Case Report

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Unexpected inguinal hernia content: A case report of an ectopic kidney—Robot-assisted laparoscopic repair

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Abstract

We present the case of an ectopic kidney located in the scrotum, discussing decision-making, surgical management, and outcomes. Although this is a rare pathology, we aimed to correlate this case with other reports of inguinal hernias and provide a literature review focusing on surgical and urological findings and management in similar patients. The patient is a 73-year-old man who presented with a progressive enlargement of his right inguinal area over the past 4 years. A routine computed tomography scan revealed an ectopic kidney in the scrotum, extending into a ~10 cm inguinal hernia, with severe hydronephrosis and a dilated ureter. Management options included nephropexy versus nephrectomy. A multidisciplinary approach involving general surgery and urology was employed, and the patient underwent a robot-assisted laparoscopic right inguinal hernia repair and kidney relocation. Postoperatively, renal function showed slight improvement, and no hernia recurrence was reported at the 6-month follow-up. This case highlights the importance of a multidisciplinary approach in the management of ectopic kidneys associated with inguinal hernias and contributes to the limited literature on this rare condition.

Keywords:

Case report, ectopic kidney, inguinal hernia, minimally invasive surgery, nephropexy, robotic-assisted surgery, scrotal hernia

Introduction

It been estimated that 25% of men and 2% of women will develop an inguinal hernia during their lifetime, with a bimodal presentation occurring in early life and after the age of 70 years, making its repair one of the most frequently performed surgeries in the United States. Several risk factors have been identified, including inheritance, which increases the risk of hernias by four to eight times.[1,2] A low body mass index (BMI), though seemingly paradoxical, has been proposed to reduce the risk by providing visceral fat that helps prevent abdominal organ herniation. Other risk factors include chronic constipation and chronic obstructive pulmonary disease, both of which lead to chronically increased intra-abdominal pressure, as well as Ehlers–Danlos syndrome and other connective tissue disorders due to collagen defects. Additionally, prostatectomy has been identified as a contributing factor.[1-3]

It is notable that inguinal hernias are not only common but also have a high recurrence rate, ranging from 0.5% to 15%. This variability depends on the surgeon's experience and the technique used, such as mesh repair, which has a recurrence rate of 3%–5%, compared to suture repair, with a recurrence rate ranging from 10% to 15%. Other contributing factors include technical errors leading to excessive tension on the repair, the type of hernia (with direct

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hernias having a higher recurrence rate than indirect hernias), patient gender, obesity, smoking, socio-occupational factors, steroid use, diabetes, malnutrition, and chronic cough, all of which predispose individuals to recurrence.[1,4]

The most common contents of inguinal hernias are omentum, or segments of the small bowel and colon. In women, reproductive system, including the ovary, has also been involved.[5,6] However, solid organ-containing hernias have been sporadically reported, typically in association with congenital malformations or prior surgeries.[7,8]

Bladder and ureteral herniation have been documented, with bladder involvement occurring in 1%–4% of inguinal hernia cases.[7] In the case of ectopic kidneys, Bochdalek hernias, a congenital diaphragmatic hernia, have been described in the literature with renal ectopia, as well as renal ectopias occurring after trauma or surgery. Herniation of a kidney into the lumbar region has been reported in the context of an ectopic pelvic kidney, supernumerary kidneys, or following a kidney transplant. However, such occurrences, especially in the context of a patient without risk factors such as prior surgeries or trauma, remain rare and sporadic.[6,8-12]

One possible explanation for these cases is nephroptosis, or a "floating" or mobile kidney, an underreported condition characterized by a kidney descending more than two vertebral bodies or over 5 cm when the patient moves from a supine to an upright position.[13] In fact, cases of "extreme nephroptosis" have been reported, where the "floating kidney" is located within an inguinal–scrotal hernia.[14]

In the following abstract, we present a case of renal ectopia, specifically located in the scrotal sac, with surgical correction relieving symptoms and improving kidney function.

