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CASE REPORT



Conservative treatment of partial testicular artery injury during transabdominal preperitoneal hernioplasty (TAPP)

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ABSTRACT

Inguinal hernias are common conditions in general surgery. Laparoscopic approach, whether transabdominal preperitoneal (TAPP) or totally extraperitoneal (TEP), is favored for its lower rate of surgical site infection, shorter hospital stay, and faster return to daily activities. Complications still occur, albeit in a small percentage, but can prolong hospital stay or be fatal. We present a case of a 55-year-old male patient who underwent TAPP procedure with proposed iatrogenic testicular artery injury resulting in a bilateral retroperitoneal hematoma. The treatment was conservative, and the patient was discharged in good general condition after 13 days. Six months postoperatively, no signs of hernia recurrence were observed. According to available literature, this is the first conservatively treated occult testicular artery injury during TAPP inguinal hernioplasty.

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Inguinal hernia; hernia repair; laparoscopy; bleeding; testicular artery; conservative treatment

Introduction

Inguinal hernioplasty is one of the most frequently performed operations. Many hernia society guidelines recommend a laparoscopic approach for any type of inguinal hernia, especially bilateral, for recurrence after open anterior approach, and concurrent inguinal and umbilical hernias [1–4]. The most common postoperative complications of bilateral transabdominal preperitoneal hernioplasty (TAPP) are seroma (3.61%), hernia recurrence (1.96%), and bleeding (0.93%) [5]. However, sometimes more severe, even life-threatening complications may occur. We present a case of iatrogenic injury to the testicular artery during the TAPP procedure, which was successfully managed conservatively.

Case report

A 55-year old male was admitted to the Department of Surgery for elective repair of left inguinal hernia. In previous medical history, he underwent right inguinal hernioplasty by open anterior approach with mesh 19 years ago (no medical record was available for this operation) and had controlled arterial hypertension. The left inguinal hernia was detected 5 years ago, with the

progression in size and symptoms during previous months. On clinical exam, the hernia was reducible, 3 cm in diameter, and with a cough impulse. Surgery was performed by an experienced abdominal surgeon. No perioperative antibiotic prophylaxis was administered. Recurrence of the right-sided hernia was noticed intraoperatively. Both hernias were direct, without any content in the hernia sac. On the right side, a polypropylene mesh (12 × 15 cm²) was placed, and on the left side, 12 × 15 cm² titanised polypropylene mesh (TIMESH, pfm medical, Nonnweiler, Germany), due to the defects in the overlying peritoneum. Both meshes were fixed with 5 mm helical, titanium, nonabsorbable tacks (ProTack™, Covidien, Medtronic, Minneapolis, MN). The fixation locations included two tacks on the pubic bone and several tacks along the superior border of the mesh, avoiding triangle of doom, the triangle of pain and deep inferior epigastric artery. No intraoperative complications were noted. On the first postoperative day, clinical examination revealed bilateral ecchymoses in inguinal, scrotal, and iliac regions, demonstrating typical signs of retroperitoneal hematoma; Stabler's, Bryant's, and Gray-Turner's signs, respectively (Figure 1(A)). Mild abdominal pain was reported. The abdomen was diffusely painful, without abdominal guarding or signs of

