

The Partial Iliopubic Tract Resection Technique for Incarcerated Femoral Hernia: A Case Series and a Literature Review

Kioto Yokoyama ¹, Keisuke Tomoda ¹, Satoru Takayama ¹

Review began 04/22/2024

Review ended 05/31/2024

Published 06/23/2024

© Copyright 2024

Yokoyama et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

¹. General Surgery, Nagoya Tokushukai General Hospital, Kasugai, JPN

Corresponding author: Kioto Yokoyama, kykyky0930@gmail.com

Abstract

Femoral hernias have a high incarceration rate, often necessitating urgent surgical intervention. In this report, we present a safe and reproducible laparoscopic technique for incarcerated femoral hernias with bowel involvement, including repair.

Between December 2022 and May 2023, three female patients with incarcerated femoral hernias underwent urgent laparoscopic surgery. All patients presented with abdominal pain and were diagnosed with small bowel incarceration using computed tomography. Under laparoscopy, we confirmed intestinal incarceration and performed a standard transabdominal preperitoneal approach to identify the hernia defects. The iliopubic tract on the abdominal side of the hernia defect was carefully dissected using an energy device to enlarge the hernia orifice. A spontaneous reduction of the incarcerated intestine was achieved. After confirming the absence of bowel perforation, mesh was placed to repair the hernia. Following peritoneal closure, the affected part of the intestine was extracorporeally resected and anastomosed. We performed this technique on three patients, all of whom were later discharged without complications.

In conclusion, for incarcerated femoral hernias with bowel obstruction, laparoscopic partial division of the iliopubic tract enables an easy, safe, and reproducible approach to incarceration release and subsequent hernia repair.

Categories: Gastroenterology, Emergency Medicine, General Surgery

Keywords: incarcerated femoral hernia, laparoscopic repair, iliopubic tract division, bowel obstruction, minimally invasive surgery

Introduction

Femoral hernias, although less common than inguinal hernias, pose a significantly high risk of incarceration, with 35-43% of cases requiring emergency surgery, often involving bowel resection [1,2]. Among older adults, reports suggest a mortality rate of approximately 5% in patients who undergo emergency surgery for femoral hernia [3-5]. This underscores the critical importance of prompt and effective treatment for femoral hernia incarceration within the context of acute abdominal conditions. Recently, emergency laparoscopic surgery has gained traction and its effectiveness has been well substantiated. Femoral hernias are prone to incarceration owing to the strong ligamentous structure of the femoral ring.

We present a series of three consecutive cases of incarcerated femoral hernias treated with emergency laparoscopic surgery. Our approach involved partial resection of the iliopubic tract (IPT) and enlargement of the hernia orifice, enabling a safe release of the incarcerated content. Concurrent hernia repair was achieved using the same laparoscopic technique. This minimally invasive approach is considered safe and reproducible, and does not require advanced technical skills. Here, we discussed our experience with emergency surgery for incarcerated femoral hernias and described the surgical technique based on a review of the literature.

Case Presentation

Between December 2022 and May 2023, three female patients with incarcerated right femoral hernias were admitted as emergency cases. All patients presented with abdominal pain and were transported to the hospital via emergency medical services. A reduction in hernia content was not possible in all instances. Preoperative computed tomography (CT) scans confirmed small bowel incarceration with intestinal obstruction, prompting urgent laparoscopic surgery.

All patients underwent laparoscopic repair of a right femoral hernia with intestinal obstruction using general anesthesia. A vertical incision was made above the umbilicus and a 5-mm trocar was inserted using the optical method with a 5-mm direct-view endoscope. The abdominal cavity was then examined to assess for adhesions. Further, a 5-mm port was placed >4 fingerbreadths outward to the right from the first port.

How to cite this article

Yokoyama K, Tomoda K, Takayama S (June 23, 2024) The Partial Iliopubic Tract Resection Technique for Incarcerated Femoral Hernia: A Case Series and a Literature Review. Cureus 16(6): e62985. DOI 10.7759/cureus.62985

Additionally, another 5 mm port was inserted between the first port and the left anterior superior iliac spine, positioned >4 fingerbreadths away from the first port (Figure 1). Gauze manipulation was performed using 3 mm laparoscopic grasper forceps.

