

Laparoscopic Management of Concomitant Inguinal Hernia and Round Ligament Cysts

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ABSTRACT

Objective: To evaluate and compare the efficacy and potential side effects of transabdominal preperitoneal repair (TAPP) and total extraperitoneal repair (TEP) for inguinal hernia with mesothelial cysts of uterine round ligament (IHMCL) repair.

Study Design: Observational study.

Place and Duration of the Study: Department of General Surgery, The Second Clinical Medical College of Jinan University, Shenzhen People's Hospital, Shenzhen, Guangdong, China, from January 2018 to December 2023.

Methodology: Data on patient demographics, cyst characteristics, surgical duration, blood loss, postoperative pain scores, hospital stay, and occurrence of seroma were retrieved from medical charts and analysed for differences between patients who had received TAPP *versus* TEP.

Results: The study population comprised 32 female patients diagnosed with inguinal hernia complicated by round ligament cysts who received surgical management, between 2018 and 2023. Of these, 17 (53.1%) patients underwent TEP repair, with the remaining 15 (46.9%) cases managed *via* the TAPP approach. Demographically, the patient cohorts were quite similar across both groups. Postoperative pain levels (VAS scores at 12 hours after surgery) were significantly lower in the TEP group (5.06 ± 1.676 vs. 6.20 ± 1.014 , $p < 0.05$). Hospitalisation time (1.59 ± 1.004 days vs. 2.47 ± 1.302 days, $p < 0.05$) and the number of postoperative seromas (0 vs. 4, $p < 0.05$) were also significantly lower in the TEP group. The mean operative time and intraoperative blood loss were comparable between the groups.

Conclusion: As a surgical procedure for treating IHMCURL, TEP is superior to TAPP in terms of postoperative pain, length of hospital stay, and the incidence of postoperative seroma. Perhaps it can be considered as the preferred surgical procedure.

Key Words: Total extraperitoneal repair, Transabdominal preperitoneal repair, Female inguinal hernia, Mesothelial cyst of uterine round ligament.

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INTRODUCTION

Mesothelial cyst of the uterine round ligament (MCURL) (often also called a Nuck cyst) is a rare, benign lesion, developmentally caused inguinal mass in women and is often overlooked in the diagnosis of inguinal masses.¹ When symptoms are evident, the disorder is usually characterised by a movable, difficult-to-reset lump in the groin area accompanied by vague pain.² This lesion occurs in women between the ages of 30 and 40 years; 82% of cases appear on the right side, and 30 to 50% of cases are associated with an inguinal hernia.³ Consequently, preoperative diagnosis is challenging and highly susceptible to misdiagnosis.⁴

Its prevalence is currently unknown.⁵ There are three main theories regarding its pathogenesis, the most commonly agreed-upon of which is that it develops as a result of occlusion in the defective Nuck's canal.⁶ Surgical excision and hernia repair are inevitable when symptoms develop or when the cyst is found to be increasing in size.⁷ At this time, diagnostic laparoscopy and TEP therapy offer an effective option for adult women with inguinal hernia with mesothelial cysts of uterine round ligament (IHMCL).⁸

Currently, the main treatment remains surgery.⁹ Surgical resection and hernia repair are unavoidable in cases where symptoms are already present or the cyst is gradually increasing in size.¹⁰ As a result of the swift advancement in procedures such as transabdominal preperitoneal repair (TAPP) and total extraperitoneal repair (TEP), the repair of inguinal hernias has turned into a frequently conducted operation within the field of general surgery.^{11,12} In patients with IHMCURL, laparoscopic hernia repair offers a precise diagnosis and an opportunity to remove the cyst during hernia repair.¹³ However, it is uncommon for adult women with IHMCURL to be recommended for laparoscopic treatment.^{14,15}

