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Laparoscopic Transabdominal Preperitoneal Repair of Inguinal Hernia: A Retrospective Study of 1104 Patients

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ABSTRACT

Background: Hernia surgery is one of the most common operations worldwide. Surgery remains the primary treatment for hernias, with limited benefit from conservative management—initially, laparoscopic repair offered better diagnostics, less chronic discomfort, and reduced postoperative pain. TAPP (transabdominal preperitoneal) repair enhances anatomical recognition, identifies vascular structures, and reveals contralateral groin hernias.
Objectives: To report our institution's experience with TAPP repair, including complications and long-term outcomes.
Materials and methods: We retrospectively reviewed all patients who underwent TAPP groin hernia repair between January 1, 2017, and December 31, 2022. The analysed variables included age, sex, hernia type and site, size, mesh type, fixation method, conversion to open repair, operation duration, previous surgery, comorbidities, surgeon expertise, and follow-up.
Results: Among the 1104 patients, 97.3% were male and 2.7% were female, with a mean age of 47.44 ± 12.54 years. Hypertension was the most common comorbidity (10.1%). Recurrent Hernias were present in 9.4% of cases, while indirect hernias accounted for 49.3%. Around 2/3rd cases were performed by senior surgeons. Inguinoscrotal hernias were observed in 11.3% of the patients. Intraoperative complications occurred in 3.4% of cases. Postoperative seromas (5.9%) and chronic pain (4%) being the most frequent postoperative issues.
Conclusion: TAPP repair for inguinal hernias is an effective and feasible approach with satisfactory outcomes. It is also suitable for training junior surgeons with no significant predictors of postoperative complications.
Keywords: Inguinal hernia; Transabdominal preperitoneal; Complications; Seroma; Recurrence.

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INTRODUCTION

One of the most common operations performed worldwide is hernia repair. The most common type of hernia is groin hernia. The likelihood of developing a groin hernia in a person's lifetime is as high as 40% for men and 6% for women. Surgery is the standard treatment for hernias and has no clear role in preserving hernia management [1, 2]. For many years, several types of open inguinal hernias have been repaired, with just a few negative aspects related to insufficient exposure and complications [2, 3]. Laparoscopic repair was first offered in the early 1990s, and the procedure has gained popularity over time for the management of groin hernias. The advantages of laparoscopic groin hernia surgery include less postoperative pain, less chronic pain that lasts for a long time, and superior diagnostic value [4].

Laparoscopic treatment of a groin hernia is less invasive than open surgery because it requires only small incisions during the procedure rather than a large incision, such as open hernia surgery. It also has fewer complications that may affect the outcome [5]. Laparoscopic repair offers many benefits compared to open procedures, including less pain after surgery, quicker recovery, and a lower chance of the hernia

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coming back for people with repeated or both-sided inguinal groin hernias, and for women as well [6].

According to national sources, the percentage of laparoscopic hernia repairs can reach up to 55% because the procedure is more expensive and requires additional supplies that are not needed for open surgery [7]. The two most popular methods for treating groin hernias are total extraperitoneal (TEP) repair and laparoscopic transabdominal preperitoneal (TAPP) repair. Although there appears to be controversy about the technique selected, the majority of published literature has demonstrated comparable efficacy and results [8].

However, some surgeons who support the TAPP have reported that it provides superior anatomy identification and is a significant surgical landmark; second, it is superior in demonstrating contralateral groin hernias and identifying their presence, which can be corrected in the same operation; and third, it is superior in identifying vascular structures and preventing injury to them. To achieve the greatest results from laparoscopic hernia repair for patients, the surgeon's experience and preference when choosing between TAPP and TEP are the best advice [8, 9].

This article presents our experience with the long-term outcomes and potential complications of inguinal hernia repair via TAPP repair, the primary type of laparoscopic hernia surgery performed at our institution.

MATERIALS AND METHODS

Our study was a retrospective cohort analysis of prospectively collected data at Hamad Medical Corporation (HMC) tertiary hospitals in Qatar. The Medical Research Center (IRB) of HMC approved this retrospective study (#MRC-01-23-862). All patients who underwent TAPP repair for a groin hernia were identified through electronic medical records and admitted to the surgery department between January 1, 2017, and December 31, 2022. There are no exclusion criteria; the only requirement for inclusion was being older than 18 years. The collected data cover the following: Age, sex, groin hernia type, site, size, mesh utilized, fixation type, conversion status, reasons for conversion to open surgery, length of surgery, prior surgery, comorbidities, surgeon expertise, and follow-up.