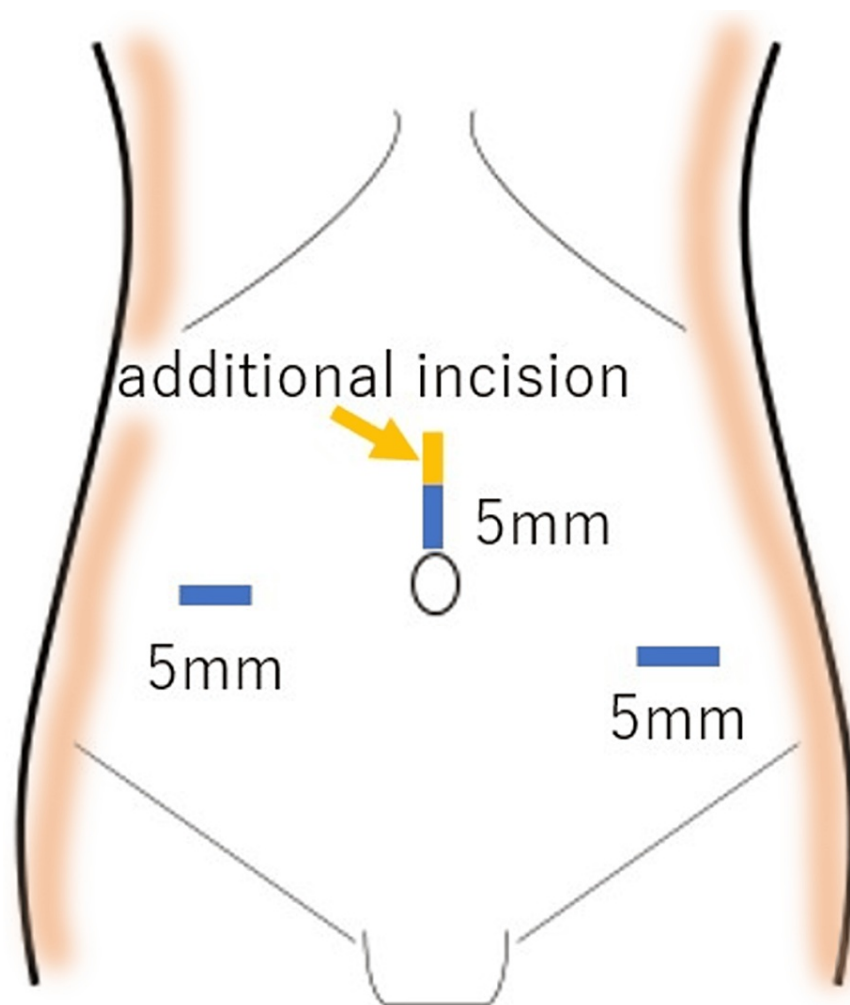


FIGURE 1: Port placement and skin incision

Three 5 mm ports were placed as shown in this figure. Additionally, a midline incision was made after hernia repair to perform bowel resection.

Image created by the authors.

In all three cases, the small intestine was incarcerated in the femoral ring. Intestinal traction was minimized owing to the risk of perforation. The initial step involved creating a peritoneal incision extending from the hernia orifice to the medial umbilical fold (Figure 2). The preperitoneal space was then dissected and the round ligament of the uterus was separated using laparoscopic coagulation shears (LCS). The preperitoneal space was expanded by dissecting the hernial orifice, allowing IPT identification (Figure 3). Subsequently, the space between the IPT and incarcerated intestine was gently dissected using forceps to create a slight separation, followed by partial division of the IPT using LCS (Figure 4). During this process, the tissue padding of the LCS was oriented toward the intestinal side to ensure adequate precautions against intestinal injury. The incarcerated small intestine was naturally released by dissecting a few millimeters of the IPT (Figure 5). None of the three patients exhibited perforation of the small intestine.

