), and in 1987 it was found that women with cervical cancer were more likely to have partners with PIN [233].

It was not until 2002 that strong evidence emerged for a connection between cervical cancer and lack of male circumcision. This large, well-designed, multinational study by the International Agency for Research on Cancer and published in the *New England Journal of Medicine* found that monogamous women were 5.6 times more likely to have cervical cancer if their partner was uncircumcised and had had six or more sexual partners (adjusted odds ratio = 0.42) [100]. For women whose male partner had an intermediate sexual behavior risk index, circumcision was also protective, although not as strongly (odds ratio = 0.50). Penile HPV infection was associated with a fourfold increase in the risk of cervical HPV infection in the female partner. Although prevalence in condom users (0.83) and nonusers (0.67) differed little [100], a subsequent study of university undergraduates found HPV to be 70% lower in women whose partners always used condoms [234].

In 2006, UNAIDS data from 117 developing countries found a cervical cancer incidence of 35 per 100,000 women per year in 51 countries with a low (<20%) circumcision prevalence compared to 20 per 100,000 women per year in 52 countries with a high (>80%) circumcision prevalence ($P < 0.001$) [235]. Of all factors examined, male circumcision had the strongest association with cervical cancer incidence.

A meta-analysis in 2009 of 14 studies up until September 2007 (5 in the USA, 2 in Mexico, 2 in Australia, and 1 each in South Korea, Denmark, England, Kenya, and the multinational study in Brazil, Columbia, Spain, Thailand, and the Philippines referred to above) found that the risk of cervical cancer in women whose male partner had a high sexual behavior risk index was 5.5 times greater if the man was uncircumcised [107]. In Bali, where most men are not circumcised, cervical carcinoma is the most frequent carcinoma in women [38].

HPV is very common amongst young women. In recent years, a vaccine against 2 of the more than 20 types of HPV that can cause cervical cancer (types 16 and 18) began being used, and since HPV types 16 and 18 account for approximately 70% of cervical cancers, it could theoretically prevent two-thirds of cervical cancers. A large, randomized, placebo-controlled, double-blind trial of women aged 16–24 years found, however, that vaccination reduced the rate of cervical lesions by only 20% over the 3 years of the study [236]. Furthermore, HPV vaccination was found to not be cost-effective, even under favorable assumptions for vaccination programs [237]. Elimination of HPV 16 and 18 from the population might take 20–30 years. In the meantime, at the population level, other oncogenic HPV types not vaccinated against might take over and replace these two types of HPV [238]. Participation has, moreover, been impeded by concerns about promiscuity and by opposition from anti-immunization lobby groups, who point to the real, albeit rare, risks posed by vaccination. Given the high cost of vaccinating all girls compared with the lesser cost and possible higher overall protective effect of universal male circumcision against the many high-risk HPV types, circumcision would appear to be a more logical and more cost-effective strategy. A bonus would, moreover, be to protect against the other conditions seen more commonly in uncircumcised males and their sexual partners.

Prevention of Breast Cancer in Women

In the past decade, ten studies have identified high-risk HPVs in breast tumors [239, 240]. The type(s) found were identical to those in the cervix of each woman [241, 242]. The suggestion that some breast cancers may involve a sexually transmitted agent [243] is supported by findings that women with HPV-positive breast cancer are significantly younger than those with HPV-negative breast cancer [244]. HPV can, moreover, be found in the bloodstream of cervical cancer patients [245] and male blood donors, attached to blood cells [246]. But the actual virus responsible remains to be identified conclusively. Other possible viruses include mouse mammary tumor virus (MMTV) and Epstein-Barr virus (EBV) [240]. Other than for HPV, a role for uncircumcised male partner(s) in any sexual transmission will require further research.

Herpes Simplex Virus Type 2 in Women

In 2003, a history of sexual intercourse with an uncircumcised man (ever) was reported to increase a woman's risk of infection by herpes simplex virus type 2 (HSV-2) by 2.2-fold [247]. This study, in Pittsburgh, Pennsylvania, involved 1,207 women aged 18–30 years, whose overall HSV-2 seroprevalence rate was 25%.

Chlamydia in Women

Chlamydia trachomatis, but not *C. pneumoniae*, was found in 2005 to be 5.6 times more common in women whose male partner was uncircumcised [248]. The group studied was the same multinational one referred to above for HPV. But a subsequent prospective study in two African countries and Thailand found no significant difference [249]. The multinational study in 2005, however, tested for antibodies to *Chlamydia*, so providing data on lifetime exposure rather than acute infection. The consequences of genital *Chlamydia* infection include pelvic inflammatory disease that may lead to infertility, ectopic pregnancy, and pelvic pain. *Chlamydia* is also a cofactor in HPV-induced cervical cancer and, in both sexes, HIV transmission. In men, just as in women, it can cause infertility, as well as prostatitis and urethral blockage.

To explain the findings it was suggested that the prepuce, by trapping infected cervicovaginal secretions for longer, would increase risk of penile urethral infection and thereby transmission to the vagina during sex [248].

Bacterial Vaginosis and Trichomonas in Women

Bacterial vaginosis (BV), previously termed "Garnerella," is one of the most common infections in women. Its epidemiology is similar to that of established STIs [250] and is associated with cervical intraepithelial neoplasia [251]. A study in 2008 in Pittsburgh of women without BV at enrolment, found that they were twice as likely to develop this condition over the following year if their male partner was uncircumcised [252]. Two earlier studies in the USA did not, however, find an association, but these were small and had limited power [253, 254]. An RCT in Uganda found that bacterial vaginosis of any type was 40% lower, and severe bacterial vaginosis was 61% lower, in the wives of men in the circumcised arm of the trial [87]. It was suggested that the foreskin of males could facilitate survival of BV organisms, such as gram-negative anerobic bacteria, and make an uncircumcised male a more efficient and more prolonged transmitter of infection [87, 250]. Bacterial vaginosis has been regarded recently as a "sexually enhanced disease" rather than an STI, with male circumcision being seen as protective [255].

A study in 2009 of cervical swabs collected in a suburban STI clinic in Sydney found the following microorganisms: *Trichomonas vaginalis* (3.4%), HSV-1 (2.6%), HSV-2 (0.8%), cytomegalovirus (6.0%), Epstein-Barr virus (2.6%), enterovirus (2.1%), varicella-zoster virus (VZV; 0.4%), *Ureaplasma parvum* (57%), *Ureaplasma urealyticum* (6.1%), *Mycoplasma genitalium* (1.3%), *Mycoplasma hominis* (13.7%), *Chlamydia trachomatis* (0.4%), and group B streptococci (0.4%) [256]. In 2010, the entire micobiome under the foreskin was determined. This identified organisms that would cause bacterial vaginosis, including *Anaerococcus* spp., *Finegoldia* spp., *Peptoniphilus* spp., and *Prevotella* spp. [85].

The RCT in Uganda referred to above also demonstrated 48% lower *T. vaginalis* and 22% lower genital ulceration in women whose male partner was in the circumcised arm of the trial [87]. It was suggested that the moist nature of the subpreputial space might enhance the survival of *Trichomonas*.

Effect on Sexual Function, Sensation, Sensitivity, and Satisfaction

The foreskin, just as the rest of the penis, contains sensory nerve receptors. There is, however, no credible scientific evidence that the extra complement of these in uncircumcised men leads to greater sexual pleasure or that circumcision reduces the latter. As to sensitivity, a diminution is desired by many men (and their sexual partners) in order to prevent premature ejaculation and prolong intercourse [257]. Sexual sensation is mediated by a specific class of nerve endings, genital corpuscles, and these are not present in the foreskin [258].

The first scientific study to address the question of penile sensitivity was carried out by Masters and Johnson, who undertook clinical and neurological testing of the ventral and dorsal surfaces, as well as the glans, and detected no difference between circumcised and uncircumcised men [259]. Sexual pleasure also appeared to be similar.

In 1997, the National Health and Social Life Survey (NHSLS) of 1,410 men in the USA found that uncircumcised men were more likely to experience sexual dysfunctions, especially with age [260]. This was slight at younger ages, but later in life included finding it twice as difficult to achieve or maintain an erection. The survey discovered that circumcised men engaged in a more elaborate set of sexual practices, and their female partners tended to prefer the esthetics of a circumcised penis over an uncircumcised one. The circumcised men received more fellatio and masturbated more.

Greater sexual dysfunction with age was also noted in a telephone-based survey of 10,173 men in Australia in 2006, this being greatest in men over 50, in whom 27% of uncircumcised, but only 15% of circumcised, men reported difficulty maintaining an erection [7]. Physical pain during intercourse was also less common among circumcised men. A later, smaller survey by this group found no difference in erectile problems [8]. The uncircumcised men were, however, more likely to worry that their penis looked unattractive. Both of these surveys have serious shortcomings in breadth, design, and the validity of conclusions reached [261, 262].

Two US studies published in 2002 both found similar or greater sexual satisfaction in men after circumcision as adults [263, 264]. In the smaller survey [263] there was no difference in sexual drive, erection, ejaculation, problem assessment, or satisfaction compared with what the men recalled sex being like prior to foreskin removal. Penile sensitivity was the same. This paper stated that their study was prompted by reports by proponents of "foreskin restoration," in particular the "disparity between the mythology and medical reality of circumcision regarding male sexuality" [263]. In the other study [264], 62% said they were satisfied with having been circumcised and liked their new look, with 50% reporting benefits. Penile sensitivity, although not tested directly, was thought by some of the men in this study to be slightly lower (but not statistically so), which may have contributed to their claims of better sex. Although there was no change in sexual activity, some of the men thought erectile function was slightly less (category scores: 12.3 vs. 11.1, $P = 0.05$), which is the opposite of the very much larger NHLS referred to above [260]. As in the latter, oral sex became more frequent, but there was no change in anal sex or masturbation [264]. Their partners were also more likely to initiate sex with the men after they had been circumcised.

Men circumcised for nonmedical reasons in Turkey exhibited increased ejaculatory latency time, which was considered by the men as an advantage in that they could prolong intercourse [265].

A study involving a battery of quantitative somatosensory tests to evaluate the spectrum of small to large axon nerve fiber function found no difference in sensitivity of the glans penis between 43 uncircumcised and 36 neonatally circumcised US men [266]. The authors controlled, moreover, for factors that can alter neurologic testing (age, erectile function status, diabetes, and hypertension).

A study in London of 150 men aged 18–60 years circumcised for benign disease found identical erectile dysfunction scores before and after circumcision [267]. There was no change in libido for 74%; 69% had less pain during intercourse, and 44% of the men, and 38% of the partners thought appearance was better after circumcision. Sensation improved in 38%, was unchanged in 44%, and was worse in 18%. Overall, 61% were pleased and 17% were not, that is, 3.5 times more were happy with their circumcision.

Intravaginal ejaculatory latency time (IVELT; the time from start of vaginal intromission to start of intravaginal ejaculation, recorded by stopwatch and paper diary) in 500 couples, was found to be 6.7 min (range 0.7–44.1) in circumcised men and 6.0 min (0.5–37.4) in those not circumcised [268]. The data were similar for the Netherlands, UK, Spain, and the USA, but in Turkey was 3.7 min (range 0.9–30.4). IVELT decreased significantly with age, being 6.5 min in men aged 18–30 years compared with 4.3 min in men over 51 years ($P < 0.0001$). The data were not affected by condom use. The researchers subsequently repeated the study using a blinded timer device (to reduce any bias) in a different set of 474 men (mean age 38.5 ± 11.4 SD) from the same countries [269]. In circumcised men (excluding Turkey) mean IVELT was 10.3 min (±9.3 SD; range 0.6–52.7) and in uncircumcised men was 8.8 min (±6.9 SD; range 0.3–38.6) (P = 0.13). Median was 7.2 and 6.0, respectively (excluding Turkey: 4.4 min). Alcohol users had a higher mean IELT than nonusers (9.0 vs. 7.3; P = 0.002). But there was no difference for condom users and nonusers (7.7 vs. 9.0), nor age group (8.2, 9.2, and 7.3 for 18–30, 31–50, and >51 years), and the number of sexual events did not decrease with age category. Erectile dysfunction was 37%, 34%, and 40% in the respective age categories. The men's own estimates of IVELT were 31% higher than the actual recorded values. One-third had an IVELT (averaging 4.9 min) that was shorter than what they would have liked and two-thirds of these were willing to take medication to remedy this.

Age of childhood circumcision had no effect on overall sexual function in men aged 22–44 years (mean 30) in Turkey [270]. Since all men are circumcised in this Muslim country there was no control group of uncircumcised men to compare with. Of the seven areas of sexual function examined, the only difference was higher avoidance seen in those circumcised between ages 0–2 years compared to the 3–5 years and 6–12 years age groups [270]. But had they corrected for small sample size, the significance of this difference would have disappeared.

The quality of the evidence was elevated by the publication of RCT data in 2008. Amongst 4,456 sexually experienced men aged 15–49 years, a trial in Uganda found no difference in sexual satisfaction or clinically significant function between the 2,210 randomized to receive circumcision and the 2,246 who remained uncircumcised over the 2 years of the trial [271]. At 6 months (i.e., the earliest time examined after the procedure), difficulty with penetration was noted in 1.4% of circumcised men and 0.6% of uncircumcised men; pain on intercourse was 0.6% circumcised and 1.2% uncircumcised. And at 12 months and 24 months these were all identical between each group. Sexual satisfaction also did not differ statistically – in circumcised men being 98.5% at enrolment and 98.4% at 2 years, and in uncircumcised men being 98.0% and 99.4%, respectively. The other trial, in Kenya, found that at 24 months, 64.0% of the circumcised men reported that their penis was "much more sensitive" and 54.5% rated their ease of reaching orgasm as "much more" [271, 272]. A large and increasing proportion of the men reported having sex more often compared to before they were circumcised. Risky behavior was decreased in the circumcised men and they found it easier to apply a condom. Although penile sensitivity was increased, this was not associated with premature ejaculation, and it seemed that, overall, the sexual experience for these men was enhanced.

Sensory stimuli from the penis are transmitted by the pudendal nerve. An objective measurement for assessment of sexual satisfaction is, therefore, penile pudendal evoked potential (PEP). In men aged 18–27 years who underwent circumcision, mean PEP latency was 42.0 ms before and 44.7 ms after circumcision, the difference (2.76 ms) being statistically significant [273]. The authors concluded that circumcision may contribute to sexual satisfaction by prolonging PEP latency by 5% and, thus, intercourse time. The study found, moreover, that sexual function was not affected adversely by circumcision.

Concerns about leaving too much mucosa during circumcision, for fear of later premature ejaculation (PE), appear unfounded. A study in Iran found mucosal cuff length was 15.4 mm in men with PE and 14.7 in men without PE [274]. In this study, penis length was 121 and 130 mm in each respective group. A Korean survey of 3,980 men aged 20–59 years found no difference in premature ejaculation by circumcision status [275].

A study in 2007 claiming higher sensitivity of the uncircumcised penis has often been cited by opponents of circumcision. This involved men in the San Francisco Bay Area and was conducted by anti-circumcision identities with funding from National Organization of Circumcision Information Resource Centers (NOCIRC) [276]. It measured "fine-touch pressure thresholds" at 19 locations on the uncircumcised and 11 on the circumcised penis, finding a difference of borderline significance ($P = 0.03$) for the orifice rim. After Bonferroni correction by critics of the study, to eliminate false positives arising from the multiple testing involved, this single statistical difference disappeared [277]. The study contained, moreover, serious design flaws: it listed subjects in Methods who were unaccounted for in Results, contained biased statements, and demonstrated other omissions that cause it to lack credibility [277].

Perhaps the most important parameter is, however, sensation of the penis during arousal. This was tested in a Montreal study using thermal imaging of the penis. It found no difference between circumcised and uncircumcised men aged 18–45 years (mean age 24) [278]. More circumcised participants reported an increase in their level of arousal, while more uncircumcised men reported being unaffected by the erotic stimulus (a movie). Sensitivity to touch on the forearm as compared to the glans penis or shaft decreased during arousal in both groups, as would be required for penetration.

Women's attitudes are also noteworthy. In the USA, a large majority of women preferred the circumcised penis for sexual activity [279]. In this survey, 90% said it looked "sexier," 85% said it felt nicer to touch, and 55% said it smelled more pleasant. Even women who had only ever had uncircumcised partner(s), preferred the appearance of the circumcised penis. Only 2% preferred an uncircumcised penis for fellatio, with 82% preferring the circumcised variety. Preference for intercourse was 71% for the circumcised penis, compared with 6% for the uncircumcised. Manual stimulation was 75% versus 5%, and visual appeal was 76% versus 4%. A similar preference by women for the circumcised penis was noted in Australian magazine survey by Badger [280, 281]. Women's attitudes were also examined in one of the RCTs in Africa, with the overwhelming majority (97%) reporting either no change (57%) or improved (40%) sexual satisfaction after their male partner had been circumcised [282].

Thus, research has revealed that there are no adverse effects of circumcision, there being little or no difference in sensation during arousal, nor sensitivity of the flaccid penis between circumcised and uncircumcised men. Function is no lower and could on average be superior in circumcised men. Satisfaction is very high amongst both men after having been circumcised and their sexual partners. For many men the sexual experience is enhanced after circumcision, the shaft of the penis making closer contact with the walls of the vagina during intercourse.

Rates of Circumcision

Globally, 30% [283] (Fig. 19.3) to 34% (Waskett, Manchester, UK, unpublished) of males are circumcised. The biggest proportion of male circumcisions in the world are a consequence of Islamic tradition or Judaic religious reasons, which are largely immutable. But in the USA, in particular, health reasons and family tradition are the main drivers. Here we discuss recent trends, particularly in countries having a predominantly Anglo-Celtic heritage.

Higher Circumcision Rates in Upper Echelon of Society

Socioeconomic stratification is seen in the USA, with the National Health and Lifestyle Survey finding higher circumcision rates among whites and the better-educated [260]. Rates differed little between Christian denominations. In the National Health and Nutrition Examination Survey (NHANES) of 1999–2004, for those born in the 1970s circumcision rate was 96% in men with an annual household income of greater than US$55,000, 92% for income US$35,000–54,999, and 84% in those below the poverty level [62]. For those born in the 1980s, the corresponding rates were 85%, 85%, and 75%, respectively. This has been the situation in Australia too, where the higher socioeconomic-educated groups in society have higher rates of circumcision [7, 8]. And in the UK, a corresponding class distinction accompanies circumcision practice [284].

In the USA, the withdrawal of Medicaid for circumcision services by 16 states has had a negative impact on the poor [285, 286]. Policy by state health departments is driven in part by

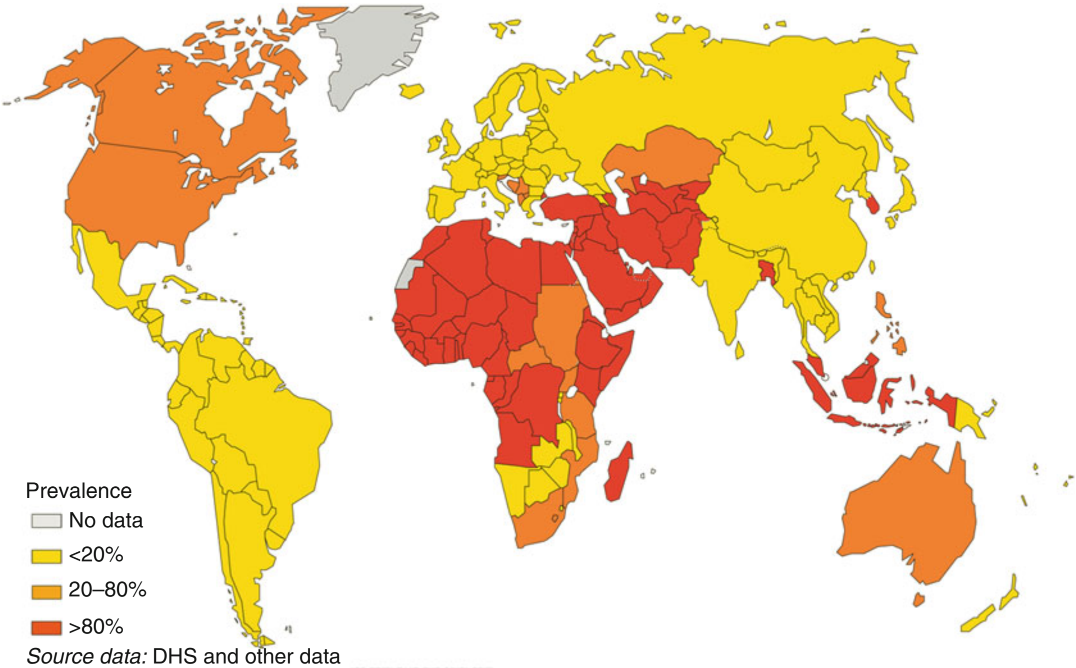

Fig. 19.3 Global circumcision rates in different countries (Kindly provided by the World Health Organization via Kim E.Y. Dickson, with assistance from Helen A. Weiss, London School of Tropical Medicine and Hygiene) (*Source data*: DHS and other data)

American Academy of Pediatrics (AAP) policies. As the AAP policy becomes more positive one would anticipate this disadvantage to be reversed.

Thus, in English-speaking countries of Anglo-Celtic heritage, the upper echelon tend to be circumcised.

Sexual Initiation and Sexuality Do Not Differ by Circumcision Status

In the NHANES survey, sexual initiation occurred at the same age (16.7 and 16.9 years) in uncircumcised and circumcised men [62]. The proportion who had ever had a male partner was also similar (3.4% and 4.9%, respectively). Median number of lifetime sex partners was 5.8 in uncircumcised and 7.0 in circumcised men, a difference that disappeared after stratification by race/ethnicity [62].

Reasons Why Parents Choose to Have Their Boys Circumcised

Although the range, quality, and quantity of medical information on the benefits of circumcision has increased over the years, the reasons given by parents for having their infant boys circumcised have changed little. A survey of new mothers in the USA in 1988 found hygiene and appearance were the two major reasons for choosing to have their newborn son circumcised [279]. Similarly, a Canadian survey found the reasons mothers gave for getting their infant boys circumcised were health or hygiene (44%); to be like their father, siblings, or peers (36%); religion (17%); and other reasons (3%) [287]. Further analysis of the data in this survey shows a strong, significant ($P=0.013$) positive correlation between the mother saying she received enough information about circumcision and the circumcision rates

(Waskett, Manchester, UK, unpublished). A survey in 2007 in Melbourne, Australia, of parents who were having their sons circumcised found that the most common reason was hygiene (96%), followed by family tradition (57%), medical benefit (36%) and aesthetics, with 14% believing it improved sexual performance/enjoyment as an adult, and looked better to women [288]. The most common concern was pain (79%), apparently not realizing that circumcision can be pain-free with local anesthetic as is now recommended by the Royal Australasian College of Physicians (RACP) and AAP. A survey in Mysore, India, of women, 78% of whom were Hindus (who traditionally do not embrace circumcision), 18% were Muslims (who do) and 4% Christians, found that after they were informed actively about the risks and benefits of male circumcision, 81% said they would definitely have their boy(s) circumcised if the procedure were offered in a safe hospital setting, free of charge, and 7% said they would probably get it done, with only 1% saying they would not have their boys circumcised [289].

One of the major developments in recent decades is recognition that infants do feel pain, which has led to local analgesia being recommended. General anesthesia, although recommended by some pediatric bodies is ill-advised, as this carries risks, including those of neuronal damage [290].

Policy Statements and Influence on Rate

In the early 1970s, promotion of infant bonding became popular, and ways of reducing discomfort in newborns were advocated, leading some middle-class families on the East and West coast of the USA to no longer get their boys circumcised. Another factor was a statement by the AAP Committee for the Newborn that there are "no valid medical indications for circumcision" [291]. A slight decline in circumcision ensued. The folly of this trend became evident as a result of research in the years that followed. The research through the 1980s and beyond that showed benefits of circumcision might explain why circumcision rate rose again between 1988 and 2000 in the USA [292, 293]. Interestingly, a study published in 2007 repudiated the 1970s thinking about disruption of infant bonding [294]. This detailed longitudinal study in New Zealand found no adverse effect on breast-feeding outcomes or cognitive ability after comparing a wide range of variables between boys who were circumcised soon after birth in 1974 and those who were not [294]. In the USA today, 86% of parents favor infant male circumcision, those who do not are more likely to be Hispanic [295].

The exact rate of infant circumcision in the USA today is not known precisely owing to lack of universal record keeping, but an analysis by J.H. Waskett and B.J. Morris (2010, unpublished) has found the rate to be steady and high. More reliable data are available for *adult* males, the rate being 88% in whites of Anglo-Celtic extraction, 73% in Blacks, and 43% in Hispanics [105, 296].

In the UK, circumcision rate increased after World War I, just as it did in the USA, but in the mid-1930s it began to decline toward the current overall rate of less than 15% (Waskett and Morris, 2010, unpublished). This fall preceded the adoption by Britain of a nationalized health-care system in 1948, when procedures for which cost was considered to exceed benefit were removed. Circumcision also declined rapidly across Europe after a (misguided) paper by Gairdner in 1949 [26].

