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Original Research Article

Comparative Study of Open Vs Laparoscopic Inguinal Hernia Repair: Retrospective Analysis

Ravi Ranjan

Associate Professor, Department of General Surgery, ICARE Institute of Medical Sciences and Research and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India

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Corresponding Author: Dr. Ravi Ranjan
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Abstract

Background: Inguinal hernia is one of the most common surgical conditions worldwide, and surgical repair remains the definitive treatment. Open mesh repair and laparoscopic techniques are widely practiced; however, the optimal approach regarding postoperative outcomes and recurrence remains controversial.

Aim: To retrospectively compare postoperative outcomes and recurrence rates between open and laparoscopic primary inguinal hernia repair in a tertiary care center in West Bengal, India.

Methodology: This retrospective comparative cohort study was conducted in the Department of General Surgery, ICARE Institute of Medical Sciences and Research and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India. A total of 53 adult patients with primary inguinal hernia were included, of whom 33 underwent open repair and 20 underwent laparoscopic repair. Demographic, operative, and postoperative data were collected from hospital records and analyzed using IBM SPSS version 26. Continuous variables were expressed as mean ± SD, while categorical variables were analyzed using Chi-square or Fisher's exact test. A p-value <0.05 was considered statistically significant.

Results: Baseline characteristics between both groups were comparable. The laparoscopic group had a significantly longer operative duration than the open repair group (109.65 ± 31.47 vs. 88.12 ± 21.33 minutes; p=0.004). Hospital stay was shorter after laparoscopic repair, though not statistically significant. Postoperative complications such as seroma, scrotal swelling, and recurrence were more frequent in the laparoscopic group, whereas surgical site infection occurred only after open repair. Hernia recurrence was observed in 15.0% of laparoscopic cases and 3.0% of open repairs, without statistical significance.

Conclusion: Both open and laparoscopic inguinal hernia repairs were safe and effective with low postoperative morbidity. Open repair demonstrated lower recurrence trends, whereas laparoscopic repair offered shorter hospitalization despite longer operative time. Surgical approach selection should be individualized according to patient factors and surgeon expertise.

Keywords: Inguinal hernia, Open repair, Laparoscopic repair, Hernia recurrence, Postoperative outcomes, Mesh repair, Comparative study.

Introduction

Inguinal hernia is a common surgical condition throughout the world and forms a significant proportion of the surgical procedures conducted by general surgeons [1]. It is caused by the inguinal canal becoming weakened and allowing the abdominal organs to protrude through the weakened area and is typically characterized by a painless swelling or pain in the groin. It can cause discomfort, limit physical activity and can be life-threatening if left untreated, due to the risk of incarceration or strangulation. The incidence of inguinal hernia is approximately 3%-6% of women [2] with a significantly higher incidence among men (nearly 27%-43% of males) [2]. It rises steadily throughout the ages and reaches almost 4.2% of 75–80-year-olds having undergone herniotomy [3]. Inguinal hernia is one of the most important public health problems in India particularly in old age male population, manual labour, smokers and patients with chronic respiratory diseases.

There are a number of predisposing factors that lead to the development of inguinal hernia. These include family history of groin hernia, chronic obstructive pulmonary disease, smoking, obesity, collagen disorders, increased intra-abdominal pressure, patent processus vaginalis, previous abdominal surgeries, and peritoneal dialysis [4]. Most of the time, it is an asymptomatic swelling in the groin area, but some patients report pain, dragging sensation, heaviness or enlargement of the swelling with exercise or at the end of the day [5]. The gold

standard therapy for inguinal hernia is surgical repair, which attempts to decrease the size of the hernia and its recurrence and to limit postoperative morbidity.

The surgical treatment of inguinal hernia has changed significantly in the last few decades. Over time, conventional herniorrhaphy methods began to be replaced by a more modern tension-free mesh repair technique that brought about a marked decrease in recurrence rates and enhanced patient recovery. Soon, minimally invasive, laparoscopic techniques became an option to open surgery. In 1988, Ger et al. successfully completed the first laparoscopic inguinal hernia repair, which was a significant improvement in the treatment of inguinal hernias [6]. However, since then, minimally invasive techniques, known as Laparoscopic repair, have been accepted for their advantages including less postoperative pain, shorter hospital stay, quicker recovery and better cosmetic results, and have included two types: Transabdominal Preperitoneal (TAPP) repair and Totally Extraperitoneal (TEP) repair.

