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Original Article

Laparoscopic Surgery for Groin Hernia Repair: Single-Center Experience

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Abstract

Background: Inguinal hernia arises from a condition characterized by a weakened abdominal wall. Laparoscopic inguinal hernia surgery is one treatment option. Due to the increasing use of laparoscopic inguinal hernia repair at Srinagarind Hospital, we are interested in studying these patients' side effects and treatment outcomes.

Materials and Methods: A descriptive study collected data between December 2011 and May 2022 at Srinagarind Hospital, Khon Kaen University. The medical records were reviewed, and data was collected. Descriptive statistics were used to analyze the data and report the side effects and treatment outcomes.

Results: A total of 269 patients underwent laparoscopic inguinal hernia repair. Among these patients, 251 were males (93.31%), and 18 were females (6.69%). The median age of the patients was 64 (IQR, 54-71). The most common comorbidities were hypertension (36.43%) and benign prostatic hyperplasia (BPH) (26.32%). The most common diagnosis was indirect inguinal hernia (40.89%). The overall median operative time was 65 minutes (IQR, 55-90). The median blood loss during the procedure was 5 milliliters (IQR, 5-10). The most common complication observed was hematoma, which occurred in approximately 16 cases (5.95%). Infection occurred in two cases (0.74%), and the recurrence rate was 1.49%.

Conclusions: Laparoscopic surgery for inguinal hernia repair was found to be efficient, safe, and comparable to other international studies regarding complications and recurrent rates, with no reported mortality.

Keywords: Inguinal hernia, Laparoscopic, TAPP, TEP, Complications

Introduction

An inguinal hernia arises from a condition characterized by a weakened abdominal wall, leading to the protrusion of internal abdominal organs such as the intestines and fatty tissue (omentum) into the groin area. It is found in 27-43% of men and 3-6% of women.[1] The condition is often accompanied by symptoms such as pain, swelling, and intestinal obstruction, which require surgical treatment. The traditional classification of inguinal hernias includes indirect inguinal hernia (IIH), direct inguinal hernia (DIH), and femoral hernia.[2]

Laparoscopic inguinal hernia surgery is increasingly popular among patients who have undergone open surgery or experienced recurrence. It is especially ben-

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eficial for patients who require a small surgical incision. Studies have shown that laparoscopic surgery can help reduce groin pain after the procedure when compared to open surgery.[3]

There are two commonly used approaches to laparoscopic repair of inguinal and femoral hernias involve two different anatomical approaches to the preperitoneal space: totally extraperitoneal (TEP) hernia repair and transabdominal preperitoneal (TAPP) hernia repair.

TEP repair was performed in the preperitoneal space and was developed to avoid the risks of entering the peritoneal cavity.[4,5] The surgeon creates a working space between the peritoneum and the anterior abdominal wall. This approach has the advantage of eliminating the risk of intra-abdominal adhesion formation.[5,6]

On the other hand, TAPP repair is performed within the intra-peritoneal cavity by placing the mesh in a preperitoneal position and covering it with the peritoneum to keep it away from the bowel. It provides a larger working space than TEP repair, with easy access to both groins. TAPP repair can also be attempted in patients with prior lower abdominal surgery. Nevertheless, the TAPP repair procedure is not without its potential risks, including the possibility of inflicting injuries upon adjacent intra-abdominal organs, the formation of adhesions leading to intestinal obstruction, or even the occurrence of bowel herniation.[6,7]

Due to the increasing use of laparoscopic inguinal hernia repair at Srinagarind Hospital, researchers are interested in studying the treatment outcomes and potential side effects experienced by these patients.

Materials and Methods

A descriptive study was conducted on patients diagnosed with inguinal hernia and undergoing laparoscopic inguinal hernia treatment, including TAPP and TEP laparoscopic techniques, at Srinagarind Hospital from December 2011 to May 2022. Patients who had lost their medical records were excluded from the study.