Circumcision was fairly much routine in Australia and Canada until the early 1970s, when a similar fall took place in response to statements by the pediatric bodies in each country [297, 298]. These followed the 1971 pronouncement by the AAP referred to above. In Australia, a telephone survey in 2001–2002 of 10,173 men aged 16–59 years found 69% of those born in Australia are circumcised [7]. However, the rate in those aged 16–20 years was only 32%, leading to public health concerns and a call to increase circumcision [261]. Most of the men in this survey had been circumcised in infancy. A later survey in 2005 by the Richters group found circumcision rates of 62–66% for ages 30 through 64 years, but rate was only 35% in 20–29 year olds, and 27%

in those aged 16–19 years [8]. A rate of 66% was found amongst 1,427 homosexual men in Sydney in whom circumcision status was confirmed by clinical examination [299]. For boys aged less than 6 months, the Medicare data show a rise in rate from 10.6% in 1994 to 12.7% in 2004 [300] and then to 18% by 2010 [301]. Medicare data relate to claims and are, thus, underestimates.

In 1975, the AAP statement in the USA was modified to "no absolute valid…" [302], which remained in the 1983 statement, but in 1989 it changed significantly to "New evidence has suggested possible medical benefits" [303]. In its 1999 statement, however, the AAP offered a neutral stance [304]. Although the literature review the AAP conducted was academically weak, it did, nevertheless, mention a vast array of benefits. The major flaw of this document was that it fell short of recommending circumcision, which it would have, had it been based on a more balanced literature survey. This may have been quite understandable, given medico-legal worries in the face of very hostile, politically active anti-circumcision lobby groups. In a joint response, the Chair of the 1989 AAP Taskforce on Circumcision, Edgar Schoen, M.D., and others more expert than those on the 1999 Taskforce, rebutted the 1999 statement [93, 305]. Others also leveled valid criticisms [306, 307]. But surprisingly, in 2005 the AAP reaffirmed its 1999 policy [308], in effect suppressing all of the very strong affirmative evidence published since its 1999 statement. Schoen condemned the AAP for ignoring the 7 years of extensive research findings since 1998 [309]. Further to this, in 2007, when challenged by Schoen [310], a Section Editor of the major journal in the field, *Pediatrics*, called for the AAP to reassess its position in the light of new data [311].

This review is now in progress and news media statements in 2009 and early 2012 suggest that the AAP will move from a neutral to a positive stance, supported by the CDC, that has weighed in on the debate as a result primarily of concern about higher risk of HIV infection in uncircumcised men during heterosexual and insertive homosexual intercourse [188]. In January 2010, a respected pediatric journal published a call for the AAP to advocate neonatal circumcision [168], and this was supported by an editorial commentary by a member of the AAP committee [312]. In that issue, the journal published a brochure for parents that listed health benefits and stated that risks of the procedure were rare and minor [313].

The most recent statement by the Canadian Paediatric Society was in 1996 [314], and by the Royal Australasian College of Physicians (RACP), Division of Paediatrics and Child Health was in 2010 [315]. Although these provide information on the benefits and possibility of rare or minor risks, they too suffered from falling short of drawing the obvious evidence-based conclusion that circumcision is the best choice for lifetime health and sexual well-being. The previous (2004) RACP statement [316] was, in fact, the subject of a damning peer-reviewed critique that demonstrated that it was ideology-based rather than evidence-based [3]. A new, more diverse committee was then formed in 2006, although its chair, once again a pediatrician, has demonstrated in news media comments, placement on the RACP website of an unauthorized statement, and in resistance to recommendations in peer-review of drafts leading up to the final policy statement being released in Sep 2010 considerable resistance to advocating infant circumcision. During this period there was considerable acrimony both within and outside the committee, demonstrating the extremes of emotion that can override sensible implementation of medical evidence attesting to the net benefits of circumcision, especially when performed in infancy when it is lower risk and much simpler to do. The policy that emerged in 2010 can, like its predecessors, be criticized severely for its biased, inaccurate, unscholarly, ideological stance and lack of adherence to evidence-based medicine in reviewing the literature. It led to a petition denouncing it by over 50 professional experts, including Fellows of the RACP and related bodies. A devastating critique in an official journal of the RACP was published in 2012 [316a].

The British Medical Association (BMA) has never made an attempt to review the medical literature on circumcision, producing instead a pompous, paternalistic, and legalistic statement in 2003 [317, 318]. In 2006, it produced a document that recognized the "spectrum of views within the BMA's membership," stating that the "BMA has no policy," and "the BMA believes that parents should be entitled to make choices about how best to promote their children's interests" subject to limitations imposed by society [319]. In 2007, the *British Medical Journal* (*BMJ*, the official journal of the BMA) published two short "head-to-head" opposing commentaries, one consisting of emotive, legalistic arguments opposing circumcision [320] and the other, by an Editorial staffer, giving a sensible, balanced overview of the many benefits and why "it is far better to help parents to find a competent operator" than comply with the BMA guidelines and make it difficult for them [321]. An article in that issue on medical indications for circumcision distorted and downplayed the benefits by selectively citing publications that supported the negative agenda of its author [322]. It seemed, nevertheless, that at long last the BMA, via the *BMJ*, had begun to address the issues.

The American Urological Association (AUA) has produced statements that are in keeping with the medical evidence, concluding, in 2007, that "circumcision should be presented as an option for health benefits" [323].

In March 2007 the WHO and UNAIDS endorsed circumcision for HIV/AIDS prevention [170] and in 2008 released an extensive document listing the vast array of benefits [324]. Charitable bodies and governments have provided funding to increase circumcision in sub-Saharan Africa, and in 2010, the AUA formed a task force to assist in the rollout.

By and large, the statements of most of these professional bodies have tended to recommend that medical practitioners inform parents fully of the benefits and minor, rare risks associated with having their male children circumcised. Publicly most give the impression that the benefits and harms are very evenly balanced. Indeed, professional bodies have carefully avoided taking sides in the polarized debate, by making noncommittal guidelines and leaving it to the medical practitioner to discuss the matter with the parents [325].

While such bland tolerance has accommodated a broad range of strong and conflicting opinions, the medical profession is today faced with a growing knowledge base that indicates a wide range of health benefits of circumcision and that these exceed any risks, meaning that the time is fast approaching when affirmative statements cannot be avoided [309, 325–328].

Dr Susan Blank, chair of the 2008–2012 AAP Task Force on Circumcision said on ABC News that the Academy noticed some "really very compelling data" and that "it was time to look at the full body of literature and see what is out there." On August 24, 2009 the CDC in the USA announced that it was considering the promotion of routine infant male circumcision for disease prevention. Coinciding with this, Dr Michael Brady, a consultant for the AAP said "The academy is revising its guidelines … and is likely to do away with the neutral tone in favor of a more encouraging policy stating that circumcision has health benefits even beyond HIV prevention, like reducing urinary tract infections for baby boys" [329].

To quote Professor Roger Short: "If we believe in evidence-based medicine, then there can be no debate about male circumcision; it has become a desirable option for the whole world" [330].

The first evidence-based policy statement on infant male circumcision, prepared on behalf of the Circumcision Foundation of Australia, was published in 2012 [331]. Other affirmative evidence-based statements, by the Centers for Disease Control and Prevention and the American Academy of Pediatrics, are anticipated in 2012. The important issue of what is the best age to circumcise has now been addressed by way of a detailed evaluation of the literature [332], finding in favor of infancy.

Conclusion

After a decrease in rate in recent decades, infant male circumcision is rising worldwide. Table 19.2 assembles all of the common risks posed by not circumcising an infant and compares these with the risks inherent in medical circumcision itself, which is the only consideration needed, given that infant circumcision confers virtually no long-term harm to the male.

Table 19.2 The risk of acquiring various medical conditions is more common in uncircumcised males

Condition	Fold increase	NNT
Risks for not circumcising		
Urinary tract infection (infants)	10	50
Urinary tract infections (lifetime)	5	3
Pyelonephritis 5 (infants)	10	100
With concurrent bacteraemia		1,000
Childhood hypertension		1,500
End-stage renal disease		13,000
Candidiasis	2	10
Prostate cancer	1.5–2	6
Balanitis	3	10
Phimosis	Infinite	10
High-risk HPV	5	5
Genital herpes (HSV-2)	1.3	10
Syphilis	3	200
HIV infection	3–8	1,000
Penile cancer	>20	1,000
In female partner:		
Cervical cancer	4	
Chlamydia	4	
HSV-2	2	
Bacterial vaginosis	2	

Note: Thus risk of developing a condition requiring medical attention is over 1 in 3

Risks associated with medical circumcision in infancy	Proportion	NNH
Local bruising at site of injection of local anaesthetic (if dorsal penile nerve block used)	0.25[a]	4
Infection, local	0.002	600
Infection, systemic	0.0002	4,000
Excessive bleeding	0.001	1,000
Need for repeat surgery (if skin bridges or too little prepuce removed)	0.001	1,000
Loss of penis	Close to 0	One million
Death	0	Virtually zero
Loss of penile sensitivity	0	Zero

Note: Thus risk of an easily-treatable condition = 1 in 500 and of a true complication = 1 in 5,000

Table 19.2 (continued)

Values are based on statistics for USA (see [3] for refs used for source data

The fold increase in risks is shown relative to number needed to treat (NNT) to prevent that condition. Also shown are risks of the procedure itself, including number needed to harm (NNH)

NNT number needed to treat – i.e., approximate number of males who need to be circumcised to prevent one case of each condition associated with lack of circumcision, *NNH* number needed to harm, i.e., number that need to be circumcised to see one of each particular (mostly minor) adverse effect

aThe minor bruising (from this method only) disappears naturally without any need for medical intervention, so is no included in overall calculation of easily-treatable risks

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Circumcision, Sexual Function, and Sexual Satisfaction

20

John N. Krieger

Editors' Note

As physicians, it is not uncommon for us to react and change our practices pertaining to a certain disease or operative processes, based on anecdotal evidence, especially if negative, and worse if there is vocal negative response from a select minority of patients.

The issue of sexual function and satisfaction is one of the more controversial and emotional aspects related to circumcision and in the past has not been well studied. Moreover, both these subjects are very difficult to assess objectively. The work herein, provides a great leap forward and has been monumental toward our understanding of these issues, as thousands of patients were studied and investigated thoroughly. However, the primary population studied may not necessarily extrapolate to populations and conditions within Western cultures. Without a doubt, this issue requires much in-depth, ongoing evaluation in other cultures, as has been done using similar proper reproducible, reliable methodology to those used by these authors.

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Introduction

Male circumcision is being promoted as a public health intervention in many areas, particularly in Eastern and Southern Africa. Three randomized clinical trials [1–3] support epidemiological data [4] showing that adult male circumcision reduces the risk for HIV infection in men by 51–76% in high-risk heterosexual populations. The clinical trials documented acceptable surgery-related adverse event rates [1–3] and led the World Health Organization to recommend male circumcision as one element of HIV prevention programs [5]. Neonatal circumcision reduces urinary tract infection rates substantially [6–8], and other data suggest that male circumcision is associated with lower sexually transmitted infection rates [9–15]. Circumcised males do not develop phimosis or paraphimosis, and they are at lower risk for balanitis and penile cancer [16–18]. In addition, female sexual partners of circumcised men were shown to have reduced risk of cervical cancer [13] and chlamydial infection [19].

Despite these proven benefits, there is concern that male circumcision may decrease sexual function and satisfaction. Ritualistic male circumcision has been practiced in West Africa and the Middle East for over 4,000 years [20]. In the West, circumcision started to be promoted in the late nineteenth century for a varied public health reasons from reduction of syphilis risk to prevention of masturbation [21, 22]. Some societies use male circumcision to reduce pubescent males' excitability and sexual arousal, while other

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societies view male circumcision as a means of enhancing sexual prowess [23].

Among the proposed mechanisms by which circumcision may decrease sexual function are: re-organization/atrophy of neural circuitry [24], keratinization of the glans penis to lower sensibility [25–28], decreased erectile function [26], increased ejaculatory latency time [29], removal of the smegma with lower pheromone levels, and less “normal gliding action” [23].

Available studies describe highly variable and inconsistent effects of circumcision on male sexual function. Some case control studies have reported that circumcised men have reduced sexual sensation, masturbatory pleasure, and sexual enjoyment compared to uncircumcised men [25, 27], with higher fine-touch pressure thresholds in the glans among circumcised men compared to uncircumcised men [28]. Before and after studies of men circumcised as adults have reported differing results. Some describe decreased penile sensitivity [26, 30], while others describe no change in penile sensitivity and satisfaction [31]. One before-and-after study found an increased ejaculatory latency time after circumcision, which was considered an advantage [29]. A probability sample of 10,173 Australian men aged 16–59 found that circumcised men were less likely to report trouble keeping an erection or physical pain during intercourse [32]. Payne and associates found no difference in genital sensory testing as a function of sexual arousal between 20 circumcised and 20 uncircumcised men [33]. The US National Health and Social Life Survey documented that circumcised men had a more elaborate set of sexual practices [34]. A recent randomized clinical trial found that circumcised adult men had no clinically significant decreases in sexual satisfaction or sexual function [35].

Randomized Clinical Trial of Adult Male Circumcision in Kisumu, Kenya

To better define the risks and benefits of circumcision, our group prospectively evaluated sexual function and sexual satisfaction among adult men participating in a randomized, controlled clinical trial of adult male circumcision to prevent HIV infection in Kisumu, Kenya [36].

The trial design, circumcision technique, adverse events, and primary outcome (HIV infection) have been described [2, 37, 38] as have the assessments for male sexual function and satisfaction [36]. Briefly, participants were recruited from sexually transmitted disease clinics, workplaces, communities, social events, and youth organizations. Potential participants were given an appointment for randomization and possible circumcision within 1 week of screening. For inclusion men had to be uncircumcised with normal genitalia, HIV-negative, sexually active in the last 12 months, and aged 18–24 years; and have a hemoglobin ≥9.0 mmol/L and reside in Kisumu District. Exclusion criteria included foreskin covering less than half of the glans, a bleeding disorder, history of keloid formation, other conditions that might unduly increase the risks of elective surgery, or a medical indication for circumcision.

After detailed, written, informed consent, participants were randomized 1:1 to circumcision or delayed circumcision after a 2-year follow-up period (the control group). In both groups participants were counseled extensively on sexually transmitted infection (STI) and HIV risk reduction, and were provided unlimited supplies of free condoms. The circumcision group underwent a standard “forceps guided procedure” [38].

Detailed evaluations were conducted at baseline, 1, 3, 6, 12, 18, and 24 months from randomization for both the circumcision and the control groups. Each visit included a standardized medical history and physical examination, plus a personal interview to obtain socio-demographic and health information and to assess behavioral risk factors. Trained counsellors interviewed participants in their language of choice (English, Dholuo, or Kiswahili). Data were collected on sexual behaviors, sexual function, and satisfaction during intercourse [36].

The study employed generalized estimating equation approaches and statistical modeling to conduct two primary analyses [36]. The first analysis compared sexual function over time between the circumcised and uncircumcised groups. There were five measures of sexual dysfunction that were presented in each participant's desired language: "inability to ejaculate," "premature ejaculation," "pain during intercourse," "sex is not pleasurable," and "difficulty achieving and/or maintaining erection." "Any sexual dysfunction" was defined as a positive response to any of these five questions. The second analysis compared sexual satisfaction and pleasure over time within circumcised men. Secondary analyses compared the standardized clinical assessments by circumcision status and penile complaints after circumcision among circumcised men.

Results

Over 3 years, 2,784 participants were randomized: 1,391 in the circumcision group and 1,393 in the control group [2, 39]. Among the 2,784 men enrolled, 100 were excluded from this analysis: five did not complete the baseline interview, three were outside the age range, 16 control participants were circumcised, 57 men were randomized to circumcision but were not circumcised, and 19 men randomized to circumcision but were not circumcised within 30 days of randomization. Participants' median age was 20 years, over 85% were sexually active in the past 6 months and they had a median of four lifetime sex partners. The study arms were well balanced in terms of socio-demographic characteristics and sexual behaviors.

Sexual Dysfunction: Common at Baseline

Of the 2,684 participants in the main trial, 2,292 answered all sexual dysfunction questions at baseline, including 567 (25%) who reported any sexual dysfunction. These men included 409 (18%) reporting ejaculating too quickly; 182 men (8%) reporting no pleasure during sex; 173 men (8%) reporting pain during sex; 160 men (7%) reporting difficulty achieving or maintaining erection; and 101 men (4%) reporting inability to ejaculate.

Comparison of Sexual Functions in Circumcised and Uncircumcised Men

The circumcision and the control groups both experienced dramatic decreases in reported sexual dysfunction (Fig. 20.1a–f). For the circumcision and control groups, respectively, the rate of any of the five sexual dysfunctions decreased from 23.6% and 25.9% at baseline to 6.2% and 5.8% at the 24-month follow-up visit. In sophisticated statistical modeling, circumcision status was not associated with having any sexual dysfunction, or with any of the five individual dysfunction items, except for premature ejaculation. Men who underwent circumcision were 17% less likely to report premature ejaculation at follow-up.

During follow-up, almost all circumcised men reported that their erections felt normal, that their penis did not deviate with erection, that they had little or no difficulty inserting their penis during intercourse, and that they had little or no difficulty achieving erection because their skin was too tight. On examination, no circumcised man had painful lumps along the suture line, significant scarring, twisting of the penis or penile pain. Almost all men were satisfied with their circumcisions (as reported by 98.9% of men at month 6, increasing to 99.9% of men at month 24). None of 1,332 circumcised men developed symptoms of balanitis during follow-up, compared to nine (0.7%) of the 1,323 uncircumcised men. Based on follow-up time, the rate of symptomatic balanitis among uncircumcised men was 0.40 cases per 100 person-years.

Sexual Function and Satisfaction in Circumcised Men

At their 6, 12, 18, and 24 month visits, each circumcised man was asked six questions to assess sexual function and pleasure compared to before being circumcised. At their 6-month follow-up, 50% of circumcised men reported that their penis was "much more" sensitive, increasing to 64% at month 24. In contrast, a constant rate of approximately 6–7% reported that their penis was "somewhat less" or "much less" sensitive. Ease of reaching orgasm was rated as "much more" by

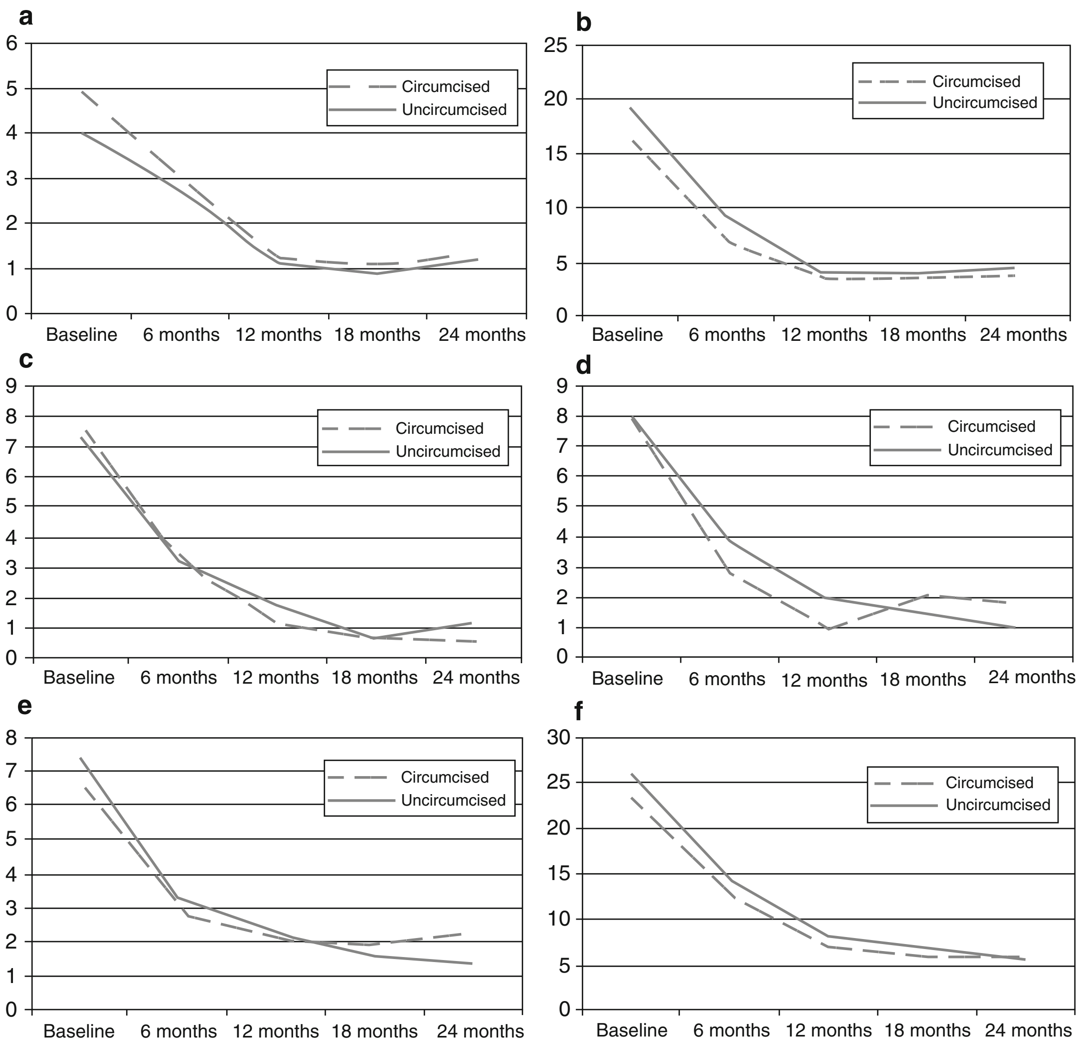

Fig. 20.1 Percent reporting sexual dysfunctions by circumcision status and study visit. (**a**) Inability to ejaculate; (**b**) premature ejaculation; (**c**) pain during intercourse; (**d**) sex is not pleasurable; (**e**) difficulty achieving or maintaining erection; and (**f**) reporting any sexual dysfunction

37% at month 6, increasing to 55% at month 24. The same item was rated "somewhat less" or "much less" by 14% at month 6, decreasing to 8% at month 24. At 6 months, 12% of men reported having sex "much more" often than prior to circumcision, a rate that increased to 29% at 24 months. In contrast, frequency of sex was rated as "much less" by 18% at month 6 months and 12% at month 24. Condoms were reported as "easier to use" by 47% of men at month 6, increasing to 59% of men at month 24. Few men reported avoiding sex because of being circumcised. The increases over time in ease of reaching orgasm, penile sensitivity, and more frequent sex were all significant statistical modeling analyses.

Male Circumcision, Sexual Function, and Satisfaction

The clinical trial provided highly reassuring data on the effect of male circumcision on sexual function and satisfaction. Adult male circumcision was not associated with sexual dysfunction.

Overall, 24.2% of the healthy 18–24-year-old men in our study reported sexual dysfunction at baseline. This rate is roughly comparable to rates observed in surveys from the USA [40], Britain [41], and other countries [42, 43]. There was no difference between circumcised and uncircumcised men in frequency of erectile dysfunction, inability to ejaculate, pain during intercourse, lack of pleasure with intercourse, or these dysfunctions combined. There is a suggestion that circumcision may reduce reported premature ejaculation, but this effect was not strong and the difference was not maintained after 6 months. On careful clinical evaluation over 2 years of follow-up, there was no evidence that circumcised men had an increased rate of penile deformities or long-term surgical complications. More than 99% were "satisfied" with their circumcisions and none was "dissatisfied." These important findings support and substantially extend findings from another randomized trial of adult male circumcision that also found no significant difference in sexual function between circumcised men and uncircumcised controls [35]. These observations are reassuring and support current efforts to promote male circumcision to prevent HIV infections in some countries, particularly in Eastern and Southern Africa. In contrast to many other prevention measures evaluated in clinical trials, male circumcision has proven effective with marked reduction in risk of HIV infection risk among circumcised men.

Decreasing rates of reported sexual dysfunction in both circumcised and control men over the course of the study may represent regression to the mean, increased familiarity with the study questions, or another effect of repeated assessment. Most importantly, this effect was observed in both the circumcision and control groups. Having an uncircumcised control arm allowed observation of such unanticipated factors in contrast to other studies that only evaluated adult men before and after circumcision [26, 29, 30].

The randomized clinical trial data suggest potential benefits for circumcised men. Circumcised men experienced higher levels of sexual satisfaction: increased penile sensitivity and enhanced ease of reaching orgasm. Circumcised men in this study had progressively higher rates of sexual satisfaction over time and other minor benefits, such as a lower rate of balanitis. No circumcised man developed symptoms of balanitis during 2 years of follow-up, while there were 0.4 cases of balanitis per 100 person-years among the uncircumcised men. This is likely an underestimate of the rate of balanitis in uncircumcised men because the study protocol excluded men with genital abnormalities, such as phimosis or paraphimosis, and participants did not have medical comorbidities that would increase their risk for balanitis.

