



# Advantages of minimally invasive approach for inguinal bladder hernia repair: case report and literature review

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**Abstract:** Inguinal bladder hernia (IBH) is a rare disease, with only 73 adult cases being reported in Medline over the past decade, 75 cases including the present report. Its preoperative diagnosis is difficult without typical presentation; however, the three most common signs/symptoms are urinary frequency, two-stage urination and acute kidney injury (AKI). Prompt diagnosis should be made in patients presenting with an inguinoscrotal mass along with the aforementioned symptoms. According to a review of the literature of the last decade, 93.3% of IBH diagnoses were made prior to surgery, compared to fewer than 10% in the past century. However, documented cases show that IBH is associated with significant complications if diagnosis is delayed. In addition, there were no reports on the laparoscopic extended-totally extraperitoneal (eTEP) in such cases. Herein, we report 2 cases of IBH along with the literature review. The first patient was diagnosed with IBH during open hernioplasty using saline insufflation via a Foley's catheter. The second patient presented as an early recurrence, with incarceration after ipsilateral open hernioplasty. This case was diagnosed and successfully treated by eTEP repair. All patients recovered without complications. We aimed to report the diagnosis and surgical approach in IBH along with evidence-based discussion from published studies. The eTEP approach was feasible and safe for the treatment of an incarcerated extraperitoneal type of IBH. The advantages of a minimally invasive approach for IBH are discussed in this report.

**Keywords:** Case report; hernioplasty; inguinal bladder hernia (IBH); inguinal hernia; laparoscopy

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## Introduction

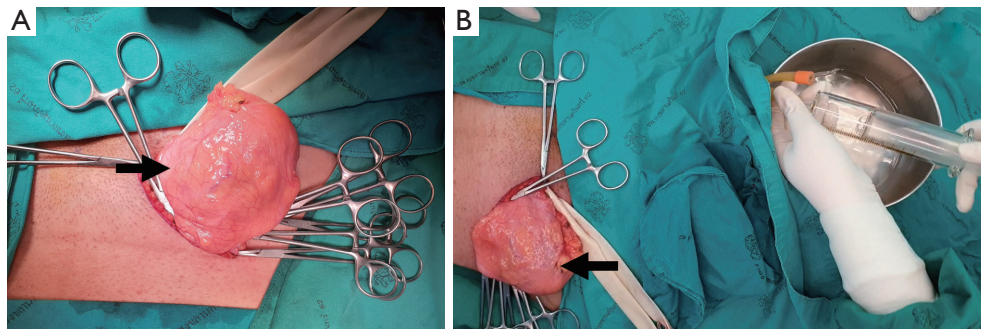
Inguinal bladder hernia (IBH) is a rare disease, accounting for 0.5% of all inguinal hernias (1). Given to the rarity of the disease, patients with IBH are at risk for misdiagnosis during preoperative evaluation. Indeed, acute kidney injury (AKI), or even multiorgan failure (MOF) might be a result of delayed diagnosis (2,3). Upon diagnosis being made, open hernioplasty has been the treatment of choice; however, literature reviews have demonstrated that some patients with IBH have been treated with ipsilateral

open hernioplasty (4,5). There are some advantages of a laparoscopic approach in such cases, specifically to the laparoscopic extended-totally extraperitoneal (eTEP) to be discussed. We present the following case in accordance with the CARE reporting checklist (available at <https://ls.amegroups.com/article/view/10.21037/ls-21-19/rc>).

## Case presentation

We report on two cases of IBH and the literature review,

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**Figure 1** Insufflation of bladder to confirm inguinal bladder hernia: (A) distended bladder (arrow) after insufflation; (B) insufflation of saline via Foley's catheter.