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TAPP is performed by entering the abdominal cavity to explore the inguinal area and peritoneal cavity, further incising the peritoneum to mobilise the hernia sac, and placing the patch on the inguinal wall.¹⁶ TEP does not enter the abdominal cavity; instead, it operates on the hernia sac and places a patch in the preperitoneal space.¹⁷ There is a scarcity of clinical research that has examined the comparative effectiveness of TEP and TAPP procedures for the treatment of IHMCURL. Therefore, the advantages and disadvantages of these two surgical procedures for treating IHMCURL remain unclear. The objective of this research was to evaluate and contrast the immediate postoperative results of the two surgical approaches, focusing on surgical details, incidence of postoperative seroma, and duration of hospital stay for hernia repairs, while also assessing the preliminary safety and efficacy of TEP in the treatment of IHMCURL.

METHODOLOGY

An observational analysis was conducted retrospectively on patients who underwent TAPP or TEP repair for concurrent IHMCURL at the Department of Hepatobiliary and Pancreatic Surgery, Shenzhen People's Hospital, Shenzhen, China, between January 2018 and December 2023. Only patients with unilateral IHMCURL were included in this study to reduce heterogeneity. The exclusion criteria encompassed emergency surgical interventions, recurrent hernia history, incarcerated hernia confirmed by imaging, bilateral hernia presentation on preoperative CT, active surgical site infections, high-risk comorbidities (ASA class III-IV), and incomplete records. Preoperatively, all patients routinely received comprehensive counselling regarding surgical alternatives, including conventional open hernioplasty, TAPP, and TEP approaches. This study also ensured that they were fully aware of the indications for each technique, the associated risks, and the level of technical proficiency required for these different surgical approaches. All inquiries from patients regarding the surgery were meticulously addressed, ensuring that the patients made an informed decision on their surgical approach. The hospital Ethics Committee approved the study, and due to its retrospective nature, informed consent was not required.

Ultrasonography (USG) and computed tomography (CT) are important methods for diagnosing IHMCURL. USG is simple, inexpensive, non-invasive, and non-radioactive, providing valuable information.¹⁸ Both CT and USG are effective tests for the preoperative determination of cyst size.⁸ All patients underwent at least one USG or CT preoperatively to measure the cyst's size/width (Figure 1). Patient demographics, pulled from medical records, encompassed age, body mass index (BMI), alcohol and tobacco consumption history, and co-existing conditions such as diabetes and hypertension. Information regarding the duration of surgery and blood loss during operations was obtained from the medical records. Postoperative comparisons included tramadol dosage for pain relief, hospitalisation duration, pain intensity measured by the visual analogue scale (VAS) with scores ranging from 0 (no pain) to 10 (worst pain), and postoperative seroma cases. Postoperative VAS pain assessments

were conducted at 12 and 24 hours, and again on the seventh day post-surgery. Following surgery, each patient was administered 40 mg of parecoxib intravenously. Patients with a VAS pain score greater than 5 or requiring additional pain relief were given an additional 50 mg of tramadol per dose. Patients were discharged with a VAS score of less than 4 and no specific discomfort.

The surgeons who carried out the operations in both groups had a minimum of a decade of experience in laparoscopic procedures and had performed over 100 TAPP or TEP surgeries. Both groups used general anaesthesia, positioned the patients in a head-low-foot-high 10° to 15° supine position, routinely disinfected and draped the area, and then established artificial pneumoperitoneum.