The potential risk for "sexual disinhibition," or increased high-risk behaviors, is cause for concern. Over time, a large and increasing proportion of circumcised men reported having sex more frequently compared to before they were circumcised. This might suggest that the circumcised men increased their sexual activity due to a perceived reduction in risk of HIV acquisition. However, detailed studies found no difference between circumcised and uncircumcised men with regard to risky sexual practices (including unprotected sexual intercourse, recent sex with a casual sex partner, and inconsistent condom use), and there was a significant decrease in these behaviors in the circumcision group from before circumcision to after [2]. Importantly, circumcised men reported that condom use was easier after circumcision and this increased over time. The concern about potential sexual disinhibition emphasizes the need for continued HIV/STI evaluation and counseling in risk reduction as male circumcision is introduced as an HIV prevention intervention.

Conclusion

The potential risk that male circumcision might reduce sexual function or sexual satisfaction led to inclusion of detailed evaluation of these outcomes as part of a randomized clinical trial of adult male circumcision to prevent HIV infection. Circumcised men did not experience an increased risk of sexual dysfunction when compared to uncircumcised control men. Among circumcised men, penile sensitivity and ability to reach orgasm increased. Similar rates of sexual dysfunction plus the benefits of male circumcision support integration of male circumcision into programs to reduce HIV infection risk.

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Part VIII

Understanding Circumcision

21 Why Circumcision: From Prehistory to the Twenty-First Century

Guy Cox and Brian J. Morris

Editors' Note
This chapter reviews the history of the most globally distributed cultural practice, save fire and tool making. The authors review known archeological data and explore various opinions and possibilities why circumcision became so globally ubiquitous. From a historical-cultural view, circumcision is a fascinating enigma; it is an ancient custom that is endowed with culture, religion, pragmatism, mysticism, Darwinian considerations, medical significance, and debate.

There's a divinity that shapes our ends, rough-hew them how we will

Hamlet Act V Scene 2

Circumcision in Prehistory

Is circumcision the oldest known surgical procedure [1]? The oldest operation for which there is tangible physical evidence is trepanning, since several Neolithic skulls have burr holes from this procedure, with healing showing that it was performed on living subjects who survived [2]. However, iconographic evidence puts circumcision much further back – well into the Paleolithic period, with many cave paintings and sculptures showing circumcised penises [3] (Fig. 21.1). By Egyptian times, around 5,000 years before present (BP), circumcision was well documented, recorded in pictures and texts (Fig. 21.2). Most Egyptian mummies are circumcised, providing the first tangible evidence of the operation. Grave statues – figures of the deceased showing him at different ages – typically show a circumcised penis (Fig. 21.3).

The other basis for assigning a vast antiquity to circumcision is its global distribution. Circumcision has traditionally been practiced through most of Africa, much of Asia, most of Australia, Polynesia and Melanesia, large parts of South and Central America, and smaller areas of North America [4, 5]. No other cultural practice, except the use of fire and the manufacture of stone tools, has such a global distribution. This suggests that, like the use of fire and stone tools, circumcision was one of the cultural practices, or memes, carried by the original *Homo sapiens* radiation out of Africa. Many primitive peoples

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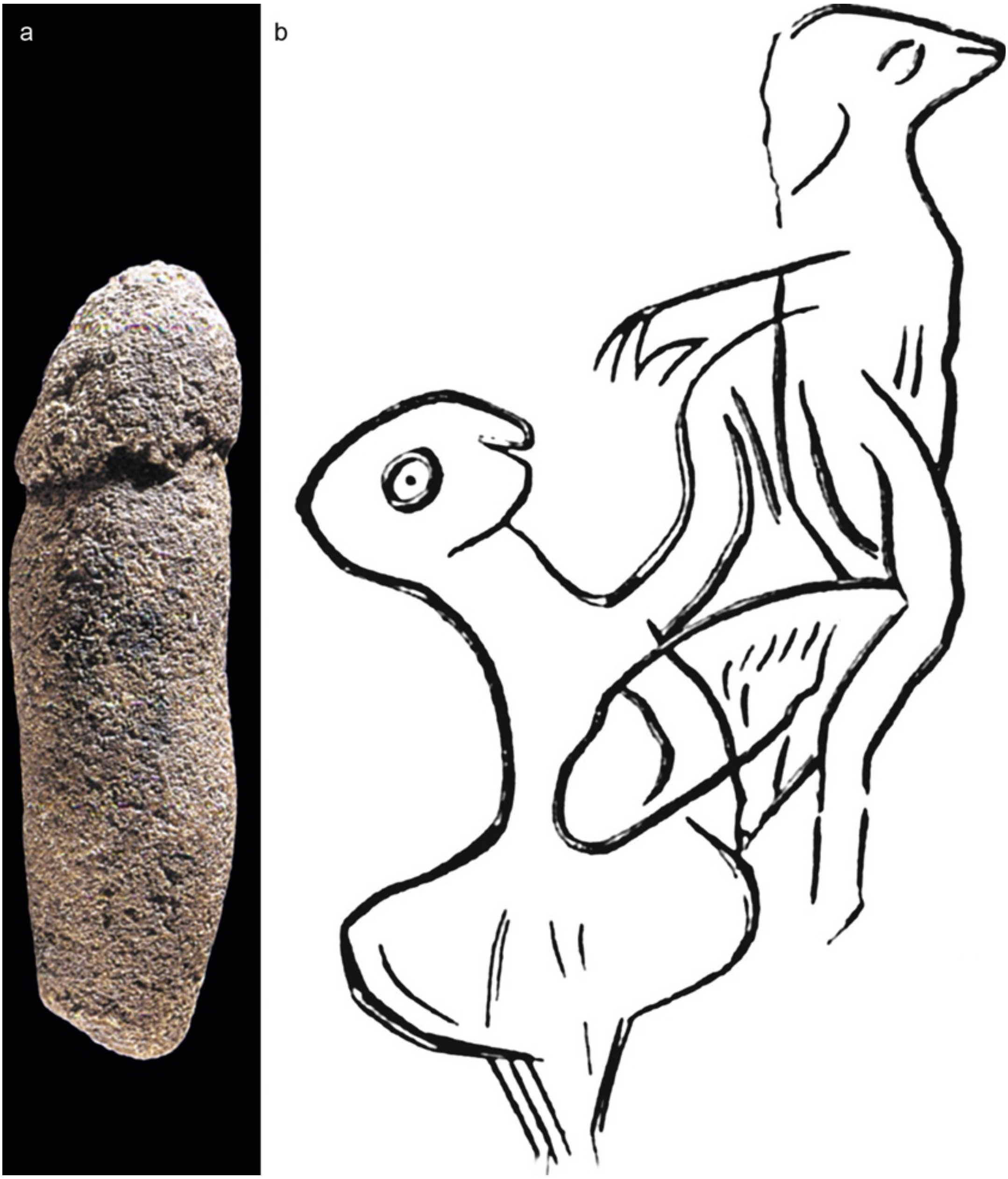

Fig. 21.1 (**a**) Sculptured circumcised phallus, possibly intended for use as a dildo. Castanet Cave. (**b**) Circumcised man apparently about to engage in coitus with a woman. The sexual characteristics of both are much exaggerated. Engraving in Los Casares cave (Riba de Saelices, Spain), possibly of Gravettian-Solutrean chronology, around 20,000 years ago (Reproduced from [3] by kind permission of the authors and of Elsevier)

have practiced other body modifications, but none of these has more than a local distribution. Given, that humans arrived in Australia at least 45,000 years BP [6] and have preserved a Palaeolithic hunter-gatherer society ever since, this, as well as iconography, places the origin of circumcision firmly back in the early Palaeolithic. It is probably not stretching the evidence too much to suggest that modern man evolved as a circumcising species.

Fig. 21.2 Circumcision scene from the tomb of Ankh-ma-Hor Saqqara (Sakkara), Egypt, 2,500–3,000 BC (Reproduced by kind permission of the Wellcome Library, London)

Faced with such a fundamental practice in human society, the question "why?" looms large. The answer needs to be divided into three parts: (1) the perceived significance to the culture, (2) the practical effect in everyday life, and (3) the selective significance in Darwinian terms. The answer to the first question appears to be religious – traditional cultures that practice male circumcision assign great significance to it, and the operation is carried out with considerable ceremony. This is in marked contrast to female genital cutting (see Chap. 24), which is accompanied by no religious or ceremonial ritual in the relatively few cultures that practice it. The key factor here is that imbuing a practice with religious significance ensures its perpetuation in the culture. Details of the religious ceremonies vary widely, but common factors in primitive cultures are exclusion of women from the ceremony and postoperative seclusion of the circumcised youths [4, 7, 8].

The answer to the second question also seems clear – circumcision, in primitive cultures, is the symbolic indication that sexual intercourse is permitted. This is found in Africa [4, 8], Polynesia [9], and Australia [4], in regions where later religious or medical practice has not modified the basis and timing of the operation. Relevant here, too, is that the nineteenth-century Zulu king Chaka banned circumcision [10] because young men, once circumcised, were more interested in sex than in being warriors in the army he was building to unite southern Africa under his reign.

The third question is the tricky one, since any surgical operation can be assumed to be a survival risk in a primitive society, so that one might expect, *prima facie*, circumcision to have a negative selective value in Darwinian terms. There must, therefore, be a greater benefit which outweighs the risk, giving circumcision a net selective advantage. The benefit is difficult to explain on medical grounds. Circumcision protects against infantile urinary tract infections – but these mostly affect boys younger than the age at which circumcision is performed in primitive societies. It also protects against penile cancer – but this typically affects men well past the age of paternity, and so should have little selective effect. The recent discovery that circumcision is strongly protective against human immunodeficiency virus (HIV) could provide an alternative view, since the effects of HIV are worse than the likely morbidity of primitive circumcision operations. But HIV has only been known from the late twentieth century, so to provide a medical explanation for circumcision we

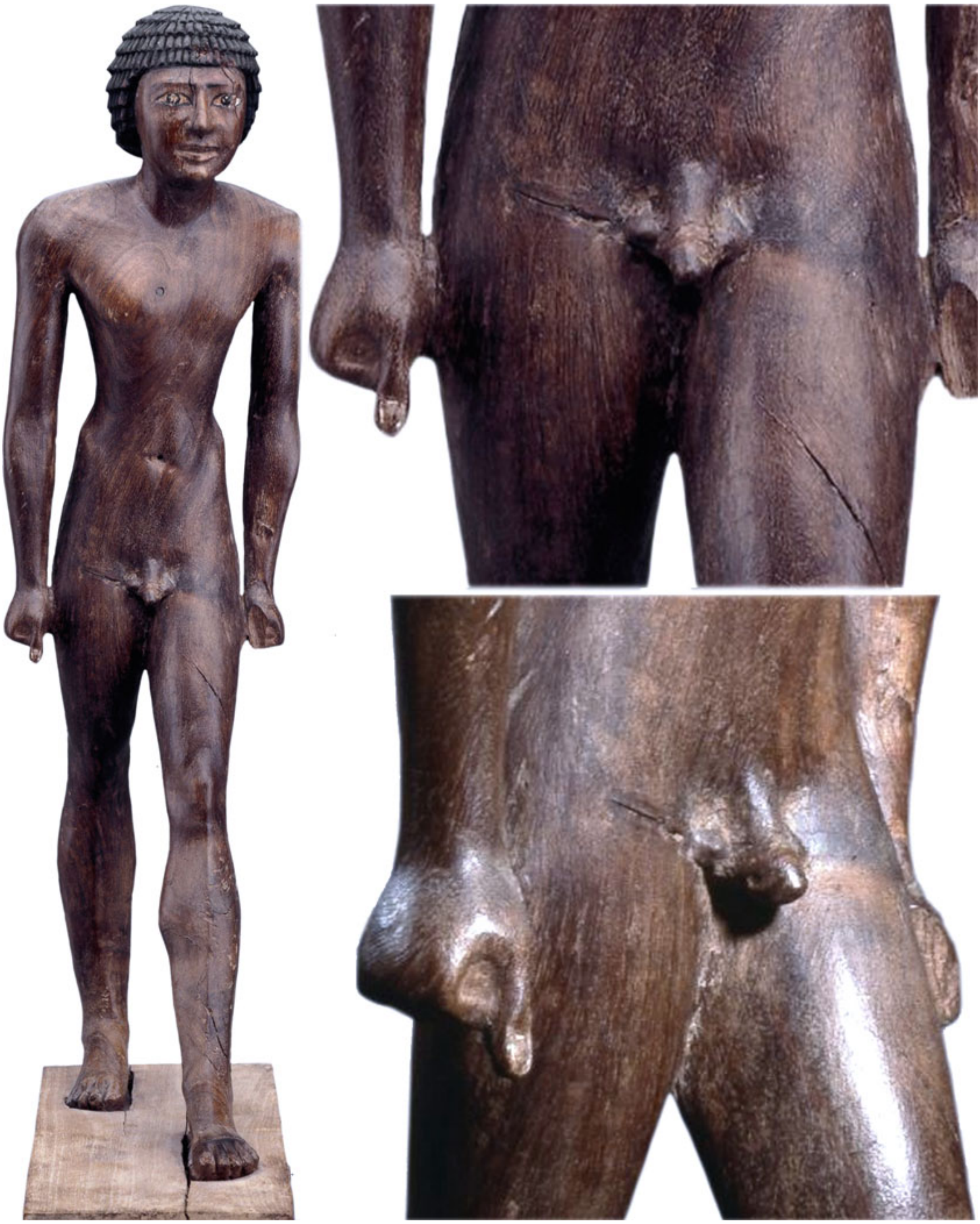

Fig. 21.3 Grave statuette of Merire-hashetef (or Meryrahashtef) from the necropolis at Sedment, 2,345–2,181 BC. The teenage boy is seen to be circumcised, and in the detail views on the right the folds of residual inner foreskin indicating a type 1a circumcision are clearly visible (© Trustees of the British Museum)

would have to postulate a similar, but now extinct, disease prevalent 50,000 years ago. Lacking any such evidence, we need to seek nonmedical explanations.

Two published studies have addressed this question. The hypothesis put forward by one of us [11] remains the only consistent explanation for pan-global circumcision traditions. In brief, with the development of modern humans, where many skills must be learnt before men and women are self-supporting, there came to be a selective advantage in deferring reproduction for a few years beyond biological puberty. Couples who delayed reproduction were likely to have more surviving offspring, since they were better placed to support their children. This created a uniquely human paradox – it was necessary for adolescents to go through puberty in order to develop the bodily strength required for adult skills, yet they must not use the ability to reproduce which puberty conferred.

This favored modifications to the genitalia which hindered early intercourse. Females developed a hymen and the male prepuce evolved to be phimotic. Both conditions were painful impediments to first intercourse, but did not impede reproduction once virginity had been lost. (In Western Europe, parents commonly intervene to make boys' foreskins retractable, but in countries where this is not practiced, the majority of young adult males suffer from phimosis [12–14].) Once these obstacles are overcome and intercourse has occurred, the foreskin is redundant, which explains why, in adult males, it commonly does not cover the glans [15]. Thus, circumcision may have arisen as a means of regulating this process more precisely, defining exactly the age at which a male could begin to reproduce. As such, it had substantial selective advantage for circumcising societies.

Both anatomical and cultural evidence supports this interpretation, and since the original paper [11] more such evidence has come to light.

The human penis is very different from those of the other hominids, *Pan*, *Pongo*, and *Gorilla*. In the great apes, the fold which forms the foreskin is attached to the proximal part of the shaft, so that when the foreskin retracts with an erection, most of the penile shaft, the *pars medialis*, is exposed, not just the glans [16]. The glans itself is less well defined than in *Homo*, being most pronounced in *Gorilla* and not defined at all in *Pan* (chimpanzees). Phimosis is unknown, even in infants – the foreskin is always loose, and retracts with erection. In the orangutan (*Pongo*), the glans is exposed in juveniles, but not in adults – the reverse of the human situation. Thus, phimosis arose as a specific development in the evolution of the genus *Homo*. Other developments were greater demarcation of the glans, and the repositioning of the foreskin so that there was no longer a *pars medialis*. The baculum (penile bone) was also lost [17]; an essential development since in *Homo* the penis must bend in coitus [18]. The human penis is much larger than that of *Gorilla* and though comparable in length to those of *Pongo* and *Pan* it is much larger in diameter, and does not retract into the body cavity when flaccid. Some of these modifications must be related – the loss of the baculum probably enforces the greater diameter and nonretraction. Some, doubtless, relate to the changes in the female reproductive tract associated with bipedal locomotion, and the need for the birth canal to pass the much larger human head; both factors make a thicker and more flexible penis advantageous. But these factors cannot explain the selection pressure for phimosis, nor the rearrangement of the glans and prepuce. These can be explained only by the idea that a formal virginity had positive selective value.

In twenty-first-century Western society, the idea that a boy has physical symptoms of virginity comparable to the hymen of a girl may seem fanciful, but in eighteenth-century Germany it was regarded as a matter of fact: "There is no positive doubt among physicians that in Christians of the age of 13 the prepuce is so tight that the glans of the penis cannot be denuded without the greatest pain, for which reason physicians are wont to consider this tightness of the prepuce as one of the signs or virginity. Although as far as stiffness and erection of the penis of such youth is concerned, it is sometimes found to be capable of and suitable for copulation; nevertheless, we think it is unfitted for generation itself on account of the narrowness of the prepuce." Bryk [4], who quotes this (p. 108), concurred with that view, though by the early twentieth century such an opinion might have been less mainstream. In contemporary Africa (where the spread of HIV has made virginity testing of both boys and girls an important issue) a nonretractable prepuce is still held to denote virginity [19, 20].

A few cultures retain a custom of formal postpubertal foreskin retraction (defloration). Thus the

Luo of Kenya (the only non-circumcising tribe in Kenya) have a ritual of forcibly retracting the prepuce, a practice they regard as equivalent to circumcision [21]. Likewise, in Polynesia, some cultures have a custom of formally retracting a boy's prepuce followed by first intercourse with an older woman – while girls undergo an identical symbolic defloration by an older man [9]. In the Polynesian case, though, the boy is later circumcised.

While phimosis provided an obstacle to early intercourse, the adoption of circumcision provided a much more effective control of the start of reproductive life – hence its subsequent ubiquity. But no such control methods are likely to succeed unless young males have an alternative outlet for their powerful sex drive, so the penis likely evolved to provide just that, with the shaft of the penis no longer exposed, but covered with mobile skin to provide a source of indirect stimulation for masturbation. Apes often stimulate themselves manually to erection (as an indication that they are ready for sex), but do not continue to orgasm, which would waste sperm and so reduce the chance of passing on their genes.

For adolescent humans, in contrast, wasting sperm is a preferable strategy to fathering children that the boy cannot support. In this context, it is noteworthy that in many tribal African societies only uncircumcised boys masturbate; it would be shameful for a circumcised youth to do so. In any case, after circumcision intercourse is permitted as a sexual outlet [4, 8]. Paleolithic depictions of coitus (Fig. 21.1) show circumcised penes, while a depiction of solo ejaculation shows a long, phimotic prepuce (Fig. 21.4) [3].

Wilson [22] has presented an alternate scheme, which postulates that circumcision is an impediment to copulation. A married man has sufficient access to his wife to overcome this impediment and successfully father children, but a potential interloper finds it harder to impregnate a woman with the limited access he can obtain. In this way, circumcision becomes a weapon in the "sperm wars" by which a man seeks to ensure that only he fathers his partner's children. He will not waste resources in bringing up a child that does not carry his genes. Circumcision both grants a man the right to have a mate, and at the same time reduces his ability to consummate the relationship.

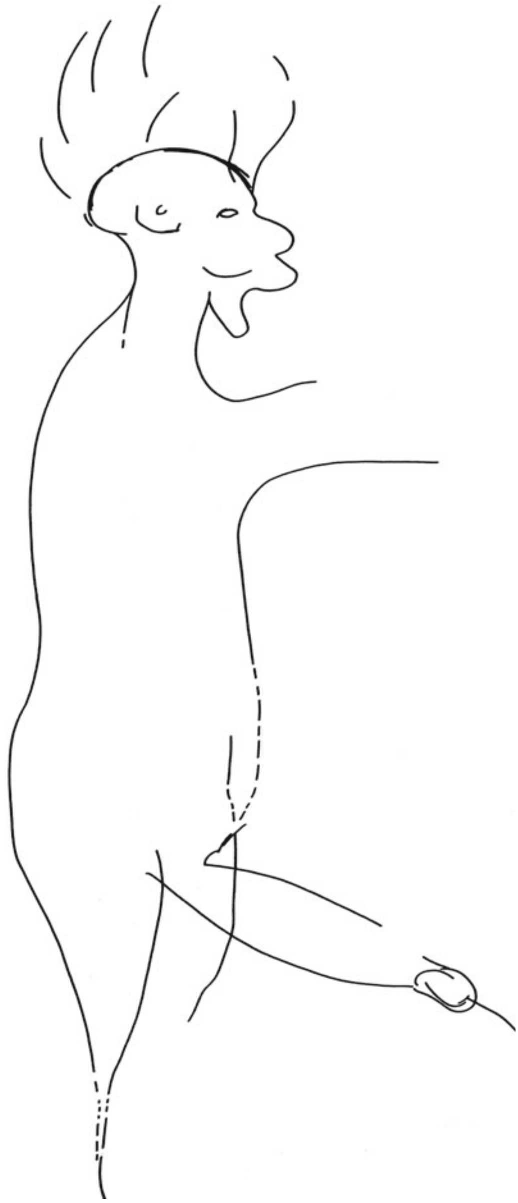

Fig. 21.4 Engraving of a man with long (phimotic?) prepuce in the act of solo ejaculation, presumably through masturbation. Upper Paleolithic, Ribeira dos Piscos (Foz Coa, Portugal) (Reproduced from [3] by kind permission of the authors and of Elsevier)

Wilson admitted that he had no evidence that circumcision had this effect.

The logical inconsistency here is that the "outsiders," who do not have a partner and will, therefore, seek opportunistic mating, will be the uncircumcised males (circumcised males are permitted partners of their own). If these are better at mating they will be more, not less, likely to father offspring. It would be far more plausible to propose, as Bryk [4] does, that circumcision facilitates intercourse. Thus, outsiders would find their mating attempts hindered by their foreskins, while legitimate partners would be able to mate successfully.

Based on his premise, Wilson makes the “prediction” that circumcision will be most prevalent in polygynous societies. This correlation is well known, but does not support his argument. In a polygynous mating system, opportunistic matings have a very high chance of achieving paternity. This is particularly the case with *Homo sapiens*, since females who live together synchronize their ovulations, so a man has only a limited time window in which to inseminate his entire harem. Since a man can typically mate only once or twice a day and does not attain full seminal volume until several days without mating, he has no chance of out-competing an interloper.

Wilson [22] also suggests that penile anatomy favors his hypothesis, but it does not. The only polygynous hominids are gorillas (*Gorilla gorilla*), and they have very small penes and testes relative to body mass [16]. This reflects the fact that unlike the promiscuous chimpanzees (*Pan troglodytes*) and bonobos (*Pan pygmaeus*) they do not need to compete by producing copious quantities of sperm. A silverback (dominant male) gorilla ensures paternity by preventing access to his harem. Human males have large penes and medium-sized testes (intermediate between those of a gorilla and a chimpanzee), so do not match this model at all. The anatomical implication is that polygyny is not native to *Homo sapiens*, and anthropological evidence suggests that polygyny arose in some human societies as an indirect consequence of the transition from hunter-gatherer to agricultural lifestyles [5] – long after the evolution of circumcision.

Religious Circumcision

As discussed above, male circumcision has always had a ceremonial and cultural significance and, thus, has been a religious rite within the tribal context. But the rise of large-scale organized religions that adopted circumcision brought about a change in the significance of the operation, separating it from permission to reproduce, which was now regulated directly by the religion. The long-term consequence of this was to reduce the age at which the operation was performed, a trend that culminated in the Jewish practice of neonatal circumcision.

The complex polytheistic religion of ancient Egypt seems to have been the first mass religion to make circumcision a requirement. The sun god Ra was believed to have circumcised himself, and from the spilt blood two other gods, Hu and Sia, came into being [23, 24]. Mummies show that the practice dates from predynastic times (before 4,000 BC) [23] and the 5th or 6th dynasty (2,500–3,000 BC) tomb of Ankh-ma-Hor at Saqqara has a relief depicting the operation (Fig. 21.2). Even older is a written source that gives a recipe for treating excessive post-circumcision bleeding [23].

