

Robot-Assisted Laparoscopic Repair of Extraperitoneal Ureteral Inguinal Hernia with Mesh Placement

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Abstract

Background: Ureter involvement within indirect hernias is a rare phenomenon usually identified incidentally during herniorrhaphy. Even more rare are extraperitoneal ureteral inguinal hernias, which represent about 20% of these cases and are characterized by a substantial amount of extraperitoneal fat in the hernia defect, the absence of a peritoneal sac, and associated with hydroureteronephrosis and nephroptosis. To date, repair of ureteral inguinal hernias has been performed exclusively using open surgical techniques. We report the first case of successful robot-assisted laparoscopic repair of this rare presentation.

Case Presentation: A morbidly obese 70-year-old male with an unremarkable surgical and urological history presents with a 15-year history of nonpainful, enlarging right scrotal swelling measuring 25 cm in diameter. CT imaging revealed right nephroptosis and a hernia defect containing a dilated right ureter looping into the scrotum surrounded by significant extraperitoneal fat. Retrograde pyelography and ureteral catheter placement confirmed a >100 cm ureter. The patient underwent a robot-assisted laparoscopic repair. The inferior epigastric artery, spermatic cord vessels, vas deferens, and ureter were identified. The defect was reduced using external scrotal pressure and reinforced with ProGrip™ self-fixating laparoscopic mesh. The patient was discharged 2 days later following an uneventful postoperative course.

Conclusion: Although rare and usually incidentally discovered, extraperitoneal ureteral inguinal hernias can be identified preoperatively by the astute clinician. Preoperative identification allows for improved surgical planning, including a minimally invasive approach. Robot-assisted laparoscopic repair with mesh placement is a feasible alternative to traditional open techniques.

Keywords: inguinal ureteral herniation, extraperitoneal, robot-assisted

Introduction and Background

INDIRECT INGUINAL HERNIA is a common clinical condition and involvement of the urinary bladder within a hernia is well described.¹ In contrast, indirect herniation of the ureter through the inguinal canal, although previously described, is extraordinarily rare with less than 150 cases reported in the literature.² Eighty percent of ureteral inguinal hernias are classified as paraperitoneal, and more rarely, 20% are purely extraperitoneal.^{2–4} All prior reported cases of ureteral inguinal hernia have been repaired using an open surgical technique; some authors have claimed laparoscopic

repair to be implausible.² We report the first minimally invasive repair of an extraperitoneal ureteral inguinal hernia.

Presentation of Case

Our patient is a 70-year-old, morbidly obese (body mass index 37) male with no prior abdominal/inguinal surgery or urinary complaint, who was begrudgingly referred to general surgery by his primary care physician after evaluation for a 15-year history of a bothersome, nonpainful, enlarging, right-sided scrotal swelling ~25 cm in diameter (Fig. 1). Given the size of the herniation, preoperative CT imaging was pursued.

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FIG. 1. Large right-sided scrotal enlargement secondary to indirect inguinal herniation of retroperitoneal fat, kidney, and ureter.

Imaging identified right nephroptosis with a posteriorly rotated renal pelvis and a large right inguinal hernia with scrotal contents, including a long-looping, dilated right ureter (Fig. 2). Of note, no intraperitoneal contents were appreciated within the hernia on imaging.

The patient was taken to the operating room for cystoscopy, retrograde pyelogram, right ureteral catheter placement, and robot-assisted laparoscopic repair of the extraperitoneal ureteral inguinal hernia with mesh. Cystoscopy demonstrated a normal urethra and bladder with ureteral orifices in the standard orthotopic positions. Retrograde pyelogram redemonstrated a long-looping ureter with the inferior margin located at the base of the scrotum (Fig. 3A) and the renal pelvis adjacent to the bladder (Fig. 3B). A standard 70 cm open-ended ureteral catheter merely reached the bottom of the scrotum, and thus a 150 cm angiocatheter was obtained from interventional radiology and advanced completely to enter the ureteropelvic junction.