For TEP, the surgical incision began at the lower border of the umbilicus through the anterior sheath of the rectus abdominis muscle. Subsequently, a 10 mm Trocar tube was introduced between the rectus abdominis muscle and its posterior sheath, and it was fixed into place with sutures. An extraperitoneal CO₂ pneumoperitoneum was established, and the pneumoperitoneal pressure was maintained at a uniform level of 13 mmHg. Trocar tubes 5 mm were inserted in the mid-upper and mid-lower thirds of the umbilicus-pubic symphysis line to serve as the primary and secondary operative ports. Separation of the preperitoneal loose tissue toward the Retzius space was followed by exposure of the Bogros space with the round ligament of the uterus. The cyst attached to the ligament was found, and then the preperitoneal space around the cyst was enlarged and freed until it was completely exposed to the surgical field (Figure 2B and C). The cyst and the round ligament of the uterus were removed after adequate manoeuvring space had been obtained (Figure 2D). The abdominal wall defect was repaired following the removal of the cyst (Figure 2F). The peritoneum of the abdominal wall defect was sutured shut with a non-absorbable thread (Johnson ETHIBOND X519H). A self-fixing polypropylene mesh (Covidien) was used to reinforce the abdominal wall, ensuring that the edges of the mesh in each direction were longer than 5 cm from the edge of the defect (Figure 2E). Generally, it is not necessary to use additional fixation measures to hold the mesh in place. Ultimately, under laparoscopic guidance, the pneumoperitoneum was gradually deflated to confirm the mesh's secure positioning. Following this, the trocar tubes were extracted, and the surgical incisions were sutured. The procedure maintained complete haemostasis. If more blood or fluid leakage occurred during the procedure, a drain was placed in the preperitoneal space to prevent seroma or blood accumulation.

For the TAPP procedure, a small incision was made just above the superior border of the umbilicus, followed by the establishment of a carbon dioxide pneumoperitoneum at a pressure of 13 mmHg. A 10 mm trocar tube was placed through the supraumbilical incision to serve as an observation port, and 5 mm trocar tubes were placed at the junction of the lateral border of the rectus abdominis muscle and the 5 mm horizontal

line below the umbilicus on each side (Figure 2A). The peritoneum was incised 2-3 cm above the superior border of the inner ring of the femoral canal, the anterior peritoneal space was separated, the cyst was resected, and the defect was closed using the same method as in TEP. A 15 x 10 cm polypropylene hernia mesh was used to cover the defect, ensuring that the mesh extended 5 cm beyond the hernia defect in all directions. The incisions were closed after deflating the pneumoperitoneum under laparoscopic view.

Continuous data were expressed as the mean \pm standard deviation, and the normality of the distribution was determined using the Kolmogorov-Smirnov test, Levene's test was used to test for variance. Data that conformed to normal distribution and had uniform variance were analysed using the t-test. Comparisons of categorical data relied on either the Chi-square test or Fisher's exact test, depending on the context. The IBM SPSS version 20 software facilitated the statistical analyses. A statistically significant result was indicated by a two-tailed p-value below 0.05.

RESULTS

A total of 32 patients with IHMCURL were included, including 17 who underwent TEP and 15 who underwent TAPP. The mean age of the women across both groups was comparable (37.29 ± 11.11 vs. 43.87 ± 11.39 years, $p = 0.109$). The TEP and TAPP groups had similar mean BMI (21.67 ± 3.36 vs. 23.76 ± 2.92 kg/m², $p = 0.072$). Both groups exhibited comparable rates of comorbidities, including diabetes and hypertension, and similar percentages of patients with drinking or smoking habits. The average cyst size in the TEP and TAPP groups was not significantly different (29.29 ± 15.96 vs. 32.80 ± 20.75 mm, $p = 0.594$). These findings are outlined in Table I.