Case Description

Background

A 73-year-old man with a medical history of hypertension, hyperlipidemia, gastroesophageal reflux disease, atrial fibrillation, and stage 4 chronic kidney disease was referred for evaluation of a right inguinal hernia containing the right kidney. His surgical history included a laparoscopic cholecystectomy in 2011, complicated by choledocholithiasis and pancreatitis, which required a temporary tracheostomy and PEG tube due to swallowing difficulties.

The patient reported progressive enlargement of the right inguinal area since 2021, with no associated pain or obstructive symptoms [Figure 1]. Physical examination revealed a BMI of 31.9 and a large, non-tender right inguinal mass. An initial computed tomography (CT) scan revealed an ectopic right kidney located in the scrotum, extending into a ~10 cm inguinal hernia, with severe hydronephrosis and a dilated ureter Figure 2]. A renal function study showed the left kidney contributing 88% of total function, while the right kidney accounted for 12%.

Management options included nephropexy versus nephrectomy. General surgery, in conjunction with urology, performed a robot-assisted laparoscopic right inguinal hernia repair. A peritoneal flap was created, and

Figure 1: Enlargement of the right inguinal region

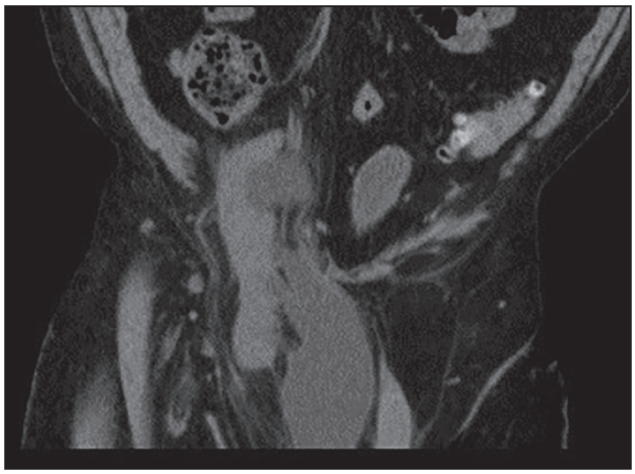

Figure 2: Abdominopelvic computed tomography scan revealing an ectopic kidney located within the scrotum

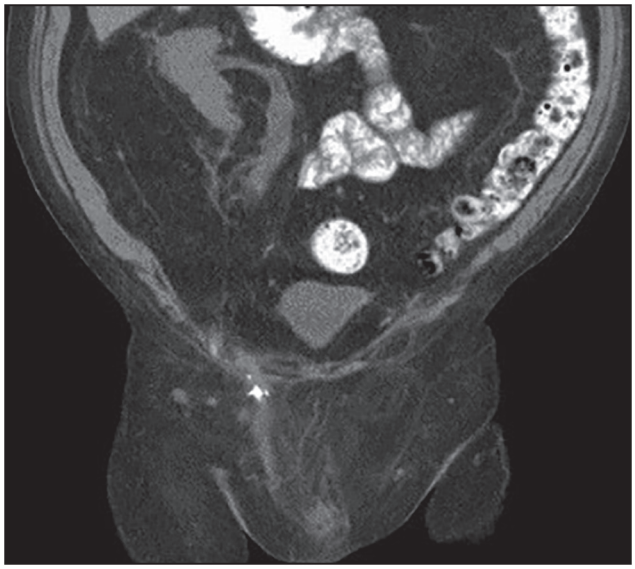

Figure 3: Post-op computed tomography scan: Right kidney repositioned in the abdominal cavity

the internal inguinal ring had to be incised and enlarged to facilitate reduction. Following kidney repositioning, the internal ring was reapproximated. An extra-large 3D Max Mid™ mesh was positioned, and the peritoneal flap was subsequently closed. A right ureteral stent was then placed. Postoperative CT scan of the abdomen and pelvis confirmed the right kidney had been successfully repositioned within the abdomen [Figure 3].