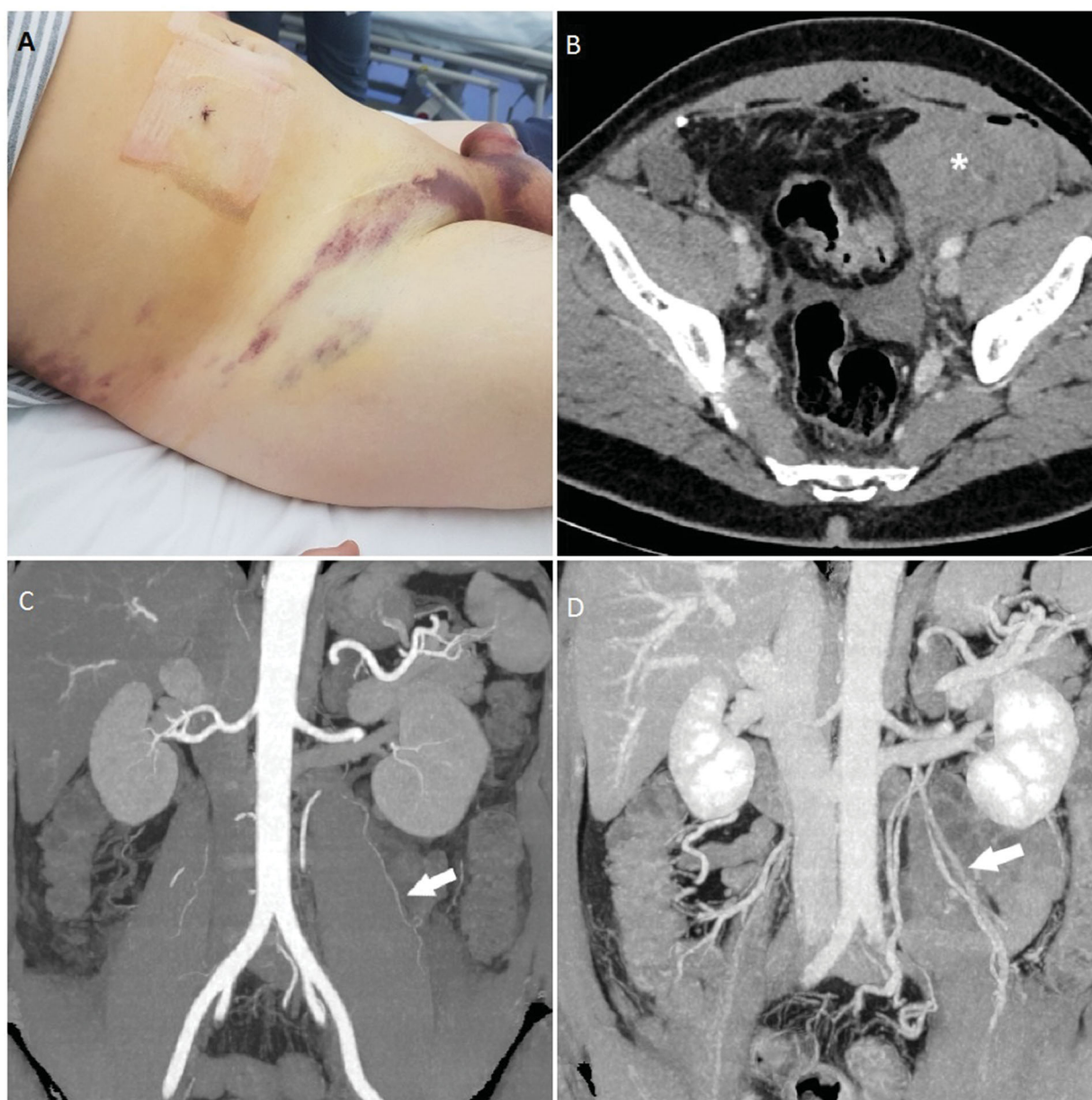


Figure 1. (A) The three typical signs of retroperitoneal hematoma are visible: Stabler's, Bryant's and Gray-Turner's sign, respectively. (B) CT examination revealed a large pelvic hematoma (*). (C) Hematoma surrounding the left testicular artery (arrow). (D) Left testicular vein (arrow). No active bleeding was detected.

abdominal compartment syndrome. A significant drop in the hemoglobin level was present (Figure 2). On the 2nd postoperative day, transabdominal ultrasound (US) showed dense liquid infraumbilically up to the urinary bladder, measuring $8.1 \times 4.4 \text{ cm}^2$. Due to a further decline in the hemoglobin levels, computed tomography (CT) angiography of the abdomen and pelvis with iv. contrast revealed suprapubic and bilateral retroperitoneal hematomas, larger on the left, measuring $12 \times 6.5 \text{ cm}^2$ (Figure 1(B)). In the arterial phase, deep inferior epigastric arteries and right testicular artery had normal flow (Figure 1(C)). Both left testicular artery and vein were followed up to the hematoma without distal visualization. Both testicles were painless with normal consistency,

symmetric, and without pain on palpation. Since there were no clinical signs of testicular ischemia, the consulting urologist did not find an indication for Doppler evaluation of the perfusion of testes. No acute extravasation of contrast was found (Figure 1(D)). Due to the lack of active bleeding, the interventional radiologist did not indicate embolization. Given the patient's hemodynamic stability, conservative treatment started, with regular monitoring, repeated hemoglobin measurements, and clinical examinations. On the 3rd postoperative day, due to further fall in hemoglobin level, one dose of packed red blood cells was administered (Figure 2). On the 4th postoperative day, the patient was febrile up to 38.5°C , so the empirical therapy with 1 g of cefazolin and 500 mg

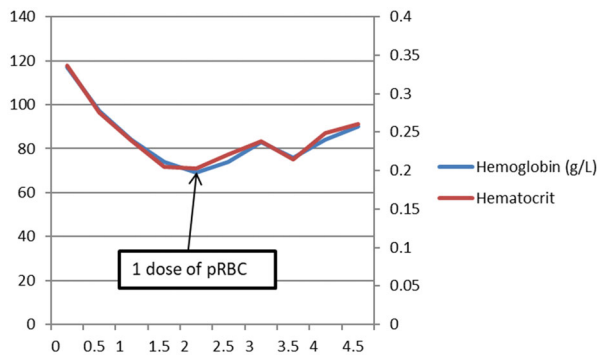


Figure 2. Hemoglobin and hematocrit levels during the first five postoperative days. Significant and continuous fall was evident until the 3rd day when one dose of packed red blood cells (pRBC) was administered (arrow).