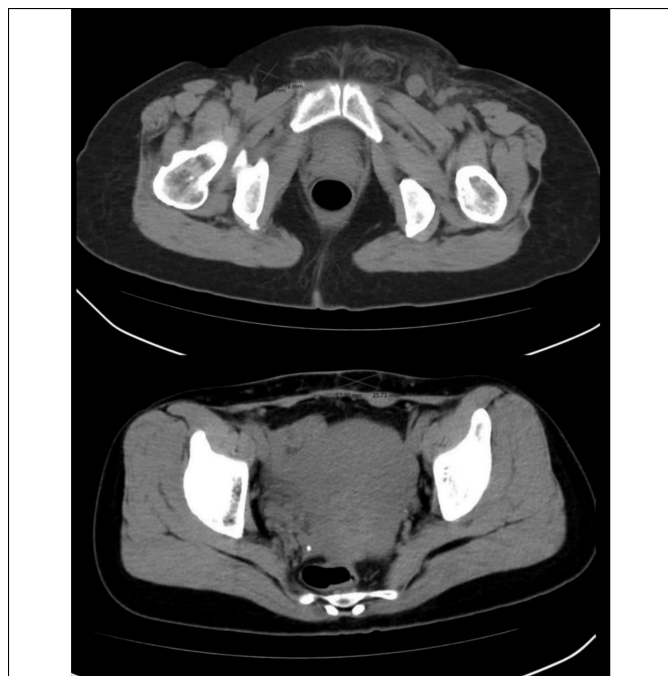


Figure 1: Preoperative computer tomography for nuck cyst.

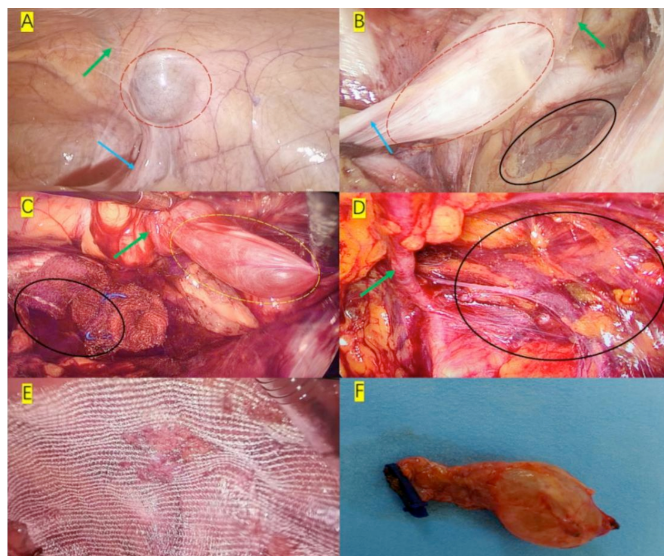


Figure 2: Intraoperative views (A) Nuck cysts in TAPP surgery (cyst is marked by dotted circle, green arrow indicates the inferior epigastric vessels, blue arrow indicates the round ligament of the uterus) (B, C) Nuck cysts in TEP surgery (cyst is marked by dotted circle, green arrow indicates the inferior epigastric vessels, blue arrow indicates the round ligament of the uterus, black circle in Figure B represent the Bogros gap and in Figure C represents the Retzius gap) (D) Complete removal of the cyst (green arrow indicates the inferior epigastric vessels, black circle represents the Bogros gap) (E) Mesh placement in retrorectus space (complete coverage of myopectineal orifice) (F) Excised nuck cyst.

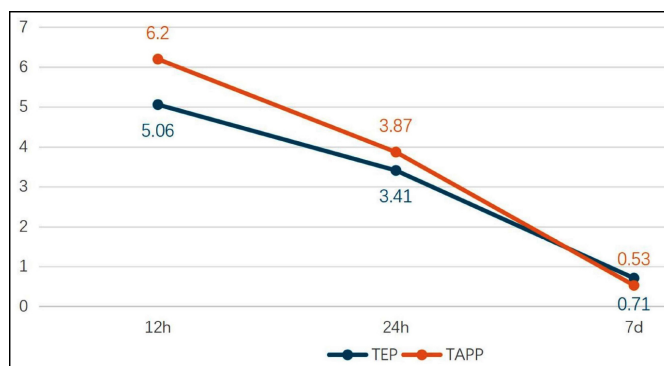


Figure 3: Trends of VAS score.

Twelve hours postoperative ratings on the VAS revealed that individuals who underwent TEP procedures had lower levels of pain compared to those who had TAPP procedures (Figure 3). The mean length of hospital stay was significantly shorter in the TEP group compared to the TAPP group (1.59 ± 1.00 vs. 2.47 ± 1.30 days, $p = 0.04 < 0.05$). A total of 4 patients in the TAPP group developed postoperative seromas, which was a statistically significant difference, and there were no other surgical complications within 7 days after surgery. A concise overview of the aforementioned features is presented in Table II.

