

ORIGINAL ARTICLE

Medicine Science 2025;14(4):1164-9

Are there benefits to laparoscopic repair of femoral hernias compared to open surgical repair?

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Received 08 September 2025; Accepted 27 October 2025

Available online 27 November 2025 with doi: 10.5455/medscience.2025.09.242

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Abstract

The rarity of femoral hernias compared to inguinal hernias makes it difficult to present studies comparing laparoscopic surgery with open surgery in these diseases. In this study, we compared the results of open and laparoscopic surgery in the treatment of femoral hernia. A total of 81 patients with femoral hernia who underwent laparoscopic and open repair between January 2020 and December 2024 were analyzed in a retrospective cohort study at a single center. 34 patients were in the Laparoscopy (LA) group and 47 patients in the Open Approach (OA) group. The baseline data characteristics appeared comparable between the two groups in our study (Table 1). Recurrence rate and mean hospital stay were higher in the OA group ($p=0.03$ and $p=0.018$, respectively). In the LA group, 28 (82.4%) of the operations were performed by a specialized hernia surgeon, whereas in the OA group, 20 (42.5%) of the operations were performed by a specialized hernia surgeon, a statistically significant difference ($p < 0.001$). There was no significant difference between the groups regarding follow-up periods, chronic pain, operation time, mortality, and complications. Laparoscopic repairs of femoral hernias demonstrated a reduced recurrence rate and a shorter duration of hospital stay without elevating the risk of complications, all while maintaining comparable operative times to open repairs. Moreover, prospective randomized studies are necessary to further evaluate such comparisons in the context of femoral hernias.

Keywords: Femoral hernia, laparoscopy, open repair, laparoscopic repair

Introduction

Every year, over 20 million people globally have surgery to repair groin hernias [1]. Femoral hernias, a type of groin hernia, are less common in adults than inguinal hernias, which are among the most common surgical procedures. They account for 2-4% of all groin hernia repairs, with femoral hernia repairs most commonly occurring in patients aged 30 to 70 years [2,3]. Femoral hernias occur through a small opening beside the femoral vein, called the femoral ring, and they are more frequently observed in women. Compared to inguinal hernias, they pose a greater risk of incarceration or strangulation, making emergency surgery crucial [1,4-6].

Laparoscopic inguinal hernia repairs are increasingly preferred over open repairs. Due to various concerns, the traditional open repair method is shifting towards laparoscopic repair for

femoral hernias. A study conducted in Denmark revealed that the incidence of femoral hernias occurring subsequent to open inguinal hernia repair is 38% [7]. This rate suggests that femoral hernias can be overlooked in the initial repair. Furthermore, considering the advantages of laparoscopic repair, such as improved wound healing, reduced chronic inguinal pain, and an earlier return to normal work [1], laparoscopic repairs are also favored for femoral hernias. The relative rarity of femoral hernias compared to inguinal hernias complicates the presentation of studies comparing laparoscopic surgery with open surgery for these conditions. This study retrospectively examines the outcomes of open versus laparoscopic surgery for femoral hernia.

Material and Methods

A single-center retrospective cohort study examined patients

CITATION

Yılmaz AH, Bozkurt HA. Are there benefits to laparoscopic repair of femoral hernias compared to open surgical repair?. Med Science. 2025;14(4):1164-9.



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with femoral hernias who received laparoscopic or open repair from January 2020 to December 2024. Data were collected retrospectively from medical records. After collecting data, a comparative analysis of the results from the two approaches was conducted. Patients are categorized into the laparoscopy (LA) group and the open approach (OA) group. We collected and analyzed demographic characteristics, including age, gender, American Society of Anesthesiologists (ASA) scores, body mass index (BMI), and smoking habits for both groups. It was noted whether a hernia surgeon performed the operation and whether emergency surgery was performed. Data from both the operative and postoperative phases were documented and analyzed in each group.

Patients aged 18 and older with a unilateral femoral hernia were included. Those under 18 and patients with bilateral hernias were excluded from the study. The ethics committee of the University of Health Sciences, Van Training and Research Hospital approved the study (Date: 20.12.2024, protocol number: GOKAEK-2024-02-05).