Surgical procedure in detail

The patient was placed under general anesthesia and positioned in reverse Trendelenburg. A Veress needle was introduced at the left upper quadrant for insufflation, followed by the placement of an 8-mm optical trocar superolateral to the umbilicus. Additional 8-mm trocars were inserted bilaterally, and a 12-mm AirSeal® trocar was placed in the left upper quadrant.

Upon exploration, a large right inguinal hernia was observed containing bowel and an ectopic kidney. The patient was repositioned in Trendelenburg with the right side elevated, and the surgical robot was docked.

A peritoneal flap was created approximately 6 cm cephalad to the hernia defect. Dissection was extended medially and laterally until Cooper's ligament, and the femoral space was well exposed. A large indirect hernia defect was noted, containing herniated bowel and the ectopic kidney.

Meticulous dissection was performed to fully reduce the hernial sac and contents. The internal ring was incised and enlarged to facilitate complete reduction. Once the kidney was repositioned, further mobilization of the right spermatic cord was performed. The right cord was partially ligated using a 45-mm Endo GIA™ stapler. This decision was made to allow for the possibility of testicular survival and to reduce venous stasis, preserving some vascular supply to the testis and potentially decreasing postoperative congestion and chronic scrotal pain.

It is worth mentioning that the testicle could not be identified during this procedure, likely due to the significant enlargement of the testicular sac caused by the presence of the kidney in the scrotum, and because the testis was possibly atrophic given the patient's age, making identification even more challenging.

Additional fat was mobilized from the abdominal wall around the hernia site. The hernia repair and retroperitonealization of the kidney was completed. The internal ring was reapproximated using 1–0 Stratafix™ suture, and an 10 × 15 cm extra-large 3D Max mid mesh was positioned and secured medially to Cooper's ligament and laterally to the anterior abdominal wall with 2–0 Vicryl suture. The peritoneal flap was then closed with 3–0 barbed suture.

After the hernia repair, a 6 × 28 JJ ureteral stent was placed on the right pelvic kidney.

Completion and postoperative course

At the end of the procedure, all instruments were removed, and the abdomen was desufflated. The fascia was closed with 0 Vicryl, and the skin incisions were closed with 4–0 Monocryl and reinforced with a topical skin adhesive. The patient was successfully extubated and transferred to the post-anesthesia care unit in stable condition.

Operative time

One hour 47 min.

Findings

- Large right scrotal inguinal hernia containing an ectopic pelvic kidney.
- Hernia successfully reduced after dividing the internal ring.
- Repair performed with primary closure of the internal ring and reinforcement with mesh.

Complications

None reported.

Estimated blood loss

General Surgery: 20 cc.

Urology: 50 cc.

Drains and Implants

Implants: Extra-large three-dimensional Max mid mesh.

Drains: 6 × 28F JJ right ureteral stent and a 16F Foley catheter.

Postoperative care and follow-up

The patient was transferred to the intensive care unit for overnight monitoring. Two days later, he was discharged. A ureteral stent placed during surgery was maintained for 40 days to ensure adequate drainage and protect the remaining urinary tract. Two weeks postoperatively, he developed a significant hydrocele due to the large scrotal sac. This was successfully treated with scrotoplasty and hydrocelectomy, along with orchiectomy. The testis could not be preserved as it was atrophic and functionally compromised, which was consistent with intraoperative findings during the initial surgery. The patient had been informed preoperatively about the potential need for orchiectomy given the size of the hernia containing the kidney and the likelihood of testicular atrophy. As a result of the procedure, creatinine decreased from 2.86 to 2.01 mg/dL, and estimated glomerular filtration rate improved from 23 to 34 mL/min/1.73 m². At the 6-month follow-up, no recurrence of the hernia was noted.

Discussion

This 73-year-old man had several risk factors for developing an inguinal hernia, including advanced age, male sex, and a history of prior abdominal surgery, which could have weakened the abdominal wall. Although obesity is generally considered a protective factor, his hernia still developed, likely due to other underlying factors such as increased intra-abdominal pressure from past medical conditions.