The puzzling factor about Egyptian circumcision is that although it was the norm, and virtually universal in depictions of the naked male form (Fig. 21.3), not all males were circumcised. Even one or two Pharaohs were uncircumcised [5, 24]. Herodotus was of the opinion that the Egyptians practiced circumcision mainly for hygienic reasons: “They practice circumcision for the sake of cleanliness, for they place cleanliness before comeliness” [24] – the earliest reference to the hygienic benefits of circumcision which, tacitly, it seems that he accepted. Yet, in fact, it clearly had a much deeper significance, since Pythagoras, at much the same time as Herodotus was writing, had to be circumcised before he was allowed to enter the great library at Alexandria [25]. (This also shows the draw of the greatest library of the ancient world, since circumcision was anathema to the ancient Greeks [23, 26].) It has been suggested [23] that circumcision was originally reserved for the priesthood, then was adopted by the ruling classes, and later percolated down to the rest of society, but others feel that it had no relation to social class [5]. Any such percolation must have happened by 2,500 BC since another relief at Saqqara shows a carpenter at work; his loincloth has slipped and he is revealed as well-endowed and circumcised [24].

A stele from the twenty-third century BC refers to a mass circumcision of 120 youths, which hardly implies circumcision was just for a privileged minority [24].

The most likely explanation for some men being uncircumcised lies in the polytheistic nature of Egyptian religion – possibly the cults of some particular deities rejected circumcision as being a declaration of allegiance to Hu and Sia. In the case of the one or two uncircumcised Pharaohs, it may also reflect the long-running battle between Church and State, which certainly existed in ancient Egypt [5] and which has not yet ended. These Pharaohs may have been deliberately denying the authority of the priesthood by not being circumcised.

There is some debate about the age at which circumcision was performed in ancient Egypt. The boys shown in Fig. 21.2 have variously been interpreted as young [23] and pubertal [24]. The assistant holding the boy at the left is the same height as the boy being circumcised, but he could be another member of his peer group (perhaps the next in line for the operation). The squatting circumcisers would each be a good head taller than the boys when standing. The mortuary statuettes of Merire-hashetef (or Meryrahashtef) show him at three ages, of which Fig. 21.3 is the youngest – a just postpubertal teenager [27]. He is already circumcised at this age. To put a lower bound, the mummy of the boy Horus in the Nicholson Museum, University of Sydney, has recently been shown, by X-ray tomography, to be uncircumcised [28]. He was 6 or 7 years old. The account of a mass circumcision mentioned above [24] records with pride that none of the boys struggled – again implying that they were young, or this would not have been noteworthy. As a best estimate, therefore, we could suggest that boys were circumcised between the ages of 10 and 14 – younger than the norm in tribal life, but older than in most later societies.

The origin of Jewish circumcision is given in the Bible [29] (see Chap. 23). Unfortunately, no really ancient texts survive – the oldest textual sources date only from the first and second centuries BC, and they are fragmentary. So we depend on copies of copies of copies and the text needs to be read in this context. In short, Abraham was unable to get Sarah (his wife) pregnant (though he did give his Egyptian maid, Hagar, a son, Ishmael). At an advanced age (arguably exaggerated though mistranslation of ancient time units such as “seasons” into years) God ordered him to get circumcised, and he promptly succeeded in fathering a son, Isaac, by Sarah.

The striking feature of the story is how matter-of-fact it was for Abraham and his household to get circumcised. “And Abraham took Ishmael his son, and all that were born in his house, and all that were bought with his money, every male among the men of Abraham’s house; and circumcised the flesh of their foreskin in the selfsame day, as God had said unto him.” Clearly they were living among people to whom circumcision was a familiar operation, and there was no difficulty in finding a circumciser the very same day. Contrast this with the situation many years later, when the Jews under Joshua reached the Promised Land after their 40 years in the wilderness. All the circumcised men and boys who had left Egypt were now dead, and none of the children born on the journey had been circumcised. Not only had circumcision died out, so had any experience of performing the operation. This time God had to give more specific instructions, requiring them to make stone knives, much sharper than the bronze knives in everyday use at that time, for the operation [30].

Abraham’s son Isaac was circumcised at 8 days old (7 days in modern reckoning – see Chap. 23), a week after his birth. From then on (barring the time in the wilderness) all Jewish boys were circumcised at that age, and the ancient symbolism of it being a prelude to marriage was lost.

The early Christian church struggled over whether or not circumcision should be a requirement (see Chap. 25). The debate is chronicled in the Acts of the Apostles and various epistles, but was never really resolved. In the end, the Coptic church kept, and still keeps, circumcision as a religious requirement. The Orthodox church in Eastern Europe is strongly opposed to it (possibly more to distinguish themselves from their Muslim neighbors than on theological grounds), and the Catholic church is distinctly ambivalent, over the centuries sometimes condemning it (on theological grounds) but at other times favoring it (on hygienic grounds, the idea being that good health and hygiene helped to keep boys free from sin).

The world's largest, and newest, circumcising religion is Islam, but it is also the most paradoxical (see Chap. 24). Circumcision is not mentioned in the Qur'an, yet it is universally practiced by Muslims worldwide. This is usually explained on the basis that circumcision is a matter of cleanliness and hygiene, and was already universal in the time of the prophet Mohammed. Islam lays great stress on matters of cleanliness, not just ritual cleanliness but the everyday practical form as well, to a far greater degree than other major religions.

Since there is no strict ritual prescribed, the age at which Muslim boys are circumcised varies widely. Thesiger describes [31, 32] postpubertal circumcision among nomadic and tribal Arabs, but this is not the norm. Some urban Muslims have adopted neonatal circumcision, but the commonest practice is to circumcise prepubertal boys between the ages of 4 and 10. It is an important festive event, at which the boy wears special, elaborate clothing and receives many presents. It is thus a keenly awaited occasion for the boy.

The traditions of Hinduism prohibit circumcision, and even any interference with a tight foreskin [13]. Sikhism, a very young religion in world terms, specifically bans circumcision in its holy book, which dates from 1708 [33]. It is clear from the context that this was part of the rejection of Islamic customs: "If God wished me to be a Muslim, it would be cut off by itself" [33]. Buddhists do not circumcise, though this seems to be more of a philosophical tradition of not inflicting harm than a specific prohibition. The only scriptural reference which could refer to circumcision is number 10 of the 32 Attributes of an Enlightened One: "His sexual organs are concealed in a sheath and exude a pleasant odor similar to vanilla" [34].

It is not clear that this refers to the foreskin, and in any case the 32 attributes are indicators of a divine status, not everyday characteristics. Buddhist youths and men often wear the foreskin permanently retracted [4, 35], which Hindus and Sikhs would not do.

Traditional Methods of Circumcision

It is a curious fact that a wide range of techniques are used in traditional circumcisions. One finds, for example, three different circumcision methods used on one African hillside by members of one tribal group [36], and three different implements used to circumcise three generations of one family of aboriginal Australians [7]. An obvious implication is that the end result is more important than the procedure, and this is borne out by modern medical practice, in which at least seven techniques are in common use, including four of the primitive methods described here. Other factors probably include the desire to cement regional distinctions, and individual circumcisers' development of techniques which work for them.

Type 1a: The simplest, commonest, and almost certainly oldest surgical technique is to pull the foreskin forward, and cut through it in front of the glans. The released outer skin springs back down the penile shaft and the remaining inner foreskin is pushed back to meet it, becoming the skin of the distal part of the penile shaft [37]. A refinement is to clamp the skin in front of the glans, thereby reducing the risk of damage to the glans and providing a degree of hemostasis. Tribal Arabs just use string [31], but many tools have been used for the task [4] including metal, wood, or ivory slit shields (Fig. 21.5), clamp forceps, and the modern Mogen clamp (see Chap. 9).

There will typically be a surplus of mobile skin on the penile shaft and since the inner foreskin is much thinner than the shaft skin it will form wrinkles behind the glans. This effect is clearly visible in the statuette of Merire-hashetef (Fig. 21.3) so we can see that around 4,500 years ago Egyptian boys were circumcised by this technique.

Type 1b: The cut is made as in a type 1a, but then the inner foreskin is excised. The scar will lie in, or close to, the sulcus and little or no free

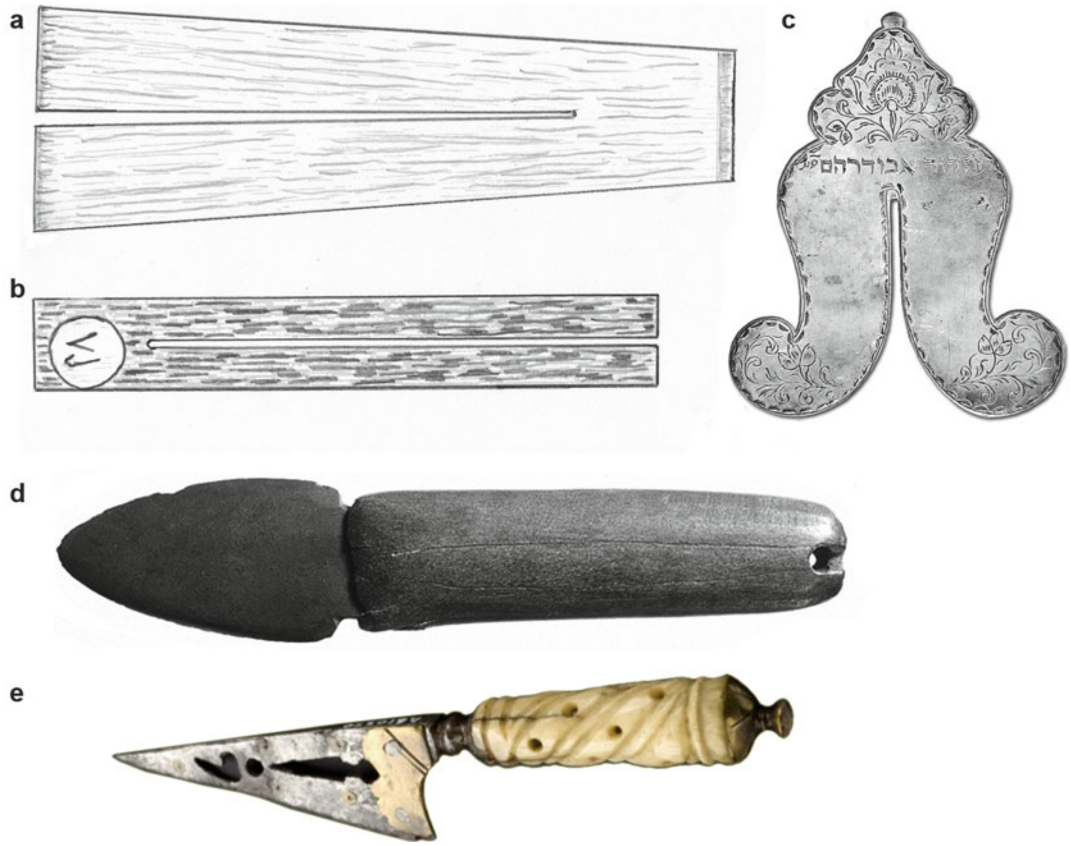

Fig. 21.5 Traditional circumcision implements. (**a**) Slit wooden shield (Turkey). (**b**) Split reed (Turkey) (Both redrawn after [4], Figs. 31 and 32). (**c**) Silver Jewish circumcision shield, dated 1790, from North Africa or Middle East (Photograph courtesy Hapner Collection). (**d**) Circumcision knife with slate blade and bone handle. Victoria land, North America (Photograph courtesy Wellcome Library, London). (**e**) Small, ornate circumcision knife with triangular blade and carved ivory handle, c. 1780 (Photo courtesy Science Museum, London, & Wellcome Images)

skin is left. This is common in modern medicine [38] and is also found in Africa [36]. In traditional Jewish circumcision, the inner foreskin is slit and more or less excised, giving a similar result. It is claimed [4] that the technique was changed from type 1a to this form in Greco-Roman times to prevent the widespread practice of foreskin restoration [4, 24, 39], and it would certainly have that effect.

Type 1c: An African variation [36]. The inner foreskin is forcibly torn away after the initial cut, and the inner surface of the residual outer skin is scraped raw, as is distal part of the penile shaft. The residual outer skin is drawn forward over the raw shaft and any residual inner skin, and the raw surfaces fuse together during healing. The appearance after healing resembles type 1b, but on the distal part of the shaft the skin is fused to the shaft beneath.

Type 2a: Dorsal slit. The foreskin is slit on the dorsal side from the orifice to the *corona glandis*. Often a flat wooden blade will be inserted under the foreskin and the cut made down to it. The foreskin falls away from the glans, leaving it exposed, and the inner and outer foreskin layers heal together. No skin is actually removed. This is the method used through much of Polynesia [8, 40], and is also still used in modern medicine as a more conservative alternative to traditional circumcision.

Type 2b: A dorsal slit is made, and from the base of the slit the foreskin is cut away following the coronal sulcus. This is also a method used both traditionally [4] and in modern practice; the result is indistinguishable from a type 1b circumcision.

Type 2c: A partial slit, just sufficient to pass the glans, is made forward from the corona, but not extending to the preputial orifice. The glans is passed through this opening, and is thereby exposed, and the prepuce hangs down below the frenulum. This redundant skin may be left in its entirety [41] or partially trimmed off [36]. This method seems to be unique to certain groups in Kenya.

Type 3: In a particularly radical operation found in parts of Arabia, the skin is removed from the entire penile shaft, exposing Buck's fascia [4, 30]. This practice continued at least until the mid-twentieth century [30], but it seems unlikely that it still exists.

Pre-Twentieth-Century Changes in Prevalence

At some stage the inhabitants of Europe, who were circumcised in Palaeolithic times [3], abandoned the practice. The most likely explanation is that at a time of extreme privation during a glacial period ritual life was lost in the struggle for survival. One can draw a parallel with the loss of the tradition among the Israelites who were starving in the wilderness [29]. In North Africa and Asia Minor, the warmer climate spared the population such rigors – ritual life continued, leading in time to the world's first advanced, literate civilizations. Not all populations in the area retained circumcision – the Philistines are always reported as uncircumcised in the Bible. However, by 500 BC Herodotus reported that they were circumcised [42]. The Syrians also were said to have once been uncircumcised, but later adopted circumcision from the Egyptians [42]; so circumcision was current across North Africa and Asia Minor in pre-Islamic times.

Trends across the rest of Asia were complex. The original inhabitants of Japan, the Ainu, practiced circumcision [4], but the modern Japanese (those of Korean descent) do not. Whether this is the result of ethnic traditions or of the Buddhist religion is not clear. Koreans today are almost all circumcised, but this is said to be a modern adoption (see below). In India and China circumcision was not practiced, presumably from Hindu and Buddhist influence. It is known that circumcision was originally customary in Sulawesi [4], and therefore probably throughout the Indonesian archipelago. The spread of Buddhism and Hinduism into these regions led to the abandonment of circumcision, but it became the norm again following the adoption of Islam. Islam also brought circumcision to much of the Indian subcontinent. Aboriginal Taiwanese practice circumcision, like their ethnic cousins the Filipinos, but successive Chinese invasions of the island in the last 400 years have made the Taiwanese a minority.

In Africa the spread of Islam was largely into countries such as Nigeria and the Sudan, where circumcision was already the norm. The only large-scale change was the abandonment of circumcision by the Zulus in the nineteenth century [10].

The advanced civilizations of pre-Columbian America practiced circumcision [5], though more primitive tribal people did not. Again, this may reflect the loss of ritual in times of privation. However, the Spanish *conquistadores* banned the practice as part of their systematic destruction of the indigenous cultures. It is now rare in South America though more common in Latin North America.

The Melanesian, Polynesian, and Aboriginal Australians – inhabitants of Australasia and Oceania – mostly practiced circumcision, and still do so where traditional culture has not been lost. However, the Polynesian tribes which colonized New Zealand in the last phase of Polynesian expansion mostly abandoned the custom [40], and so did many of the Melanesian tribes of the main island of Papua New Guinea.

What is clear from this complex story is that by historic times circumcision had entirely lost its original significance of permitting marriage, and had become a badge of cultural and/or religious identity, so that changes in circumcision status reflected changes in cultural or religious affiliations.

The Rise of Prophylactic Circumcision in the Late Nineteenth and Early Twentieth Centuries

Knowledge of the benefits of circumcision existed in Europe centuries ago. A famous example involves Louis XVI of France. In 1770, Marie Antoinette, 12th daughter of the Emperor and Empress of Austria, married the future Louis XVI at the age of 14. By 18, she became queen. Louis XVI suffered from phimosis that prevented successful intercourse [43, 44]. Lacking the responsibilities of motherhood, Marie Antionette spent her time in expensive frivolities. In a secret visit to France, her brother, Emperor Joseph II, persuaded Louis to get circumcised (at age 22, 8 years after their marriage). She subsequently bore three children, but this was too late to save the French monarchy. It may, however, have been the start of a tradition of circumcision among European royalty. It is well known that the British royal family has a long history of favoring circumcision [45], and anecdotal evidence suggests that this was true of most of European royalty.

What was the rationale for the adoption of circumcision in the English-speaking world from the latter part of the twentieth century? The earliest research showing medical benefits (protection from syphilis and cancer) was appearing at this time [46, 47], but had little impact – largely because it could only compare Jewish and Gentile groups, and this left a host of variables uncontrolled. More pertinent were the current movements in medical science. Hygiene had become an important issue, along with the whole idea of healthy living as preventative medicine. This all related back to current trends in medical science that had identified bacteria as causes of disease and, hence, for the first time offered a logical framework for prophylaxis.

Even though hygiene was now recognized as important, a bath was still a weekly event, at best. In these conditions, maintaining hygiene in an uncircumcised penis was bound to be difficult, and contemporary medical literature bears this out [47–49]. At the same time, surgery was becoming safer, so that surgical solutions to common medical problems were becoming much more attractive. Prevailing opinion also recognized (rightly or wrongly) a circumcised penis as more effective sexually [4, 50].

The masturbation issue has to be considered here as well. While the Church has always condemned masturbation, regarding something as sinful was not the same thing as regarding it as harmful. In the sixteenth and seventeenth centuries it was simply regarded as a trivial childish pursuit. In 1597, John Dowland published his setting of Fulke Greville's poem "Away with these self-loving lads" – a light-hearted love song which immediately became hugely popular. The masturbation reference was not seen as risqué, just a cliché for immaturity. Somehow, in the eighteenth century, the idea that masturbation was harmful gained a wide circulation. Eventually, even normal nocturnal emissions ("wet dreams") came to be seen as pathological. By the mid- to late nineteenth century, writings on the topic were positively apocalyptic [49, 51].

That much is undeniable, but the contentious issue is where circumcision comes in. Some eighteenth-century authors formed the opinion that masturbation of a circumcised penis was impossible, an idea comprehensively demolished by Bryk [4] and, in spite of some claims to the contrary, this seems to have had little influence in the adoption of circumcision. More relevant is the widespread idea that the irritation of retained smegma and penile infections would lead to the discovery of masturbation [38, 49]. This at least has an air of plausibility – that is, if one accepts the idea that any boy will not discover masturbation. Another point – and an undeniable one – was that circumcising a boy who masturbates will at least enforce a break in the practice [38]. On the other side of the coin, some texts which ranted against masturbation made no mention of circumcision [51], so the connection probably had no wide currency.

What is undeniable is that many medical texts on both sides of the Atlantic were advocating

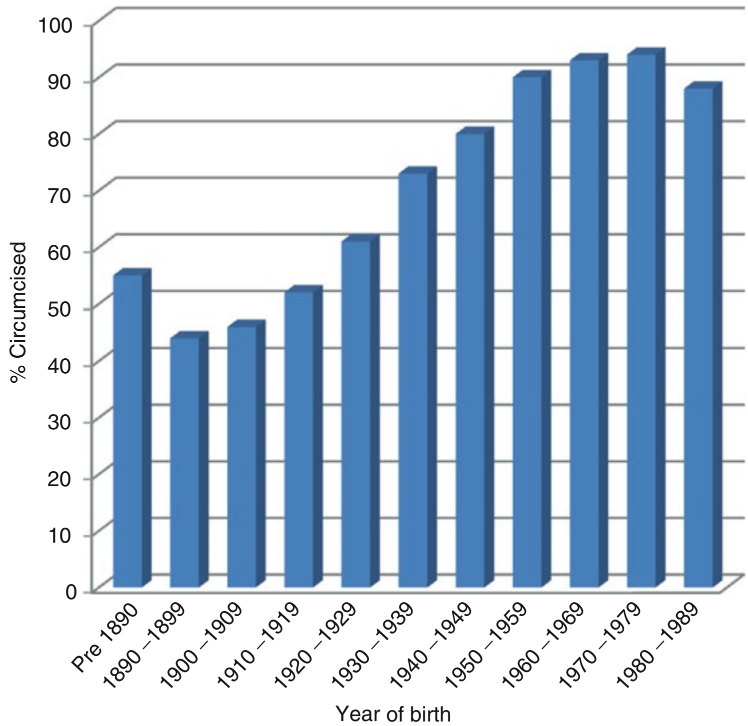

Fig. 21.6 Estimates of circumcision rates among white American males 1890–1990 (Data from [56–58])

circumcision, some with wild enthusiasm [48] and others with more restraint [38]. Circumcision became commonplace in the USA well before the end of the nineteenth century and continued to increase in popularity through most of the twentieth century (Fig. 21.6). There was an economic aspect to it as well – in boys born between 1949 and 1958, the circumcision rate was 45.1% amongst boys from families with an average annual income of $1,000, and 94.1% amongst boys from families with an average income greater than $15,000 [52]. Likewise Speert [53] reported a 74% circumcision rate for private patients and 57% for ward (public) patients at the Sloane Hospital between 1933 and 1951. However, by the end of his study period the rate among ward patients had risen to match that of private patients – the distinction by income class had disappeared. Part of the ongoing rise in the mid-twentieth century may have been driven by observations by the Armed Forces during World War II, in which many uncircumcised men experienced health problems [53–55].

The introduction of prophylactic infant circumcision into British society was to a considerable extent a trickle down from the practice of royalty, first into the higher levels of the aristocracy, then into the aspirational middle classes. It never reached the working classes to any great extent. By 1950 the majority of pupils at British public (fee-paying) schools had been circumcised, while the proportions were reversed in state schools [59]. The first author (who attended a state primary school and a public secondary school in England) can confirm this.

In egalitarian Australia, such class distinctions were never likely to be maintained, and circumcision became well-nigh universal by the mid-twentieth century. It also became the norm in New Zealand, and was very common among English-speaking white people in South Africa.

Why did circumcision not become equally popular among non-English speaking nations? In France, at least, similar recommendations were made by the medical profession [49], yet circumcision remained rare. The answer would seem to be the prevalence of anti-semitism in Europe. To modern eyes, late nineteenth-century Britain seems rather anti-semitic, but in that period Britain had a Jewish Prime Minister (Benjamin Disraeli) and, in general, Jews enjoyed a level of acceptance that they did not have in Europe. In America, the Jewish population was large and influential, and emulating their practices had no negative connotation. In Australia, the racial issues of the time involved primarily Aborigines and Chinese immigrants, and Jews were essentially below the radar.

The establishment of critical mass is also important – once a substantial proportion of the male population is circumcised, the idea that it is a Jewish practice is no longer relevant. In Britain this was aided by the fact that circumcision was well known to be as much a practice of the nobility as a Jewish religious rite, so that the racial–religious nexus was broken. In continental Europe this never happened, and once Hitler began his rise to power, any idea of establishing circumcision as a health measure was inevitably doomed.

Changes in Attitudes and Prevalence 1950–2010

By the middle of the twentieth century it was widely accepted that circumcision confers almost total protection from penile cancer [53]. The correlation was so stark that alternative explanations based on religion or social status were inconceivable. Other medical benefits were not so clear – the evidence was suggestive but not conclusive

In 1949 a paper was published, which had a considerable impact on British circumcision practice. Douglas Gairdner [59] carried out a detailed anatomical study, showing that it is not normal for the prepuce to be retractable at birth. He studied children at different ages and came to the conclusion that "after about 3 years of age steps should be taken to render the prepuce of all boys retractable and capable of being kept clean." He also noted that "Either the boys of well-to-do parents are suffering circumcision much too often, or those of poorer parents not often enough." The use of the word "suffering" indicates clearly enough Gairdner's view. He recommended against circumcision, largely on the basis of negative consequences of the operation. His estimates of deaths from circumcision were hugely larger than those from subsequent studies, and must be regarded as suspect. Even so, death from penile carcinoma was a much greater risk. From 1950, infant circumcision rates declined substantially in England, though how much this owes to Gairdner's paper and how much to the establishment of the National Health Service (NHS) is debatable. The NHS was set up by the Labour Party, and circumcision was largely the practice of Conservative voters, so it was probably inevitable that the NHS would not provide routine circumcision.

Four years later, an American study by Harold Speert [53] came to the exactly opposite conclusion. In New York, there was only one death in the half a million circumcisions carried out in 10 years, and this was a circumcision carried out by an unlicensed mohel, not a physician. Speert also noted that penile cancer was not a rare disease, and only appeared so in the USA because most men were circumcised. Circumcision, therefore, increased in popularity in the USA (Fig. 21.6). In Australia, too, circumcision showed an excellent safety record [60] and remained popular.