Outcomes

All demographic characteristics were documented. We noted postoperative complications including hematoma, seroma, surgical site infections, length of hospital stay, mortality, chronic pain, and recurrence. It was recorded whether there was emergency surgery and whether a specialized hernia surgeon performed the hernia repair.

Laparoscopic methods included totally extraperitoneal (TEP), enhanced view-totally extraperitoneal (eTEP), and transabdominal preperitoneal (TAPP) repair. Open methods included mesh plug repair combined with anterior mesh repair (Lichtenstein), mesh plug repair alone, and primary tissue repair.

Chronic inguinal pain is defined as ongoing moderate pain lasting at least three months.

The primary finding of this study was the recurrence of hernias.

Statistical Analyses

Before proceeding with further analyses, the Kolmogorov–Smirnov and Shapiro–Wilk tests were implemented to evaluate the normality of the variables. In cases where the data displayed a normal distribution, parametric tests were utilized. Specifically, the independent sample t-test was applied to compare parametric values, while the Mann–Whitney U test was employed for assessing non-parametric measurements between groups. The relationships and differences among groups concerning categorical variables were examined using Chi-square and Fisher’s exact tests. Results related to demographic characteristics were presented as ratios of qualitative variables, whereas quantitative variables were conveyed as means accompanied by standard deviations. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 22.0 (SPSS Inc., Chicago, IL, USA). A p-value of less than 0.05 was considered statistically significant in all analyses.

Results

A total of 99 patients who underwent femoral hernia repair were included. In some cases, eighteen patients were excluded from the analysis due to bilaterality, insufficient follow-up, and a lack of appropriate data. A flow diagram is shown in Figure 1. A total of 81 patients were analyzed. 34 patients were in the LA group, and 47 patients were in the OA group. The mean age was 45.5 (±17.5) in the LA group and 45.5 (±17.9) in the OA group (p=0.98). In the LA group, 10 (29.4%) patients were male, and 24 (70.6%) were female, and in the OA group, 11 (23.4%) patients were male, and 36 (76.6%) were female (p=0.54). The ASA scores were comparable in the LA and OA groups (p=0.87). Smoking patterns were comparable in both groups (p=0.90). The BMI scores were 25.3 (±2.8) for the OA group and 24.5 (±3.5) for the LA group (p=0.31). Baseline data are shown in Table 1.

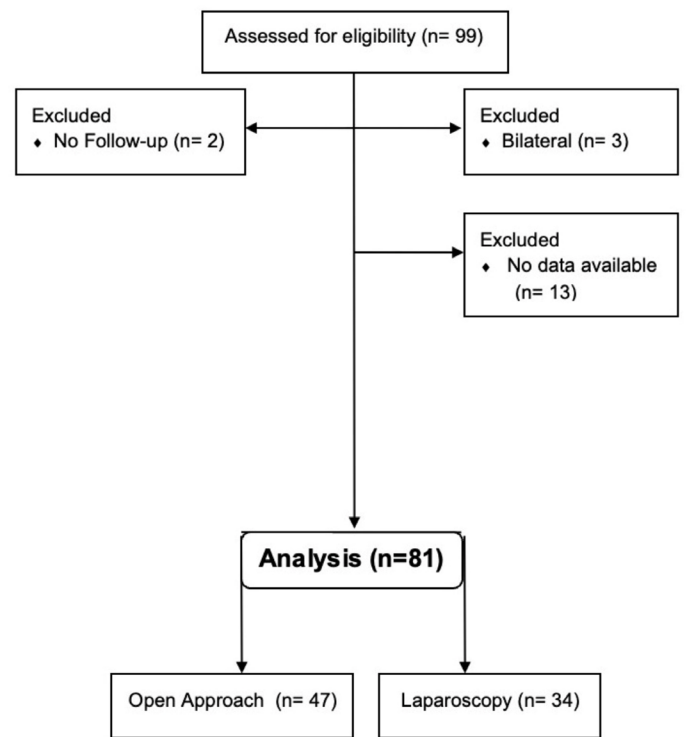


Figure 1. A flow diagram

Table 1. Baseline data

Datas	Laparoscopy (n=34)	Open Approach (n=47)	p
Age mean(±SD)	45.5 (±17.5)	45.5 (±17.9)	0.98
Sex (Male/Female)	10/24	11/36	0.54
ASA n (%)			0.87
I	10 (% 29.4)	16 (% 34)	
II	20 (% 58.8)	25 (% 53.2)	
III	4 (% 11.7)	6 (% 12.7)	
Smoke n (%)	9 (% 26.4)	13 (% 27.6)	0.90
BMI (kg/m²) mean(±SD)	24.5 (±3.5)	25.3 (±2.8)	0.31