DISCUSSION

Laparoscopic surgery was introduced to surgeons over 40 years ago as a method for repairing inguinal hernias.¹⁹ Compared with traditional open surgery, laparoscopic surgery reduces surgical trauma, decreases the incidence of postoperative complications, and alleviates postoperative pain in patients, making it the surgical procedure of choice for the treatment of inguinal hernias.²⁰

Table I: Baseline characteristics of patients.

Variables	TEP (n = 17)	TAPP (n = 15)	p-value
Mean age (n)	37.29 ± 11.106	43.87 ± 11.388	0.109
Mean BMI (kg/m)	21.6713.362	23.76 ± 2.923	0.072
Left side : Right side	10 : 7	7 : 8	0.723
Mean cyst size (width in mm)	29.29 ± 115.956	32.80 ± 20.751	0.594
Comorbidity (hypertension + diabetes)	3 (H:D = 2:1)	1 (H:D = 0:1)	0.603
Alcoholism	0	1	0.469
Smoker	3	0	0.229

N: Number, Y: Years, TEP: Total extraperitoneal repair, TAPP: Transabdominal preperitoneal repair. Fisher's exact test was used for qualitative data. t-test for independent samples was used for quantitative data. $p < 0.05$ was considered statistically significant.

Table II: Perioperative details.

Variables	TEP (n = 17)	TAPP (n = 15)	p-value
Mean operative time (min)	62.59 ± 15.067	73.33 ± 20.859	0.102
Mean blood loss (ml)	15.59 ± 6.820	14.00 ± 9.487	0.587
Mean VAS score at			
12 hours after surgery	5.06 ± 676	6.20 ± 1.014	0.026*
24 hours after surgery	3.41 ± 1.417	3.87 ± 1.302	0.354
7 days after surgery	0.71 ± 0.588	0.53 ± 0.640	0.433
Dosage of tramadol after surgery (mg)	23.53 ± 35.872	36.67 ± 35.187	0.305
Mean length of stay after surgery (days)	1.59 ± 1.004	2.47 ± 1.302	0.40*
Postoperative seroma (n)	0	4	0.038*

N: Number, ml: Milimetre, VAS: Visual analogue scale, mg: Miligram, * $p < 0.05$, TEP: Total extraperitoneal repair, TAPP: Transabdominal preperitoneal repair. Fisher's exact test was used for qualitative data. t-test for independent samples was used for quantitative data. $p < 0.05$ was considered statistically significant.

In recent years, the use of meshes for inguinal hernia repair has become the norm, reducing the recurrence rate from more than 15% with tissue repairs to less than 1%.²¹ Today, the most commonly used laparoscopic techniques are TEP and TAPP. Both procedures require the use of synthetic mesh. TAPP involves manoeuvring the hernia within the abdominal cavity, while TEP does not enter the peritoneal cavity. Instead, TEP accesses the hernia site through the preperitoneal plane, and a mesh is used to seal the extraperitoneal hernia opening after manipulation of the hernia sac.²² The preference for these two approaches remains controversial in the academic community. However, both TAPP and TEP are considered safe and feasible for the treatment of inguinal hernias.²³ TAPP surgery offers a large operating space with easily recognisable anatomy and a relatively simple surgical technique, especially for larger hernia sacs. However, the TAPP procedure is prone to damage to abdominal organs and tends to cause abdominal adhesions during peritoneal suturing. TEP, on the other hand, because it completely separates the anterior peritoneal space through the extraperitoneal space, has almost no impact on intraperitoneal organs and eliminates the need to suture the peritoneum. However, due to the surgery being performed in the preperitoneal space, there is less room for surgical manipulation. If the peritoneum is damaged by improper surgical operation, the gas entering the abdominal cavity can lead to a narrowing of the surgical space, increasing the difficulty of the operation. Consequently, numerous investigations propose that the selection of surgical technique is contingent upon the surgeon's expertise and personal inclinations.