Surgical procedure

Before the patient enters the operating room, we give the patient instructions to urinate in the preoperative area. We routinely recommend administering intravenous antibiotic prophylaxis with a third-generation cephalosporin to the patient before the induction of general anaesthesia. With the use of the open Hasson technique, pneumoperitoneum was established through an incision above the umbilicus via an 11 mm port at 14 mmHg, and the abdominal pressure was adjusted. We inserted two additional 5 mm ports in the right and left lumbar quadrants, just above the level of the umbilicus. We placed the patient in the supine position, tucked both arms close to the body, and fixed them to the operating table. We kept the patients in the Trendelenburg position, tilting them to the right or left depending on the location of the hernia. After a diagnostic laparoscopy of the abdomen, hernia defects were identified, and a good inspection of the contralateral site was performed for any possibility of finding asymptomatic contralateral hernias. We identified the anatomy of the groin area anatomy and important landmarks, such as spermatic vessels and vas deferens. Careful identification of all groin area possible sites of hernia: indirect, direct inguinal hernia, femoral hernia, and obturator hernia areas. We start to create the peritoneal flap. First, by marking and then opening between marked points, the 1st mark is 2 cm superior and lateral to the superior anterior iliac spine. Then, we move from lateral to medial horizontally, and just before reaching the medial umbilical fold, divert proximally; thus, we create an incision such as a hockey stick or S-shaped incision, which helps keep the peritoneal flab away from the surgical field during dissection. With the first cut in the peritoneum, we pull it down strongly to all the peritoneal air to go in between the peritoneum and transversalis fascia and create a dissectible plan. Our protocol involves dissecting laterally over the triangle of pain while preserving the preperitoneal fat that covers the nerves there and then medially revealing the pubic bone and carefully identifying the obturator canal and corona mortis if present.

Next, we address the sac, dissecting it from the lateral aspect in all directions to isolate it from the spermatic vessel and vas deferens. If the hernia is indirect, the entire sac is dissected, the redundant sac is cut out, and the end loop is used to ligate the sac from the inside. When a congenital indirect hernia occurs, we dissect the sac up to the testis, then cut it and leave a portion of it in place. The sac is then taken out and closed off. In the case of a direct hernia, the transversalis fascia sac is fully separated, and the weakened transversalis fascia is sewn to the adjacent rectus muscle via tackers or sutures. The inguinal canal must be checked for the presence of cord lipomas, which must be removed if they are found. We employ umbilical ports to introduce mesh after it has been rolled, so we avoid inserting larger working lateral ports. Personnel preferences regarding mech options are absent; we use whatever is available with adequate size to cover all hernial orifices in the groin area. If the mesh is not self-fixing, such as the ProgGrip mesh variant, we secure it in place. The peritoneal flap is then closed via absorbable continuous stitching once enough haemostasis has been achieved. Unless there is a clear indication, intra-abdominal drains were rarely used. The majority of cases required a one-day hospital stay to recover fully, be able to return home in a stable state, and to arrange appointments for appropriate follow-up at an outpatient clinic [10].

Statistical analysis

A comprehensive analysis was conducted utilizing descriptive statistics to examine interval variables. The mean and standard deviation were calculated to summarize the central tendency and dispersion of these continuous variables. At the same time, we looked at categorical variables, like the types of meshes used for fixing things, surgical details, and overall results, by using frequency counts and percentages. Student's t tests were used to determine if there were significant differences in various outcomes related to interval variables, like postoperative complications, recurrence, chronic pain in the groin, and seroma formation. For categorical variables, chi-square tests were conducted to investigate potential associations. A two-tailed P-value of < 0.05 was considered the threshold for statistical significance. The entire analysis was executed via the statistical package for social sciences (SPSS), version 29 [IBM Corp. (International Business Machines Corporation), Armonk, New York, United States] ensuring a robust and standardized approach to data examination and interpretation.

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RESULTS

A total of 1,104 patients with groin hernias who underwent laparoscopic repair were enrolled in the current study. In 67.1% of cases, the TAPP procedure was performed by senior, experienced surgeons who are experts in laparoscopic hernia repair; junior surgeons performed the remaining cases (32.9%) under the supervision of senior surgeons. The majority of cases (97.3%) were males. The study population's mean age was 47.44 ± 12.54 years. 98.9% of the patients were married. A total of 3.3% of the patients had a history of smoking, whereas 5.5% of the patients had a history of steroid use. The mean duration of swelling in the groin was 19.5 ± 17.3 months. Fifteen percent had related comorbidities, with hypertension accounting for the highest prevalence in 10.1% of patients. There were no significant predictors regarding the demographics and comorbidities of the patients, nor were there any relationships found regarding preoperative laboratory results and radiological scans (Table 1).