The medical records were reviewed, and data was collected across various categories, including gender, age, diagnosis, underlying diseases, previous abdominal surgery, operative time, and complications. Postoperative pain was assessed using a pain score measured on a numeric pain rating scale, ranging from 0 (indicating no pain) to 10 (indicating the possibility of worsening pain). Pain scores were recorded immediately after the operation and on the first postoperative day. Blood loss is evaluated by anesthesiologists. They use several methods, such as visual estimation, surgical suction canisters, or weighing sponges and swabs. Descriptive statistics were employed to report all collected data.

Results

A total of 269 patients underwent laparoscopic inguinal hernia repair. Among these patients, 251 were males (93.31%), and 18 were females (6.69%). The median age of the patients was 64 (IQR, 54-71). The most common comorbidities observed were hypertension (36.43%), benign prostatic hyperplasia (26.32%), and dyslipidemia (17.83%).

Out of the 269 patients, 219 (81.41%) underwent totally extraperitoneal (TEP) repair, while 48 (17.84%) underwent transabdominal pre-peritoneal (TAPP) repair. Two patients required conversion to open hernia repair.

The most common diagnoses were indirect inguinal hernia (40.89%), bilateral direct inguinal hernia (20.07%), recurrent indirect inguinal hernia (12.64%), and direct inguinal hernia (11.15%) (Table 1).

Table 1 Baseline characteristics

Variable	N = 269 (%)
Sex	
Male	251 (93.31)
Age (year)	
Median	64 (IQR, 54-71)
Comorbidity	
Hypertension	98 (36.43)
BPH	70 (26.32)
Dyslipidemia	48 (17.83)
DM	23 (8.55)
Cirrhosis	8 (2.97)
COPD	6 (2.23)
Morbid obesity	3 (1.11)
Procedure	
TEP	219 (81.41)
TAPP	48 (17.84)
Other*	2 (0.74)
Diagnosis	
IIH	110 (40.89)
DIH	30 (11.15)
Pantaloon	4 (1.49)
Bilateral DIH	54 (20.07)
Bilateral IIH	11 (4.09)
Recurrent IIH	34 (12.64)
Recurrent DIH	12 (4.46)
Recurrent bilateral DIH	5 (1.86)
Recurrent bilateral IIH	9 (3.34)

*Convert to open hernioplasty

Among the 110 patients with unilateral indirect inguinal hernia, the distribution was as follows: 4.55% had the bubonocele type, 77.27% had the funicular type, and 18.18% had the scrotal type (Table 2).

Table 2 Indirect inguinal hernia (IIH) type

Unilat IIH	**N = 110 (%)**
Bubonocele	5 (4.55)
Funicular	85 (77.27)
Scrotal	20 (18.18)
Bilat IIH	**N = 11 (%)**
Bubonocele	2 (18.18)
Funicular	8 (72.73)
Scrotal	2 (9.09)
Recurrent IIH	**N = 34 (%)**
Bubonocele	1 (2.94)
Funicular	30 88.24)
Scrotal	3 (8.82)
Recurrent bilat IIH	**N = 9 (%)**
Bubonocele	1 (11.11)
Funicular	8 (88.89)
Scrotal	0

The overall median operative time was 65 minutes (IQR, 55-90). The longest operative time was observed in cases of bilateral indirect inguinal hernia and recurrent indirect inguinal hernia, which averaged around 95 minutes. The overall median blood loss during the procedure was 5 milliliters (IQR, 5-10), with recurrent indirect inguinal hernia showing the highest median blood loss of approximately 10 milliliters. The median hospital stay for all patients was 3 days (IQR, 2-3) (Figure 1).

The overall median immediate postoperative pain score was 4 (IQR, 2-6), while the median pain score on postoperative day 1 was 2 (IQR, 1-4) (Figure 2).

There were two cases (0.74%) of intraoperative complications: corona mortis injury in bilateral indirect inguinal hernia and bradycardia in recurrent indirect inguinal hernia. The most common complication observed was hematoma, which occurred in approximately 16 cases (5.95%). Infection was observed in two cases (0.74%), and the recurrence rate was 1.49% (Table 3).