One possible explanation for this rare presentation is the presence of wide hernial openings and weak fixation of the perinephric fat to Gerota's fascia. This theory is supported by Shchukin *et al*.[14] who analyzed cases in the literature and found similar patterns in patients with this condition.[14]

In such cases, the decision between nephropexy and nephrectomy should be carefully considered on an individual basis, given the high morbidity and mortality associated with nephrectomy.

Although renal hypermobility is often subclinical, nephroptosis has been reported as symptomatic in some cases or as a contributing factor to complications such as hernia strangulation. When the urinary system is involved, leading to ureteral obstruction, urinary symptoms, risk of strangulation, or in this case, worsening of renal insufficiency, surgical correction is indicated.[6]

Eight cases of inguinal hernias containing the kidney have been described in the literature.[15-22] Among these, four cases were managed conservatively due to the patients' overall condition or comorbidities,[19-22] one case did not specify the treatment,[15] and three cases were corrected surgically using an open approach—all of which included hernia repair and repositioning of the kidney.[16-18] Notably, in one of the cases, the initial laparoscopic approach was converted to an open procedure due to adhesions and difficulty in reducing the hernia.[17] In contrast, to the best of our knowledge, this is the first reported case of an inguinal hernia containing a native orthotropic kidney whose surgical correction was performed using a robotic approach.

Highlighting that the correction of these rarely reported pathologies should adhere to the same fundamental principles that guide the treatment of any inguinal hernia.

Given this patient's chronic kidney disease, kidney preservation was prioritized to maintain renal function as much as possible.

Robotic-assisted nephropexy for nephroptosis has been described as a feasible technique. The approach is similar to laparoscopic nephropexy; however, it typically requires four ports.[23] In this case, due to the large volume of the hernia sac contents, an additional assistant port was used to achieve proper traction and counter-traction during the procedure.

Once performed, the procedure results in an uncomplicated postoperative course and an improvement in renal function, making it a successful approach. Therefore, it is expected that this technique can be reproduced in similar cases.

Conclusion

A comprehensive evaluation, carefully planned surgical approach and case individualization, involving an interprofessional team as urology and general surgery, are key to achieving a successful outcome.

For cases with large hernia sacs, extending the hernial ring through dissection and, if needed, using an additional assistant port alongside the four robotic arms can provide better traction and counter-traction, making it easier to reduce the herniated mass, in this case, the kidney.

To improve postoperative outcomes, placing a JJ stent and a urinary catheter is recommended. Given the distorted anatomy, ensuring proper urine drainage helps prevent complications such as kinking or stenosis, allowing for an unobstructed flow.

Successfully reducing the hernia and preserving the patient's right kidney had a positive impact on the progression of chronic kidney disease. However, ongoing monitoring of renal function remains essential to reduce long term morbi-mortality.

In some cases, nephrectomy may still be necessary if hernia reduction is not feasible, poses a significant risk

to the patient's life, or leads to increased morbidity. Each case should be approached individually, balancing the risks and benefits to achieve the best possible outcome.

Robotic-assisted nephropexy is a viable option in the context of reducing complex inguinal hernias, particularly in cases involving large hernia sacs and patients with anatomical distortions such as renal ectopia.

Author contributions

LKF.: Conceptualization, Project Direction, Writing – Original Draft Preparation.

FE: Literature Review, Writing – Review & Editing.

JPD.: Literature Review, Writing – Review & Editing.

AL.: Literature Review, Writing – Review & Editing.

RS.: Surgical planning and Procedure, Supervision, Project Administration, Writing – Review a Final Approval.

Ethical policy and Institutional Review Board statement

This case report was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Given that this is a retrospective case report involving a single patient with no identifying information disclosed, Institutional Review Board approval was not required. Written informed consent was obtained from the patient for the publication of clinical details and images.

Declaration of patient consent

The patient provided written informed consent for the procedure after a thorough discussion of the risks, benefits, and alternatives. Additionally, he granted permission for the publication of relevant clinical details and materials related to his case.

Data availability

All relevant data related to this case report are included within the manuscript. No additional datasets were generated or analyzed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Nil.

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