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## ■ CASE STUDY

# Vasal Injury During Inguinal Herniorrhaphy: A Case Report and Review of the Literature

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### Abstract

An injury to the vas deferens during inguinal herniorrhaphy from possible tethering of the vas has not, to our knowledge, previously been described in the surgical literature. We report a case of iatrogenic injury of the vas deferens that occurred during elective hernia repair in a 28-year-old man who had previously sustained blunt trauma to the abdomen and pelvis.

### Introduction

Inguinal herniorrhaphy is among the most common surgical procedures performed in the US.<sup>1</sup> An inguinal hernia develops from a weakness in either the abdominal wall fascia at the Hesselbach triangle or the internal inguinal ring. Any adjacent abdominal contents may be contained in or adherent to an inguinal hernia sac. The spermatic

cord—consisting of the vas deferens, vessels, nerves, lymphatics, and tunica albuginea—is often involved in inguinal hernias, particularly of the indirect variety. Yet reports of injury to the spermatic cord and its contents are rare. We herein report a case of vas deferens injury during inguinal herniorrhaphy in a patient who had previously sustained extensive abdominal and pelvic trauma.



Figure 1. Axial computed tomographic scan of pelvis revealing diastasis and heterotopic ossification superior to symphysis pubis adjacent to right inguinal canal.

### Case Study

A 28-year-old man with a history of pelvic fracture sought urologic evaluation because of erectile dysfunction and the desire to conceive a child. His medical and surgical history was notable for a pedestrian vs auto accident in 2005, in which he sustained fractures of the pelvis and right femur (Figure 1), and a partial urethral disruption. He required an emergency exploratory laparotomy, with a temporary colostomy because of a rectal laceration, and external fixation of his pelvic and femoral fractures. The urethral injury was treated with temporary Foley catheterization and a suprapubic cystostomy tube, after which normal voiding function eventually returned. After an initially unsuccessful attempt at colonic reanastomosis, the colostomy was later reversed. The patient's medical history was otherwise unremarkable; he did not use prescription medications or smoke tobacco. He could obtain erections using phosphodiesterase Type 5 inhibitor therapy, suggesting a vasculogenic cause of his erectile dysfunction. He opted to attempt conception with his partner by natural means.

His urologic evaluation at our institution took place four years after his accident. At this time, a moderate right inguinal hernia was identified, prompting referral to the General Surgery Service. The hernia caused discomfort but was easily reducible, without evidence of incarceration or obstruction. The patient's pelvic surface anatomy was heavily scarred from the prior external fixator placement. After an extensive discussion, the patient decided to undergo surgical

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repair of the hernia with polypropylene mesh. An open approach was selected, given the patient's history of abdominal-pelvic surgery.

At the time of herniorrhaphy, extensive scarring was noted in the subcutaneous and fascial layers, possibly resulting from previous pelvic hemorrhage. The inguinal canal was exposed, and the iliohypogastric and ilioinguinal nerves and the spermatic cord were identified. A 5-cm-diameter direct hernia sac was identified medial to the epigastric vessels. The cord and hernia sac were densely adherent but could be separated, after which the spermatic cord was encircled using a Penrose drain. During retraction of the cord en masse to expose the pubic tubercle and floor of the inguinal canal, an audible snap was heard. Careful inspection revealed that the vas deferens had fractured, possibly because of extensive scarring and lack of mobility of the vas in particular.

An intraoperative urologic consultation indicated that the vas was firm and attenuated. The proximal and distal vasal ends were identified and were incised to expose fresh tissue in preparation for primary end-to-end anastomosis. The vas was approximated using 5 interrupted 7-0 polypropylene (Prolene) sutures in a tension-free manner. A

metal clip was placed just lateral to the anastomosis to facilitate possible future localization. A Lichtenstein tension-free mesh herniorrhaphy was performed to repair the direct hernia, and the wound was closed.

The patient's postoperative recovery was uncomplicated. Pathologic evaluation of a segment of the vas did not demonstrate ischemic changes or other underlying abnormalities (Figure 2).

A postoperative semen analysis revealed a low-normal sperm count of 20 million/mL with motility and morphologic characteristics within normal limits. Although the status of the vasal repair was unknown at the time of that analysis, these findings suggested that the contralateral vas was patent and functional, and likely would enable the patient to conceive a child. However, he underwent another urologic evaluation after 9 months of failing to achieve a pregnancy with his spouse. He chose to undergo vasography with contrast medium delivered by hemivasotomy proximal to the prior anastomotic site. The contrast agent did not pass beyond the level of the inguinal canal, saline injection revealed obstruction, and a 2-0 nylon suture did not pass the region of the inguinal canal, thus indicating vasal obstruction at the anastomotic site.

The stricture was identified, excised, and reconstructed by vasovasostomy (Figure 3).