Robotic port configuration mirrored that which is commonly employed with radical cystectomy. Visual inspection of the peritoneal cavity confirmed no intraperitoneal contents within the hernia confirming an extraperitoneal-type hernia (Fig. 4A). The peritoneum was incised lateral to the right medial umbilical ligament and internal inguinal ring, ensuring adequate peritoneal flaps for mesh coverage. The peritoneal flaps were isolated from the surgical field by internal retraction accomplished with Hem-o-Lok clips (Fig. 4B). A

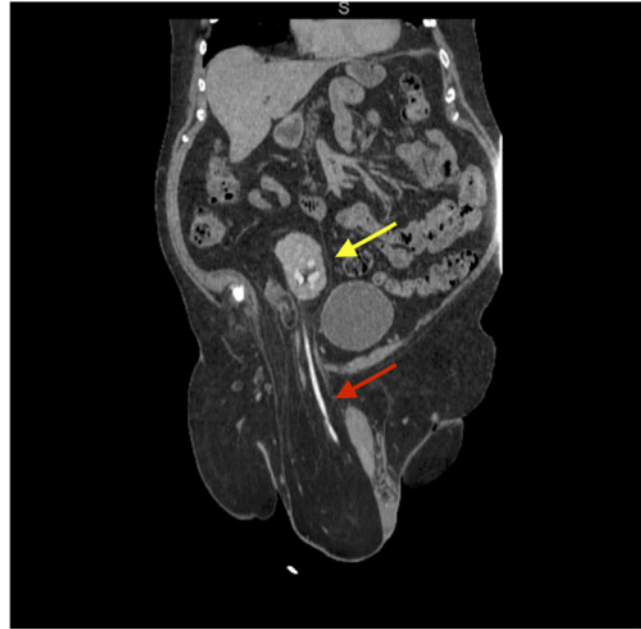


FIG. 2. CT imaging demonstrating right nephroptosis (yellow arrow) and right ureter within the scrotum (red arrow). Note large amount of retroperitoneal fat within the scrotum.

substantial mass of extraperitoneal fat was observed protruding through the hernia defect. The inferior epigastric artery, spermatic cord vessels, vas deferens, and ureter were systematically identified. Through a tedious process, the hernia contents were reduced with the significant aid of external scrotal pressure. A closed suction drain was placed into the scrotum to prevent seroma formation. A ProGrip™ self-fixating laparoscopic mesh (Medtronic, Minneapolis, MN) was trimmed to size and placed over the fascial defect (Fig. 4C). The superior peritoneal edge was then closed in a running fashion to the now reduced extraperitoneal fat to exclude the mesh from the intraperitoneal contents. The patient's postoperative course was uneventful, and he was discharged home on postoperative day 2.

Discussion and Literature Review

Ureteral inguinal hernias are exceedingly rare and commonly present in men in the fifth to sixth decade of life. Ureteral hernias fall into two categories: paraperitoneal (80%) and extraperitoneal (20%).^{2,4} Paraperitoneal hernias are suspected to involve a peritoneal sac that mechanically pulls the adjacent ureter through the defect.² In contrast, extraperitoneal hernias are characterized by large amounts of retroperitoneal fat and associated with nephroptosis. These are thought to be acquired or congenital in etiology. An acquired mechanism involves a prolapse of retroperitoneal fat and ureter through the inguinal canal without a peritoneal sac. A congenital etiology is thought to include an embryologic defect in which the ureteral bud fails to detach from the Wolffian ducts, resulting in ureter development in the scrotum.⁴

While a history of renal transplantation, given the location of transplant ureter within the space of Retzius, can