Most other countries did not adopt circumcision, with the noticeable exception of South Korea, where the operation became very popular in the second half of the twentieth century [61]. Virtually all boys are circumcised by adulthood, with the preferred age being between 8 and 11 [62]. While these authors attributed this to American influence, this seems unlikely since the age of circumcision matches more the practice in the Philippines and elsewhere in southeast Asia. Quoted anecdotal evidence [61] mentions that the Korean Army favored the procedure during the Korean War, and also that many popular newspaper and magazine articles promoted circumcision in the early 1950s.

With a substantial cohort of circumcised gentiles available for study, medical research into circumcision was greatly facilitated. The penile cancer question was definitively settled by American [63] and Canadian [64] studies, while the long-suspected connection between uncircumcised male partners and cervical cancer in females was also eventually confirmed [65]. Meanwhile, 25 years ago, an unexpected discovery showed that circumcision conferred a 10–20-fold reduction in infant urinary tract infections [66, 67], making it far safer for boys to be circumcised than not, even in the first month of life [68]. Most recently, circumcision has been shown to give a 60% reduction in female–male transmission of HIV [69]. As a result, in the twenty-first century, circumcision is expanding into formerly non-circumcising parts of Africa, where heterosexual HIV transmission is common.

Although the medical evidence on the benefits of circumcision has increased over the years, the reasons given by parents for having their infant boys circumcised has changed little. Surveys in the USA [70], Canada [71], Australia [72], and Korea [62] showed that hygiene was the major factor in the decision, as in the nineteenth century (and possibly the fifth century BC).

From 1971, various national medical associations have expressed positions on circumcision. In that year, the American Academy of Pediatrics (AAP) Committee for the Newborn stated that that there are "no valid medical indications for circumcision" [73]. In 1975, this was modified to "no absolute valid…" [74], which remained in the 1983 statement, but in 1989 it changed significantly to "New evidence has suggested possible medical benefits" [75]. In its 1999 Statement, however, the AAP offered a neutral stance [76]. This has remained its position, but recently that position has been challenged [77, 78] and the AAP is now reassessing its recommendations in the light of recent research. News media statements in 2009 suggest that the AAP will move from a neutral to a positive stance, supported by the Centers for Disease Control and Prevention, which according to a recent report in the New York Times will now recommend circumcision [79]. The effect of all this on circumcision rates in the USA has been minor at most (Fig. 21.6).

In Australia, the Australian Paediatrics Association released a statement in 1971 [80] based on the contemporary American one. A revised statement was issued by the Royal Australasian College of Physicians in 2004 [81], but the topic has remained controversial, with considerable disagreement among the committee members, and at the time of writing a new draft has yet to be agreed upon. However, the effect on circumcision rates has been dramatic, with a decline to about 20%, though there are substantial differences from state to state. A similar decline has been seen in Canada, with the current rate about 31% but again with big differences between provinces [71]. It seems likely that in the near future revised recommendations, taking a more positive attitude to circumcision, are likely in many English-speaking countries.

What of the future? Current medical advice and public health projects now underway seem to point to a worldwide increase in circumcision rates in the first half of the twenty-first century. Since this – perhaps for the first time in history – is based on firm medical evidence it might be a continuing trend.

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22 Rituals, Culture and Economics

Byron D. Joyner and Ismael Zamilpa

Editors' Note

Medical professionals interact with people from all walks of life and from every cultural nook of the globe. It behooves us then to consider regional and cultural expectations when dealing with a subject as sensitive as circumcision.

It is difficult, if not impossible, to determine the origin of most customs. When a practice persists after its original purpose has ceased, the practice gains ritualistic or cultural status. Original motivations for a custom are frequently obscured by mythological, religious, ritualistic, and secular rationalizations. For example, if asked, few Jews would know the origin of its emblematic symbol, the Star of David. Given its Hebrew name, Shield of David, most Jews likely associate it with King David's shield; when in fact, its use only traces to about the twelfth century. Most Christians would have a similar problem if asked the origin of the Cross as their emblematic symbol; this too was introduced later in Christian history. The point is, all cultures have customs that they cannot, ipso facto, explain or defend but to which they are committed. The practice of circumcision be it ritual, cultural, or trendy, exemplifies this social characteristic.

Though pop culture places the origin of circumcision with the Jews, circumcision is far older, likely many tens of millennia older (see Chap. 23). It is the emphasis that Jews place on circumcision that has made it emblematic of Jewish culture. Almost all newborn Jewish males in Israel, an estimated 99% of Jewish men in Great Britain and Northern Ireland, and 98% of Jewish men in the USA are circumcised.

Even when religious and cultural customs are not influential, certain customs can be passed on with the comingling of different populations. For example, reports from the seventeenth to the nineteenth century suggest that male circumcision in the Caribbean was practiced among local Africans working for Jewish employers. Another example is represented by the unusual South Korean practice of circumcision which began after contact with the American military during the Korean War [1].

In Islamic society, the practice of circumcision is attributed to the Prophet Abraham, who Muslims revere as their patriarch. Circumcision, a common practice in Arabia, actually predates Islam, and is not mentioned in the Quran (see Chap. 24). Nevertheless, Muslims see circumcision as an act of cleanliness, and though not mandatory seems to be universal.

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Table 22.1 Number and percentage of male newborn infants circumcised during hospitalization, by geographic region: United States, selected years 1980–2006

Region	1980	1985	1990	1995	2000	2005	2006	Trend[a]	Medicaid (Yes:No)
	Number circumcised in thousands								
United States	1,261	1,162	1,169	1,200	1,166	1,172	1,145		
Northeast	253	221	238	249	256	254	224		
Midwest	403	331	341	317	330	330	330		
South	379	393	396	454	422	422	421		
West	226	218	195	180	166	166	170		
	Percent circumcised								
United States	64.7	59.5	59.0	64.1	62.4	57.3	56.1	+0.20	35:16
Northeast	67.5	65.2	62.6	68.3	64.6	66.9	63.6	−0.04	8:1
Midwest	75.9	70.5	76.0	79.8	81.4	78.7	77.9	+0.23	11:3
South	56.0	56.0	57.1	66.1	63.9	58.7	55.3	+0.11	13:4
West	61.8	49.0	42.4	42.6	37.3	31.5	33.8	−0.99	5:8

Modified from Buie et al. [2]
Circumcision rates over the 2½ decades presented here have stayed relatively constant except in the West where there has been a significant decline (likely due to an increase in immigrant population and representing 8 of the 16 states and DC where Medicaid does not cover circumcision; AZ, CA, ID, MT, OR, NV, UT, WA)
[a]Trend and Medicaid coverage data were added for comparison

The percentage of circumcised males varies by geographic location, by religious affiliation, and to some extent, by socioeconomic status.

Data from the National Hospital Discharge Survey (NHDS) report that 1.1 million (56%) newborn males born in US hospitals were circumcised in 2006. Circumcision rates in the Western USA have decreased while remaining relatively static in the rest of the country (Table 22.1). Rates vary significantly by race, geographic region, education level, and religious belief.

Traditionally, Hispanic and Asian groups have represented the lowest circumcision rates [3]. Indeed, individual state statistics reveal lower neonatal circumcision rates among Hispanic and Asian infants which are similarly reflected in national data and due largely to the fact that circumcisions are not commonly performed among immigrant populations from Latin America and Asia. The lower rates of circumcision among Medicaid recipients compared to those with private insurance may reflect the growing Hispanic and Asian immigrant populations using Medicaid [4–6]. Furthermore, Medicaid pays for a large and increasing share of all births in the USA (41%), and male children whose delivery is paid for by Medicaid are less likely to receive a circumcision. The lack of reimbursement for circumcision may act as an additional deterrent to circumcision among low-income non-Hispanic families. This finding is consistent with evidence from Great Britain where low rates are attributed to the lack of coverage by the British National Health Service [7].

Personal preferences and ideas regarding circumcision vary among family members, cultural and ethnic populations, and religious groups. Differences are more obvious in a multicultural conglomerate such as the USA. Alder et al. reported higher circumcision rates in affluent sectors of the population [8]. The same study suggested that many lower-income families were less able to afford the procedure especially if their insurance carriers did not cover routine circumcision. It was also found that the level of education attained by the patient's mother plays a role in the circumcision rate. Boys whose mother did not complete high school were circumcised at a lower rate than those whose mothers had secured a high school diploma or a more advanced degree [8].

Being circumcised appears to be a significant predictor for a man who would have a child circumcised, and may be perceived as good parenting within certain social groups. Other social motives include hygiene and aesthetics. Teasing by peers or rejection by sexual partners may be further incentive for circumcision.

Clinicians are uniquely positioned to educate males and parents that such ridicule is based on intolerance [9].

The cultural, religious, and ethnic profiles of the USA are changing dramatically due to the increasing influx of immigrants, and this trend is expected to continue over the coming years. The strong preference expressed by immigrants to retain traditional attitudes toward and practices of nontherapeutic male circumcision dictates that today's health professional be sensitive to a variety of cultural traditions when informing patients about risks and benefits of circumcision. In the absence of medical recommendations immigrants prefer to follow the traditions of their culture of origin [10].

In countries where circumcision is not routinely performed, even the act of foreskin retraction is discouraged. Foreskin preserving operations for hypospadias and phimosis have been established. In Italy, for example, where circumcision is not routinely practiced, ritual circumcision is not allowed in public hospitals under the free health-care system. There is even a rule not to retract the foreskin before the age of 5 years. In Brazil, the concept of normality includes an uncircumcised penis, with the foreskin covering the glans, at least partially. It is common to have parents demanding a prepuce-sparing procedure to correct pathologic phimosis and congenital hypospadias. In the Brazilian society, circumcision for cultural reasons seems to be done more frequently in individuals with higher incomes. In poorer populations, circumcision is almost exclusively performed for preputial pathology [11].

The age of Internet knowledge is also a cultural phenomenon, affecting practices regarding circumcision. Many parents, and sadly many practitioners, will be misinformed by what they read on the Internet. Often the primary care provider represents the only opportunity to calmly and methodically review the pros and cons of circumcision so that the parents can make an informed decision that is right for them and their child.

In most cases, the requests for circumcision will not be modified based on medical recommendations. Therefore, providers should at least be culturally sensitive, allowing an open dialogue. For example, Latin American patients will likely request a circumcision because someone else recommended it. This would be an opportunity to explain the evidence information which might justify or discourage the procedure. Muslim and Jews will request the procedure based on historical customs and religious beliefs and it is our responsibility, as medical professionals, to first understand those traditions and be sensitive to these persuasions. Lastly, as medical professionals, we must be ready to defer an elective circumcision where contraindications exist despite pressures related to religious or cultural expectations, as, for example, in the setting of hypospadias.

The chapters that follow will aid the medical professional in understanding the attitudes and expectations of various cultures on the matter of circumcision.

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Jewish Ritual Circumcision

23

David A. Bolnick and Kenneth E. Katz

Editors' Note

This chapter is comprised of two submissions: "The Bris" and "The Operating Room Bris."

Circumcision is central to Judaism. With over 90% adherence it may be the most steadfastly practiced tradition within the Jewish faith. Unlike many religions that practice circumcision, Judaism has strict guidelines for who, when, and how to carry out the ritual. This sometimes leads to an unintentional schism between the Jewish patient and a naïve medical provider. This chapter is presented here to close that gap.

Jewish ritual circumcision is often performed by lay practitioners who are specifically trained in the art of circumcision – the *mohel*. It is the responsibility of the mohel to engage the medical profession where needed; mostly where a specific condition could contraindicate a circumcision or when there are complications. It is important that medical professionals, especially urologists, work openly and cooperatively with the mohel for the benefit of the Jewish community.

The Bris

David A. Bolnick, Ph.D.

Bris is a common, if not quaint, reference to the ceremony of Jewish ritual circumcision. For the Jewish people, the *bris* of a son is a heartfelt and joyous occasion; as it is written, "May your mother and father rejoice, and may the one who bore you thrill with joy [1]." *Bris*, short for *bris milah*,[1] literally means *covenant of circumcision*. The Torah, or Hebrew Bible, tells of God saying to Abraham: "I will sustain My covenant between Me and you, and between your descendants after you … [as a sign] every male among you shall be circumcised [2]." And so it has been that the descendants of Abraham, both Jews and Muslims, have embraced this obligation down through the millennia. In fact, at greater than 90% adherence, circumcision may be the only custom purposefully observed by Jews of every nation and every affiliation (e.g., Orthodox, Conservative, Reform, etc., and Jews with no other connection to the faith).

If you ask Jewish parents why they want to circumcise their sons the answer is most often – because that's what we've done for 4,000 years… My father was circumcised, his father was circumcised, and his father… all the way back to

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[1] Hebrew, Variant forms from Hebrew include bris, brit, berit, and b'rit (i.e., b´rĭs, b´rēt, b´rĭt; mē´lah, and mēla).

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Abraham and Isaac. Occasionally, you find young parents who are on the fence, that is, of course, until the grandparents find out. When it comes to the overall Jewish community, whether in the first century or in the twenty-first century, not to circumcise is not an option.

So strong is this loyalty that the seventeenth-century philosopher, Benedictus (Baruch) Spinoza, no fan of circumcision, stated that "The sign of circumcision is, as I think, so important, that I could persuade myself that it alone would preserve the [Jewish] nation forever [3]."

Throughout their history, the Jewish people have been tormented for their unwavering fidelity to circumcision [4]. There is a story of this fractious inquisitor who asked the first-century BCE[2] sage, Rabbi Akiva – If God had intended man to be circumcised, would he not be born circumcised? Rabbi Akiva answered by holding in one hand raw grain, as God had given it, and in the other hand baked goods, as man had perfected it [5]. Thus, Jews view circumcision as a perfecting of the human form – as is alluded in the biblical verse "Walk before me and be perfect [6]."

That said, it is important to understand that circumcision does not make a male child Jewish; he is Jewish if his mother is Jewish (either by heritage or that she had converted prior to his birth).[3] In the case of conversion to Judaism, the male is circumcised as a first step of conversion.[4] Infant conversion is often seen where the mother has not completed the process of conversion or where a non-Jewish child is adopted by Jewish parents. Universal Jewish practice requires that all males are circumcised and only sets aside the requirement where an individual's physical condition puts him at risk.

Who, When, and Where

Every Jewish father is obligated to circumcise his own sons [7], just as Abraham circumcised his own sons, Ishmael and Isaac [8]. However, most fathers are not trained to circumcise. So a *mohel*[5] is invited to serve as a stand-in for the father. A *mohel* is an observant Jew who has studied the texts and laws related to *bris milah* and who has trained in the techniques of circumcision. The standards for the *mohel* are high since most Jewish communities are small and word of any issues is quickly spread. That said, mohelim are no different than any other professional and there are great ones, awful ones, and everything in between; where the majority of us practice.

Ideally, a *bris* should take place on the eighth day.[6] God said to Abraham: "…at the age of eight days every male among you shall be circumcised… [2]"; and to Moses: "…on the eighth day, the flesh of his foreskin shall be circumcised… [9]." Therefore, we may not perform a *bris* before the eighth day and only certain circumstances justify its delay beyond the eighth day, for example, a child that is not well may not be circumcised. "It is possible to circumcise later, but it is not possible to restore life [7, 10]." Jewish law and therefore *mohelim* take this very seriously. Even a relatively minor issue, with low incidence of pathology, like a newborn rash in the groin would be grounds to postpone a bris, whereas many physicians would not consider it a contraindication.[7] See Chap. 8 for

[2] Before the Common Era or Before the Christian Era.

[3] While the standard worldwide is to recognize the Jewish status by whether or not the mother is Jewish, many in the Reform movement in the USA recognize a baby as potentially being Jewish if the father is Jewish (adopted by the Central Conference of American Rabbis in 1983).

[4] With the exception of an infant, most people spend a year or so studying before they finally commit to the conversion, so the circumcision would be postponed until that time.

[5] Jewish ritual circumciser. Pronunciations: *mohel* (mō`hell), *moyl* (moyl), *moel* (mō-el); *mohelim* (mō`hell·ēm) is plural.

[6] The eighth day is counted with the first day being the day of birth. Since the Jewish calendar starts at sunset, a baby born on Monday day will have his bris the following Monday. If the baby is born on Monday night, the bris is held the following Tuesday. The *bris* may only take place during daylight.

[7] There are some mohelim that will not do a *bris* if the bilirubin level is over 10 mg/dL (171 μmol/L). Most *mohelim* will do a *bris* if the bilirubin level does not exceed 18 mg/dL (308 μmol/L) and is dropping (i.e., this and other indications are that it is physiologic jaundice).

[8] This would require pre-approval from the hospital administration.

common health conditions that can delay a circumcision or *bris*.

A *bris* usually takes place in a home or synagogue (and sometimes in a larger venue like a meeting hall). Unless there are extenuating circumstances, a newborn *bris* should not take place in the hospital. An exception may be made where a parent or significant relative is hospitalized at the time.[8] Where a *bris* is delayed beyond the newborn period (6–12 weeks depending on the practitioner), the *bris* should take place in a clinical setting or in the operating room (see section "Bris in the operating room").

Note to Urologists

Since it is important that, where possible, *bris milah* take place on the eighth day, it is helpful to schedule an appointment as soon as possible if the *mohel*/practitioner requests a urology consult before proceeding with the bris. Often the consult requires a same day or next day appointment.

The Bris Ceremony

For most parents, a *bris* is a joyous life cycle to share with loved ones and community. All are welcome: male, female, Jew, non-Jew, young, old – everybody.[9] It is not uncommon to find that relatives have flown in from all over the country or the world to be at the bris. A *bris* does not require a specific number of people other than the baby and a *mohel*, but in general most families congregate 20–60 guests. Sometimes, for families who are very active in a community, a *bris* of 100–400 or more guests can be expected.

Bris milah is possibly the oldest ritual in Judaism. Thus, it is rich with many beautiful customs from all around the world. Every *mohel*, every community, and every family have their own special way of celebrating a *bris*. Here is this author's way in which family and communal customs are incorporated:

Following a brief pre-circumcision exam (see Chap. 8), the baby is held in the back of the room, while family, friends, and community are gathered. The ceremony begins with a friend or family member lighting a candle. This represents a new spark of life entering the community. This is followed by one or two loved ones bringing the baby to be circumcised. As the baby enters the room, everyone stands and joyfully greets him with the words *baruch hah-bah*![10] The baby is then brought to the Throne of Elijah; a chair set aside for the prophet Elijah (also known as the Angel of the Covenant). While a loved one holds the baby on the Throne of Elijah, the mohel recites a blessing that greets Elijah. The father then takes his son from the Throne of Elijah and places him upon a pillow for his *bris*. The father must publicly appoint the *mohel* to serve in his place [7] else the father must do the circumcision himself. Then the author tells of the Hasidic custom where during a *bris* everyone closes their eyes and prays for the well-being of the child or someone in need – and sing a well-known song (*Eliyahu HaNavi*) to calm the baby and parents; mostly the latter. While a family member or highly respected guest, called the *sandek*, holds the baby on the pillow, the mohel recites the blessing of circumcision and performs the circumcision (Fig. 23.1). The baby makes his blessing, in his own way, and the father recites the blessing of the covenant. The baby is bandaged, diapered, and then handed to his mother or a loved one to hold for his naming. A rabbi, the *mohel*, or an honored guest recites the naming blessing giving the child his Jewish name. Following the naming, blessings of a speedy recovery for the baby and a continued recovery for the mother are said. Since the Talmud states that the Jews accepted *bris milah* with joy, it is celebrated with joy [11] – the congregants may sing and dance, and, most notably, partake of a festive meal [7].

9 Some parents are concerned that a bris may be inappropriate for children. The fact of the matter is, children do just fine (usually better than those parents). As with most of life's trials, being forthright, honest, and upbeat will make the bris a joyous occasion for our children as well.

10 Blessed be he who enters (Hebrew). In *baruch* (ba·rooch) the 'ch' is pronounced as in the name Bach.

Fig. 23.1 Traditional bris scene. An honored guest, the sendek, holds the baby on a pillow. I have the mother occupy herself and the baby with a sucrose (~23%) saturated gauze. Since the pre-exam and probing the prepucial space takes place in a separate room, the circumcision itself takes less than 30 s, including bandaging and diapering

Some Details About Bris Milah

For the Jewish people, *bris milah* is the fulfillment of a commandment of God; thus, only a Jew may perform (or initiate or complete[11]) *bris milah* [7]. *Bris milah* itself has two requirements: excising the foreskin that covers the corona[12] and drawing blood of the covenant (*dom bris*). The rabbis have established that anyone may be employed to remove the foreskin (Jew, non-Jew, male, female), but only a Jew can have the proper intention to fulfill the requirement of *dom bris*. *That is, Bris milah* is not done for reasons of health, hygiene, or cosmesis as is a medical circumcision. If a circumcision is done as a medical procedure or without the proper intention to perform the commandment, then a corrective procedure should be performed. In this case, *dom bris* was not fulfilled and at some point we perform a corrective *dom bris* (the drawing of a drop of blood big enough to see from the site of the circumcision – often from the corona for convenience). This is also done for those already circumcised who are converting to Judaism.

Before entering Canaan,[13] the profit Joshua circumcised the Jewish people as commanded and buried the foreskins in earth. Thus, once excised, we place the foreskin in a vessel containing earth [7, 12]. This author uses soil from Jerusalem as a symbolic connection with our ancestors. A beautiful and ancient custom is to bury the foreskin under the roots of a young tree, then in good time harvest branches from the tree to decorate the child's marriage canopy. This gives the groom a sense of where he started, his *bris*, where he is now at, his marriage, and what his future holds for him.

[11] Where a *bris* is part of a more elaborate procedure in the operating room, it is appropriate that the *mohel* make the blessings and first cut (or draw the first blood) and then the surgeon completes the process (see section "Bris in the operating room"). Some mohelim like to finish the process by making the last, final cut.

[12] The foreskin here refers to the outer layer and the mucous membrane layer combined.

[13] In the Hebrew Bible, Canaan is the land promised to Abraham and the descendents of Isaac and extends from Lebanon southward and across into part of modern Egypt and eastward to the Jordan River Valley.

Ritual Circumcision Techniques

The techniques used for ritual circumcision differ from those most often used in the medical profession. Whereas most circumcisions in the USA are performed with the Gomco clamp or Plastibell, most Jewish ritual circumcisions are either performed with a shield[14] (Fig. 23.2) or a shield-like clamp called the Mogen clamp (Fig. 23.3-F; see Chap. 9). The *mogen* techniques are most notably known for their quickness and relative safety. A very few *mohelim* use only an *izmel* – a knife used for ritual circumcision (Fig. 23.3-G). Most rabbis find all three techniques (*izmel* only, *mogen*, and Mogen clamp) acceptable. Some, more traditional rabbis have reservations about the Mogen clamp since it was originally marketed as a bloodless device which would then preclude *dom bris*. In this author's 20-plus years of experience with the Mogen clamp, there is always at least a drop or

[14] Mogen (מגן) is shield in Hebrew and the common name for this device.

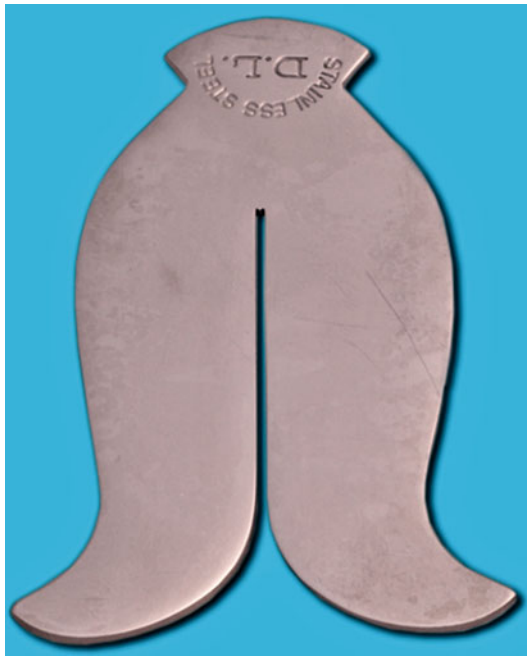

Fig. 23.2 Modern *Mogen* circumcision shield (From D. Bolnick collection. Manufactured by Dov Lublinsky & Son). The mogen (shield) is stainless steel with a 1 mm slit. A dab of ointment is placed at the aperture to allow it to easily slide onto the extended foreskin

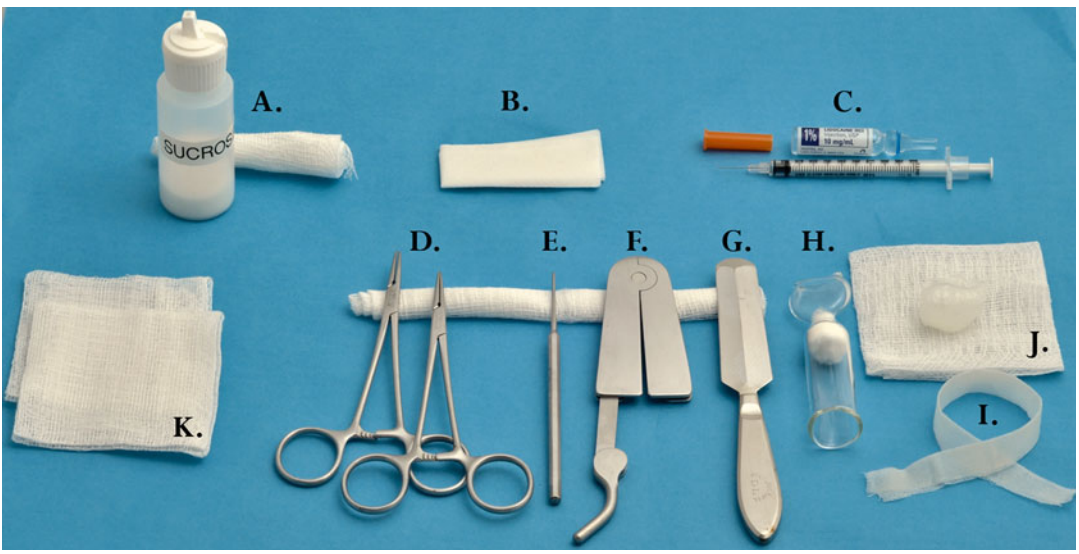

Fig. 23.3 Mogen clamp setup for ritual circumcision. *A*. Sucrose (2 × 3.5g sugar packets in about 1 oz of warm water) solution and rolled gauze for baby to suck on. *B*. Antiseptic towelette to clean groin. *C*. 1% Lidocaine HCl (plain, preservative free, PF) and 1 mL, 30 ga, insulin syringe for dorsal penile nerve block. *D*. Two mosquito hemostats (only one is used). *E*. Stainless-steel probe. *F*. Mogen clamp, *G*. *Izmel* (ritual double edged knife). *H*. Glass pipette for *metzitzah*. *I*. Vaseline gauze (folded to 0.5 × 8 in.). *J*. 3 × 3″ gauze with mound of vitamin A&D ointment (non-perfumed). *K*. Extra 3 × 3″ gauze for cleanup, and a disposable diaper and wipes – just in case (not shown)

two of blood so the requirement of *dom bris* is always met. The entire circumcision (including bandaging and diapering) should take less than a minute. Although no *mohel* is faulted for taking longer than a minute, the crowd often gets restless after 30 s and over a minute and they will assume something is wrong.