**Figure 2** Right scrotal mass (white arrows), 5 cm × 5 cm in size extended from the most medial part of inguinal area corresponding to the superficial inguinal ring (dot circle).

using the following method: we conducted the literature search on Ovid (Medline), using the MeSH term: inguinal hernia, bladder hernia or “inguinal bladder hernia”, herniorrhaphy, and hernioplasty. The results were limited to an adult population, in the English language and between 2011 and 2021; last search date was on August 4, 2021.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (approval No. REC.64-406-10-3) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patients for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

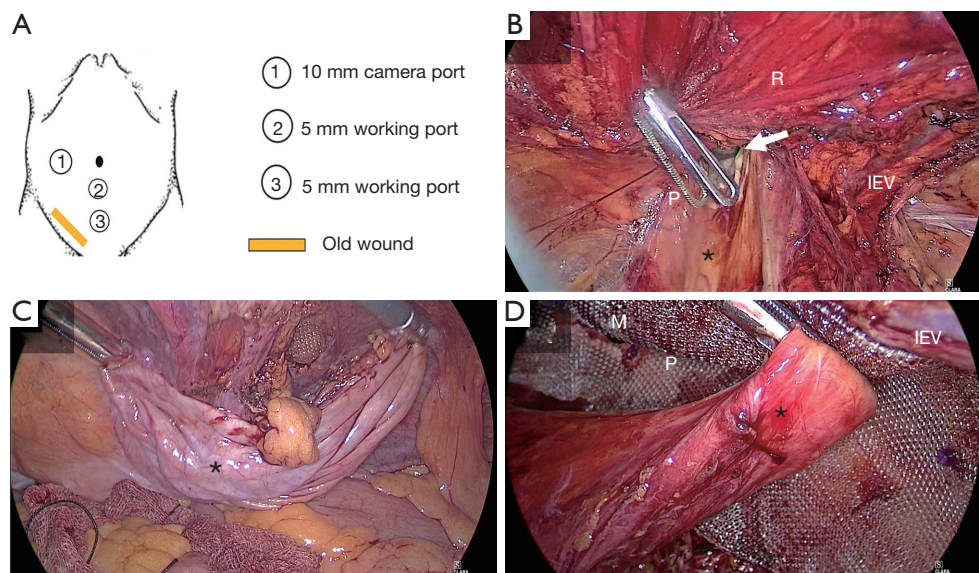
### **Clinical case 1**

The first case was a 60-year-old, male presenting with a

right groin mass for 1 year, without urinary symptoms. He was diagnosed with indirect inguinal hernia (IIH) and underwent an open hernioplasty. During the operation, we found 4 cm × 3 cm sized, sac-like structures with complete separation from the spermatic cord, protruding medially to the inferior epigastric vessels; suspected for urinary bladder. To confirm that the sac-like structures were from the urinary bladder, saline insufflation via a Foley's catheter was used (*Figure 1*). Once confirmation was made, the urinary bladder was reduced, unopened to the extraperitoneal space. Light-weighted, polypropylene mesh, 15 cm × 10 cm in size, was used and completion of hernioplasty via the Lichtenstein technique was performed. The postoperative period was uneventful, the patient was discharged on postoperative day 2 and there was no clinical evidence of recurrence on follow-up at 6 months.

### **Clinical case 2**

For the second case, a 67-year-old, male presented with a right groin mass, with difficult urination for 1 year. He was diagnosed as having a direct inguinal hernia with benign prostatic hypertrophy (BPH), and underwent open hernioplasty via the Lichtenstein technique. On postoperative day 4, he had a recurrent, irreducible tendered right scrotal mass, 5 cm × 5 cm in size, that extended from the most medial part of the inguinal area (*Figure 2*); this was accompanied with marked abdominal distension. His preoperative diagnosis was recurrent hernia with small bowel obstruction (SBO). Our decision was to undertake a posterior approach, using the eTEP technique (*Video S1*). The eTEP was selected instead of TEP because of two reasons: first, a short distance between an umbilicus and pubic tubercle, second, an incarceration of hernia which might causing a narrow view in



**Figure 3** Laparoscopic preperitoneal repair findings: (A) ports placement; (B) hernia defect (arrow) located at just anterolateral to pubic tubercle (P), close to the origin of rectum muscle (R) and medial to inferior epigastric vessels (IEV); (C) the peritoneoscopy shows redundant viable bladder (\*); (D) mesh placement cover all potential defects including pubic tubercle (P) and midline (M).