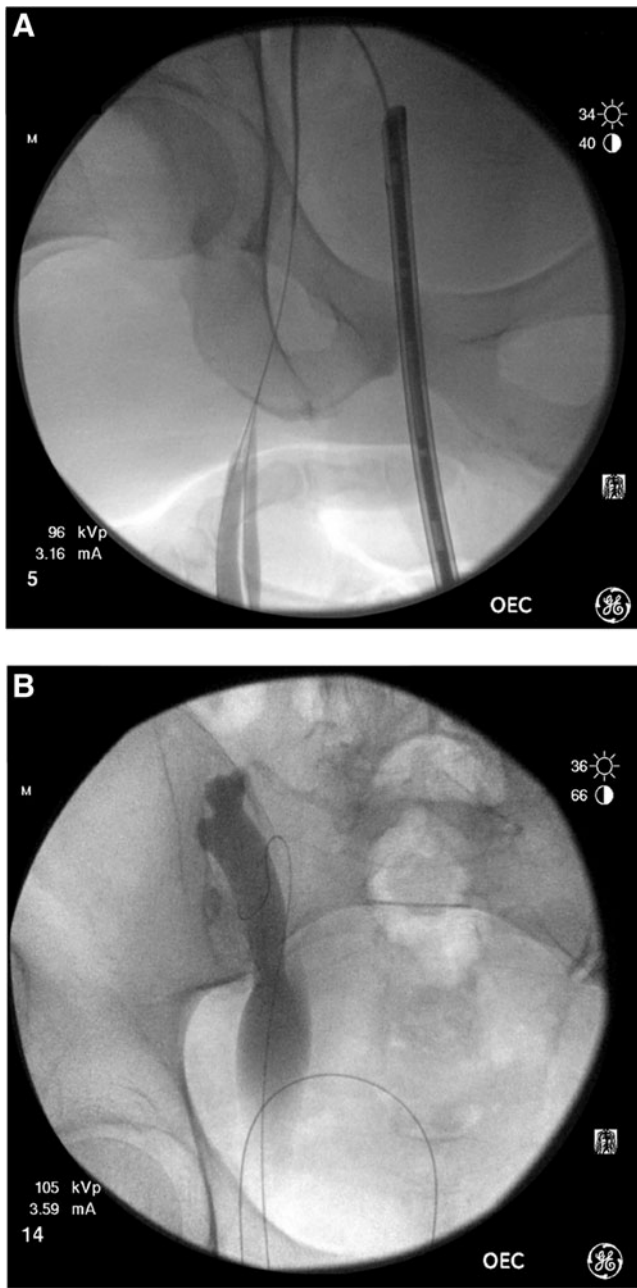


FIG. 3. (A) Retrograde pyelogram demonstrating long-looping ureter with distal end within the inferior aspect of the scrotum. (B) Retrograde pyelogram demonstrating nephroptosis with renal pelvis adjacent to urinary bladder.

predispose patients to this condition, obesity remains the single greatest risk factor.^{2,4} Ureteral herniation very rarely occurs on the left as the inferior aspect of the fascia of Toldt sits at the secondary root of the sigmoid mesocolon and tightens the retroperitoneum, thus fixing the ureter. This same anatomic reinforcement is lacking on the right; thus the higher incidence of the finding on the right side.^{2,4} Ureteral herniation is often asymptomatic, and strangulation is uncommon given the significant fascial defect required for presentation; nonetheless, surgical repair is recommended in all cases.⁴