The study revealed that 46.1% of participants had a left-sided inguinal hernia repaired. In most of the cases, 90.6% were primary hernias, and 9.4% were recurrent cases involving TAPP repair. There were no significant (P-value > 0.05) correlations observed between the side of the hernia, the recurrent type of hernia, or the existence of an inguinoscrotal hernia and postoperative complications (Table 2).

There were many mesh types that we employed: ProGrip in 27.7% of cases, Polyproline mesh in 21.8%, and Ultra Pro mesh type in 33.6% of hernia repairs. Bard 3D mesh was in 12.2% and Dextile mesh type was the least used in 4.6% of cases. We applied different mesh fixation methods; we employed glue in 0.5% of the cases, self-fixing meshes in 27.7%, tackers in 67.7%, and glue plus tackers in 4.1%. We examined the relationship between mesh type and the three primary PO problems and discovered that, when compared to other mesh types, Dextile mesh was significantly associated with no patients developing this condition (P-value = 0.041). Similarly, we discovered that there was no recorded recurrence following hernia surgery using the polyproline type of mesh (P-value = 0.001). The type of mesh utilised in the repair does not significantly (P-value = 0.352) correlate with PO chronic groin pain (Table 3).

The mean mesh surface area was 199.37 ± 62.58. a drain was required in 1.8% of patients . In 1.8% (20 patients) of this group, converting to an open method was necessary due to challenging dissection. The average duration of hospitalization was 1.08 ± 0.34 days, and the average duration of follow-up care was 1.79 ± 1.05 years. This study has no recorded mortality. Regarding the relationship between surgery detail and intraoperative complications with PO complications, there was no significant correlation (P-value > 0.05). However, we found a significant association between PO complications and longer follow-up duration (P-value = 0.001) (Table 4).

DISCUSSION

Over the past few decades, laparoscopic inguinal hernia repair has grown in popularity worldwide. Experts recommend it for bilateral or recurrent groin hernias, but recently, they have also recommended it for unilateral hernias. It has become more common because of its advantages over open hernias in terms of small incisions, less chronic postoperative pain, fewer complications, and rapid return to daily activities [8, 11]. TAPP and TEP are the most commonly performed laparoscopic inguinal hernia repairs; notably, there are no differences in terms of duration of stay, recurrence rate, or complications associated with the procedure [12]. The transabdominal technique allows for a greater workspace, accurate identification of the anatomical structure of the groin area, and superior evaluation of the contralateral side for the discovery of undetected or missed groin hernias. TAPP repair is the most frequently used approach in groin hernia repair in our unit because a skilled surgeon is readily available to perform the procedure, even though it has a short learning curve [13].

Sbaco et al., examined the feasibility of TAPP repair in an emergency setting. They reported that TAPP patients were younger, had fewer comorbidities, and had shorter hospital stays (mean of 2.6 days). They also demonstrated that TAPP is a valuable option in emergency groin hernia repair with good safety and efficiency [14]. According to another study, TAPP repair has an acceptable operating time of 64 minutes and is both safe and useful in emergency situations. The primary side effect of the operation is seroma, which affects 8.5% of patients [15]. There were just five emergency cases in our study since the surgeons at our institute prefer to operate on emergency patients via an open method. Despite the small sample size, we did not find any differences from the TAPP procedures we performed, and the literature suggests that laparoscopic management of emergencies presenting with groin hernias is encouraged.

The mean operative time (OT) in our study was 98.24 minutes, which is considered high. The reason may be that our institute is a teaching and training center for junior staff (residents and fellows), and this training purpose significantly affects OT. According to Takayama et al., bilateral groin hernia repair requires a longer operating time of 103 minutes [16]. Another study revealed that experts had a shorter operating time (OT) compared to trainees. When they examined the mean OT of experts and trainees, they reported that the former had a shorter duration (59 minutes) than the latter (64 minutes) [17]. In our study, which included 30 female patients, representing 2.7% of the total study cohort, TAPP repair was safe and did not significantly differ between male and female participants in most study variables, except the absence of a specific type of bilateral hernia and the absence of any intra- or postoperative complications. Additionally, there was no confirmed conversion to open surgery and no reports of recurrence. In addition, the short operative time in females was significant. Our method preserves the round ligament throughout surgery in all patients. In a study by Lin et al., 159 female patients underwent TAPP repair. The results indicated that the procedure is successful in treating groin hernias in female patients, with a lower incidence of seroma and hematoma (4.7%), 1.6% of patients experiencing chronic pain following surgery, and no recurrences noted. The study also examined round ligament preservation versus cutting, but there was no significant difference between the two groups [18].