Every *mohel* has his style and approach. Here is one example of the ritual. First, the baby must have not fed for at least 1 h. Before the *bris*, in a private room, the child is examined to determine that he is in good health, has no active rashes in the groin or on the genitalia, and has no genital anomaly that requires postponement of the circumcision. At this point the genital area is cleansed with an antimicrobial solution,[15] a dorsal penile nerve block (DPNB; if the parents have opted for that) is administered, and then, with a lubricated probe (Fig. 23.3-E), any adhesions within the prepucial space are released (see Chap. 4 for more details). It is also this author's practice to mark the level of the coronal sulcus and 12 o'clock position with a surgical marking pen to allow for a quicker, more predictable circumcision. The circumcision is accomplished by grabbing the foreskin at 12 o'clock with a mosquito hemostat and pulling to extend it so the coronal marking is distal to the glans, then sliding the aperture of the *mogen (or Mogen clamp) onto* the extended foreskin. With the glans safely shielded by the *mogen*, the foreskin is excised. Once the glans is laid bare, suction is applied to the entire penis with a pipette (Fig. 23.3-H) or with gauze to perform the custom of *metzitzah* (sucking of the wound). The origin of this ancient practice is unclear. It was considered essential for the well-being of the baby and is probably akin to sucking on any open wound, which seems to be an innate behavior. Originally, *metzitzah* was done by mouth, but mores and medical sensitivities given cases of HSV transmission to the immune-susceptible newborn dictate the use of a pipette or a modified gauze technique; that is, metzitzah should not be performed by mouth [13]. The circumcised penis is then bandaged and the baby is diapered and swaddled.

A more traditional approach, practiced by some mohelim (often within Hasidic communities in the USA and by the Orthodox Jews throughout Israel), involves the excision of the outer prepucial layer to the level of the coronal sulcus followed by splitting the remaining inner layer partway up along the dorsum (sometimes with a fingernail) and then rolling back the inner layer to behind the coronal sulcus. This technique dates back to antiquity and is discussed in the Talmud (see history of circumcision in Chap. 21).

Pain Control for Bris Milah

For the most part, and for most newborn babies, the 30 s it takes to perform ritual circumcision, including bandaging and diapering, is very well tolerated; babies cry according to their personality and most are easily and quickly consoled. Recent medical studies, however, have shown that babies do respond to the pain of circumcision in physiological ways associated with stress in addition to crying. It has been shown that common techniques of pain control can reduce these physiological changes. Thus, in 1999 the American Academy of Pediatrics (AAP) issued a policy statement that analgesia has been found to be safe and effective in reducing the pain associated with circumcision, and should be provided if the procedure is performed. Most rabbis, including Orthodox rabbis[16] though not all, support pain control for *bris milah*.[17]

[15] To avoid the cloths staining issues associated with iodine solutions, I prefer a clear antimicrobial solution like chlorhexidine.

[16] For example, Rabbi Moshe D. Tendler, Professor of Jewish Medical Ethics, Yeshiva University, whose opinions are highly regarded in this area.

[17] To deliver a nearly imperceptible DPNB, use plain Lidocaine from an ampule (without preservative). The preservative is more viscous and produces more pain when injected. Also use a 1 cc insulin syringe with an ultrafine, 0.5 in., 30 ga needle. Standard sites of 10 and 2 o'clock are injected by pressing downward (proximally) about 1 cm at the base of the penis so the needle can be inserted close to the Buck's fascia below the level of the peno-suprapubic junction. This has two advantages. First, it is a relatively insensitive area and, second, it does not lead to any penile distortion. Always check for blood return before you inject.

Last but not least, to keep the baby calm, starting at the pre-exam and throughout the entire event, the baby can suck on a rolled gauze that is continually soaked with sugar water.[18] In fact, most mothers do better if they are actively involved with the *bris*, so they can be put in charge of delivering the sugar water (see Fig. 23.1).

Bris and Circumcision Jokes

In North America, and likely elsewhere, the bris or circumcision joke is part-and-parcel of the bris experience. It is not a formal part of the ceremony and the mohel or rabbi should not be telling jokes but there is no escaping the family funnyman or the community comic. To understand this phenomenon, consider the following. What do you get when you mix a subject like circumcision, with all its connotations, and a people who have produced the overwhelming majority of twentieth-century comics [14]? You get *bris* jokes and lots of them – good, bad, smutty, and otherwise. I cannot tell you how many times a person has asked me, did you hear the one about… To which I politely respond, not since the last *bris*, do tell… It is quite entertaining, sometimes hysterical, to hear the same joke told over and over and over again, each time by a different person and each time with a little bit of its own twist.

Just as it is not appropriate for a mohel or a rabbi to tell jokes at a bris, it would be in poor taste to include any here, unless, that is, it is for the sake of education. So for the sake of education I will include my favorite clean joke amongst the hundreds I have heard:

> It happened in the time of the samurai. The emperor's head samurai died suddenly leaving his position vacant. So the emperor sent forth a message to all the good people of the land announcing the open position of Head Samurai. The day arrived and only three people showed up: a Chinese samurai, a Japanese samurai, and a Jewish samurai. The emperor calls in the Chinese samurai. "Impress me with your skills…" The Chinese samurai opens a matchbox and out flies a fruit fly. The sword flies – WHOO-OOSH. The fly drops to the ground in two pieces! The emperor says, "Ah – that is very impressive!" Then the emperor calls for the Japanese samurai. "Impress me with your skills…" The Japanese samurai opens a matchbox and out flies a fruit fly. The sword flies – WHOO-OOSH, WOOSH. The fly drops to the ground in four pieces! The emperor says, "Ahhh – that is very, very impressive!" Then the emperor calls for the Jewish samurai. "Impress me with your skills…" So the Jewish samurai opens his matchbox and out flies a fruit fly. The sword flies – WHOO-OO-ISH and the Jewish samurai turns to the emperor with a countenance of pride – with the fly still buzzing around the room. The emperor is furious, "You have wasted my time – why is the fly not dead?" "Ahhhh – says the Jewish samurai, circumcision is not meant to kill."

The Operating Room Bris

Kenneth E. Katz, M.D.

In general, a *bris* or Jewish ritual circumcision should take place on the child's eighth day of life. But there are various reasons for waiting until the child is older. So as not to risk any harm to the infant, Jewish law demands that a circumcision must be postponed until an ill baby is healthy. Jews are so cautious that *mohelim,* ritual circumcisers, sometimes wait to do a bris well beyond when a physician may consider it a safe procedure. For example, the Talmud (the written compilation of "Jewish oral law") specifies something as innocuous as jaundice as a reason for postponing a *bris*. Other common reasons for postponing a *bris* include prematurity, generalized illness, etc.

Congenital penile anomalies such as hypospadias, chordee, scrotal webbing, and the like also require delay of newborn circumcision until the child is old enough – generally 6 months of age or older – to undergo surgical repair (see Chap. 5).

[18] You can either make it yourself; mix two packets of sugar (7 g total) with 30 mL of warm tap water, or you can purchase Sweet-Ease®.

Another reason for a ritual circumcision beyond the newborn age is conversion to Judaism, a required step for all males. If he had already been circumcised as a newborn, a ceremonial *bris* called "hatafat dam bris" is done by taking a drop of blood from the site of the previous circumcision. But if a boy or adult male convert to Judaism has never been circumcised, then a full ritual circumcision must be performed.

Likewise, if a non-Jewish infant is adopted by a Jewish family, the family may choose to have him convert to Judaism, and like any other male convert, would then require ritual circumcision. His parents have that option until he turns 13, the age of majority in the Jewish religion. A similar situation occurs if a Jewish mother uses a non-Jewish "surrogate mother" to carry her fetus. That is, Jewish law defines a baby as Jewish if he is born to a Jewish mother from her womb. By this definition, in this case, the baby would require conversion to be considered Jewish.

If a *bris* needs to be postponed beyond one to two months of age, many *mohelim* consider it more compassionate and medically safer to have the procedure performed under general anesthesia. In addition to an increased awareness and pain, there is an increasing risk of bleeding as the baby gets older. Although there are some *mohelim* who specialize in older children and adult circumcision, most are only trained in newborn circumcision, so they utilize the surgical skills of a pediatric urologist to perform the procedure. If the patient is full grown, then the circumcision should be done by an adult urologist in either a clinical setting under local anesthesia, or if requested, in an operating room under general anesthesia.

In either case, the surgeon is not necessarily Jewish (a requirement), and is generally not trained in the ritual aspects of a *bris* (another requirement). To overcome this obstacle, a urologist and a mohel can work together in the operating room to provide these patients whose circumcision were delayed, and their families both the surgical and ritual aspects a *bris* requires and deserves. As a *bris* ceremony is generally a festive event for family and friends, a novel approach to allow close relatives into the operating room to witness the ritual aspects of the ceremony should be followed.

Obviously, it can be challenging to perform all the rituals of a traditional *bris* ceremony in an operating room setting where a circumcision, often in conjunction with a genitoplasty, is being done under general anesthesia. Yet, with a little staff cooperation and understanding, this has been carried out in many operating rooms across the nation and throughout the world. Here I present a simple paradigm that has proven very successful in both the Denver and Seattle Children's Hospitals.

After the general anesthesia induction, up to six close family members can be invited into the operating room for the ceremonial portion of the bris. This may include both parents, close family, and sometimes two additional people, Jewish witnesses, in the case of conversion. In most cases it is just the parents – but there have been up to ten people, not including adjunct OR staff who came just for the celebration. The family members are dressed in disposable operating room suits and wear surgical masks. Videotaping or photography of the ritual portion is certainly permitted. The *mohel* says some words of welcome and traditional blessings are recited. An operating room stool maybe decorated with an embroidered pillow specifying it as the Chair of Elijah the Prophet. The father appoints the *mohel* as his agent. Then the mohel says the pre-bris blessing and, wearing sterile gloves, makes an initial incision into the foreskin (Fig. 23.4). This "first cut" is required to be done by the mohel or father according to Jewish law. At this time, or after recovery, a traditional *kiddish* cup is filled with kosher wine and the prayer of sanctification is said followed by the child being given his Jewish name. The traditional song "Simon Tov" and others are sung by all in attendance (Fig. 23.5). The family is then ushered back to the waiting area while the surgeon completes the procedure.

This meets all Jewish requirements and involves the family in a positive way. The ritual portion is done as expeditiously as possible with the understanding not to unnecessarily prolong the child's time under anesthesia. With this joint mohel/urologist approach, we are able to serve families by accomplishing their religious goals while performing a safe and painless surgical procedure.

Fig. 23.4 Mohel making initial cut. The mohel makes the initial cut (drawing of blood) and then the urology surgeon (editor, Dr. Koyle on right) completes the procedure. The parents are in the OR for the initial blessings, cut, and celebrating (not seen here)

Fig. 23.5 Celebrating a bris in the OR. Once the initial cut is made and the requisite blessings said, those in the OR celebrate with song

Summary

For Jews, *bris milah* is a connection with their people and history and maybe as close to spirituality as many will ever experience. This single religious act has it all like no other – drama, suspense, pathos, adventure, mystery, travel, food, humor, culture, religion, etc. But *Bris milah* is also a physical act, an altering of the body, and at times requires the cooperation between religious officiates and medical practitioners. Therefore, it is important that any medical practitioner that may directly or indirectly be involved with circumcision be familiar with the Jewish sensitivities of *bris milah*.[19]

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[19] This could apply to family physicians, pediatricians, obstetricians, midwives, ER/ED/urgent care physicians, urologists, and any other health-care workers who support these areas.

Islam and Circumcision

24

Mohamed S. El-Sheemy and Ali M. Ziada

Editors' Note

As with any cultural or religious tradition, the medical practitioner must be mindful of sensitivities and requirements of that community. Though universal throughout Islam, the practice of circumcision is in many ways a personal preference and not specified by the religion – so customs and expectations may vary from family to family. Thus, the practitioner should seek to understand the requirement and expectations of each patient (family).

Introduction

Circumcision is a universal practice that is greatly influenced by cultural and religious traditions. It is the most frequent operation on males not only in Islamic countries, but also other parts of the world [1, 2]. For example, in the USA more than one million male infants are circumcised each year [3]. It is estimated that one-third of the global male population is circumcised [4, 5].

The origin of circumcision is shrouded in antiquity; 6,000-year-old mummies have been reported to show evidence of circumcision [6]. Documentary evidence shows the first references to circumcision in Egypt no later than 2,300 BC (Artworks showing the rite being performed on a standing adult male adorn tombs of this period). Moreover, the hieroglyphic sign for "penis" in the Egyptian Book *of the Dead* is a circumcised organ [7] (see Chap. 21 for more details on the history of circumcision).

Islamic Rules for Male Circumcision

The sources of the Islamic law are, in order of importance, *Qur'an*, *Sunnah*, Consensus, and *Ijtihâd* (see below). So Muslims are divided into different schools of thought, some of which are distinctive enough to be called sects. These differences have led to the emergence of six schools of law with a spectrum of opinions.

Qur'an	The holy book of Islam or Muslim scripture – the highest and most authentic authority in Islam
Sunnah	The actions and *hadîth* (utterances) of the Prophet Muhammad (peace be upon him – pbuh) passed on through tradition
Consensus	Consensus of the scholars or of the entire community (a point of controversy)
Ijtihâd	The individual efforts of scholars to attain understanding of the *Sharîah* (i.e., the Divine Law) through various tools

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Although circumcision is not mentioned in the *Qur'an*, Muslims everywhere regard it as essential. This practice is attributed to the Prophet of Islam. For this reason, circumcision acquired the status of *Sunnah* (Prophet's tradition), although the tradition is attributed to the Prophet Abraham. Allah ordered Prophet Muhammad (pbuh) to follow the religion of Abraham (pbuh). When Allah says "Then we inspired you: 'Follow the religion of your father Abraham, the upright in Faith.' (*Qur'an* 16:123)"; and, thus, part of the religion of Abraham is circumcision. The Prophet Muhammad said: "The Prophet Abraham circumcised himself when he was eighty years old" related by Bukhari [8] and Muslim [9]. Male circumcision is part of the *fitrah* (in Arabic), or the innate disposition and natural character and instinct of the human creation. Prophet Muhammad (pbuh) said: "Five are the acts quite akin to *fitrah*: Circumcision, clipping or shaving the pubes, clipping of the nails, plucking or shaving the hair under the armpits, and clipping (or shaving) the moustache." Reported in Bukhari [10] and Muslim [11]. The act of circumcision is referred to in Arabic as *Taharah* which translates to cleanliness, virtue, or purity. Furthermore, Muslim scholars argue that the performance of circumcision as recommended in Islam is medically beneficial and reflects the wisdom of the Islamic statements.

Among the different schools of Islamic law, some consider male circumcision obligatory while the majority recommends it. Despite differences of opinion, none consider it a precondition of being a Muslim. As a result, it is not a prerequisite for any person converting to Islam. Similarly, a person born of Muslim parents, if not circumcised, may remain a Muslim and will not be considered non-Muslim only because he is uncircumcised.

The Age for Circumcision

Islamic scholars are not unanimous about the age at which circumcision should be carried out. The Prophet Muhammad recommended performing circumcision at an early age. During the time of the Prophet Muhammad (pbuh) circumcision was done for boys at the time of their Aqiqah (traditional celebration for the birth of a child which involves the sacrifice of an animal in thanks to Allah). The Prophet (pbuh) performed the Aqiqah of al-Hasan and al-Hussein (the prophet's grandsons) and circumcised them on the seventh day as related in al-Bayhaqi and Tabarani. Other hadith mention it being done later. The details here are not important but it goes without saying that this minor operation is easier on a baby than it is on an older boy. If it is essential, circumcision can be delayed for medical reasons. It is considered sensible to perform circumcision before the age of puberty where boys start praying regularly.

The prevalent practice in modern-day Egypt as well as the majority of the Muslim world is that children born in hospitals are circumcised before discharge. In rural areas, the practice is delayed to a few weeks or even up to the age of 5–7 years. If circumcision would pose any risk to health, it may be delayed until the person is fitter and more able to cope with it. Some children born with hypospadias in rural areas are interpreted by their families as being circumcised by an angel at birth. These children are not subjected to traditional circumcisers due to that superstition or belief.

Prevalence of Male Circumcision

Sunnah represents an accepted basis for the derivation of religious law; it is not surprising that the overwhelming majority of Muslims respect this teaching and have their male offspring circumcised.

The classification of male circumcision prevalence for 118 developing countries was studied by multivariate linear regression to describe associations between male circumcision and cervical cancer incidence, and between male circumcision and HIV prevalence. Among these, 53 countries, containing 700 million males, were categorized as having a high (>80%) male circumcision prevalence; 14 countries, containing 135 million males, were categorized as having an intermediate (20–80%) male circumcision

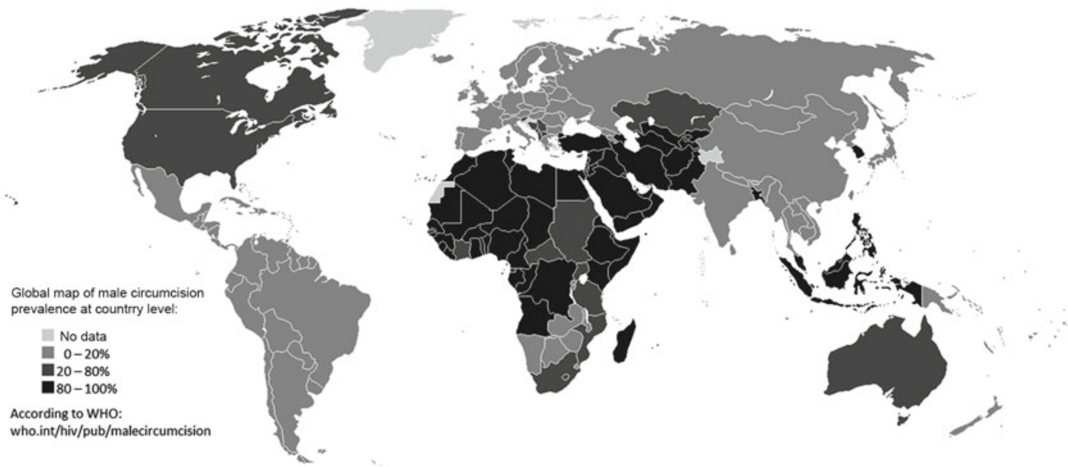

Fig. 24.1 Global map of male circumcision prevalence at country level, as of December 2006 (Image is provided courtesy of Emifaro)

prevalence; and 51 countries, containing 1.6 billion males, were categorized as having a low (<20%) male circumcision prevalence. Male circumcision prevalence had a distinct geographical pattern. Thirteen of 14 (93%) developing countries in North Africa and the Middle East had high male circumcision prevalence. Twenty-eight of 45 (62%) sub-Saharan African countries had high male circumcision prevalence. Eight of 27 (30%) Southeast Asian and Pacific Island countries had high male circumcision prevalence, and most circumcised males resided in Indonesia, Pakistan, Bangladesh, or the Philippines. Only 4 of 18 (22%) developing countries in Europe and Central Asia had high male circumcision prevalence, and all 18 developing countries in Latin American and the Caribbean region had low circumcision prevalence [12].

In the above-mentioned study of prevalence, male circumcision was strongly associated with religious variables. A greater percent of the population being Muslim was strongly associated with more male circumcision prevalence and, conversely, a greater percentage of the population being Christian was strongly associated with less male circumcision. In 49 of 53 countries with high male circumcision prevalence, the mean percentage of the population Muslim was 69% and the mean percentage of the population Christian was 16%.

Figures 24.1 and 24.2 outline the world Muslim population (Pew forum on religion and public life 2009), overlapping with the WHO male circumcision worldwide incidence.

Regional Differences in Circumcision

Circumcision practices are different in developed and developing countries. In the developed world, circumcision is performed mainly by pediatricians, family practitioners, and obstetricians [13]. In developing societies, circumcision was traditionally performed by the local barber/traditional circumciser. Nowadays, many parents prefer to hire trained nurses or doctors or bring the boys to modern clinics and hospitals. Traditional circumcisers are still available in developing countries. They are nonmedical people, who are usually males. They learn the procedure from their master who is also a traditional circumciser. Although they are becoming less common, they still exist in areas where medical doctors are not readily available [14].

In rural Turkey, mass circumcision is performed in 85% of cases by lay circumcisers and traditional drummers, with only 10% by health technicians and 5% by trained doctors. In the Gulf States, because they are affluent, 85% of circumcisions in Saudi Arabia, the United Arab

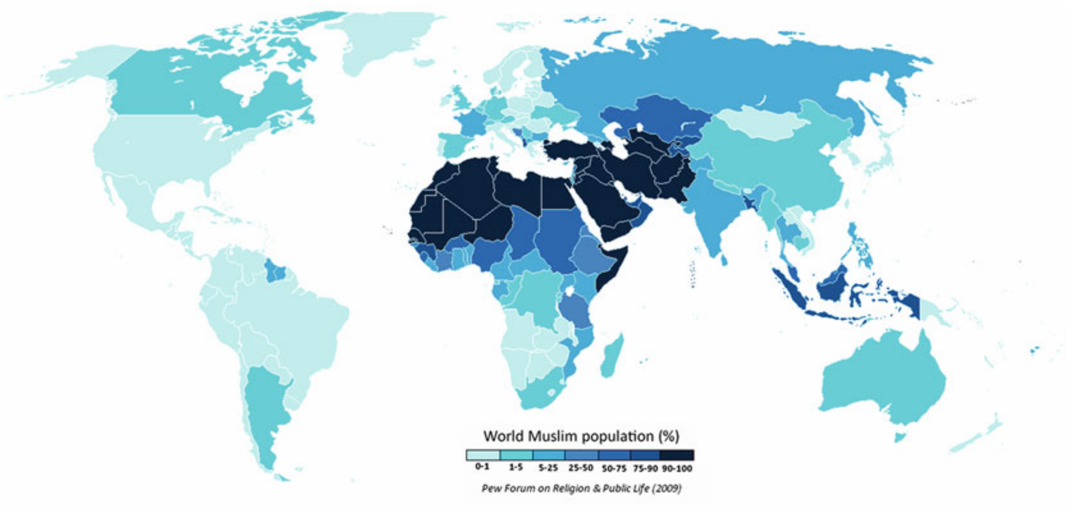

Fig. 24.2 Muslim population of the world map by percentage of each country, according to the Pew Forum 2009 report on world Muslim populations (Image is provide courtesy of HaireDunya)

Emirates, and Iran are performed by doctors or health technicians, and only 15% by traditional circumcisers [15].

In Pakistan, 90–95% of circumcisions are performed by traditional circumcisers, village barbers, paramedical theatre staff and technicians, and only 5–10% have access to a proper medical facility where a doctor performs the circumcision under strict aseptic technique. During the procedure, the child is held in a seated position with both legs apart. A probe, a cutter made of wood, and a razor are used for excising the prepuce. The operation is performed with no anesthesia, no sutures, and with unsterilized instruments. Ashes of burnt wood are used to establish hemostasis. To alleviate the trauma of pain, the occasion is converted into a celebration where relatives and guests are invited, and the child wears festive garments soaked in perfume. Female members sing cultural songs and at the end of the ceremony the guests are served with meals and sweets [16].