ASA: American society of anaesthesiologists; BMI: Body mass index; SD: Standart deviation

In the LA group, 24 patients (70.5%) underwent TEP repair, 7 patients (20.5%) underwent TAPP repair, and 3 patients (8.9%) underwent eTEP repair. In the OA group, 32 patients (68%) received an exclusive plug repair, 5 patients (10.6%) received a plug repair in conjunction with anterior tissue repair, and 10 patients (21.2%) underwent primary tissue repair. In the LA group, 28 (82.4%) of the operations were performed by a specialized hernia surgeon and 6 (17.6%) by a non-specialized hernia surgeon. In the OA group, 20 (42.5%) of the operations were performed by a specialized hernia surgeon and 27 (57.5%) by a non-specialized hernia surgeon, and this is statistically significant ($p < 0.001$). In the LA group, 7 (20.5%) patients had emergency surgery, while 27 (79.5%) patients had elective surgery. In the OA group, 9 (19.1%) patients had emergency surgery, and 38 (80.9%) patients had elective surgery ($p = 0.87$). Hernia repair data are shown in Table 2.

The average follow-up duration was 24.5 (± 12.4) months for

the LA group and 29.1 (± 18.2) months for the OA group ($p = 0.12$). The mean operative time was 45.4 (± 13.9) minutes for the LA group and 43.9 (± 12.9) minutes for the OA group ($p = 0.68$). The mean hospital stay was 1 (± 0) day in the LA group and 1.6 (± 1.1) days in the OA group ($p = 0.018$) (OA group hospital stay range is 1-5). The occurrence of postoperative complications was comparable in both groups ($p = 0.94$). Hematoma occurred in 2 (5.8%) in the LA group and 4 (8.5%) in the OA group ($p = 0.70$). Seroma was observed in 3 (8.8%) of the LA group and 3 (6.3%) of the OA group ($p = 0.70$). SSI occurred only in 1 (2.1%) of the OA group ($p = 0.58$). Subcutaneous neck emphysema as a different complication was seen in 1 patient in the LA group ($p = 0.42$). Mortality was seen only in 2 (4.2%) patients in the OA group ($p = 0.33$). Chronic pain was seen in 1 (2.9%) patient in the LA group and 5 (10.6%) patients in the OA group ($p = 0.38$). Recurrence occurred in 6 patients, exclusively within the OA group ($p = 0.03$). The follow-up findings are presented in Table 3.

Table 2. Hernia repairs

Repairs	Laparoscopy (n=34)	Open approach (n=47)	p
TEP	24 (% 70.5)	-	-
TAPP	7 (% 20.5)	-	-
eTEP	3 (% 8.9)	-	-
Plug	-	32 (% 68)	-
Anterior Repair (Lichtenstein) + Plug	-	5 (% 10.6)	-
Primary Tissue Repair	-	10 (% 21.2)	-
Surgeon			< 0.001
Specialized Hernia Surgeon	28 (% 82.4)	20 (% 42.5)	
Non-specialized Hernia Surgeon	6 (% 17.6)	27 (% 57.5)	
Surgery			0.87
Emergency Surgery	7 (% 20.5)	9 (% 19.1)	
Elective Surgery	27 (% 79.5)	38 (% 80.9)	

TEP: Totally extraperitoneal; TAPP: Transabdominal preperitoneal; eTEP: enhanced view-totally extraperitoneal