The most common complication following laparoscopic repair of a groin hernia is believed to be seroma formation, which can occur in as many as 19% of individuals undergoing TAPP surgery. The presence of seroma and hematoma may result in infection, mesh migration, a greater risk of recurrence, and significant postoperative concerns for patients and their families [19, 20]. A review of studies showed that there was no difference in the rates of postoperative seroma or hematoma among different methods of open hernia repair

Table 1. Patient demographics, comorbidities, and pre-operative investigations in relation to the main post-operative complications*.

PO Complication (N)	No PO seroma formation (1060)	PO seroma formation (44)	P-value	No PO Chronic groin pain (1039)	PO Chronic groin pain (65)	P-value	No PO Recurrence (1075)	PO Recurrence (29)	P-value
Demography and patient history									
Male gender: N (%)	1033(97.5%)	41(93.2%)	0.088	1010(97.2%)	64(98.5%)	0.547	1045(97.2%)	29(100.0%)	0.362
Age(M±SD)	47.46±12.63	46.86±10.32	0.756	47.32±12.51	49.32±12.96	0.212	47.33±12.57	51.52±10.59	0.076
H of Previous surgery N(%)	207(19.5%)	7(15.9%)	0.552	198(19.1%)	16(24.6%)	0.271	210(19.5%)	4(13.8%)	0.440
H of Smoking N(%)	35(3.3%)	1(2.3%)	0.706	35(3.4%)	1(1.5%)	0.420	35(3.3%)	1(3.4%)	0.954
H of Steroid treatment N(%)	60(5.7%)	1(2.3%)	0.335	58(5.6%)	3(4.6%)	0.741	60(5.6%)	1(3.4%)	0.620
Married patients N(%)	1049(99.0%)	43(97.7%)	0.439	1027(98.8%)	65(100.0%)	0.384	1063(98.9%)	29(100.0%)	0.567
Presence of comorbidities N (%)									
Total	159(15.0%)	7(15.9%)	0.869	152(14.6%)	14(21.5%)	0.131	158(14.7%)	8(27.6%)	0.050
CAD	16(1.5%)	0(0.0%)	0.412	15(1.4%)	1(1.5%)	0.951	16(1.5%)	0(0.0%)	0.508
DM	72(6.8%)	4(9.1%)	0.555	71(6.8%)	5(7.7%)	0.791	76(7.1%)	0(0.0%)	0.138
HT	108(10.2%)	3(6.8%)	0.466	105(10.1%)	6(9.2%)	0.820	111(10.3%)	0(0.0%)	0.068
Renal	19(1.8%)	0(0.0%)	0.370	19(1.8%)	0(0.0%)	0.271	19(1.8%)	0(0.0%)	0.470
BPH	8(0.8%)	0(0.0%)	0.563	7(0.7%)	1(1.5%)	0.425	8(0.7%)	0(0.0%)	0.641
Emergency admission	5(0.5%)	0(0.0%)	0.648	4(0.4%)	1(1.5%)	0.179	5(0.5%)	0(0.0%)	0.713
Laboratory and radiology data									
Hemoglobin (M±SD)	12.50±2.15	12.53±2.26	0.919	12.47±2.15	12.87±2.21	0.153	12.51±2.14	12.21±2.50	0.461
Serum albumin (M±SD)	36.13±5.10	36.29±4.88	0.832	36.06±5.1	37.36±4.89	0.430	36.1±5.1	37.82±4.87	0.069
Defect in ultrasound (M±SD)	9.48±3.57	10.2±3.98	0.237	9.45±3.55	10.52±4.1	0.050	9.49±3.61	10.11±2.14	0.220

* Values expressed as frequency (N number and %); M±SD mean ± standard deviation. PO postoperative; H History; CAD Coronary artery disease; DM Diabetes mellitus; HT Hypertension; BPH Benign prostatic hyperplasia.

Table 2. Correlation between hernia characteristics and post-operative complications*.