The patient had an uncomplicated recovery, and subsequent semen analysis findings 1 month and 4 months after surgery were equivalent to his preoperative values. After 2 attempts at intrauterine insemination, the patient and his wife were able to successfully conceive a child spontaneously.

## Discussion

We believe that this case represents a novel and previously undescribed mechanism of injury to the vas deferens during open inguinal herniorrhaphy, in the setting of extensive scarring resulting from prior pelvic surgery. To determine whether there is a precedent for this scenario in the medical literature, we searched the MEDLINE electronic database for English-language articles by using the following key words: vas, hernia, injury, pelvis, scar. No reports were identified.

An iatrogenic injury to the vas deferens during adult open inguinal herniorrhaphy is rare.<sup>2</sup> Mechanisms of vasal injury include partial or complete transection, fracture, thermal or crush injury, compression, and excessive tension from a foreign body such as mesh, leading to obstruction and ischemia.<sup>2,6</sup> Injury to the vas deferens is thought to occur when it is adherent to the hernia sac.<sup>7,8</sup> Although difficult to prove, chronic ischemia from our patient's earlier pelvic vascular injury might have contributed to inherent weakness of the tissue, predisposing it to fracture despite careful handling of the cord. Furthermore, although the vasal injury may contribute to obstruction as a source of azoospermia, results of his physical examination demonstrated mild atrophy of the right testicle, suggesting that blood supply may have been compromised during one of his prior operations.

At the time of surgery, we hypothesized that either scar tissue was tethering the testicle and vas or that chronic ischemia contributed to the vasal injury and abnormal texture of the vas. Typically, the testicle can be delivered into the inguinal canal with gentle traction, but in this case, the testicle was immobile

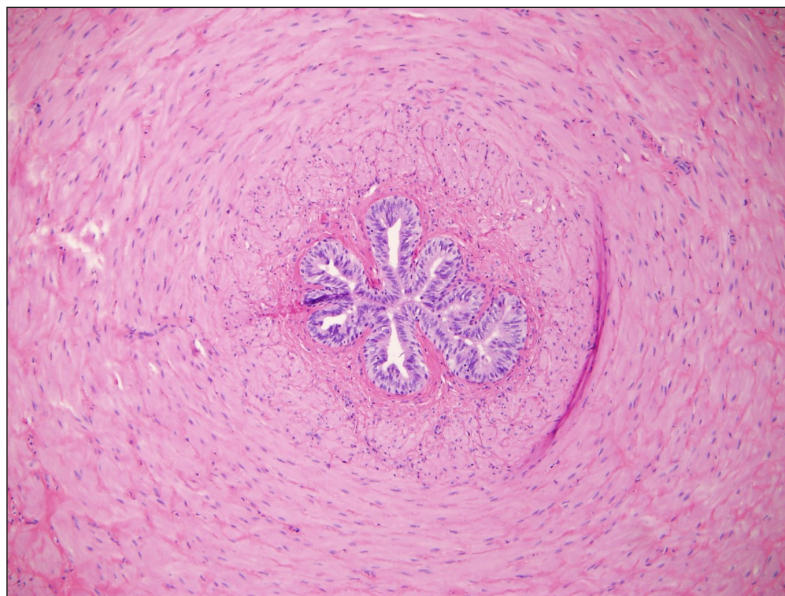


Figure 2. Cross-section of unremarkable vas deferens (hematoxylin-eosin stain, original magnification 100 $\times$ ).

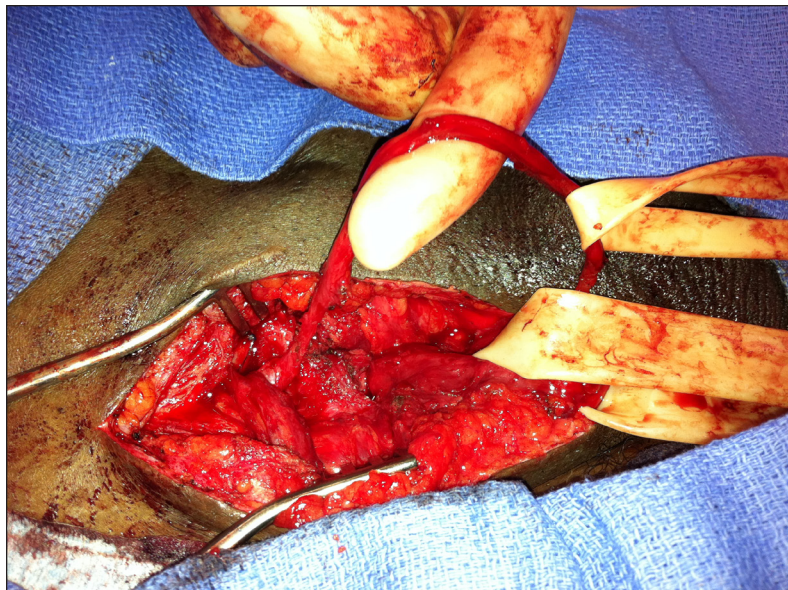


Figure 3. Intraoperative photograph of reconstructed vas deferens via vasovasostomy.

and the vas fractured into two segments. The absence of chronic ischemic findings in the pathologic evaluation of the vas led us to conclude that scarring from the pelvic fracture and tethering of the testicle placed the vas on traction and resulted in the abnormal texture.