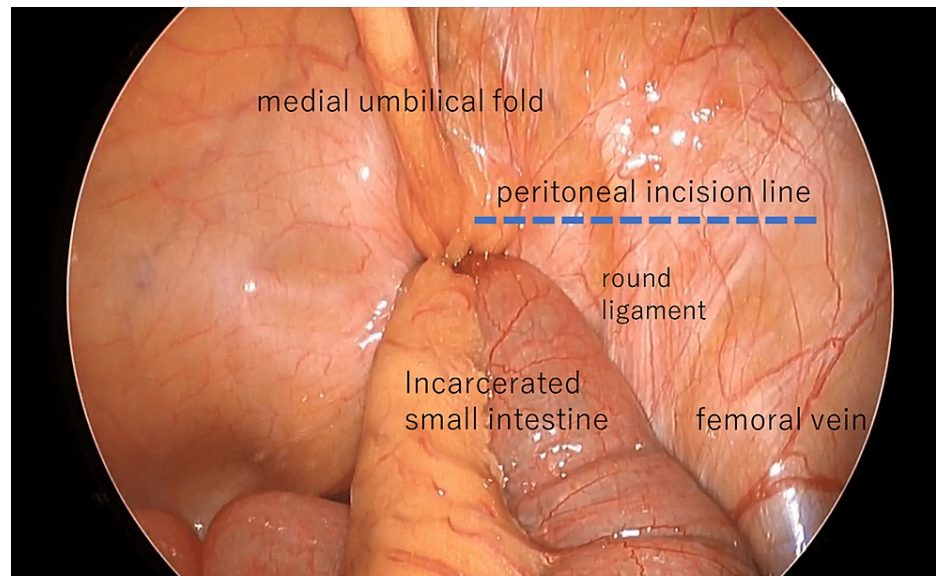


FIGURE 2: Right femoral hernia with incarcerated small intestine

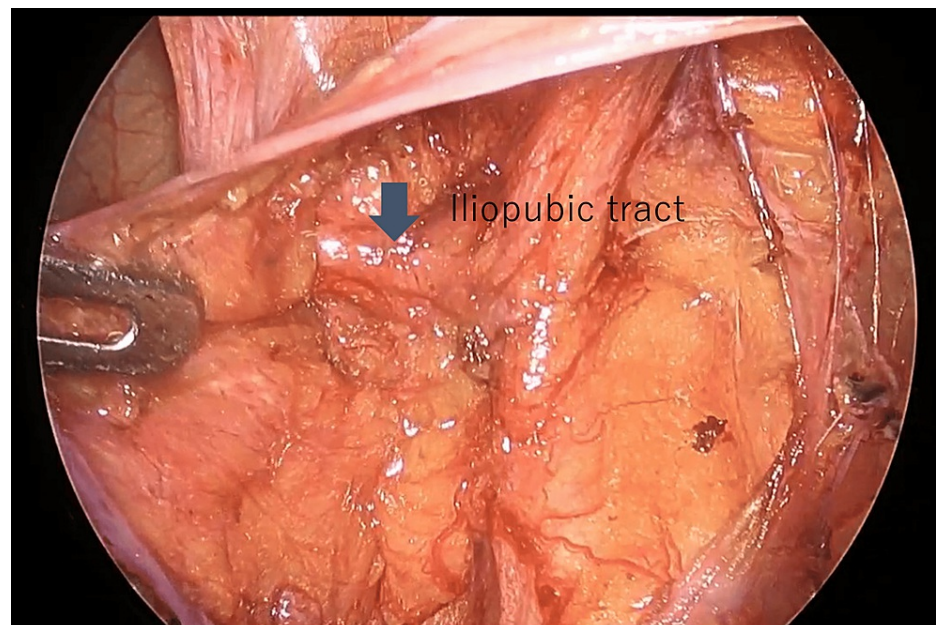


FIGURE 3: IPT findings on laparoscopy

After dissecting the peritoneum and separating the preperitoneal fat, the IPT that forms the head side of the hernia gate is identified.