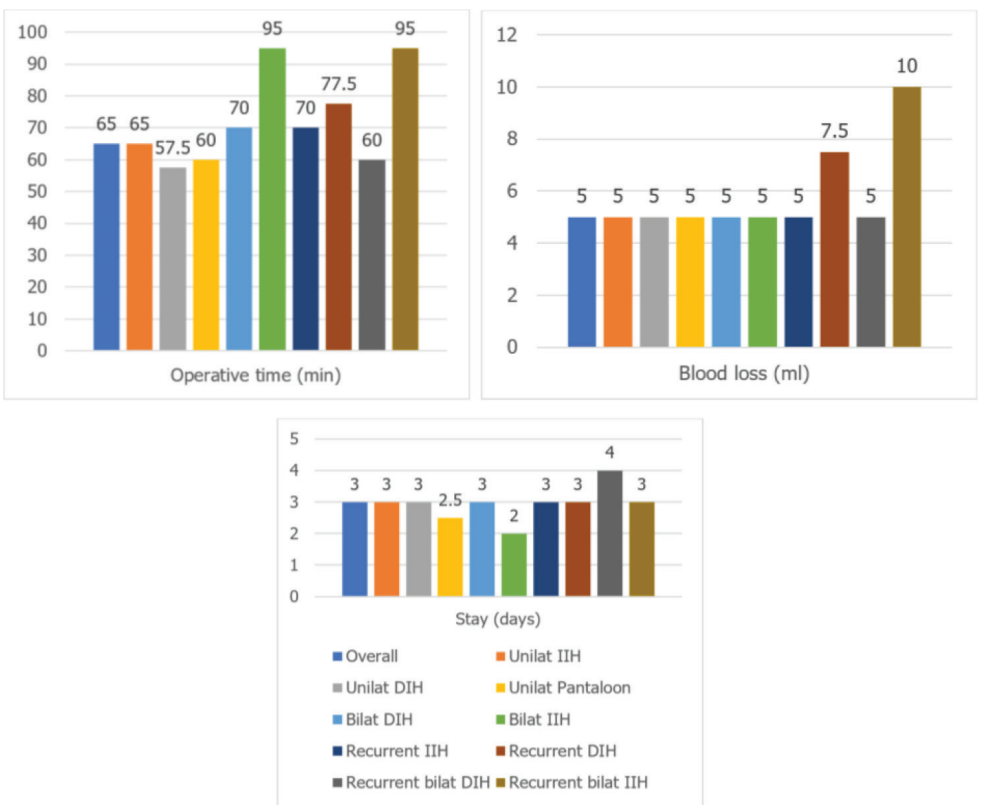

Figure 1 Post-operative pain score by types of inguinal hernia

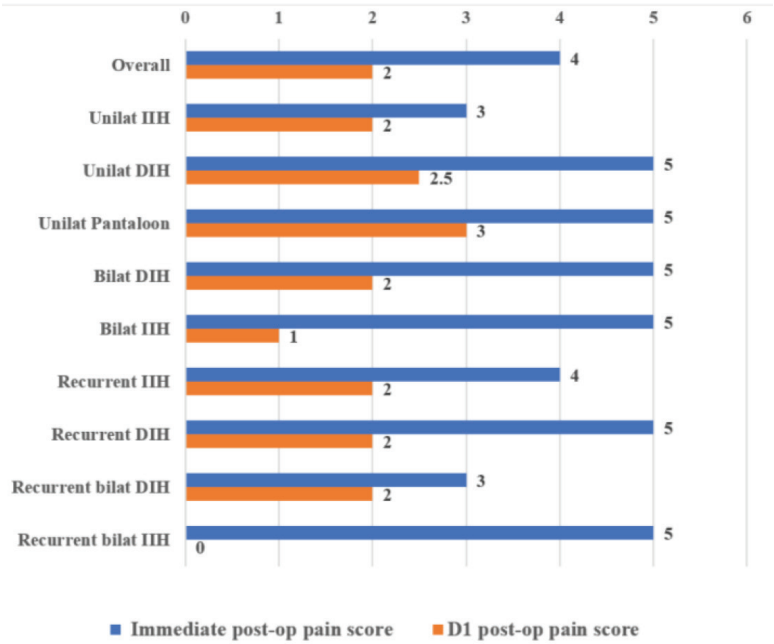

Figure 2 Post-operative pain score by types of inguinal hernia

Table 3 Complication of Laparoscopic surgery for groin hernia repair

Type	Intra-op complication N (%)	Hematoma N (%)	Infection N (%)	Recurrence N (%)
Overall	2 (0.74)	16 (5.95)	2 (0.74)	4 (1.49)
Unilateral IIH	0	6 (5.45)	1 (0.91)	0
Unilateral DIH	0	1 (3.33)	1 (3.33)	0
Unilateral pantaloon	0	1 (25)	0	0
Bilateral DIH	0	4 (7.41)	0	2 (3.7)
Bilateral IIH	1 (9.09)*	0	0	0
Recurrent IIH	1 (2.94)**	4 (11.76)	0	1 (2.94)
Recurrent DIH	0	0	0	1 (8.33)
Recurrent bilateral DIH	0	0	0	0
Recurrent bilateral IIH	0	0	0	0

*Corona mortis injury

**Bradycardia

Discussion

The definitive treatment for most inguinal hernias is surgical repair.[8-11] Laparoscopic inguinal hernia repair is an increasingly helpful procedure because it offers fewer postoperative complications, shorter hospital stays, and quicker recovery times.

Zhu et al. Significant advantages of TEP compared to the open extraperitoneal approach include a lower incidence of total post-operative complications (Odds Ratio, 0.544; 95% confidence interval, 0.369-0.803), a reduction in urinary problems [0.206 (0.064,0.665)], an earlier return to normal activities or work [SMD = -1.798 (-3.322, -0.275)], and a shorter length of hospital stay [-1.995 (-2.358, -1.632)]. No difference was found in operative time, the incidence of hernia recurrence, chronic pain, intraoperative complications, seromas or hematomas, wound infection, and testicular problems between the two techniques.[12]

Haladu et al. Laparoscopic repair was associated with a statistically significant (range: 26-46%) reduction in the odds or risk of chronic pain. Still, there is no evidence of differences in recurrence rates between laparoscopic and open repairs.[3]