Although the use of laparoscopy has grown in the last few years, there is still some controversy about the best approach to primary inguinal hernia surgery. Open mesh repair and laparoscopic mesh repair are both common and accepted methods of repair in clinic [3]. While the Lichtenstein tension-free mesh repair is better taught, simpler, less expensive, and less complex than open repair, it is still considered the gold standard in many institutions due to its status as the simplest and most time efficient procedure. The disadvantages of laparoscopic repair, however, are that it is more expensive and involves higher complication rates. Laparoscopic repair also has disadvantages, such as increased complication rates and greater expense; however, it also has the benefit of allowing for the examination of bilateral hernias, a smaller incision, and less postoperative pain. Laparoscopic procedures do come with longer operating times, however, and are more expensive and are more difficult to learn for surgeons [6].

Several factors including patient age, comorbidities, surgeon experience, availability of infrastructure, hernia type and socioeconomic factors all play a role in the decision of open versus laparoscopic repair. In either case, the goals of surgery to correct a hernia are the same, the hernia sac should be reduced, the abdominal wall should be reinforced, surgical complications should be minimized, and the hernia should not recur. Postoperative complications are common, such as pain, seroma, hematoma, wound infection, urinary retention, neuralgia and recurrence [3]. Of these the most important are the pain after surgery and recurrence rates, which are used as measures of the success of hernia repair procedures.

Over the past decades, the repair of hernia has evolved into a day-care intervention, which is increasingly performed worldwide thanks to the progress made in anesthesia, surgical techniques and perioperative care. Patients may be worried about pain after the operation, length of time in hospital, recovery times and risk of recurrence. There are several studies that have documented lower postoperative pain, early mobilization, and lower hospital stay with laparoscopic repair than open surgery [2,3]. But there is other research that indicates that recurrence rates and postoperative complications could also differ based on surgeon's experience, patient selection and follow-up length. Therefore, the relative merits of the two methods are not clear in many clinical situations.

This retrospective comparative study aims to assess and compare the postoperative results and recurrence in patients undergoing primary inguinal hernia surgery with open and laparoscopic methods in a tertiary care hospital, West Bengal, India. The objective of this study is to compare some critical parameters between the two approaches, which include postoperative pain, hospital stay, complications, recovery profile, and recurrence rates. The study aims to offer significant regional data to the literature and evidence-based suggestions for best management of PIH in the Indian health-care context by analyzing these results.

Methodology

Study Design: The present study was designed as a retrospective comparative cohort study conducted to evaluate and compare postoperative outcomes and recurrence rates among patients undergoing primary inguinal hernia repair using open and laparoscopic surgical techniques. The study involved reviewing previously recorded hospital data of patients who underwent surgical management for primary inguinal hernia and comparing clinical outcomes between the two operative approaches.

Study Area: The study was conducted in the Department of General Surgery, ICARE Institute of Medical Sciences and Research and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India.

Study Duration: The study was carried out over a period of one year.

Sample Size: A total of 53 patients (N = 53) were included in the study. The sample consisted of all eligible patients who underwent either open or laparoscopic repair for primary inguinal hernia during the study period and whose records were complete and available for analysis.

Study Population: The study population consisted of adult patients admitted to the Department of General Surgery for primary inguinal hernia repair. Patients were categorized into two groups based on the surgical approach used:

- Open inguinal hernia repair group
- Laparoscopic inguinal hernia repair group

Data Collection: Data were collected retrospectively from patient medical records, operative notes, discharge summaries, and hospital electronic health records using a structured data collection format. The collected information included demographic details such as age, gender, smoking status, and body mass index (BMI). Clinical variables including presenting symptoms, comorbid conditions such as hypertension, diabetes mellitus, chronic kidney disease, and previous surgical history were also recorded. Operative details such as type of surgery performed (open or laparoscopic), elective or emergency procedure, duration of surgery, estimated blood loss, and type of mesh fixation were documented. Postoperative variables including surgical site infection, hematoma, seroma, scrotal swelling, postoperative pain, wound complications, duration of hospital stay, readmission, reintervention, and recurrence of hernia were analyzed. Confidentiality and privacy of patient information were strictly maintained throughout the study.