TEP. Under general anesthesia, the patient was placed in the supine position. Ports placement are shown in *Figure 3A*. The retro-rectus space was created using a Hegar's dilator and balloon spacer. We performed dissection of the retropubic as well as the lateral space, until reaching the anterior-superior iliac of the spine. Identification of spermatic contents confirmed no IHH component. The hernia defect (*Figure 3B*) was located through the anterosuperior to the pubic tubercle area, corresponding to the superficial inguinal ring externally (*Figure 2*). The content was reduced back; thus, clearly confirming the urinary bladder (*Figure 3C*), and was then reduced to its anatomical position. The pseudosac (transversalis fascia) was then fixed with the abdominal wall. Three-dimension mesh, 10 cm × 15 cm in size, was placed over the defect and the myopectineal orifices (*Figure 3D*).

The postoperative period was uneventful, the patient was discharged on postoperative day 5. The patient was free of urinary symptoms, and there was no clinical evidence of recurrence on follow-up at 7 months.

### Literature review

Thirty-four original articles, with 73 cases of IBH have been reported over the past decade; 75 cases including this present report, with most IBHs being diagnosed preoperatively (2-4,6-27); accounting for 93.3% (70 of

75 patients). Computed tomography (CT) scanning is the imaging of choice in 26 of 34 articles (2-4,6,7,9-11). Of the total, 4.0% (3 of 75 patients) were diagnosed during operation (5,23). Surprisingly, 10.7% (8 of 75 patients) had surgical repair of their ipsilateral inguinal hernias (4-6,22,23), with only two patient undergoing transabdominal preperitoneal (TAPP) repair (15,22). The most common three presentations were: urinary frequency (14-16,18,21,22,24,27-29), two-stage urination (3,8,12,15,19,23,24,26,28,30,31) and AKI (2,3,9-11,21,27,32-34) accounting for 17.3%, 16.0% and 12.0%, respectively. It was also noticed that one-third of the patient are asymptomatic and five patients presenting with only an inguinal mass without urinary symptoms (5,20). Summary of reported cases are presented in *Table 1*. The possible presenting symptoms and signs are summarized in *Table 2*.

### Discussion

This present study has added two new cases of IBH to the body of literature; moreover, this report includes the first case of a laparoscopic eTEP approach for treatment of IBH. Open hernioplasty may result in recurrence, if the hernia is extraperitoneal bladder type with herniated through the pubic tubercle area. Hence, a laparoscopic approach seems to be superior to an open repair; in terms of diagnosis and