IPT: iliopubic tract

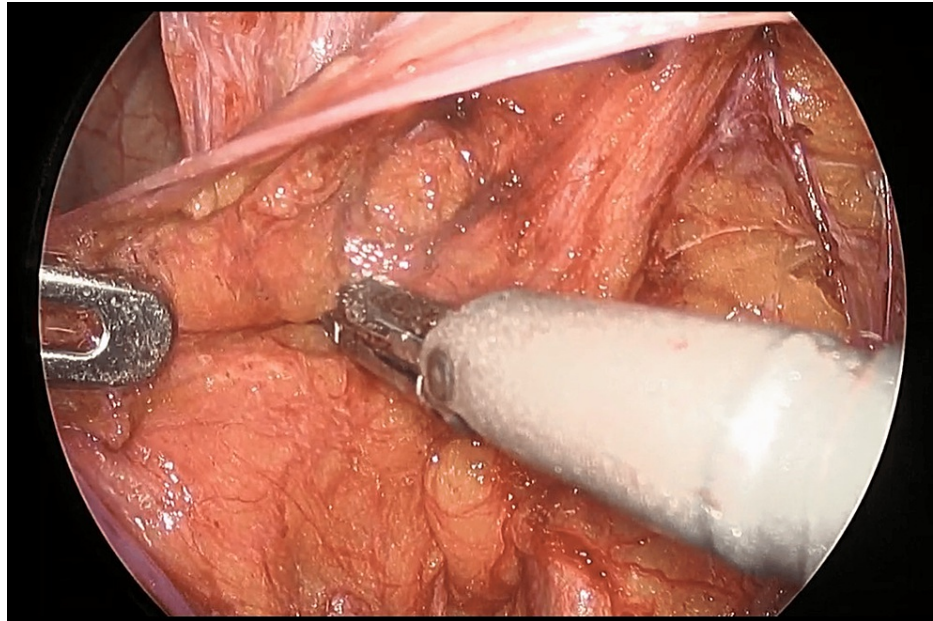


FIGURE 4: Partial iliopubic tract resection

Positioning the tissue padding of the LCS with the bowel side up, taking great care to avoid intestinal injury, and then detaching the IPT.

LCS: laparoscopic coagulation shears; IPT: iliopubic tract

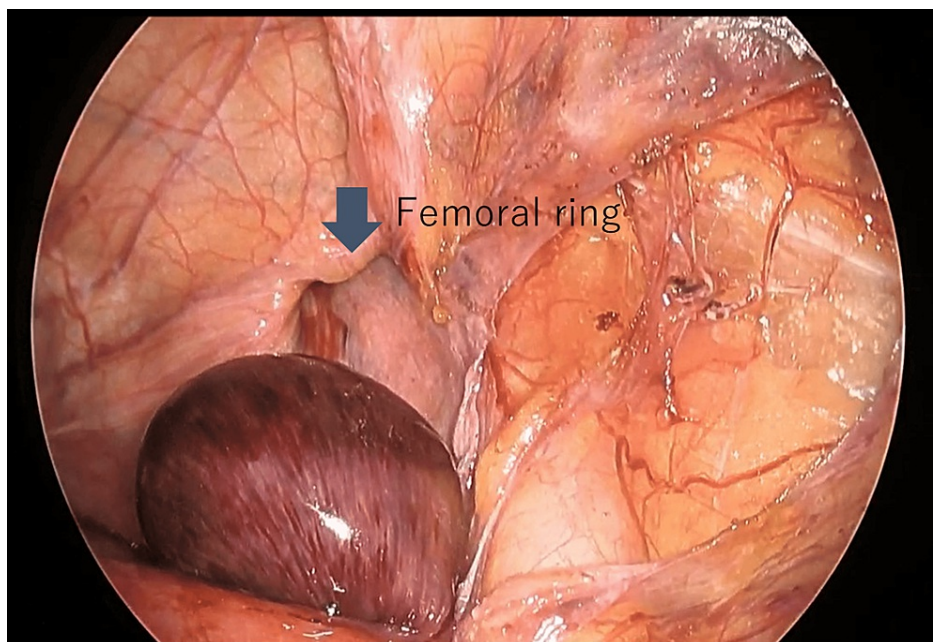


FIGURE 5: The reduction of hernia incarceration

By detaching the IPT, it is possible to release the hernia without the need for intestinal traction.

IPT: iliopubic tract

Dissection around the hernia orifice was adequately performed, and a lightweight monofilament polypropylene mesh (size: 7.9 cm × 13.4 cm in two cases, 10.3 cm × 15.7 cm in one case) was placed for repair (Figures 6, 7). Absorbable tacks (five per patient) were used to secure the mesh to Cooper's ligament, inferior epigastric vessels on both sides, rectus abdominis, and external oblique aponeurosis. Furthermore, the peritoneum was closed using a 3-0 braided absorbable suture (Figure 8).