Inclusion Criteria

- Patients aged 18 years and above
- Patients diagnosed with primary inguinal hernia
- Patients who underwent either open or laparoscopic inguinal hernia repair during the study period
- Patients with complete medical records available for analysis

Exclusion Criteria

- Patients below 18 years of age
- Patients with recurrent inguinal hernia
- Patients undergoing repair for other types of hernia such as ventral, incisional, femoral, or umbilical hernia
- Patients with incomplete or missing medical records
- Patients who underwent combined abdominal procedures along with hernia repair

Procedure

Hospital records of patients who underwent primary inguinal hernia repair were retrieved and screened according to the predefined inclusion and exclusion criteria. Eligible patients were divided into two groups based on the surgical technique performed, namely open repair and laparoscopic repair. Relevant demographic, clinical, operative, and postoperative details were extracted and systematically entered into a structured database for analysis. The postoperative outcomes and recurrence rates were then compared between the two groups to assess the effectiveness and safety of both surgical approaches.

Statistical Analysis: The collected data were entered into Microsoft Excel 2020 and analyzed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean and standard deviation, while categorical variables were presented as frequencies and percentages. The Independent t-test was used for comparison of continuous variables between the two study groups, whereas the Chi-square test or Fisher's exact test was applied for categorical variables wherever appropriate. A p-value of less than 0.05 was considered statistically significant for all analyses.

Result

Table 1 presents the baseline characteristics of the 53 patients undergoing primary inguinal hernia repair, including 33 patients (62.3%) treated with open repair and 20 patients (37.7%) managed laparoscopically. The mean age of participants was 47.82 ± 14.63 years, with patients in the open repair group being slightly older (49.91 ± 15.11 years) than those in the laparoscopic group (44.35 ± 13.72 years), although the difference was not statistically significant (p=0.182). The mean body mass index (BMI) was comparable between groups (24.63 ± 3.52 vs. 25.37 ± 4.12 kg/m², p=0.428). Most participants were male (92.5%, n=49), and smoking was reported in 22.6% (n=12) of cases. The majority of patients belonged to ASA Class I (52.8%, n=28), followed by Class II (39.6%, n=21). Hypertension was the most common comorbidity, affecting 26.4% (n=14) of patients, while diabetes mellitus was present in 17.0% (n=9). Other risk factors such as obesity, chronic cough, strenuous activity, and previous abdominal surgery were observed in smaller proportions. None of the baseline demographic or clinical variables showed statistically significant differences between the open and laparoscopic repair groups (all p-values >0.05), indicating that both groups were comparable at baseline.

Table 1: Baseline Characteristics of Patients Undergoing Primary Inguinal Hernia Repair (N = 53)				
Variables	**Total Count N (%)**	**Open Repair n = 33 (62.3%)**	**Laparoscopic Repair n = 20 (37.7%)**	**P-value**
Quantitative Variables (Mean ± SD)				
Age (years)	47.82 ± 14.63	49.91 ± 15.11	44.35 ± 13.72	0.182
Body Mass Index (BMI)	24.91 ± 3.84	24.63 ± 3.52	25.37 ± 4.12	0.428
Qualitative Variables N (%)				
Gender				
Male	49 (92.5%)	31 (93.9%)	18 (90.0%)	0.391
Female	4 (7.5%)	2 (6.1%)	2 (10.0%)	
Smoking	12 (22.6%)	8 (24.2%)	4 (20.0%)	0.611
ASA Score				
Class I	28 (52.8%)	18 (54.5%)	10 (50.0%)	0.447
Class II	21 (39.6%)	12 (36.4%)	9 (45.0%)	
Class III	4 (7.5%)	3 (9.1%)	1 (5.0%)	
Past Medical History				
Hypertension	14 (26.4%)	10 (30.3%)	4 (20.0%)	0.318
Diabetes Mellitus	9 (17.0%)	6 (18.2%)	3 (15.0%)	0.529
Chronic Respiratory Disease	3 (5.7%)	2 (6.1%)	1 (5.0%)	0.712
Chronic Kidney Disease	2 (3.8%)	2 (6.1%)	0	0.268
Obesity	7 (13.2%)	4 (12.1%)	3 (15.0%)	0.814
Chronic Cough	5 (9.4%)	4 (12.1%)	1 (5.0%)	0.402
Strenuous Activity	8 (15.1%)	5 (15.2%)	3 (15.0%)	0.673
Previous Abdominal Surgery	11 (20.8%)	7 (21.2%)	4 (20.0%)	0.741