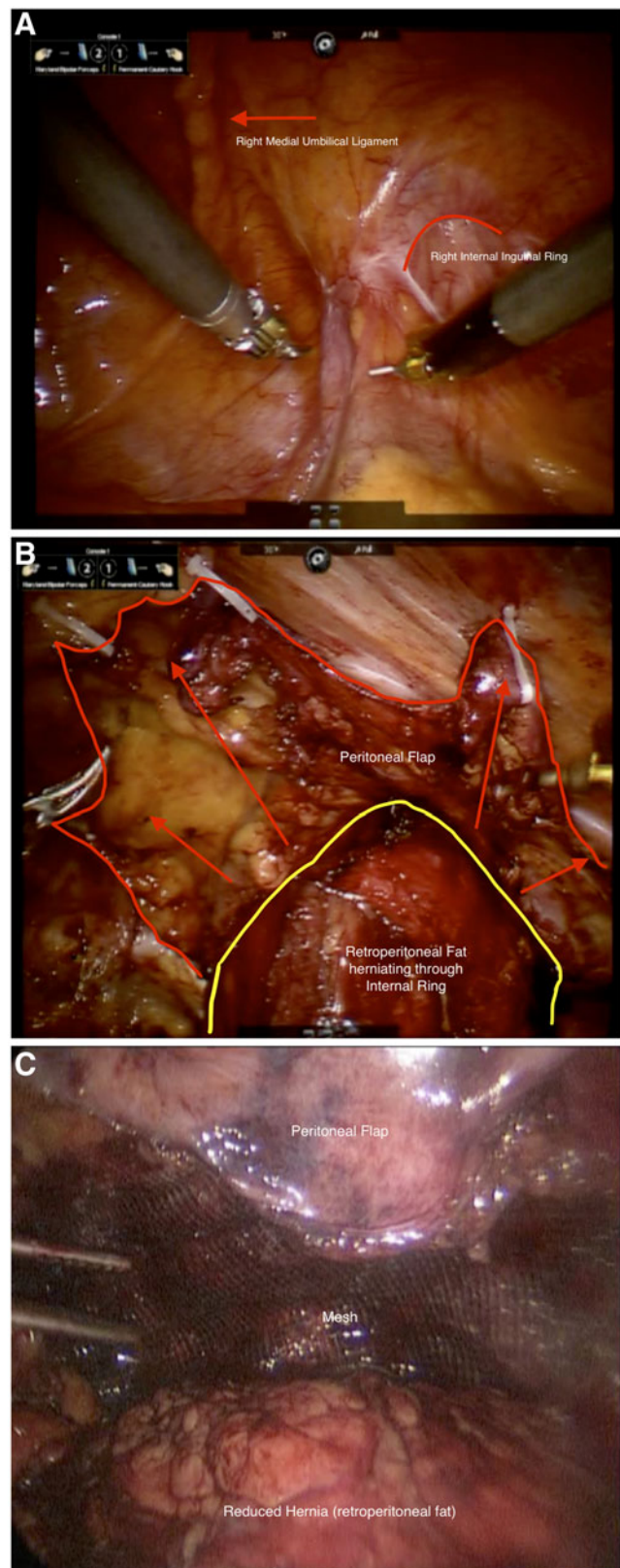


FIG. 4. (A) Intracorporeal survey demonstrating no herniation of intraperitoneal structures. (B) Internal retraction of peritoneal flaps employing Hem-o-Lok clips. (C) Mesh placed over internal ring defect and retroperitonealized by closing peritoneal flap to reduce retroperitoneal fat.

Intrascrotal hernia of the ureter is typically discovered incidentally during herniorrhaphy. Intraoperative suspicion should arise if the color and texture of herniated fat vary from that typical of a cord lipoma or if a classic hernia sac is absent.² Preoperative identification can allow for improved surgical planning, such as improved understanding of aberrant anatomy, cystoscopic insertion of a ureteral catheter, and availability of appropriate consultants. Surgeons should consider ureteral involvement if there are findings of ipsilateral hydronephrosis, concomitant urinary tract infections, or other voiding complaints.² For assistance, Yahya et al. have published an algorithm for surgeons to follow when suspecting ureteral involvement.² Retrograde ureteropyelography or CT urogram are helpful to delineate the course of the ureter and may reveal the classic “curlicue” or “loop the loop” ureter as demonstrated in this case.³ Unless necessary, the ureter should be simply reduced; unwarranted manipulation can compromise ureteral blood supply and necessitate further interventions.⁴ If the ureter is harmed or otherwise compromised, ureteroneocystostomy can be performed.^{2,4}

While minimally invasive techniques have not been previously employed to address this scenario, we demonstrate the feasibility of a robotic approach. A minimally invasive approach is a natural progression for many contemporary surgeons who have grown accustomed to robot-assisted pelvic surgery. Additionally, robotic surgery has been successfully used to treat inguinal herniation of the urinary bladder.¹ Employment of several tricks can facilitate robotic surgery. As noted in this procedure, intracorporeal retraction with Hem-o-Lok clips allows for peritoneal flap preservation without obscuring the surgical field. Not demonstrated in this case, but likely beneficial is the intraureteral use of Indocyanine Green for easy identification of the ureter.⁵ Finally, availability of a skilled bedside assistant cannot be understated as significant external scrotal pressure is required to reduce the hernia successfully.

Conclusion

While exceedingly rare, inguinal herniation of the ureter can occur and should remain within the surgeon’s differential diagnosis, especially for large fatty herniations with concomitant evidence of ipsilateral ureteral obstruction. Preoperative identification can allow for improved operative planning. Furthermore, with appropriate surgeon comfort, robot-assisted repair is feasible.

Disclosure Statement

No competing financial interests exist.

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Abbreviation Used

CT = computed tomography

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