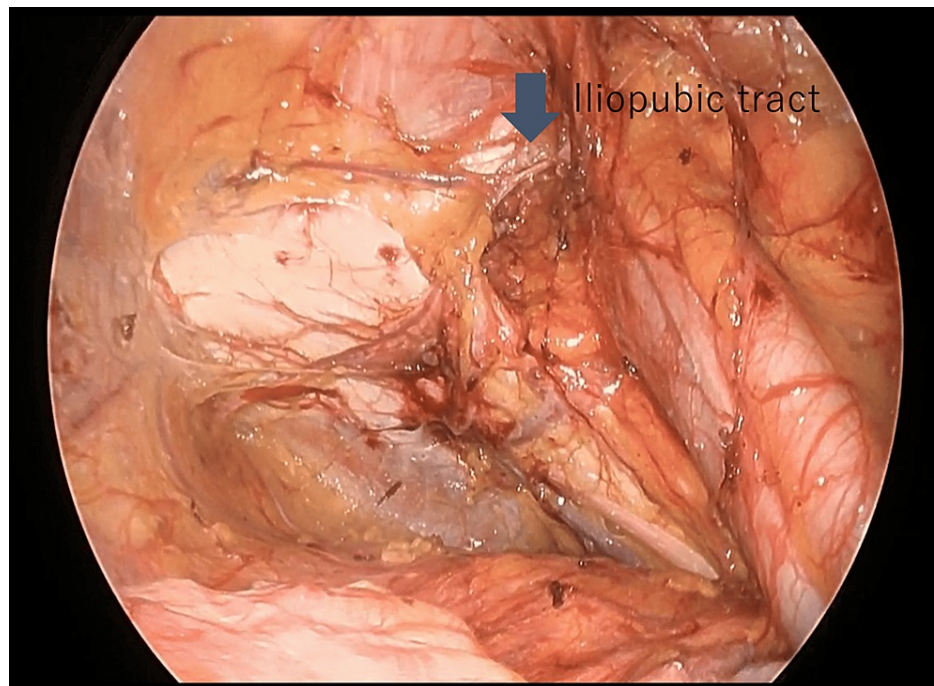


FIGURE 6: A complete dissection of the area surrounding the hernia orifice

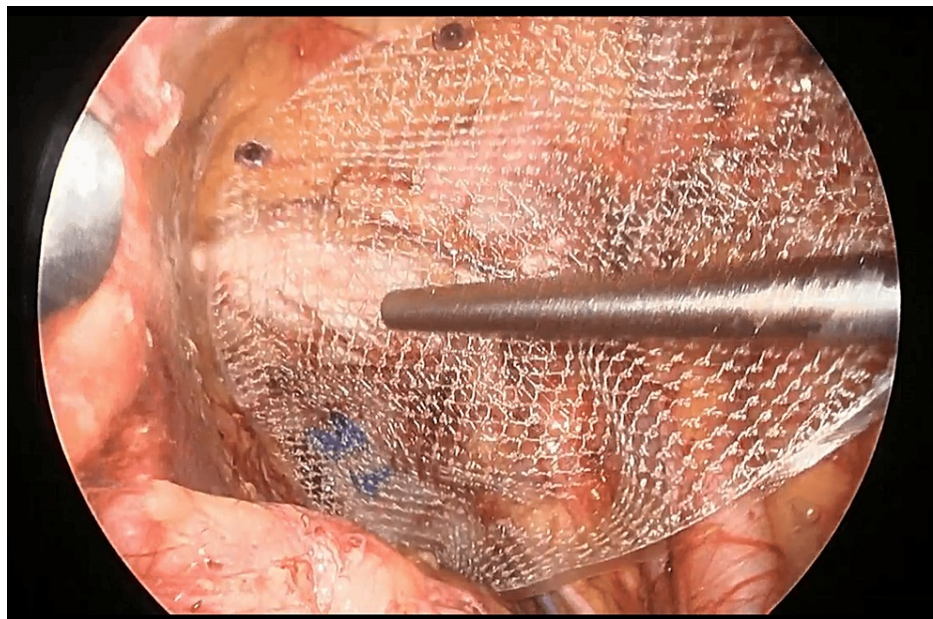


FIGURE 7: Place a mesh and secure it with tacks



FIGURE 8: Closure of the peritoneum

The peritoneum was closed using a 3-0 braided absorbable suture.