The true incidence of vas deferens injury during open hernia repair in adult men is likely underreported. This underreporting probably reflects that small injuries may be unrecognized intraoperatively, that improper mesh placement is difficult to appreciate,<sup>4</sup> and that postsurgical symptoms are often absent. In the most common scenario, an unrecognized injury is revealed only years later in the evaluation of subfertile or azoospermic men who underwent hernia repair during childhood.<sup>7,9-11</sup> Unlike in adults, inguinal hernia repair in children is the most common cause of injury to the vas deferens,<sup>9</sup> which is more delicate and attenuated in infants. Early reports suggested that vasal injury occurs in 0.8% to 2% of pediatric hernia cases.<sup>11</sup> However, an incidence as high as 26.7% has been reported in subfertile men with vasal obstruction.<sup>7</sup>

There should be a high index of suspicion for iatrogenic vasal injury in azoospermic patients who have undergone bilateral inguinal herniorrhaphy.<sup>11,12</sup> A review of 34 iatrogenic vasal injuries from

a cohort of 472 patients who underwent vasovasostomy or epididymovasostomy indicated that 30 of the injuries were caused by inguinal herniorrhaphy.<sup>9</sup> Ten of these were adult cases, supporting the argument that vasal injury is underreported after childhood. One reason for this underreporting may be that diagnosis of injury might be learned only from abnormal findings of semen analysis, a test obtained primarily for fertility evaluation. Additionally, perhaps because of delayed diagnosis, treatment outcomes for vasal injury repair are poor. Compared with vasectomy reversal, microsurgical repair of iatrogenic vasal injury was associated with a reduced success rate, longer-length vasal defects, impaired blood supply, and longer duration of obstruction.<sup>9</sup> Yet in our patient, the relatively brief duration of obstruction suggests a more favorable outcome. Because a microscopic repair of the vas requires additional expertise and equipment, the urgent nature of the intraoperative consult at the time of injury precluded this approach initially in our patient.

The advent of laparoscopic inguinal herniorrhaphy has potentially increased the risk of vasal injury, given the precarious location of the abdominal vas and gonadal vessels as they converge onto the internal inguinal ring.<sup>10,13</sup> The promi-

nent location of the vas and gonadal vessels must be noted when placing the mesh, especially during bilateral herniorrhaphy. Longer-term follow-up of the fertility of young men who undergo bilateral laparoscopic hernia repair should be considered.

Special consideration should be made when obtaining preoperative consent for inguinal herniorrhaphy from men of childrearing age who have sustained previous pelvic trauma. In our case, an intraoperative alternative would have been to ligate the vas, with the expectation that if the contralateral vas were patent, the patient's fertility would not be dramatically altered. We recognized, however, that the history of pelvic trauma might have predisposed the contralateral vas to ischemia or nonfunction, and to infertility if a repair had not been attempted. However, for patients who no longer wish to father children, the option of simple ligation of the vas deferens or unilateral orchiectomy could also be considered.

In the months after our patient's vas deferens injury, he and his wife were initially unsuccessful in achieving spontaneous pregnancy. No symptoms of scrotal edema or pain developed, or any other suggestion of an obstruction of the vas deferens. He thus chose to undergo a repeated procedure to assess the patency of the initial repair and to increase the likelihood to conceive a child spontaneously.

## Conclusion

To our knowledge, this is the first report of an unusual vas deferens injury during open inguinal herniorrhaphy in a patient with a history of extensive pelvic surgery. For patients with a history of pelvic trauma who are being considered for herniorrhaphy, our case suggests that there is a modestly increased risk of iatrogenic injury to spermatic cord structures. Although an open approach is preferred, it does not preclude the possibility of injury. Intraoperatively, extra care should be taken during mobilization of the cord structures to prevent excess traction. If an injury is identified, urologic consultation is indicated, and a primary reanastomosis should be attempted, preferably with the aid of a surgical microscope. A metal clip

placed adjacent to the site of repair may facilitate future procedures for repeated reconstruction if necessary. Finally, follow-up semen analyses may help guide fertility evaluation. ❖

#### Disclosure Statement

*The author(s) have no conflicts of interest to disclose.*

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### Bassini's Technique

This method reconstructs the inguinal canal as it is physiologically, with two rings, one abdominal, the other subcutaneous; and with two walls, one posterior and the other anterior, between which the spermatic cord passes obliquely.

— *Attività di Congresso Associazione Medicina di Italia*, Edoardo Bassini, MD, 1844-1924, Italian surgeon