For totally extraperitoneal (TEP) repairs, more than 100 cases are required to achieve a learning curve.[1] Transabdominal preperitoneal (TAPP) repairs have significantly improved conversions and admissions after 50 cases.[13]

In this study, the median overall operative time was 65 minutes, with the highest time observed in cases of bilateral indirect inguinal hernia and recurrent bilateral indirect inguinal hernia, which averaged 95 minutes. In comparison, other studies reported an average time of 90 minutes.[14-16]

The overall median blood loss was 5 ml, with recurrent indirect inguinal hernia showing the highest median blood loss of about 10 ml. This can be attributed to the difficulty in identifying anatomy due to postoperative adhesions, whereas other studies reported a blood loss of 3.8 ml.[17]

The overall median hospital stay was 3 days, including the preoperative evaluation, operation, and postoperative observation days. In comparison, other studies reported a median hospital stay of 3.5 days.[17] Zhu et al. Length of hospital stay was, in all cases, significantly shorter ($P < 0.01$) after TEP (1.84 ± 1.45 days) when compared with the open extraperitoneal operation (4.28 ± 2.20 days).[12]

Intraoperative complications occurred in two cases (0.74%): corona mortis injury in bilateral indirect inguinal hernia and bradycardia in recurrent indirect inguinal hernia. The incidence of arterial corona mortis was found to be 28.4%, with a 1.5% risk of injury to the arterial corona mortis.[18]

Hematoma was the most common complication in our study, occurring in approximately 16 cases (5.95%), while other studies reported a lower incidence rate of 3.5%.[14] The infection rate in our study was 0.74%, compared to 0.76% in other studies.[19]

The recurrence rate in our study was 1.49%, compared to 0.9% in other laparoscopic inguinal hernia repair studies.[14] Zhu et al. A meta-analysis of outcomes shows that there were 2.2% recurrences in the TEP group and 1.5% in the open group, respectively ($P = 0.379$).[12]