In all cases, the reduced incarcerated small intestine was necrotic with no prospect of blood flow recovery. The incision at the umbilicus was extended by 3 cm and the wound edges were protected. The necrotic small intestine was then exteriorized, resected, and anastomosed.

The median operative time was 135 minutes (range: 103-233 minutes). One patient had extensive adhesions in the right lower abdomen, which led to a longer surgical duration. All patients experienced positive postoperative recovery and were discharged within a week. One patient developed a postoperative seroma that resolved with observation. The mean follow-up period was three months (range: 1-6 months), with no hernia recurrences reported (Table 1).

Age	Sex	Height/BMI	Symptoms	Duration of Symptoms (h)	Operating Time (min)	Mesh Size	Postop Stay (day)	Complications	Recurrence
70	F	152/15.6	Abdominal pain	3	103	M	5	Seroma	No
79	F	156/16.8	Abdominal pain	3	135	M	7	None	No
96	F	138/24.2	Abdominal pain	7	233	L	5	None	No

TABLE 1: Clinical and operative characteristics of patients operated for incarcerated femoral hernias

BMI: body mass index; M: 7.9 cm × 13.4 cm; L: 10.3 cm × 15.7 cm

Discussion

Femoral hernias have a high risk of incarceration because of the robust ligamentous framework of the femoral ring. Notably, the outer aspect is formed by the lacunar ligament, the superior aspect by the IPT, the inferior aspect by the pectinal ligament, and the medial aspect by the vascular sheath (Figure 9).

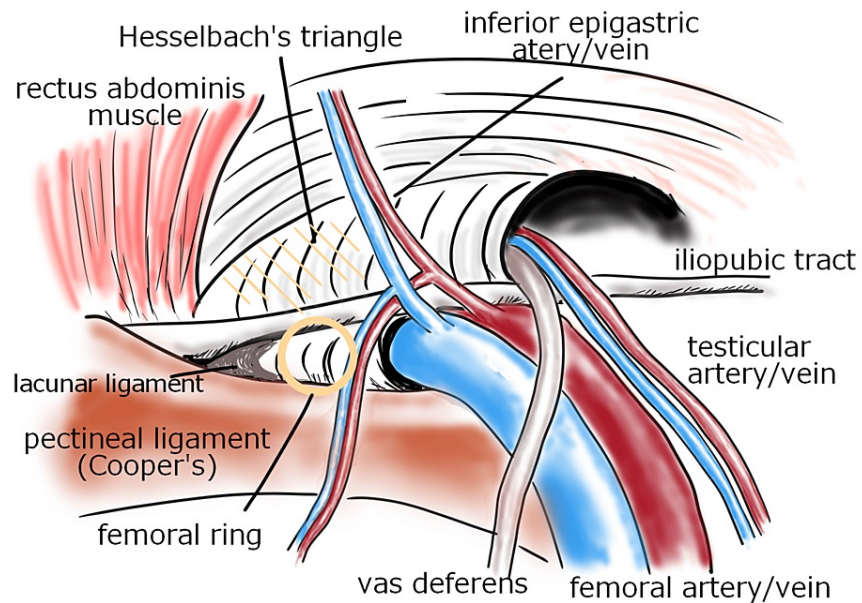


FIGURE 9: Anatomy around the femoral ring

Image created by the authors.

The management of incarcerated femoral hernias poses specific challenges and risks, necessitating careful consideration of surgical approaches. This report highlights the efficacy of a laparoscopic technique for releasing incarcerated femoral hernias with bowel involvement and subsequent repair.

Various surgical approaches have been employed for emergency femoral hernia repair, with the anterior approach (open surgery) commonly utilized. However, the effectiveness of the transabdominal preperitoneal (TAPP) approach has been widely reported recently.

The introduction of laparoscopic techniques in 1993 marked a turning point in incarcerated hernia treatment [6]. The European Association for Endoscopic Surgery's 2013 endorsement of laparoscopy for incarcerated hernias, advocating for hernia reduction under laparoscopic guidance, further solidified its role [7].