Table 3. Follow-up findings

Findings	Laparoscopy (n=34)	Open approach (n=47)	p
Follow-up (months) mean	24.5 (± 12.4)	29.1 (± 18.2)	0.12
Operation Time (min.) mean($\pm$SD)	45.4 (± 13.9)	43.9 (± 12.9)	0.68
Hospital Stay (day) mean($\pm$SD)	1 (± 0)	1.6 (± 1.1)	0.018
Complication n (%)			
None	28 (% 82.4)	39 (% 82.9)	0.94
Hematoma	2 (% 5.8)	4 (% 8.5)	0.70
Seroma	3 (% 8.8)	3 (% 6.3)	0.70
SSI	0	1 (% 2.1)	0.58
Other (subcutaneous neck emphysema)	1 (% 2.9)	0	0.42
Mortality n (%)	0	2 (% 4.2)	0.33
Chronic Pain n (%)	1 (% 2.9)	5 (% 10.6)	0.38
Recurrence n (%)	0	6 (% 12.7)	0.03

SD: Standard deviation; Min: Minutes

Discussion

The baseline data characteristics appeared to be comparable between the two groups in our study, emphasizing their homogeneity (Table 1). Females are more likely to have femoral hernias [8], a trend observed in both groups, which aligns with the literature. Additionally, our research indicated that laparoscopic femoral hernia repair led to a reduced recurrence rate and a shorter hospital stay, which can be ascribed to its minimally invasive characteristics.

In the literature, studies on femoral hernia are usually case reports. Due to the low incidence of femoral hernia, few studies compare laparoscopic methods with open methods. Patients with femoral hernia require surgery because of the increased risk of impingement or strangulation [1,9]. Femoral hernia can be treated with open techniques and laparoscopic techniques. Andresen et al. demonstrated that laparoscopic repair of femoral hernias lowers the risk of reoperation due to recurrence when compared to open repair [10]. Maskal et al. found that open repairs of femoral hernias had similar recurrence rates compared to laparoscopic methods and emphasized the feasibility of open methods [11]. Due to the scarcity of comparative studies on laparoscopic and open methods for femoral hernias, we conducted a retrospective study to evaluate these two approaches.

Laparoscopic techniques include TEP (see Figure 2), TAPP, and the increasingly popular eTEP technique. J. Daes, who described the eTEP technique, reported that it is both useful and feasible for challenging hernia repairs [12]. The mesh plug is often preferred due to its easy application in an open technique for femoral hernias [13]. In our study, 68% of those who underwent open surgery used mesh plugs, which is consistent with the literature. Our study considered anterior repair (Lichtenstein) with mesh plug placement and primary tissue repair as open repairs (see Figure 3). Primary tissue repair involved suturing the inguinal ligament, lacunar ligament, and pectineal (Cooper) ligaments to decrease the size of the external opening of the femoral canal.

Andersen et al. reported emergency surgical procedures for femoral hernias: 39.2% [10], Suppiah et al. reported 37.3% [14], and Dahlstrand et al. reported 35.9% [15]. In our study, the rate of emergency surgery was approximately 20%, which is lower than what has been reported in the literature. We believe this low rate can be attributed to the fact that patients with groin pain or active complaints were referred to the hernia surgeon at our clinic. Open inguinal hernia repairs can play an important role, and trainee surgeons often have their first cases as inguinal hernia repairs [16]. Nowadays, particularly among young surgeons, there is a greater tendency to adopt laparoscopic techniques [17]. In our study, laparoscopic techniques for femoral hernias were utilized by specialized hernia surgeons at a rate of approximately 82%. In comparison, non-specialized hernia surgeons performed the open technique at a rate of about 58% (Table 2). This suggests that specialized hernia surgeons prefer laparoscopic techniques more.