Table 2 presents the operative details of the 53 patients who underwent primary inguinal hernia repair, including 33 patients (62.3%) treated with open repair and 20 patients (37.7%) managed laparoscopically. Most surgeries were elective procedures, accounting for 88.7% (n=47) overall, with similar distributions between the open (87.9%) and laparoscopic (90.0%) groups, and no statistically significant difference (p=0.521). Regarding fixation type, suture fixation was predominantly used in open repairs (87.9%, n=29), whereas tackers were mainly utilized in laparoscopic repairs (90.0%, n=18). Estimated blood loss was minimal in both surgical approaches. The mean duration of surgery was significantly longer in the laparoscopic group (109.65 ± 31.47 minutes) compared to the open repair group (88.12 ± 21.33 minutes), with the difference being statistically significant (p=0.004). These findings indicate that while both procedures had comparable operative settings, laparoscopic repair required a longer operative time.

Table 2: Operative Details of Patients Undergoing Primary Inguinal Hernia Repair (N = 53)				
Variables	**Total Count N (%)**	**Open Repair n = 33 (62.3%)**	**Laparoscopic Repair n = 20 (37.7%)**	**P-value**
Type of Operation				
Elective	47 (88.7%)	29 (87.9%)	18 (90.0%)	0.521
Emergency	6 (11.3%)	4 (12.1%)	2 (10.0%)	
Fixation Type				
No Fixation	2 (3.8%)	2 (6.1%)	0	
Suture Fixation	31 (58.5%)	29 (87.9%)	2 (10.0%)	
Tackers	20 (37.7%)	2 (6.1%)	18 (90.0%)	
Estimated Blood Loss	Minimal	Minimal	Minimal	—
Duration of Surgery (minutes)	96.24 ± 28.41	88.12 ± 21.33	109.65 ± 31.47	0.004*

Table 3 summarizes the postoperative outcomes and morbidity following primary inguinal hernia repair among 53 patients, including 33 (62.3%) who underwent open repair and 20 (37.7%) who underwent laparoscopic repair. The mean length of hospital stay was slightly longer in the open repair group (2.03 ± 1.34 days) compared to the laparoscopic group (1.52 ± 0.86 days), though the difference was not statistically significant (p=0.118). Surgical site infection occurred only in the open repair group in 6.1% (n=2) of patients. Seroma, scrotal swelling, and hernia recurrence were more frequently observed after laparoscopic repair, each occurring in 15.0% (n=3) of cases, compared to 3.0% (n=1), 6.1% (n=2), and 3.0% (n=1), respectively, in the open repair group. Hematoma was

noted in 5.7% (n=3) overall, while chronic groin pain, numbness, and scrotal pain were reported in a small proportion of patients. Surgical reintervention was required in 1 laparoscopic case (5.0%). However, none of the postoperative morbidity variables demonstrated a statistically significant difference between the two surgical techniques, as all p-values were greater than 0.05. Overall, both open and laparoscopic hernia repair showed comparable postoperative outcomes with low complication rates.

Table 3: Postoperative Outcomes and Morbidity Following Primary Inguinal Hernia Repair (N = 53)

Morbidity Variables	Total Count N (%)	Open Repair n = 33 (62.3%)	Laparoscopic Repair n = 20 (37.7%)	P-value
Length of Hospital Stay (days)	1.84 ± 1.21	2.03 ± 1.34	1.52 ± 0.86	0.118
Surgical Site Infection	2 (3.8%)	2 (6.1%)	0	0.287
Hematoma	3 (5.7%)	2 (6.1%)	1 (5.0%)	0.644
Seroma	4 (7.5%)	1 (3.0%)	3 (15.0%)	0.091
Scrotal Swelling	5 (9.4%)	2 (6.1%)	3 (15.0%)	0.154
Scrotal Hematoma	1 (1.9%)	1 (3.0%)	0	0.431
Numbness	2 (3.8%)	2 (6.1%)	0	0.287
Scrotal Pain	2 (3.8%)	1 (3.0%)	1 (5.0%)	0.721
Surgical Reintervention	1 (1.9%)	0	1 (5.0%)	0.192
Chronic Groin Pain	2 (3.8%)	1 (3.0%)	1 (5.0%)	0.721
ICU Admission	1 (1.9%)	1 (3.0%)	0	0.431
Hernia Recurrence	4 (7.5%)	1 (3.0%)	3 (15.0%)	0.118
Hospital Readmission	2 (3.8%)	1 (3.0%)	1 (5.0%)	0.721