Recent reports have substantiated the advantages of laparoscopic approaches, such as decreased laparotomy rates, reduced wound infections, and shorter hospital stays, compared with open approaches. TAPP repair demonstrates comparable recurrence rates, along with reduced postoperative discomfort and a quicker return to normalcy, solidifying its efficacy over the anterior approach [8-10]. Notably, the emergency TAPP procedure allows for crucial intraoperative bowel assessment and confirmation of bilateral lesions. Careful laparoscopic evaluation can reveal recovery of normal coloration in the incarcerated bowels, contributing to the avoidance of unnecessary bowel resections [11-13].

In our study, all patients presented with challenging manual reductions, prompting TAPP procedures to release the hernia without the need for intestinal traction. Although all cases exhibited bowel necrosis, our technique prevented further injury or perforation, enabling bowel resection after hernia repair.

Our procedures were conducted by surgeons in their fourth to fifth postgraduate years under the guidance of experienced hernia surgeons. This suggests that the technique can be safely performed by less experienced surgeons under appropriate supervision and shared procedural understanding. The technique's high reproducibility was evident in its successful application across all cases without significant variations.

Enlarging the hernial defect during repair may appear counterintuitive; however, the primary aim is to reduce the risk of intestinal perforation. Hence, enlargement of the hernial defect is justified because sufficient mesh coverage can be achieved with accurate placement.

The discussion of mesh infection is particularly relevant in emergency hernia repair, as mesh implantation is considered a potential risk factor for infection development [14,15]. Mesh infection is a serious complication

that often necessitates mesh removal in a secondary procedure, imposing a significant burden on patients [16]. However, mesh placement allows for a single-stage surgery, reducing the length of hospital stay. Given these considerations, the decision to use meshes requires careful consideration.

Recent reports suggest that mesh repair in acute hernias may decrease recurrence risk [17,18]. The primary risk factor for mesh infection is associated with the mesh's filament type and pore size. Multifilament meshes are more susceptible to infection than monofilament meshes. Furthermore, lightweight meshes with larger pores offer advantages, such as increased elasticity, greater flexibility, and reduced patient discomfort. Additionally, larger pores are associated with decreased inflammation and reduced risk of infection. Therefore, selecting a lightweight large-pore monofilament mesh is recommended. In our cases, all patients received repairs using a lightweight monofilament polypropylene mesh with large pores [19].

Prophylactic antibiotic use is recommended, and peritoneal irrigation following hernia reduction aligns with the practices of other authors [20].

Conclusions

Emergency laparoscopic surgery is beneficial for the treatment of incarcerated femoral hernias. Detachment of the IPT with concomitant enlargement of the hernia orifice minimizes the risk of intestinal injury during incarceration release, facilitating successful repair. This minimally invasive technique offers potential benefits for patient recovery.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Kioto Yokoyama, Keisuke Tomoda

Acquisition, analysis, or interpretation of data: Kioto Yokoyama, Satoru Takayama

Drafting of the manuscript: Kioto Yokoyama

Supervision: Kioto Yokoyama

Critical review of the manuscript for important intellectual content: Keisuke Tomoda, Satoru Takayama

Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

- Gallegos NC, Dawson J, Jarvis M, Hobsley M: Risk of strangulation in groin hernias . Br J Surg. 1991, 78:1171-3. [10.1002/bjs.1800781007](https://doi.org/10.1002/bjs.1800781007)
- Kochupaty RT, Ranganathan G, Dias S, Shanahan D: Aetiology of femoral hernias revisited: bilateral femoral hernia in a young male (two cases). Ann R Coll Surg Engl. 2013, 95:e14-16. [10.1308/rcsann.2013.95.5.e14a](https://doi.org/10.1308/rcsann.2013.95.5.e14a)
- Nilsson H, Stylianidis G, Haapamäki M, Nilsson E, Nordin P: Mortality after groin hernia surgery . Ann Surg. 2007, 245:656-60. [10.1097/01.sla.0000251364.32698.4b](https://doi.org/10.1097/01.sla.0000251364.32698.4b)
- Alimoglu O, Kaya B, Okan I, Dasiran F, Guzey D, Bas G, Sahin M: Femoral hernia: a review of 83 cases . Hernia. 2006, 10:70-3. [10.1007/s10029-005-0045-3](https://doi.org/10.1007/s10029-005-0045-3)
- Ge BJ, Huang Q, Liu LM, Bian HP, Fan YZ: Risk factors for bowel resection and outcome in patients with incarcerated groin hernias. Hernia. 2010, 14:259-64. [10.1007/s10029-009-0602-2](https://doi.org/10.1007/s10029-009-0602-2)
- Watson SD, Saye W, Hollier PA: Combined laparoscopic incarcerated herniorrhaphy and small bowel resection. Surg Laparosc Endosc. 1993, 3:106-8.
- Poelman MM, van den Heuvel B, Deelder JD, et al.: EAES Consensus Development Conference on endoscopic repair of groin hernias. Surg Endosc. 2013, 27:3505-19. [10.1007/s00464-013-3001-9](https://doi.org/10.1007/s00464-013-3001-9)
- Mancini R, Pattaro G, Spaziani E: Laparoscopic trans-abdominal pre-peritoneal (TAPP) surgery for incarcerated inguinal hernia repair. Hernia. 2019, 23:261-6. [10.1007/s10029-018-1828-7](https://doi.org/10.1007/s10029-018-1828-7)
- Yang GP, Chan CT, Lai EC, Chan OC, Tang CN, Li MK: Laparoscopic versus open repair for strangulated

- groin hernias: 188 cases over 4 years. *Asian J Endosc Surg.* 2012, 5:131-7. [10.1111/j.1758-5910.2012.00138.x](#)
10. Chihara N, Suzuki H, Sukegawa M, Nakata R, Nomura T, Yoshida H: Is the laparoscopic approach feasible for reduction and herniorrhaphy in cases of acutely incarcerated/strangulated groin and obturator hernia?: 17-year experience from open to laparoscopic approach. *J Laparoendosc Adv Surg Tech A.* 2019, 29:631-7. [10.1089/lap.2018.0506](#)
 11. Leibl BJ, Schmedt CG, Kraft K, Kraft B, Bittner R: Laparoscopic transperitoneal hernia repair of incarcerated hernias: is it feasible? Results of a prospective study. *Surg Endosc.* 2001, 15:1179-83. [10.1007/s004640090073](#)
 12. Kaiwa Y, Namiki K, Matsumoto H: Laparoscopic relief of reduction en masse of incarcerated inguinal hernia. *Surg Endosc.* 2003, 17:352. [10.1007/s00464-002-4508-7](#)
 13. Ishihara T, Kubota K, Eda N, Ishibashi S, Haraguchi Y: Laparoscopic approach to incarcerated inguinal hernia. *Surg Endosc.* 1996, 10:1111-13. [10.1007/s004649900254](#)
 14. Taylor SG, O'Dwyer PJ: Chronic groin sepsis following tension-free inguinal hernioplasty. *Br J Surg.* 1999, 86:562-5. [10.1046/j.1365-2168.1999.01072.x](#)
 15. Gilbert AI, Felton LL: Infection in inguinal hernia repair considering biomaterials and antibiotics. *Surg Gynecol Obstet.* 1993, 177:126-30.
 16. Brown CN, Finch JG: Which mesh for hernia repair?. *Ann R Coll Surg Engl.* 2010, 92:272-8. [10.1308/003588410X12664192076296](#)
 17. Papaziogas B, Lazaridis Ch, Makris J, et al.: Tension-free repair versus modified Bassini technique (Andrews technique) for strangulated inguinal hernia: a comparative study. *Hernia.* 2005, 9:156-9. [10.1007/s10029-004-0311-9](#)
 18. Elsebae MM, Nasr M, Said M: Tension-free repair versus Bassini technique for strangulated inguinal hernia: a controlled randomized study. *Int J Surg.* 2008, 6:302-5. [10.1016/j.ijsu.2008.04.006](#)
 19. Liu J, Shen Y, Nie Y, Zhao X, Wang F, Chen J: If laparoscopic technique can be used for treatment of acutely incarcerated/strangulated inguinal hernia?. *World J Emerg Surg.* 2021, 16:5. [10.1186/s13017-021-00348-1](#)
 20. Mauch J, Helbling C, Schlumpf R: Incarcerated and strangulated hernias - surgical approach and management [Article in German]. *Swiss Surg.* 2000, 6:28-31. [10.1024/1023-9332.6.1.28](#)