**Table 1** Summary of case reports on diagnosis and treatment of inguinal bladder hernia

| Authors                                  | n  | Clinical presentations <sup>†</sup>                       | Previous hernia repair | Time of diagnosis | Diagnostic test                                  | Surgical approach | Complications  | Recurrence <sup>‡</sup> (month) |
|--|----|---|------------------------|-------------------|--|-------------------|----------------|---------------------------------|
| Bernhardson <i>et al.</i> (4), 2021      | 1  | Urinary retention   | Ipsilateral, open      | Pre-op            | CT scan  | Open              | Bladder injury | No (N/A)                        |
| Tome <i>et al.</i> (6), 2021             | 1  | Scrotal pain, hematuria, oliguria                         | Bilateral, robotic     | Pre-op            | CT scan  | Open              | N/A            | N/A                             |
| Levi <i>et al.</i> (2), 2020             | 1  | Urinary retention, hematuria, AKI                         | No                     | Pre-op            | CT scan  | Open              | ESRD           | No (N/A)                        |
| Gonzalez-Urquijo <i>et al.</i> (3), 2019 | 5  | Two-stage urination [2], abdominal pain [2], MOF [1]      | No                     | Pre-op            | CT scan [3], US and cystography [2] <sup>†</sup> | Open              | None           | No (28)                         |
| Cimadamore <i>et al.</i> (7), 2019       | 1  | Hematuria   | No                     | Pre-op            | CT scan  | Open              | None           | N/A                             |
| Wang <i>et al.</i> (8), 2018             | 1  | Two-stage urination                                       | No                     | Pre-op            | CT scan and cystography                          | Open              | None           | No [24]                         |
| Safavy <i>et al.</i> (9), 2018           | 1  | Flank and groin pain, hematuria, AKI                      | No                     | Pre-op            | CT scan, cystoscopy                              | Open              | Hydronephrosis | No [4]                          |
| Ghielmini <i>et al.</i> (10), 2017       | 1  | Oliguria, AKI   | No                     | Pre-op            | CT scan  | Open              | None           | No [6]                          |
| François <i>et al.</i> (11), 2017        | 1  | Urosepsis, AKI  | No                     | Pre-op            | CT scan  | Open <sup>§</sup> | None           | No [1]                          |
| Ugur <i>et al.</i> (12), 2016            | 1  | Two-stage urination                                       | No                     | Pre-op            | CT scan  | Open              | None           | N/A                             |
| Tokgöz <i>et al.</i> (13), 2016          | 1  | Flank pain, scrotal mass                                  | No                     | Pre-op            | CT scan  | Open              | None           | N/A                             |
| Kim <i>et al.</i> (5), 2011              | 1  | Scrotal mass  | Ipsilateral, open      | Intra-op          | None   | Open              | None           | No [2]                          |
| Khan <i>et al.</i> (14), 2014            | 2  | Urinary frequency [1]                                     | No                     | Pre-op            | US and MRI                                       | TAPP              | Scrotal        | No [6]                          |
|  |    | Urinary incontinence [1]                                  | No                     | Pre-op            | Cystogram  | TAPP              | hematoma       | No [5]                          |
| Umemura <i>et al.</i> (15), 2018         | 1  | Urinary frequency, two-stage urination                    | Bilateral, TAPP        | Pre-op            | CT scan  | TAPP              | None           | No (N/A)                        |
| Karanikas <i>et al.</i> (32), 2020       | 1  | AKI, Inguinoscrotal mass                                  | No                     | Pre-op            | US   | Open              | None           | No (N/A)                        |
| Hasegawa <i>et al.</i> (16), 2021        | 32 | Urinary frequency [4], No sensation of residual urine [1] |                        | Pre-op            | CT scan (prone position)                         | TEP               | None           | 1 of 32 patients [2]            |
| Tazaki <i>et al.</i> (17), 2019          | 1  | Abdominal pain, vomiting, diarrhea                        | No                     | Pre-op            | CT scan  | TAPP              | None           | No [24]                         |
| Namba <i>et al.</i> (18), 2020           | 1  | Urinary frequency, inguinal mass                          | No                     | Pre-op            | CT scan  | TAPP              | None           | N/A                             |
| Lee <i>et al.</i> (19), 2013             | 1  | Two-stage urination, inguinoscrotal mass                  | No                     | Pre-op            | US, CT scan, cystography                         | TAPP              | None           | N/A                             |

**Table 1** (continued)



Table 1 (continued)