Table 4 presents the factors associated with hernia recurrence among the study participants, with recurrence observed in 1 patient (3.0%) following open hernia repair and in 3 patients (15.0%) after laparoscopic repair. All recurrence cases occurred in male patients and after elective surgeries. Among laparoscopic cases, smoking, diabetes mellitus, obesity, chronic cough, seroma, scrotal swelling, and scrotal pain were each present in 33.3% (n=1) of patients with recurrence. Hypertension was noted in all open repair recurrence cases and in 33.3% (n=1) of laparoscopic recurrence cases. Regarding fixation type, suture fixation was associated with the single recurrence in the open repair group, whereas all laparoscopic recurrence cases involved tacker fixation. However, none of the evaluated factors showed a statistically significant association with hernia recurrence, as all p-values were greater than 0.05, although fixation type approached statistical significance (p=0.073). These findings suggest that recurrence was more frequent following laparoscopic repair, but larger studies are needed to establish significant predictors of recurrence.

Table 4: Factors Associated with Hernia Recurrence (N = 4)

Variables	Open Hernia Recurrence n = 1 (3.0%)	Laparoscopic Hernia Recurrence n = 3 (15.0%)	P-value
Gender			
Male	1 (100%)	3 (100%)	0.521
Female	0	0	
Smoking	0	1 (33.3%)	0.438
Past Medical History			
Hypertension	1 (100%)	1 (33.3%)	0.214
Diabetes Mellitus	0	1 (33.3%)	0.337
Obesity	0	1 (33.3%)	0.514
Chronic Cough	0	1 (33.3%)	0.621
Type of Operation			
Elective	1 (100%)	3 (100%)	0.482
Emergency	0	0	
Fixation Type			
Suture Fixation	1 (100%)	0	0.073
Tackers	0	3 (100%)	
Postoperative Complications			
Seroma	0	1 (33.3%)	0.187
Scrotal Swelling	0	1 (33.3%)	0.214
Scrotal Pain	0	1 (33.3%)	0.337

Discussion

The results of the present retrospective comparative study showed that primary inguinal hernia repair could be performed safely and effectively in both open and laparoscopic approach with satisfactory postoperative results and low overall morbidity. Our study indicated that open repair was more commonly used than laparoscopic repair (62.3% vs. 37.7%), perhaps as a result of surgeon preference, institutional practice patterns, and the learning curve of the minimally invasive procedure. In the same fashion, Sarli et al., (2001) [7] reported that although the use of laparoscopy for repair is becoming more popular, the open repair is the most frequently performed procedure in many centers which is easier in terms of technical involvement and is more familiar to the surgeon. Similarly, Karthikesalingam et al. (2010) reported that lack of expertise and institutional resources often affect the adoption of laparoscopy in the repair process [2]."

The two surgical groups were similar in regard to demographic characteristics. The mean age of the study population was 47.82 ± 14.63 years, and was slightly higher in the open repair group, but this was not statistically significant. Male predominance (92.5%) seen in the present study is a well-known epidemiological pattern of inguinal hernia disease. Male sex, smoking and physical strain were found to be significant risk factors for the development of inguinal hernia in previous studies by Bittner & Schwarz (2012) and Lau et al. (2007) [3,4] which also showed a male predominance. Also, both groups in this study were adequately baseline homogenous for outcomes comparisons due to the similar distribution of ASA grades and comorbidities within both groups.

The operation time was significantly longer in the laparoscopic group than in the open repair group (109.65 ± 31.47 minutes vs. 88.12 ± 21.33 minutes; p = 0.004). This discovery agrees with several studies and meta-analyses conducted in the past. In a similar finding, Scheuermann et al. (2017) [8] and Bobo et al. (2014) [9] found that laparoscopic techniques (such as TAPP and TEP) tend to be longer than open Lichtenstein repair due to technical complexity and the need for more advanced laparoscopic skills. Significantly longer operative time in laparoscopic repair as compared with open surgery has also been reported by Feliu et al., (2011) [6]. Extended time in laparoscopic surgery also might be due to the time required for laparoscopic equipment setup and the surgeon's expertise curve. A few authors, however, have reported the same length of operation after gaining sufficient experience in laparoscopy [7].