Wellwood et al. Patients randomized to laparoscopic repair were more satisfied with surgery at 1 month and 3 months postoperatively, as measured by the 36-item short-form survey questionnaire. The mean cost per patient of laparoscopic repair was £335 (95% confidence interval £228 to £441) more than the cost of open repair.[20]

According to our results and those of other studies, patients who underwent laparoscopic repair were more satisfied than those who had open repair. Although laparoscopic inguinal hernia repair is more expensive than open repair, no difference was found in operative time, the incidence of hernia recurrence, chronic pain, intraoperative complications, seromas or hematomas, wound infection, and testicular problems. Therefore, laparoscopic repair is generally preferred for bilateral or recurrent hernias, patients desiring a quicker recovery, and those without contraindications for general anesthesia.

Our study has some limitations. First, its descriptive design constrained it. Second, the surgical technique (TEP or TAPP) selection in our center was based on individual surgeon preferences, with TEP being the more frequently employed approach. Third, due to various factors, we encountered challenges in conducting complete follow-up assessments for all patients, thereby hindering the confirmation of recurrence diagnoses.

On the other hand, the study's notable strength is based on its large sample size, spanning over ten years in a tertiary care setting.

Conclusion

Laparoscopic surgery for inguinal hernia repair has been demonstrated to be efficient, safe, and consistent with international studies, showing fewer postoperative complications, shorter hospital stays, and quicker recovery times, with no reported mortality. However, there is no evidence of differences in recurrence rates between laparoscopic and open repairs.

What is Already Known on this Topic?

Laparoscopic inguinal hernia repair is a widely accepted minimally invasive procedure used to treat inguinal hernias. There are two main approaches to laparoscopic inguinal hernia repair: transabdominal preperitoneal (TAPP) and totally extraperitoneal (TEP). TAPP involves entering the peritoneal cavity to place a mesh over the hernia defect from within the abdomen. At the same time, TEP avoids the peritoneal cavity, working instead within the layers of the abdominal wall to position the mesh.

The benefits include reduced postoperative pain, fewer wound complications, shorter hospital stays, and quicker recovery. Patients typically experience more minor scars and a faster return to normal activities and work. Laparoscopic repair is particularly advantageous for bilateral hernias and recurrent hernias after previous open repairs.

What this study adds?

Single-center experience in studying inguinal hernia patients' side effects and treatment outcomes.

Conflict of Interest

All authors declare no conflict of interest.

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Supplementary appendix

Supplementary Table 1 **Operation time, blood loss, pain score, and hospital stay by types of hernia**

Type	Operative- time (min)	Blood loss (ml)	Pain score immediate post-op	Pain score day 1 post-op	Hospital stays (days)
Overall	65 (55-90)	5 (5-10)	4 (2-6)	2 (1-4)	3 (2-3)
Unilateral IIH	65 (55-90)	5 (5-10)	3 (2-5)	2 (1-4)	3 (2-3)
Unilateral DIH	57.5 (45-60)	5 (3-5)	5 (2-6)	2.5 (0-5)	3 (2-3)
Unilateral Pantaloon	60 (51.5-80)	5 (4-7.5)	5 (1.5-7.5)	3 (1-4.5)	2.5 (2-3)
Bilateral DIH	70 (60-90)	5 (5-10)	5 (4-7)	2 (0-4)	3 (2-4)
Bilateral IIH	95 (55-145)	5 (5-10)	5 (1-5)	1 (0-4)	2 (2-3)
Recurrent IIH	70 (60-90)	5 (5-10)	4 (2-5)	2 (1-4)	3 (2-3)
Recurrent DIH	77.5 (55-120)	7.5 (5-20)	5 (1-7)	2 (0.5-5)	3 (3-3)
Recurrent bilateral DIH	60 (60-70)	5 (3-5)	3 (2-5)	2 (1-5)	4 (4-4)
Recurrent bilateral IIH	95 (65-120)	10 (5-10)	5 (3-7)	0 (0-2)	3 (2-3)