There are fewer clinical studies comparing TEP with TAPP for IHMCURL. In this study, the level of postoperative pain (VAS

score at 12 hours after surgery) was significantly lower in the TEP group than in the TAPP group and was statistically significant. Postoperative pain often causes an increase in the patient's muscle tone, which in turn triggers a decrease in ventilation and lung compliance, leading to a decrease in ventilation. Patients' fear of wound pain limits their normal cough function and hinders the elimination of respiratory secretions, increasing the incidence of postoperative lung infection and pulmonary atelectasis. Acute postoperative pain also excites the sympathetic nervous system, thereby inhibiting gastrointestinal function, resulting in decreased peristalsis, disturbances in gastrointestinal function, or delayed recovery. In both cases, the lower pain level in the TEP group has clinical value for patients. The lower postoperative pain in the TEP group may be due to the fact that it did not enter the abdominal cavity and therefore did not cause damage to the peritoneum. The TEP group had an average surgery duration that was 10 minutes shorter compared to the TAPP group, probably because TEP omitted the step of suturing the peritoneum. This gap was not statistically significant in the present study, but the authors consider it still has some clinical relevance. TEP procedure is more difficult than TAPP, but there is a clear trend of decreasing operative time with an increasing number of procedures. As the sample size increases, this gap may be reflected in a statistical difference.

Seroma frequently occurs and is generally an inescapable complication following the repair of inguinal hernias.²⁴ The prevalence was as high as 37.9% at one week postoperatively.²⁵ The main causes of seroma formation are the wide separation of the preperitoneal hiatus, secretion from the distal hernia sac, irritation of the mesh, severe exudate, and intraoperative bleeding.²⁴ Seromas often present as post-

operative groin lumps with discomfort and pain. Most small seromas can be absorbed. Nevertheless, aspiration is often necessary for larger seromas because they can lead to considerable pain and discomfort, as well as a heightened susceptibility to infection. In addition, seroma can prevent the mesh from attaching to the surrounding tissue, increasing the risk of recurrence and infection. TEP has the advantage of being able to place a drain, which is an excellent solution to this problem. In this study, four cases of postoperative seroma occurred in the TAPP group, whereas in the TEP group, the decision to place a drain was based on the intraoperative situation and the operator's experience, which helped prevent the occurrence of postoperative seroma.

This research suggests that TEP is a feasible and relatively more favourable surgical approach for the treatment of IHMCURL compared to TAPP. TEP offers distinct benefits, such as minimal postoperative discomfort, abbreviated hospital stays, and a reduced risk of seroma development. Due to the limited follow-up period in this study, the authors did not evaluate long-term postoperative complications such as chronic pain and abdominal adhesions. Nonetheless, it appears that positioning the mesh extraperitoneally may reduce the risk of such long-term complications. The limitations of this study include its single-centre design, limited patient sample size, and brief follow-up duration. Further evidence supporting the advantages of TEP would require more extensive, multicentre, long-term randomised controlled trials.

CONCLUSION

As a surgical procedure for treating IHMCURL, TEP is superior to TAPP in terms of postoperative pain, length of hospital stay, and the incidence of postoperative seroma. Perhaps it can be considered as the preferred surgical procedure.

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ETHICAL APPROVAL:

The Ethics Committee of the Second Medical College of Jinan University, Shenzhen People's Hospital approved the study protocol (Approval No: LL-ZLJS-2023119-01).

PATIENTS' CONSENT:

Individual consent for this retrospective analysis was waived by the Ethics Committee of the Second Medical College of Jinan University, Shenzhen People's Hospital, due to the retrospective nature of the study.

COMPETING INTEREST:

The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:

TW, AZ, HX: Contributions to the conception and design of the manuscript.

TW: Provision of study materials or patients.

TC, WH, GP: Collection and assembling of data.

AZ, HX: Data analysis and interpretation.

All authors approved the final version of the manuscript to be published.

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