These festivals vary according to region and culture in different Muslim countries. The circumcision ceremony has traditionally been common in Turkey for centuries [17]. In this ceremony, there is music and entertainment. Circumcised males, lying down in a specially decorated bed, wear a special pelerine with bright colors, a hat resembling the crown of a king, and get presents from the visitors. This ceremony is an important social event for the family as well.

In Sudan, each boy has to be circumcised before joining school at the age of 8. Wealthier parents, who mostly live in the cities, have their sons' foreskins cut in a hospital right after birth. In the provinces outside of larger cities, boys get circumcised when they are between 4 and 6 years of age. All circumcisions are performed by an old and experienced man, the circumciser of the village. Some days later, the boy's circumcision is celebrated with all family members gathered, giving lots of presents to the boy. His father or an uncle takes the honor to hold the boy during the procedure and presents his bared genitalia to the circumciser. The boy's attention is then distracted by flute players and the other adults, while the circumciser does his work. First, the old man moves the little foreskin back and forth to make sure it easily slides over the previously oiled glans and the whole area is clean. Then he inserts a special straw (from a savannah grass) into the hose of the foreskin. The width of the straw must be about the same as the glans, and the circumciser can choose the right straw from a set that he brings along. With this straw, he pushes back the glans whilst the foreskin gets pulled forward over the straw as far as possible. The circumciser then ties a thin cord around the foreskin directly where the tip of the glans is. Now the elastic foreskin is firmly attached to the straw and the glans is marked by the cord. With one quick motion of his sharp knife, the circumciser cuts just in front of the cord through the foreskin and the straw. After the knot has been untied, the elastic outer foreskin retracts behind the glans and the inner layer would be pushed back manually so that the cuts are adapted, but not stitched. The circumciser then applies a powder made from crushed paracetamol (acetaminophen) tablets on the wound in order to stop bleeding and to release pain and then the freshly circumcised penis gets bandaged. The bandages are changed every day and new paracetamol powder is applied until the cut has healed. It is very important that the glans is absolutely uncovered by skin after the circumcision; otherwise the boy would not be regarded as circumcised and would need to be cut again. This is generally true for all Muslim circumcisions.

Circumcision is also a very important celebration in Morocco. When young boys are circumcised, they are dressed as kings and paraded around on a horse. Music is played, and friends bring gifts to mark the occasion. In Malaysia, the boy undergoes the operation at from 10 to 12 years of age. In any event, there is much festivity, with music, special foods, and many guests. While the actual event is taking place, one may hear praise of God, partly, as some observers have suggested, drowning out the boy's cries. But the procedure is relatively safe, and those who perform it are usually trained and experienced.

In modern Egypt, many traditional circumcision operations are carried out during the birthday celebration of the saint (this celebration is called the Mawlid). There, parents simply bring their little boys, from infancy up to ages 7 or 8, and the circumciser and usually an assistant hold the boy down while his foreskin is removed. Sometimes a man plays a flute or beats a drum. Afterward the child will be given sweets, like ice cream, and paraded off in honor and triumph as if he were a little prince. Whether the celebration is makeshift and humble or ceremonious and lavish, it is a significant moment in the life of a boy and his parents and siblings. Traditional circumcisions are steadily becoming rarer with many Egyptian families and other Muslim communities preferring to have their sons circumcised at birth or done later by a doctor under local anesthetic.

Female Circumcision

Female circumcision has been practiced around the world for ages, as a religious and social custom. It is carried out in 28 African countries and a few ethnic groups in Asia. It is difficult to ascertain whether female circumcision was originally an old African rite that reached Egypt or a Pharaonic custom that spread to other parts of Africa. Although Infibulation (the most extreme type of female circumcision) is commonly known as "pharaonic circumcision," there is little evidence it was practiced by ancient Egyptians[1] and its origin remains unclear.[2]

Whatever the origin of female circumcision, there is considerable evidence the practice existed long before Christianity and Islam.[3] In some countries like Egypt, female circumcision was practiced by Muslims and Christians. The practice is not known in most Muslim countries including Turkey and Arab peninsula. This leads to the conclusion that female circumcision is connected with cultural practices rather than Islam itself.

The ambiguity stems from a *hadith* by the Prophet (PBUH) which despite not authenticated by most scholars, instructed a practitioner of female circumcision, "*Take the minimum, and do not exceed it (i.e. do not encroach on the clitoris),*

[1] Seligman, C. G. 1913. "Aspects of the Hamitic Problem of the Anglo-Egyptian Sudan." Journal of the Royal Anthropologica Institute XLII: 639-46

[2] Hayes, Rose Oldfield. 1975. "Female Genital Mutilation: fertility control, women's roles, and the patrilineage in moder Sudan: a functional analysis." American Ethnologist 2/4: 617-33

[3] Stewart, Rosemary, "Female Circumcision: Implications for North American Nurses," in Journal of Psychosocial Nursing, vol. 35, no. 4, 1997, p. 35

for this would be protective of chastity by satisfying the wife's desire" (narrated by Ibn Majjah).[4] Islamic religious rulings can be deduced only on the basis of highly authentic text. Even this unauthentic *hadith*, used by some as evidence, forbids clitoridectomy.

The disadvantages and complications of female genital cutting "circumcision" will be discussed in further details by other authors.

Editors' Note

In the case of male circumcision within the Muslim community, it is generally required that the coronal sulcus be fully visible for the circumcision to be considered valid. It is not unreasonable for parents to ask for a corrective procedure where the skin has not cleared the sulcus. That said, one must not be overzealous with a smaller penis or where there is little penile skin to spare.

[4] Ibn Maja's sunnas. Muhammad Fuad Abd al-Baqi, ed. Egypt: Dar Ihya al-Kutub al- Arabiyya, 1372 AH

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25 Female Genital Cutting: The Misnomer of Female Circumcision

Stephanya Shear, Laura Hart, and Doug Diekema

Editors' Note

The expression 'female circumcision' is a misnomer and is not equivalent in scope, purpose, or consequences to a male circumcision. This chapter reviews the cultural practice of what is best termed Female Genital Cutting (FGC). FGC is not part of Islamic law but does seem to be most prevalent in Islamic regions of the world. FGC is very controversial and there are worldwide programs to eradicate its practice. Many women, maybe millions, from parts of the world where FGC is prevalent now live in Western countries where FGC is taboo, if not illegal. Every effort should be made to approach patients who have undergone FGC with sensitivity and tolerance for their culture. Creative ways should be sought to address medical needs and treatment which do not compromise cultural mores lest the patient and family shy away from seeking medical care.

In their 2010 policy statement, the American Academy of Pediatrics, though opposed to all forms of FGC, did hedge their position in order to provide a compromise to assuage more radical forms of FGC:

> However, the ritual nick suggested by some pediatricians is not physically harmful and is much less extensive than routine newborn male genital cutting. There is reason to believe that offering such a compromise may build trust between hospitals and immigrant communities, save some girls from undergoing disfiguring and life-threatening procedures in their native countries, and play a role in the eventual eradication of FGC. It might be more effective if federal and state laws enabled pediatricians to reach out to families by offering a ritual nick as a possible compromise to avoid greater harm (*Pediatrics* Volume 125, Number 5, May 2010).

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Introduction

This section will address the issue of female genital cutting, often referred to as female circumcision or genital mutilation. This section will describe the forms of female genital cutting, where it is practiced, the role of culture and beliefs about gender roles associated with the practice, efforts to restrict or eliminate the practice, and end

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with some thoughts on how Western medicine and culture think differently about male circumcision than female genital cutting.

The terminology used for these practices provides insight into the disparate attitudes that Western cultures have toward female genital cutting (FGC). It is important to recognize that the terms chosen to describe a practice frame our perceptions and describe to what degree we accept female and for that matter, male genital alteration. For many, *female circumcision* does not adequately describe this practice, since the procedures are unlike male circumcision both in technique and intention. Many critics of female cutting tolerate Western male circumcisions, and therefore resist the term circumcision. Such comparisons in their eyes may cast doubt upon the male circumcision and threaten the acceptance of male prepuce removal. The term *female genital mutilation* leaves very little room for discussion of the cultural acceptance and tolerance of the practice in many countries. The American Association of Pediatrics guidelines changed its terminology from female genital mutilation to female genital cutting precisely because the use of "mutilation" was a value-laden term that halted all discussion and served to alienate immigrants from countries that perform these procedures. Although this chapter will refer to the practice as *female genital cutting*, this term may also be considered inadequate because in most cases, the genitals are not simply cut or nicked, but rather removed either partially or entirely. In an effort to describe the psychosocial and physical ramifications of these practices, UNICEF and UNFPA refer to the practice as female genital mutilation/cutting. For the purposes of this chapter, the practice will be referred to as female genital cutting (FGC).

Female Genital Cutting Worldwide

Female genital cutting is a cultural practice that is deeply woven in the social constructs of families, marriages, and what it means to be female. It has been estimated that 100–140 million women have undergone genital cutting. More than three million girls each year are at risk of having the procedure performed in 28 Northern and Central African Countries, Central and South America, Russia, Indonesia, Yemen, Jordan, Oman, Iraq, and the Gaza territory [1, 2]. Immigration to other countries does not eliminate the risk. Female children are at risk for FGC either when they travel for a return visit to their country of origin, or when the procedure is performed by traditional practitioners or Western care providers in their new country of residence. Physicians in the USA and Canada have been approached by families seeking FGC, and in 1995 the American College of Obstetrician and Gynecologists published Committee Opinion 151 joining "many other organizations in opposing all forms of medically unnecessary surgical modifications of the female genitalia." The United Kingdom published the Prohibition of Female Circumcision Act in 1985 and prosecutions against providers of FGC and parents have occurred in Europe [3]. Female genital cutting is a prevalent practice in many countries and young girls in this country are also at risk.

Female genital cutting is practiced in various geographic regions, in all socioeconomic groups and different religious traditions. High rates of female genital cutting continue in many countries, despite efforts to abolish the practice. In 2005, UNICEF reported that among 15–49-year-old women, 99% in Guinea, 97% in Egypt, 92% in Mali, 90% in Sudan, 89% in Eritrea, and 80% in Ethiopia had undergone genital cutting. Anywhere from 5% to 70% of women in Tanzania, Kenya, Chad, Niger, Ghana, Mauritania, and Senegal have undergone female genital cutting [4]. Although FGC is often inaccurately aligned with Islam, it is not a strictly religious practice. The practice predates the Qur'an and has deep tribal and cultural origins. A number of Muslim sects have adopted the practice. Partial and complete genital removal can be found with equal frequencies in Christian and Muslim groups in countries such as Ethiopia and Benin. In Ghana, on the other hand, FGC is four times more common in Muslim communities. Despite a lack of formal religious dictates, traditional cutters and families may consider it a requirement of religious law to cut their daughters. FGC is also found to occur equally in urban and rural areas in most countries and throughout all socioeconomic groups. The pervasiveness of the practice and its association with cultural beliefs make eradication of FGC difficult and favor a multifocal approach.

Table 25.1 Reasons for female genital cutting. Reasons vary between and within countries

Tradition/custom
Belief FGC is required by religion
Ensures virginity
Discourages/prevents promiscuity
Hygienic covering of the vagina
Belief a girl cannot be married without FGC
Insures a better marriage
Aesthetically more appealing
Belief husbands find infibulation more pleasurable

The cultural reasons endorsing FGC are listed in Table 25.1. The reasons are deeply tied to a woman's role in her society, the importance of marriage and chastity, attitudes regarding desire and sexual self-determination, and what constitutes a woman's purpose in the intimate relationship with her husband. All the reasons for FGC presume that a woman's external genital organs are of little importance or use, and represent a threat to her health and virtue and the stability of her marriage. The procedure continues to be performed despite education and international efforts to eradicate the practice. FGC is supported by both women and men in most countries where it is practiced, and it is often mothers who bring their daughters to traditional cutters to have the procedure performed. A majority of women who have been cut intend to have their daughters undergo the procedure [4]. Culturally endorsed reasons for FGC vary within and between countries and cultures, but nearly all who endorse FGC insist that girls benefit from the procedure. Benefits related to marriage are the most commonly cited: FGC either improves a girl's chance for a good marriage or is necessary for any marriage. In addition, the partial or complete removal of her genitals is important for her husband's sexual satisfaction [1, 2, 4]. Families see FGC as an advantage they provide *for* their daughters, not a procedure they do *to* their daughters.

Historically, the practice of FGC has not been confined to non-Western nations. Clitorectomies were performed in the USA, France, Germany, and England up to the 1960s. Partial removal of the clitoris was thought to cure masturbation, "unnatural sexual desire in a female," epilepsy, and neurosis. Sigmund Freud dismissed the orgasmic potential of the clitoris, declaring it incomplete as compared to the vaginal orgasm. As a result, clitorectomies were performed commonly in Western cultures [5, 6] until fairly recently. As the Women's Rights and Determination Movement reached national prominence in the 1970s, these procedures were loudly criticized and eventually disappeared from practice in the USA.

Types of Female Genital Cutting

Female genital cutting consists of the partial or complete removal of genitalia for nonmedical reasons. The World Health Organization has categorized female genital cutting into four types [2, 7, 8]. The procedures represent a spectrum of partial to complete removal of the female external genitalia (Fig. 25.1). *Sunni* or Type I is the removal of the clitoris and the prepuce. Type II is clitorectomy with removal of the labia minora and possible labia majora. The most severe form of female genital removal is *pharaonic*, or Type III which involves the removal of all of the clitoris, prepuce, excision of the labia, and narrowing of vaginal introitus followed by re-approximation of the labia. An infibulated scar forms over the urethra and vaginal opening leaving only a small hole for urination, menses, intercourse, and the vaginal delivery of a pregnancy. Healing can take up to 7 days and the girls are maintained on bed rest with their thighs and legs bound together to promote formation of the infibulation scar [2]. Pharaonic procedures comprise more than 70% of the procedures in Sudan but less than 10% of those in Egypt. Pharaonic cutting is against the law in Sudan, but it continues to be practiced as providers are not regulated. Type IV is a less common form of FGC that involves all other nonmedical procedures on the genitalia including pricking, piercing, stretching, burning or incising of the clitoris and/or labia. Included in the category are all procedures known as *angurya* (scraping of the opening of the vagina) or *gishiri* (cutting and application of corrosive substances into the vagina to cause bleeding and narrowing).

Type I is the most common type of FGC overall. However, significant variation exists from region to region. In some countries, the type of cutting is influenced by socioeconomic status, ethnic group, level of education, urban versus rural

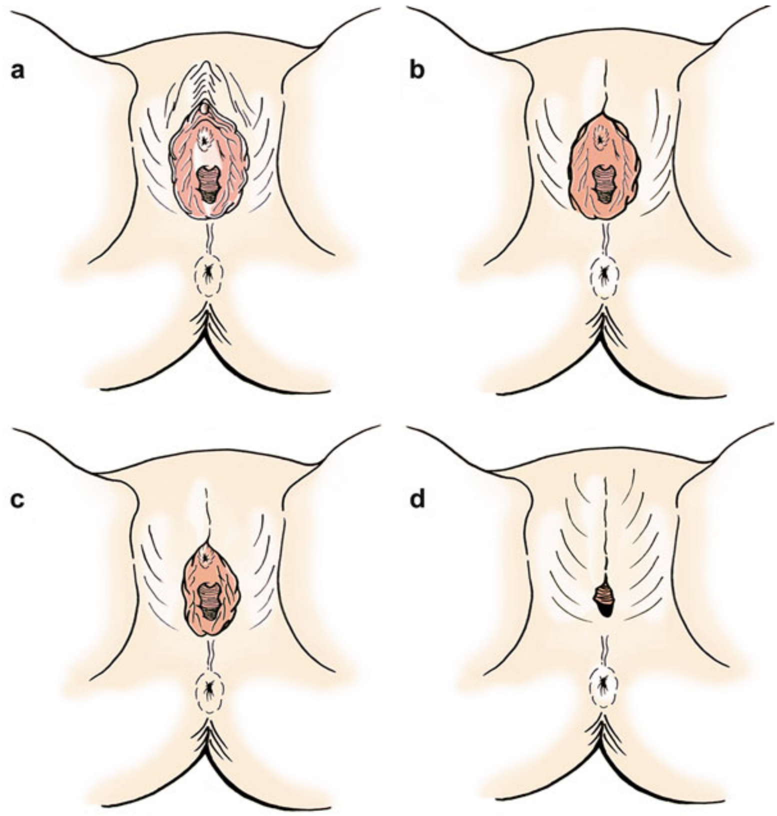

Fig. 25.1 Types of genital cutting. (**a**) Uncut-clitoris, labia majora, and minora intact. (**b**) Type I – Clitorectomy with prepucial removal. (**c**) Type II – Removal of clitoris, labia minora, and/or labia majora. (**d**) Type III – Removal of the clitoris, labia majora, labia minor with infibulation (Illustrations courtesy of Randall Cohen (MedicoLens.com))

location, and religion. In Eritrea for example, 77% of Muslim women have at least one daughter who has been infibulated, compared to only 41% of Catholic women and 11% of Protestants. Daughters of women of certain Eritrean ethnic groups, such as Hedarib, are all infibulated, whereas fewer than 10% of other ethnic groups in Eritrea perform pharaonic cutting [4]. Likewise, daughters of women living in urban areas are significantly less likely to have undergone Type III cutting than girls living in rural areas of Eritrea.

Female genital cutting is typically performed on girls ages 4–15 [1, 2, 7]. However, female infants and adults may also undergo the procedure depending on the country [5, 7]. A majority of the procedures are performed by traditional practitioners and birth attendants using knives, razors, scissors, tin can lids, glass, and other instruments. Sterile techniques are not used. Neither sedation nor analgesia is routinely available. Antibiotics are not used. Recent surveys conducted by UNICEF indicate a growing number of medical personnel involved in FGC, most notably in Egypt. The "medicalization" is attributed to governmental educational efforts highlighting the short and long-term health consequences of cutting, namely risk of bleeding and infection. Although procedures performed by medical providers may be less prone to infection, the shift toward medicalization does not address issues of human rights or the long-term health consequences of the procedure [4] and may give the appearance of recognizing the procedures as medically beneficial. In most countries, traditional cutters are still performing the majority of procedures and this trend continues with recent generations. The exceptions are Egypt and Yemen where FGC is performed less frequently by traditional cutters than has been the case in the past.

Health Outcomes from Female Genital Removal and Infibulation

Unlike male circumcisions, female genital cutting is associated with a high rate of early complications and significant long-term health consequences

[9]. The immediate health implications for female genital cutting include bleeding, wound infection, sepsis, shock, and injury to the urethra resulting in incontinence or retention. Another common short-term health consequence of FGC is injuries that occur as a result of forcefully holding the girls down while the procedure is performed [2–4]. Fractures to the clavicle, femur, and humerus as well as injuries to internal organs are seen [8]. Most girls are cut without mental preparation, and emotional traumatization can be significant [2]. Deaths have resulted from female genital cutting, either from infections, bleeding, or injury to internal organs or as a result of immobilizing the girls. To families and the greater society, immediate risks and consequences of the procedure are viewed as tolerable given the perceived social benefits to a girl's future.

However, these potential social benefits need to be viewed in the context of future health consequences [10]. Long-term complications include chronic vaginal infections, dysmenorrhea, hematocolpos, infertility, inclusion and sebaceous cysts, vulvar abscesses, vaginal stenosis, urethral strictures, chronic urinary tract infections, and sexual dysfunction including dyspareunia and anorgasmia. Long-term complications are most commonly seen with Type II and Type III cutting. Pharaonic cutting is more likely to cause difficulty with labor and delivery. The infibulation scar sustains significant trauma from intercourse, and the infibulated scar is likely to rupture as pressure increases during delivery [11]. In many instances, the woman must undergo deinfibulation in order to deliver. Vaginal and perineal lacerations, wound infections and postpartum hemorrhage are more common in women with Type III cutting without deinfibulation [2, 10]. Deinfibulation entails incision of the infibulated scar. The cut edges are then sutured. Deinfibulation improves the chances for a more normal delivery and is recommended in the second trimester by the American College of Obstetricians and Gynecologists [10]. Women with Type III cutting are at higher risk for prolonged second stage of labor, from the time of complete cervical dilatation (10 cm) to delivery. Prolongation of this stage places both the mother and infant at risk. Neonatal deaths and still births are more common in women with FGC and increase with severity of the procedure. A large study conducted over six African countries found FGC leads to one or two additional perinatal deaths per 100 deliveries [12].

Significant urinary sequela can result from female genital cutting, and includes recurrent urinary tract infections, urethral strictures, and urinary retention. Access to the bladder can be difficult as the neointroitus obstructs the urethra with the infibulated scar. One medical implication of this scarring is that the introduction of a cystoscope may be limited by the infibulation scar, and there is an increased risk of traumatizing the introital or urethral tissue during cystoscopy due to the angle that may be needed to enter the urethra. Women may be at an increased risk of bladder stone formation if they have significant urinary retention from the infibulations, and treatment of stones may be impaired by the lack of easy access to the urethra and bladder. Women who have had FGC may be at a higher risk of a vesicovaginal or rectovaginal fistula [10]. This risk is further increased if they also experience prolonged labor as a result of the procedure. Western pediatric providers should be aware that young girls who underwent FGC in their country of origin may present with urinary tract infections and inclusion cysts.

FGC is seen as a mechanism for assuring a satisfactory marriage; however, the procedure results in high infertility rates [2, 9]. As many as one-third of women are unable to become pregnant due to anatomical or psychological barriers. Furthermore, the infibulated scar can prevent normal coitus, which can insure chastity, but also insures difficulties for the married couple. Stretching of the infibulated scar is necessary to allow penetration, which frequently results in painful sexual encounters. Ironically, despite being seen as a mechanism for assuring a satisfactory marriage, FGC that results in infertility places women at significant risk. For many of these women, marriage is their only hope of economic security, and infertility may put that security at risk. Physical and emotional abuse as well as social shunning can also be devastating consequences of infertility.

Providing care for the pediatric or adult female status post genital removal and/or infibulation is challenging from an anatomical as well as cultural perspective. Culturally sensitive approaches are necessary to respect the individual's perspective on health, marriage, sexuality, and self empowerment. Although many medical staff will not condone the practice of FGC, health-care providers should be sensitive to the patient's view and attempt to understand the belief structure that allows such procedures. One's attitude toward the social acceptance of genital cutting should be separated from one's attitude toward the patient who has had FGC. The procedure is performed in young girls, who did not give assent for the procedure, and some women who have had FGC may not personally agree with the practice. It is important to provide culturally sensitive care. Young girls and women may approach Western health-care providers with shame, distrust, and distress in relation to FGC [11, 13]. The physical examination can trigger posttraumatic stress associated with memories from the cutting event of childhood [10]. Unfamiliarity with Western medical systems heightens their distress and can lead to distrust. Women who have undergone FGC and who then seek medical care as adults from Western providers, report being approached with pity or disgust. Somali women who were interviewed felt racially stereotyped and marginalized when seeking prenatal care [14]. The women reported that doctors and midwives were insensitive to their culture and did not address their fears, which include concerns about cesarean section [11] Individuals from non-Western cultures navigate an unfamiliar and often insensitive medical system. Providers should be aware of these issues, and include culturally knowledgeable and sensitive approaches throughout the patient encounter. One long-term complication of FGC that is easily avoided is the isolation and distress caused by an intolerant or disapproving medical community.

International Efforts to Eradicate Female Genital Cutting

UNICEF and the World Health Organization have embarked on a worldwide effort to reduce female genital cutting by 40% by 2012 with hopes to achieve complete eradication in at least one country. Given the deeply entrenched cultural attitudes toward a procedure performed on vulnerable populations of women and female children who have no political voice or power, these goals are ambitious and daunting. The task is further complicated by the fact that providers willing to perform FGC are often well-paid. Furthermore, formally trained nurses and doctors are increasingly performing the procedures in response to added political pressures. The "medicalization" of the female cutting has led to more gynecologists in Sudan and Egypt performing the cutting procedures.

Legislation alone will not eradicate the practice, as experiences in Sudan show. Female genital removal is a reflection of attitudes toward women and their role in society. In order to change the practice of FGC, attitudes and role perception must be transformed. Although laws and rules are not sufficient, such efforts may be important precursors to education and change. Burkina Faso, Cote d'Ivoire, Djibouti, Ghana, Senegal, and Togo have enacted legislation to ban FGC [1, 3]. In those countries, efforts to eradicate and eliminate FGC have been linked with initiatives to decrease poverty, improve educational opportunities, protect children, and provide quality health care. Support among the population to end FGC varies by country, urban versus rural location, religion, and socioeconomic status. Women who underwent FGC themselves are more likely to want their daughters to be cut [15]. The higher the education level of a woman, the more likely she would be to support eradication efforts [4]. For example, among the urban population of the Igbos ethnic majority group of Nigeria, legislation and community education have successfully reduced rates of FGC from nearly universal to less than 20% [9]. In Nigeria, as educational levels of the parents increased, they were less likely to subject their daughters to cutting. This speaks to the importance of coupling efforts to reduce FGC with poverty reduction and improved education for women. In addition, increasing the economic opportunities for women outside of marriage will likely have a beneficial impact.