| Authors                              | n | Clinical presentations <sup>†</sup>                              | Previous hernia repair | Time of diagnosis | Diagnostic test                        | Surgical approach       | Complications                           | Recurrence <sup>‡</sup> (month) |
|--------------------------------------|---|--|------------------------|-------------------|--|-------------------------|---|---------------------------------|
| Kohga <i>et al.</i> (20), 2021       | 1 | Inguinal mass  | No                     | Pre-op            | CT scan                                | TAPP                    | None                                    | No [2]                          |
| Chang <i>et al.</i> (21), 2021       | 1 | Urinary frequency, urosepsis, AKI, inguinoscrotal mass           | No                     | Pre-op            | CT scan                                | TEP                     | None                                    | N/A                             |
| AlMohaya <i>et al.</i> (22), 2019    | 1 | Urinary frequency, hesitancy                                     | Ipsilateral, TAPP      | Pre-op            | CT scan                                | Open                    | None                                    | No [1]                          |
| Moufid <i>et al.</i> (23), 2013      | 4 | Inguinoscrotal mass [1]  | Ipsilateral, open      | Pre-op            | Cystography                            | Open                    | None                                    | N/A                             |
|                                      |   | Two-stage urination [1]  | No                     | Pre-op            | Cystography                            | Open                    | None                                    | No [1]                          |
|                                      |   | Inguinal mass [1]  | No                     | Intra-op          | Methylene blue bladder instillation    | Open                    | Bladder injury                          | N/A                             |
|                                      |   | Inguinal mass, urinary incontinence [1]                          | Ipsilateral, open      | Post-op           | Exploratory laparotomy                 | Open                    | Bladder injury, intraabdominal bleeding | No [12]                         |
| Omari <i>et al.</i> (24), 2013       | 1 | Two-stage urination, urinary frequency, urgency                  | No                     | Pre-op            | US, cystography                        | Open: femoral, inguinal | None                                    | No [6]                          |
| Katsourakis <i>et al.</i> (25), 2014 | 1 | Inguinal mass, bladder tumor                                     | Contralateral, open    | Pre-op            | CT scan                                | Open                    | None                                    | No [12]                         |
| Westera <i>et al.</i> (26), 2012     | 1 | Two-stage urination, inguinoscrotal mass                         | No                     | Pre-op            | US, MRI                                | Open                    | None                                    | N/A                             |
| Ellimoottil <i>et al.</i> (27), 2012 | 1 | AKI, Urinary frequency   | No                     | Pre-op            | CT cystography                         | Open                    | None                                    | N/A                             |
| Tarchouli <i>et al.</i> (35), 2015   | 1 | Giant inguinoscrotal mass, difficult urination                   | No                     | Pre-op            | CT scan                                | Open                    | None                                    | No [6]                          |
| McKay <i>et al.</i> (30), 2014       | 1 | Two-stage urination, Inguinoscrotal mass                         | No                     | Pre-op            | CT scan                                | Open, transperitoneal   | Bladder ischemia, UTI                   | N/A                             |
| Coelho <i>et al.</i> (33), 2016      | 1 | AKI  | No                     | Pre-op            | Antegrade nephrostography, cystography | Open                    | None                                    | N/A                             |
| Karatzas <i>et al.</i> (28), 2013    | 1 | Two-stage urination, CRF, urinary frequency, inguinoscrotal mass | No                     | Pre-op            | US, CT scan                            | Open                    | None                                    | No [6]                          |
| Frenkel <i>et al.</i> (31), 2015     | 1 | Two-stage urination, urinary retention                           | No                     | Pre-op            | CT scan                                | Open                    | None                                    | No [24]                         |
| Uchio <i>et al.</i> (29), 2012       | 1 | Urinary frequency, UTI, Inguinal mass                            | No                     | Pre-op            | Pyelogram, cystoscopy, cystography     | TAPP                    | None                                    | No [24]                         |

Table 1 (continued)

Table 1 (continued)

| Authors                       | n | Clinical presentations <sup>†</sup> | Previous hernia repair | Time of diagnosis | Diagnostic test      | Surgical approach        | Complications | Recurrence <sup>‡</sup> (month) |
|-------------------------------|---|-------------------------------------|------------------------|-------------------|----------------------|--------------------------|---------------|---------------------------------|
| Ryan <i>et al.</i> (34), 2015 | 1 | Urinary retention, AKI              | No                     | Pre-op            | CT scan              | Trans-scrotal cystostomy | None          | N/A                             |
| Present report                | 2 | Inguinoscrotal mass [1]             | No                     | Intra-op          | Bladder insufflation | Open                     | None          | No [7]                          |
|                               |   | Recurrence hernia [1]               | Ipsilateral, open      | Post-op           |                      | eTEP                     |               | No [6]                          |

<sup>†</sup>, parenthesis indicates number of patients; <sup>‡</sup>, outcomes at the last follow-up; <sup>§</sup>, two-step approach: open repair after laparoscopic reduction. Pre-op, pre-operation; CT, computed tomography; N/A, not available; AKI, acute kidney injury; ESRD, end-stage kidney disease; MOF, multiorgan failure; US, ultrasonography; Intra-op, intra-operation; eTEP, extended-totally extraperitoneal; TAPP, transabdominal preperitoneal; MRI, magnetic resonance imaging; UTI, urinary tract infection; CRF, chronic renal failure.