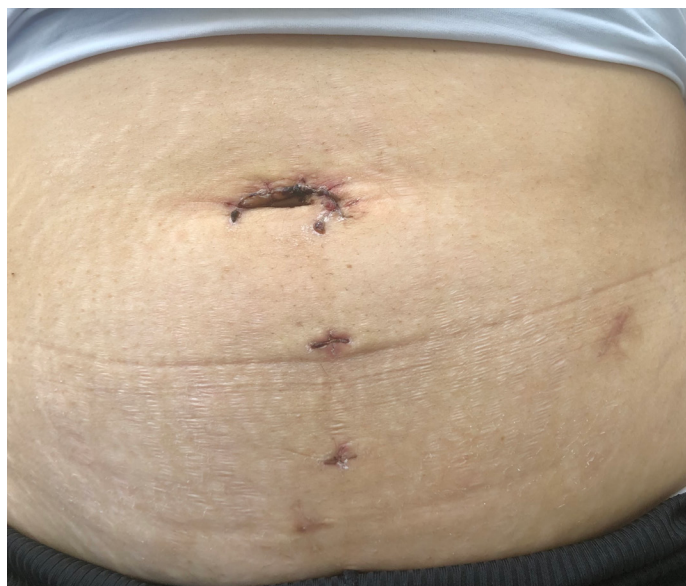


Figure 2. Laparoscopic repair



Figure 3. Open repair

Complications like seroma, hematoma, and surgical site infections were comparable between the two groups, did not require any intervention, and were resolved within 3 months. Subcutaneous emphysema, a rare complication associated with the use of laparoscopic techniques in inguinal hernia repairs, can also be seen in the TEP technique [18]. In our study, neck emphysema developed in one patient in the laparoscopic group and healed spontaneously within two weeks without requiring intervention.

Chronic pain may arise as a complication following inguinal

hernia repair, which can significantly affect patients' quality of life and, in some instances, impede their daily activities. The incidence of chronic pain has been reported to range between 0% and 36.3% [1]. Inguinal hernia surgery utilizing minimally invasive techniques offers several advantages compared to traditional open surgery, such as decreased postoperative pain, quicker recovery, and a faster return to work. Recent meta-analyses support this claim, indicating that the prevalence of chronic inguinal pain is lower with laparoscopic approaches [19,20]. While our study revealed a higher number of patients experiencing chronic pain in the open surgery cohort, this observed difference did not achieve statistical significance. This may be attributed to our small sample size. Additionally, patients had a shorter hospital stay with LA group, which we consider an advantage of minimally invasive surgery.

In our study, we observed no significant difference in operation time between the two groups examined. Contrary to the expectation that an increased number of mesh plugs in the open surgery group would lead to a shorter operative time, we hypothesize that the comparable times noted may be due to the laparoscopic procedures performed by surgeons with specialized expertise in hernia repair. Mortality was recorded in two patients from the open surgery group, both of whom underwent emergency repairs and were over 65 years of age. Consistent with existing literature, the risk of mortality and complications was found to be higher in elderly patients, particularly during instances of emergency femoral hernia repairs [21].

A recent study comparing open preperitoneal surgery and mesh plug surgery in femoral hernias found that preperitoneal repair results in a lower recurrence rate and less postoperative sensation of foreign bodies [22]. Notably, laparoscopic repairs also qualify as minimally invasive preperitoneal repairs. Research conducted by Andersen et al. indicated that laparoscopic repair of femoral hernias lowers the risk of reoperation due to recurrence when contrasted with open repair [10]. However, an alternative study suggests that laparoscopic and open repairs yield comparable recurrence rates [11].

The primary focus of our investigation, recurrence, was absent in the laparoscopic group throughout a mean follow-up period of approximately 25 months, occurring less frequently than in the open surgery cohort (see Table 3). We hypothesize that a significant factor contributing to this finding is the trend of hernia-specialized surgeons predominantly conducting operations in the laparoscopic group. Furthermore, our study revealed that tissue repair in the open surgery group, performed without mesh utilization, is linked to a significant chance of recurrence in femoral hernias [23].

The primary limitation of our research is that it is retrospective nature; however, the insights gained from our findings are significant. Due to the rare occurrence of femoral hernias, conducting prospective studies to evaluate the efficacy of various repair techniques presents considerable challenges.

Nevertheless, prospective research on femoral hernia repair, whether using laparoscopic or open surgical methods, would greatly enhance the existing literature.

Conclusion

Laparoscopic repairs of femoral hernias demonstrated a reduced recurrence rate and a shorter duration of hospital stay without elevating the risk of complications, all while maintaining comparable operative times to open repairs. When managing a patient with a femoral hernia, the reassurance of having a surgeon perform a laparoscopic repair is significant. Moreover, prospective randomized studies are necessary to further evaluate such comparisons in the context of femoral hernias.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

The ethics committee of the University of Health Sciences, Van Training and Research Hospital approved the study (Date: 20.12.2024, protocol number: GOKAEK-2024-02-05). The study complies with the Declaration of Helsinki.

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