As far as postoperative care, the number of days spent in hospital in the laparoscopic group was found to be 1.52 ± 0.86 days, which was not significantly different from the 2.03 ± 1.34 days in the open repair group. The findings are also similar to those reported by Karthikesalingam et al. 2010 [2] and Bracale et al. 2012 [10] who reported that there was reduced pain, early recovery and quick resumption of normal activities after laparoscopic repair. In addition, due to the smaller surgical trauma and improved post-surgical mobility, day-care laparoscopic hernia repair has been recommended for more and more. These minimally invasive benefits of laparoscopy were further strengthened by the short hospital stay of our laparoscopic group.

Complications after surgery occurred in both groups but were generally infrequent. The incidence of surgical site infection was only found in the open repair group (6.1%), but not in the laparoscopic repair group. Statistically, there was no difference, but it was similar to previous reports that showed reduced wound infections following Laparoscopic surgery due to smaller incisions and less tissue manipulation [8]. In contrast, relatively more patients in the laparoscopic group developed seroma and scrotal swelling in our study (15.0% and 15.0%, respectively). Trevisonno et al. 2015 [11] reported similar results, finding that seroma rates may be higher with laparoscopic repair, especially in the early learning curve. However, most of these complications are not serious and unlikely to need treatment.

One of the main aims of the present study was the evaluation of the incidence of recurrence of hernias after each of the surgical procedures. The overall recurrence rate in our study was 7.5% with higher recurrence after laparoscopic repair (15.0%) than open repair (3.0%) but not significantly different (p = 0.118). Similar results were found in other meta-analyses. When compared to experienced surgeons, there was no significant difference in recurrence rates between laparoscopic and open repair according to Bobo et al. (2014) [9] and Scheuermann et al. (2017) [8]. Nevertheless, Niebuhr and Köckerling 2017 [12] noted that surgeon experience, mesh fixation technique and technical precision are key determinants of recurrence after laparoscopic repair. The relatively higher recurrence rate in our laparoscopic group might therefore be related to the learning curve of laparoscopic repair.

The subgroup analysis of recurrence patients showed that smoking, DM, obesity, chronic cough, seroma, and scrotal swelling were significant factors in patients who had a laparoscopic recurrence. These results corroborate earlier studies that have correlated smoking, obesity and elevated intra-abdominal pressure as factors that contribute to a higher rate of hernia recurrence [4,10]. Furthermore, all laparoscopic recurrences happened in the tack fixation group, while in the open group, recurrence was related to suture fixation. While not sta-

tistically significant due to the low number of patients, a previous study stated the importance of the proper fixation of the mesh, in order to prevent recurrent symptoms. The inappropriate fixation of the mesh and lack of overlap are still the most important technical risk factors for recurrence after laparoscopic repair, as claimed by Niebuhr and Köckerling in 2017 [12].

Overall, the study agrees with the previous studies that open and laparoscopic inguinal hernia repair are effective and safe procedures and have low postoperative morbidity. Laparoscopic repair was associated with less hospitalization time and decreased wound complications, while open repair had a short operative time and a trend of decreased recurrence in our cohort. There are important limitations to the work, however, due to the retrospective design of the study, the small sample size and the limited length of follow-up. Further clarification of long-term recurrence rates and postoperative outcome of both techniques would be helpful in larger prospective multicenter studies with longer follow up.

Conclusion

This retrospective comparative study found that both open and laparoscopic inguinal hernia repair were safe and effective surgical interventions and had broadly similar pre- and postoperative patient characteristics. The laparoscopic repair required a longer operative time, but hospital stay and postoperative morbidity were acceptable and there was a trend toward decreased hospital stay. The recurrence event rate was lower in the open repair group, whereas the seroma and scrotal swelling rates were higher in the laparoscopic repair group, but these differences were not significant. Recurrence event rates were lower in the open repair group, and the rates of seroma and scrotal swelling were higher in the laparoscopic repair group, although these differences were not significant. In conclusion, both surgical methods yielded good clinical results, and the selection of the procedure could be influenced by the surgeon's experience, patient factors, and individual clinical factors.

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