Once FGC becomes less prevalent, extinction may come rapidly. This can be inferred from data that suggest that the strongest predicator of a mother not intending to have her daughter cut was that she herself was not cut [16]. Women were eight times more likely not to cut their daughters if they themselves where uncut. Although female empowerment and improved education were also positive forces, the strongest influence was the status of the mother. It could be hoped that once change occurs in one generation, it will be lasting and promote success.

For practitioners in the USA and Europe, the procedure is nearly unanimously condemned. The procedure is banned in the UK and France. In the USA it is against federal criminal law to perform female genital cutting on any girl younger than 18. Anyone who "knowingly circumcises, excises, or infibulates the whole or any part of the labia majora or labia minora or clitoris" can be found guilty and sentenced to up to 5 years in prison [17]. In addition, as a result of Nwaokolo vs. Immigration and Nationalization Service female genital cutting can be considered a form of torture and be influential in relation to immigration asylum status [18].

Social Constructs in Female Genital Cutting

How we compare male circumcision to female genital cutting in the USA is deeply rooted in our views and approaches to male and female sexuality, female self-determination, and the role of women in society. Most Americans consider female genital cutting torture and inexcusable mutilation. Many of the same people remain tolerant of male circumcision. Those critical of male circumcision believe FGC and male circumcision are comparable procedures [19]; the more common view is that the two are radically different procedures with different intentions and goals. Some insist the only real comparison to female genital cutting would be penectomy [6]. Anatomical results of the two are very different, with removal of female tissue that is analogous to the penis and scrotum.

As discussed in earlier sections, it is important to note the main *intentional* distinction between female and male circumcision. Male circumcision is performed for religious, cultural, aesthetic, and medical reasons that are quite different than the reasons for FGC. Male circumcision can reduce the rate of urinary tract infections in susceptible males. Female circumcision creates a risk for urinary tract infection. Male circumcision is medically indicated in cases of phimosis, where the skin prevents adequate urination. Infibulation can lead to urinary obstruction. Male circumcision is considered by many to enhance hygiene, while female genital cutting creates abscesses and traps urine and menstrual blood. Putting aside benefits to health, the social intention of male circumcision differs importantly from FGC, whose goal is to insure and prepare a woman for marriage and the future sexual satisfaction of her husband.

Male circumcision is not a prerequisite for marriage and it is not performed for the sexual satisfaction of a male's future wife. In female cutting, the goal and intention is to control or subvert female sexuality. The procedures are done for the benefit of marriage; to insure economic stability through marriage but also for her husband's sexual pleasure. These social benefits are juxtaposed to the risks both short and long term. Circumcision is considered a low-risk elective procedure in males with possible benefits of reducing sexually transmitted diseases or urinary tract infections [20]. Male circumcision in this country is not associated with significant morbidity or mortality as is the case with FGC. Currently male circumcision is not used to deter masturbation or sexual exploration. Female genital cutting is intended to maintain chastity, to remove desire, and to insure a subservient position in relation to men. It has long been recognized that clitoral stimulation allows a woman to achieve an orgasm without vaginal penetration and therefore pleasure is conceivable without a man. In cultures that practice FGC, women's sexuality is seen as a danger to social order.

In Western societies, the social meaning of female genital cutting has been a powerful force in opposing any form of female genital cutting.

The fact that in the USA we view female genital cutting as a denial of a woman's sexual body and self-determination is illustrated in the reaction of citizens, politicians, and physicians to one US hospital's plan to offer Type IV genital cutting to girls from a Somali community living in the Northwest.

In the 1990s, the Seattle, Washington area saw an increase in the number of Somali families immigrating to the region. A majority of these families obtained their medical care at the local county hospital. The hospital serves a large, diverse immigrant population. Women within the Somali community approached a local pediatrician and asked to provide a "nicking" procedure of the clitoral hood as a form of female circumcision for girl's within their community. After developing a protocol that was reviewed by a special ethics committee and hospital administration, the county hospital decided to offer a version of Type IV cutting. They argued that providing the service would achieve the following goals; one, the nicking procedure would be considerably less severe than the Sunna or pharaonic cutting that was usually performed; two, by medicalizing the procedure they could eliminate the immediate health concerns of infection and bleeding; three, the procedure would have minimal effect on sensation and no effect on childbearing or intercourse, and finally if they did not provide this service, some families were likely to return to Africa to have the procedure performed, a procedure that would be more mutilating than the nick being proposed. They also hoped that by offering Type IV cutting, they might be able to extinguish the procedure in the course of a generation as the girls grew to adulthood and had more opportunities in the USA. The hospital also struggled with being sensitive to and responsive toward a culture that has strong beliefs about circumcision, in both males and females. The Somali families argued that their sons were being circumcised at their request, and that their daughters ought to be offered something similar. The pediatrician and hospital approached the issue of offering the genital a "ritual nick" as a means of satisfying a cultural need in a way that would minimize physical harm to the girls undergoing the procedure. However, they would discover that the prevailing social construct of female genital cutting would overcome such reasoning.

The public outcry to the proposed procedure at the county hospital did not consider the goals of cultural sensitivity [21–24]. The critics could not separate the procedure of female genital mutilation, in this case Type IV (incorrectly referred to as Sunna in the articles), from the perception that an underlying intention of the procedure was to deny women a sexual self. The issues of female self-determination, human rights, and the acceptance of female sexuality played center stage in the arguments and opinions reacting to the proposed procedure in 1996. The goals of extinguishing the practice over time, improving health outcomes in the interim, and honoring cultural traditions seemed to pale in comparison to the appearance of supporting a procedure designed to oppress women. Articles and editorials written by politicians, activists, community members, and physicians expressed the view that even a "ritual" nick would constitute the torture of women, child abuse, and the denial of full sexual expression by women. Although the Attorney General's office felt that the Seattle procedure would not be criminalized under federal law, the hospital decided not to offer the service. The experience in Seattle in 1996 illustrates the power of intention and social meaning surrounding female circumcision. It proved to be a more powerful force than the well-intended goals of a procedure intended to protect the health and safety of young girls in the community while at the same time acknowledging the cultural rituals of the Somali community.

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Circumcision in the Early Christian Church: The Controversy That Shaped a Continent

26

Gregory Adams and Kristina Adams

Editors' Note

Other than the Coptic Church which practices circumcision, Christian dominations take a neutral position. That said, in the past decade or so there has been a small yet growing interest in "ritual circumcision" amongst Christians seeking a stronger identity with the Old Testament. The following chapter explores the history of circumcision in Christianity from the circumcision of Christ through the late Medieval period. This offers a unique perspective on how the question of circumcision shaped Christianity and maybe why there is a hint of renewed interest in this biblical tradition.

After the death of Jesus, followers of the new Christian religious movement struggled to define both their mission and identity as a distinct faith community. As the members of this fledgling church grappled with the significance of their Jewish heritage and growing ambition to spread Christianity to Gentiles, circumcision became the divisive issue within the early church. As we will see, this controversy was the driving force in forming Christianity as a distinctly Gentile religion. This allowed Gentile Christians to escape the cultural devastation of the Jewish Diaspora and positioned the religion to become the dominant faith throughout Western Europe. But the debate over circumcision did not end there. Centuries of the greatest leaders, scholars, and artists in Western history continued to ponder the practice of circumcision and its role in Christian spirituality.

The debate over circumcision in the early Christian church must be understood in the context of Jewish history and the Jewish experience within the Roman Empire. The significance of circumcision in the Hebrew tradition cannot be overstated. According to Hebrew Scriptures, the

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practice has its origins in the formational event of the Nation of Israel. Circumcision was the sign of the covenant made between God and Abraham, the father of the Jewish people. According to the Genesis narrative, God promised Abraham his descendants would be kings of a nation, and that they would be God's chosen people. In return, Jewish men must observe the practice of circumcision as a reminder of this covenant.

> Between you and me I will establish my covenant… I will make nations of you… I will maintain my covenant with you and your descendants throughout the ages as an everlasting pact… every male among you must be circumcised. Circumcise the flesh of your foreskin, and that shall be the mark of the covenant. (Genesis 17, selected verses).

Thus circumcision was not only a covenantal debt owed to God, but an indelible expression of genealogy and national identity which distinguished Jewish men from their pagan contemporaries [1].

Jesus was circumcised in accordance with this tradition. Surprisingly, scripture references the circumcision of Jesus in passing, with only one direct narrative of the event. "After eight days had passed, it was time to circumcise the child; and he was called Jesus, the name given by the angel before he was conceived in the womb. When the time came for their purification according to the law of Moses, they brought him up to Jerusalem to present him to the Lord" (Luke 2:21–22). The most important feature of this passage is that it places Jesus and his mission squarely within the Hebrew tradition. The Hebrew name given to the child at his circumcision was *Jeshua (Yeshua), which translates to* "I am who is salvation." *As such, it was through the circumcision and naming ceremony that Jesus' mission was first publically declared.* Second, the text implies that the circumcision ritual was performed not in the Temple, but presumably in a private residence. That his circumcision did not occur at the Temple underscores Jesus' humble origins.

There were an estimated four to eight million Jews living under the cultural hegemony of the Roman Empire at the time of Jesus [2]. Rome was generally tolerant of cultural differences among its conquered peoples. Unfortunately, Jewish refusal to participate in mandatory emperor-worship ensured them an existence of bitter oppression in Imperial Rome [3]. During the period encompassing the life of Jesus and early Christian church, there was an acceleration of Roman oppression of the Jews. In 19 CE, Tiberius expelled the Jews from Rome. Under the rule of Caligula beginning in 37 CE, synagogues were burned, the legal status of Jewish people was diminished, and massacres were reported. This oppression culminated in 70 CE under the rule of Titus with the military siege of Jerusalem and destruction of the Temple. Germaine to this discussion, assault on the practice of circumcision became a tool of religious and cultural subjugation. Beginning under the rule of Antiochus Epiphanes in second century BCE, circumcision was outlawed and made a capital offense [3]. The Books of Maccabees graphically depict executions for the crime of circumcision: "…two women were brought in for having circumcised their children. They publicly paraded them around the city, with their babies hanging at their breasts, and then hurled them down headlong from the wall" (2 Maccabees 6:10). Perhaps not surprisingly, it was during this time that circumcision reversal surgery became prevalent in the Jewish community.

Under this Roman oppression, the early Christian church arose from within the larger Jewish community. It is worth noting, that the first Christians were overwhelmingly Jewish both in religion and ethnicity, and as such saw circumcision as a necessary part of Christian salvation [2]. The first members of this movement held meetings within synagogues and preached to a largely Jewish audience. This loosely organized community was led by Peter, a Galilean fisherman and one of the original 12 disciples of Jesus. Scripture marks Peter as being chosen by Jesus to lead the new church (Matthew 16:18), and Catholic tradition recognizes Peter as the first Pope. Under the leadership of Peter, the Jewish Christians saw their mission not as the creation of a new religion, but as a reform movement within the Hebrew faith. As such, strict adherence to Jewish law and preservation of the covenant through circumcision was considered mandatory.

In this setting arrived the central figure in this pivotal moment in Western History, Paul of Tarsus. To understand how uniquely positioned Paul was to affect the fate of Christianity, some understanding of his origin and personality is essential. Prior to his conversion, Paul, known then as Saul, was both a Jewish Pharisee and a Roman citizen. Ironically, his early career consisted of arresting and executing members of the Christian church. Paul's Roman citizenship and Jewish cultural identity provided him a unique vantage point, as he lived and operated within and between these two rival groups. Paul famously experienced his conversion while riding a horse to Damascus. According to his testimony, he had a miraculous vision of Jesus which temporarily blinded him and knocked him violently off his horse (Acts 9). The dramatic nature of Paul's conversion is important in that it filled him with a sense of a unique and divine mission to win converts to Christianity, and justified his refusal to defer to traditional authority [2].

It was Paul's novel beliefs regarding the role of circumcision that both facilitated the formation of a Gentile Christian community, and ultimately separated this community from Jewish Christians. Interestingly, Paul did not set out to this end. He began his ministry with similar aims as Peter, namely as a religious reformer within Judaism. Paul declared his public mission as bringing "salvation to everyone who has faith, to the Jew first and also to the Greek [Gentile]" (Romans 1:16b). For reasons not entirely clear, Paul proved woefully inadequate at ministering to the former. He was widely rejected by the Jewish community as he preached in synagogues throughout the Roman Empire. The New Testament describes no fewer than nine separate times when Paul was beaten and thrown out of synagogues (2 Corinthians 11:24–25). At one point, he narrowly escaped an assassination plot (Acts 23:12–15). However, this was little deterrence for Paul and his rather grandiose sense of purpose. That Jews were not receptive to his message was taken by Paul as a sign that he should look elsewhere for converts, and he chose to do this among his fellow Roman citizens. As Paul increasingly looked outside the Jewish community for converts, a cultural divide widened within the fledgling, multiethnic faith community. Paul's outreach to the Gentile community was met with bitter resentment from many Jews who endured the oppressive Roman rule and rejected the inclusion of Romans in the synagogue. Some historians argue that the popularity of Pauline Christianity among the Romans had a backlash effect among Jews, motivating their rejection of the new religion [4]. Roman conversion was also associated with a shift in setting of early Christian meetings from the synagogues to private Roman homes.

Not surprisingly, circumcision proved to be the major stumbling block to the conversion of Gentiles. The painful procedure was both officially outlawed and offended the belief in the idealized human form that Romans had adopted from Greek art and culture [3]. But Paul – ever resourceful in his prophetic mission – engaged in some creative theology to widen the door for Gentile converts. The theological argument which drove Paul's position on circumcision was that spiritual conversion was both necessary and sufficient for salvation. He argued that both Jews and Gentiles were ultimately justified through faith, not external signs such as circumcision [5]: "…since God is one; and he will justify the circumcised on the ground of faith and the uncircumcised through that same faith" (Romans 3:30). As such, circumcision need not be considered an essential part of Christian spirituality. "For in Christ Jesus neither circumcision nor uncircumcision counts for anything; the only thing that counts is faith working through love" (Galatians 5:6). For Paul, circumcision became more a metaphor for faith than a physical sign. He wrote frequently of a "circumcision of the heart" in describing the ideal spiritual state. But Paul did not stop there. As time went on, and Paul's message fell on deaf ears within his own Jewish community, there was a progressive hardening of his position on circumcision. While earlier, Paul seemed relatively neutral toward the practice; his later writings were overtly critical of circumcision and clearly were intended to drive a wedge between Gentile and Jewish Christians. At one point, Paul made thinly veiled comparisons between the practice of circumcision and pagan phallic cults, which played on cultural misconceptions of Jews commonly held by Romans [4]. Ultimately, in what perhaps can only be understood in the setting of an enormous bruised ego, Paul turned the tables entirely. Paul identified himself and the Gentile Christians as the "circumcised," while declaring Jewish Christians to be "dogs…evil workers…who mutilate the flesh!" (Philippians 3:2). The contemporary Jewish reader would have instantly recognized an ironic double meaning in this insult as "dogs" was a pejorative slang for Romans used by the Jews [4]. Thus, Paul rhetorically reduced the traditional and sacred custom of circumcision to a shameful act which renders the circumcised of flesh an outsider among God's chosen people.

Predictably, Paul's position that circumcision, the indelible mark of the sacred Covenant was "meaningless" and a "mutilation," was bound to place him squarely at odds with the existing power structure of the early church. Signs of a rift within the church became evident at the infamous Incident at Antioch (Galatians 2). This chance meeting of Peter, Paul, and their respective followers is generally believed to have occurred around the year 49 CE. Peter set his aim on marginalizing Paul, resentful of his departure from the Jewish custom. Peter refused to allow Paul to eat with him and the other members of the group declaring him unclean through his association with Gentiles. Paul's description of this account indicates a heated exchange, and possible physical altercation between the two. Ultimately, Paul flees Antioch alone, fearful for his life and abandoned even by his most trusted followers.

In response to the Incident at Antioch, and in attempt to bridge the growing divide in the Christian community, the Council of Jerusalem was assembled in 50 CE. The Council was the first summit meeting of early church leaders, with the intent to clearly codify church teaching. Circumcision was the primary issue of debate for the Council. Paul arrived at this meeting alone and as an outsider, representing the minority opinion with respect to circumcision. Interestingly, Paul proved to be an apt politician and the Council concluded that he could continue in his ministry to the Gentiles, and that conversion without circumcision was permissible: "we [the Council] should not trouble those Gentiles who are turning to God" (Acts 15:19). Paul left the Council of Jerusalem emboldened by his newly sanctioned mission to the Gentiles (Acts 15:25). Officially freed from the requirements of Jewish Law, Paul had unintentionally formed a new religious sect which was ethnically distinct from the Jewish Christians.

The fate of Jews and Christians within the Roman Empire could not have been more different. Tragically, the Emperor Titus in 70 CE launched the definitive military campaign against the Jews, exiling them from the Holy Land and destroying the Temple of Jerusalem. The resultant Jewish Diaspora, a devastating exile, lasted until the reformation of the Nation of Israel in 1948 CE. In contrast, the fledgling Gentile Christian community nurtured by Paul was able to survive within Rome until a remarkable chain of events occurred which introduced the new religion to Emperor Constantine. Constantine's conversion, and legalization of Christianity via the Edict of Milan 313 CE, followed by the declaration of Christianity as the state religion of the Roman Empire in 391 CE by Emperor Theodosius I ensured Christian dominance in Western Europe.

While the practice of circumcision among European Christians waned, the debate over the practice waged on. Jesus' circumcision retained a special theological significance among early church scholars. The event, while little more than a scriptural footnote, was interpreted again and again by the great minds of early Christianity. The writings of Ambrose of Milan represent the first high-profile description of what would become the majority interpretation of Jesus' circumcision. Ambrose was Bishop of Milan in the fourth century and is recognized as both a saint and one of the four original Doctors of the Christian church (a title reserved for those whose scholarly work was particularly important in shaping early Christian thought and theology). In Ambrose's writings, several novel ideas emerged which influenced how Christians would later recall and interpret Jesus' circumcision. First, there was the reinterpretation of Jesus' circumcision as an act of redemptive suffering. Christians believe that the physical suffering Jesus endured during his life redeemed humanity from its sinful nature. Special reverence is given to the blood of Jesus, which is central to Catholic Christians in the Sacrament of Holy Eucharist. For Ambrose, Jesus' circumcision represented the first time that the incarnate deity bled and experienced human suffering. As a visceral act of pain and bloodshed, Jesus' circumcision both foreshadowed and mirrored his suffering on the cross. Ambrose argued that the redemption offered through Jesus' suffering is universal and absolute, and thus the Old Testament circumcision requirement is obsolete. "Since our Lord Christ suffered, seeing that the ransom is now paid for all, there is no longer any need that the blood of every man one by one should be shed by circumcision, for in the Blood of Christ the circumcision of all has been solemnized, and in His Cross we all are crucified together with Him" [6]. Clearly, this is a distinctly Christian interpretation of Jesus' circumcision, and one which has been stripped of any context of Jewish custom or Covenant history. However, the significance of circumcision as an initiation event within the Jewish community was not lost on Ambrose, and he undermined the ritual in order to replace it with the Christian initiation ritual of Baptism. Ambrose criticized circumcision as purifying only part of the body, and similar to Paul, argued it irrelevant to Gentiles not descendent of Abraham. "Circumcision commanded by the prescript of the [Hebrew] Law was partial and should cease" [6]. In contrast, Ambrose argued the preeminence of Christian baptism over circumcision both as an initiation and cleansing ritual: "For as many kinds of washings proceeded, because that one true Sacrament of Baptism with water and the Spirit whereby the whole man is redeemed" [6].

By the Middle Ages, Ambrose's interpretation of Jesus' circumcision had effectively become the official position of the Christian church. Evidence for this can be found in transcripts of sermons preached in Rome during the papal mass for the Feast of the Circumcision (more on this Feast later). These sermons consistently reiterated the notion that Medieval Christians interpreted Jesus' circumcision as a confirmation of his humanity, a prediction of the Passion, and his first act of redemptive suffering [7].

The definitive position on the practice of circumcision was delivered by Pope Eugenius IV in 1442 CE at the Ecumenical Council of Florence. The Council was called in attempt to reach consensus to allow reunification of the Eastern and Western churches, which officially severed ties for theological and political differences in 1044 CE. Several smaller Christian communities were also considered for potential reconciliation and reunification with Rome, among them the Copts who practiced circumcision. Copts are an Egyptian Christian sect that traces its origin to the flight of the Holy Family through Egypt following Jesus' birth. They had previously enjoyed better relations with the European church, participating in several councils including the Council of Nicaea in 325 CE where the core creed of Christianity was established [8]. Ultimately, the theological differences between the Copts and Rome were too great and Pope Eugenius officially declared an irreconcilable schism between the two. In order to solidify the divide between Copts and Catholics, Eugenius made the following proclamation:

> Therefore [The Church] denounces all who after that time observe circumcision, the Sabbath and other legal prescriptions as strangers to the faith of Christ and unable to share in eternal salvation, unless they recoil at some time from these errors. Therefore it strictly orders all who glory in the name of Christian, not to practice circumcision either before or after baptism, since whether or not they place their hope in it, it cannot possibly be observed without loss of eternal salvation [9].

Interestingly, modern scholars argue a more pragmatic than religious reason for the Coptic practice of circumcision, pointing out that it was not mandatory or uniformly practiced. In the Coptic tradition, circumcision was not performed as part of a religious rite, and was likely adopted from neighboring Egyptians for hygienic purposes [10].

Fig. 26.1 Christ is circumcised in a crowded church (Engraving by H. Goltzius, 1594. Provided courtesy of Wellcome Library, London)

Despite the official banning of the practice, circumcision continued to hold a unique place in the Christian imagination. Traditionally, the Feast of the Circumcision was celebrated on January 1, 8 days from the celebration of Jesus' birth. The recognition of this feast day appears to have originated in the sixth century. It is worth noting that in the Catholic calendar, the Feast of the Circumcision was a holy day of obligation, indicating its high importance in the liturgical calendar. As a day of obligation, according to Canon Law, "the faithful are obliged to assist at Mass, to abstain from such work or business that would inhibit the worship to be given to God, the joy proper to the Lord's Day, or the due relaxation of mind and body [11]." Thus, Jesus' circumcision was celebrated as both a religious and civil holiday throughout Christendom. Celebration of this Feast continues in the major sects of Christianity – Eastern Orthodox, Byzantine Rite, Anglican, and Lutheran Churches – but it has since been substituted for the Feast of the Holy Name of Jesus in the Catholic tradition. Existing alongside the liturgical celebration of Jesus' circumcision is an impressive body of artwork depicting and celebrating the event. While there is virtually no aspect of Jesus' life which has not been artistically depicted, his circumcision has a rather prominent place in Western Art (Figs. 26.1 and 26.2). Many of the great

Fig. 26.2 The circumcision, ca. 1460–1470. At the Metropolitan Museum of Art, The Cloisters (Photograph courtesy of George T. Drugas, M.D.)

masters have tackled the subject including Rembrandt van Rijn, Albrecht Dürer, Peter Paul Rubens, and Fra Filippo Lippi.

While perhaps considered quaint today, the collection and veneration of relics was very important in early church and Medieval spirituality. Relics, the remains of deceased holy persons, were commonly believed to house some element of the power and holiness of the person from which they came. As Jesus, according to scripture, ascended bodily into heaven, he left little physically of himself to be venerated. Thus, his foreskin is considered to be the only potential relic of his physical body. Not surprising, multiple persons throughout history have claimed to possess the relic. Interestingly, the history of Jesus' foreskin involves some of the major figures in European history. Charlemagne claimed to possess the relic and gifted it to Pope Leo III in exchange for the pontiff's crowning him emperor. King Henry V confiscated a foreskin relic from the Monks of Chartres because he believed it would increase his fertility and ensure an heir [3]. A particularly famous foreskin relic was discovered in Calcata, Italy in 1557 CE. This relic, credited with numerous miracles became the focus of a crackdown on relic veneration by the Catholic Church. In 1900, the Vatican threatened excommunication to any who spoke of or venerated the foreskin. Despite this, the relic continued to be displayed and honored every January 1 until its mysterious disappearance in 1983 [12].

In summary, circumcision has played a surprisingly important role in Western history. The circumcision debate forged a Gentile identity to the early Christian church which allowed it to survive the Jewish Diaspora and become the dominant religion of Western Europe. Circumcision continued to have a major cultural presence throughout Christendom even after the practice had all but vanished. The circumcision of Jesus was celebrated as a religious holiday and examined by many of the greatest scholars and artists of the Western tradition. It is our assertion that an appreciation of the complex history of circumcision enriches our understanding of the practice and offers some explanation why this humble surgical procedure continues to be a source of controversy.

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