Table 2 Summary of presenting symptoms and signs of inguinal bladder hernia

|  |
|--|
| Symptoms or signs of inguinal bladder hernia |
| Urinary frequency                            |
| Two-stage urination                          |
| Acute kidney injury                          |
| Abdominal or flank or scrotal pain           |
| Hematuria                                    |
| Urinary retention                            |
| Inguinoscrotal mass                          |
| Urinary tract infection                      |
| Oliguria                                     |
| Urinary incontinence                         |
| Hesitancy or difficult urination             |
| Sensation of residual urine                  |

repair of extraperitoneal IBH.

Regarding diagnosis of IBH, when patients have one or more of the following signs/symptoms: urinary frequency, two-stage urination, AKI in combination with an inguinoscrotal mass, in this clinical setting it is highly suggestive of IBH (2,3,6-12,15,16). CT scanning is the imaging of choice in such cases (2-4,6-13,15,17-22,25,27,28,30,31,35). Although, our second patient had abnormal urinary symptoms, the diagnosis of IBH was still missed during pre-operative and intra-operative of open hernioplasty. We revealed that the missed diagnosis of IBH was attributed to the location of the herniated

bladder through the pubic tubercle area corresponding to the superficial inguinal ring. During open hernioplasty, this area is usually not covered by mesh; thus, the IBHs could be missed during surgery. This is consistent with reported series with history of ipsilateral open hernioplasty (4-6,22,23). This patient had an incarcerated hernia with suspected SBO that necessitated emergency surgery, so, preoperative CT scan was not performed. The early diagnosis of IBH is of paramount importance, as AKI, MOF and end-stage renal disease are the results of delayed diagnosis (2,3). We found that, if IBH is suspected during an operation, insufflation of the bladder, via a Foley's catheter, is both a simple and valid tool for diagnosis.

In cases of preoperatively diagnosed IBH, either an open or laparoscopic approach can be used. However, laparoscopy has a number of advantages over an open procedure; including, shorter hospital stay, an earlier resume to daily activities, better cosmetic results, and equally low or reduced complication rates, are indeed a few of the benefits (36). In addition, TEP approach had been the preferred approach in extraperitoneal type of IBH compared to intraperitoneal and paraperitoneal type. Regarding IBHs in whom preoperative diagnosis could not be made or were recurrent after an anterior approach, we found that a laparoscopic eTEP approach offers clearer visibility of the hernia defect and content, avoids surgery in distorted anatomy or dense fibrous scarring. Moreover, wider operative field attributed to eTEP might be more suitable in an incarcerated case than TEP. Hence, laparoscopic eTEP would contribute to increased diagnostic yield, and a decreased chance of bladder injury. Furthermore, evidence has shown that an anterior approach has more pubic tubercle recurrence than a

posterior approach (37). The extraperitoneal posterior mesh placement ensures the covering of all potential defects (37); including, more medially, and the pubic tubercle or extraperitoneal type of IBH (16).

## Conclusions

IBH is a rare disease, and prompt diagnosis should be made in patients presenting with an inguinoscrotal mass along with urinary frequency, two-stage urination, AKI. Bladder insufflation is a simply tool for intraoperative diagnosis. Additionally, Laparoscopic eTEP repair might offer advantages of diagnosis and repairing of incarcerated extraperitoneal type of IBH.

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## Footnote

*Reporting Checklist:* The authors have completed the CARE reporting checklist. Available at <https://ls.amegroups.com/article/view/10.21037/ls-21-19/rc>

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at <https://ls.amegroups.com/article/view/10.21037/ls-21-19/coif>). The authors have no other conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee (approval No. REC.64-406-10-3) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patients for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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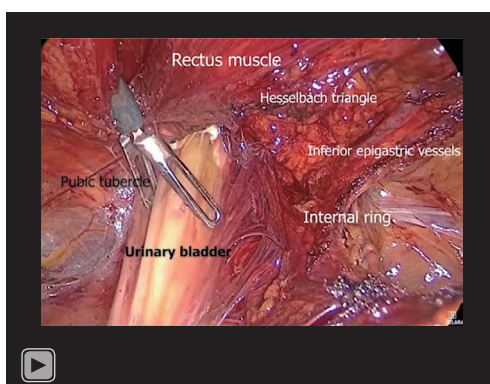
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**Video S1** Demonstration of laparoscopic extended-totally extraperitoneal hernia repair in the inguinal bladder hernia.