of metronidazole was administered iv. three times daily, for seven days. Broad-spectrum antibiotics covered potential inoculation of skin bacteria and enteral bacteria from the potentially injured bowel. On the 7th postoperative day, CT with iv. contrast revealed regression of retroperitoneal hematoma to $6.5 \times 4.5 \text{ cm}^2$ with suprapubic hematoma resorption. There were no signs of abscess formation. No active contrast extravasation was shown. The patient was afebrile, and the antibiotics were discontinued. During the hospital stay, testes and scrotum were regularly examined, without any changes, symptoms, or signs. On the 13th postoperative day, the patient was discharged in good condition. There were no abdominal or urological symptoms, ecchymoses, or pain at check-ups 3 weeks, 6 weeks, and 3 months after discharge. On the final examination, 6 months after surgery, no signs of hernia recurrence were found, and no discomfort reported. No symptoms or gross changes were found on testes and scrotum.

Discussion

With the TAPP inguinal hernioplasty, vascular injuries are possible at multiple operational steps. Injury may occur with the introduction of the Veress needle, the first trocar insertion, and during insertion of other trocars. During dissection of the preperitoneal space and the hernia sac, injuries to deep inferior epigastric arteries, testicular arteries, deferential arteries, and both external iliac arteries and veins are possible. All these vascular injuries are can occur during the mesh and peritoneum fixation with tacks. In our case, after TAPP, bilateral retroperitoneal hematoma developed. CT showed that both deep inferior epigastric arteries and right testicular artery had a normal flow up to periphery. The contrast of the left testicular artery was visible up to the hematoma, but without active

extravasation. A left testicular vein was visible up to the left renal vein. The assumption was that the most likely cause of bleeding is a small injury of the left testicular artery, which did not actively bleed intraoperatively due to stretch from manipulation, raised intraabdominal pressure, and reflex vasoconstriction. Postoperatively, a large hematoma possibly compressed the injured artery resulting in cessation of extravasation. Another exclusion of the testicular vein injury is that it would not result in such a massive hematoma. Iatrogenic injury of the testicular artery is very rare and is most commonly encountered during orchiectomy [6]. With such injuries, the vitality of the testis could be an issue. These represent high testicular artery injuries and other uninjured arteries contributing to testicular blood supply are sufficient for adequate testicular perfusion.

In the scarce literature, testicular artery injury as a result of Lichtenstein hernioplasty was treated with embolization [7]. In the mentioned case, the injury was initially approached surgically, but explorative laparotomy did not find the cause of bleeding. Postrevisional percutaneous endovascular intervention located the bleeding site, followed by successful embolization. In another paper describing two iatrogenic injuries of testicular arteries treated by embolization, authors argue that the first was due to a loss of proximal control during orchiectomy, and the second was most likely a consequence of damage with endoscope or replacement of a catheter [8]. However, in all cases described, angiography found the bleeding site, and embolization was possible. In the case of active testicular artery bleeding, interventional or surgical treatment should be performed. The decision of whether an interventional or surgical procedure is preferred should be based on patient characteristics and (inter)national guidelines and algorithms. Current *Cardiovascular and Interventional Radiological Society of Europe* guidelines do not have specific guidelines for the intervention on testicular arteries [9]. From clinical practice and published cases [7], it is difficult to find the location of bleeding in preperitoneal and retroperitoneal hematomas by surgical exploration. For open anterior inguinal hernia repairs, exploration of the surgical wound should be done first and followed by laparotomy if no source of bleeding found. For laparoscopic inguinal hernioplasties, laparoscopic exploration can be initiated but lower median laparotomy enables better visualization and successful completion of the exploration.

Therefore, the interventional radiologist was consulted and without active contrast extravasation, there was no indication for testicular artery embolization. It was decided to treat the patient conservatively due to hemodynamic stability, the absence of abdominal compartment syndrome, and abscess formation. Another possibility was a revision in the field of retroperitoneal hematoma, which would expose the patient to an additional surgical procedure (with dilemmas of approach and the type of procedure) and all risks associated with an additional procedure, with the possibility of not identifying the potential site of bleeding. If at any point hemodynamic instability, the progression of hematoma, or symptoms of sepsis occurred, the patient would be subjected to revisional surgery immediately. There are no structured data about retroperitoneal hematoma after TAPP or the issue is not well defined. In one of the largest studies based on the hernia registry data about TAPP inguinal hernioplasty, bleeding complications were divided into intraoperative, postoperative, and vascular lesions. There was no mention of specific causes of bleeding and without principles of its treatment and prognosis [5]. We propose this case as an intraoperative occult testicular artery injury, resulting in retroperitoneal hematoma after TAPP procedure, which was successfully treated conservatively.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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