PO Complication (N)	No PO seroma formation (1060)	PO seroma formation (44)	P-value	No PO Chronic groin pain (1039)	PO Chronic groin pain (65)	P-value	No PO Recurrence (1075)	PO Recurrence (29)	P-value
Hernia characteristic									
Side of hernia N(%)									
Right	332(31.3%)	8(18.2)		323(31.1%)	17(26.2%)		332(30.9%)	8(27.6%)	
Left	488(46.1%)	21(47.7%)	0.091	478(46.0%)	31(47.7%)	0.670	498(46.3%)	11(37.9%)	0.332
bilateral	240(22.6%)	15(34.1%)		238(22.9%)	17(26.2%)		245(22.8%)	10(34.5%)	
Recurrent hernia N(%)	100(9.4%)	4(9.1%)	0.939	94(9.0%)	10(15.4%)	0.090	101(9.4%)	3(10.3%)	0.863
Presence of Inguinoscrotal N(%)	939(88.6%)	40(90.9%)	0.634	113(10.9%)	12(18.5%)	0.061	121(11.3%)	4(13.8%)	0.670

* Values expressed as frequency (N number and %); M±SD Mean ± standard deviation. PO Postoperative.

and laparoscopic surgery, whether TAPP or TEP, even when using different types of mesh or fixation methods [21]. Although seroma production is thought to be a natural process that cannot be stopped, depending on the type of hernia at

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Table 3. Mesh types and fixations methods in relation to postoperative complications*.

PO complication (N)	No PO seroma formation (1060)	PO seroma formation (44)	P-value	No PO chronic groin pain (1039)	PO chronic groin pain (65)	P-value	No PO recurrence (1075)	PO recurrence (29)	P-value
Type of mesh N (%)									
ProGrip	291(27.5%)	15(34.1%)		289(27.8%)	17(26.2%)		302(28.1%)	4(13.8%)	
Polyproline	234(22.1%)	7(15.9%)		229(22.0%)	12(18.5%)		241(22.4%)	0(0.0%)	
Ultra Pro	350(33.0%)	21(47.7%)	0.041	352(33.9%)	19(29.2%)	0.352	351(32.7%)	20(69.0%)	0.001
Bard 3D	134(12.6%)	1(2.3%)		123(11.8%)	12(18.5%)		133(12.4%)	2(6.9%)	
Dextile	51(4.8%)	0(0.0%)		46(4.4%)	5(7.7%)		48(4.5%)	3(10.3%)	
Type of fixation N (%)									
Self-fixing	291(27.5%)	15(34.1%)		289(27.8%)	17(26.2%)		302(28.1%)	4(13.8%)	
Tacker	720(67.9%)	27(61.4%)	0.196	701(67.5%)	46(70.8%)	0.880	723(67.3%)	24(82.8%)	0.017
Tacker + glue	45(4.2%)	1(2.3%)		44(4.2%)	2(4.2%)		46(4.3%)	0(0.0%)	
Glue alone	4(0.4%)	1(2.3%)		5(0.5%)	0(0.0%)		4(0.4%)	1(3.4%)	

* Values expressed as frequency (N number and %); M±SD Mean ± standard deviation. PO Postoperative.

Table 4. Surgery detail, intraoperative complications, and follow–up in relation to main postoperative complications*.

PO complication (N)	No PO seroma formation (1060)	PO seroma formation (44)	P-value	No PO chronic groin pain (1039)	PO chronic groin pain (65)	P-value	No PO recurrence (1075)	PO recurrence (29)	P-value
Surgery details									
Surface area of mesh size (cm^2) (M±SD)	199.36±62.49	199.55±59.92	0.984	199.33±62.41	200±62.1	0.933	199.69±62.57	187.24±53.77	0.289
Conversion to open surgery N(%)	18(1.7%)	2(4.5%)	0.165	20(1.9%)	0(0.0%)	0.259	20(1.9%)	0(0.0%)	0.459
Operative Time(Minutes) (M±SD)	97.88±32.11	106±91	0.069	98.32±32.34	97±30.75	0.749	98.05±32.11	105.24±36.58	0.236
Done by Junior surgeon N(%)	352(33.2%)	11(25.0%)	0.256	345(33.2%)	18(27.7%)	0.359	357(33.2%)	6(20.7%)	0.157
Intraoperative complications N (%)									
Total	36(3.4%)	2(4.5%)	0.682	34(3.3%)	4(6.2%)	0.216	37(3.4%)	1(3.4%)	0.999
Bleeding	15(1.4%)	1(2.3%)	0.641	14(1.3%)	2(3.1%)	0.258	16(1.5%)	0(0.0%)	0.508
Bradycardia	2(0.2%)	0(0.0%)	0.773	2(0.2%)	0(0.0%)	0.723	2(0.2%)	0(0.0%)	0.816
Injury to inferior epigastric artery	5(0.5%)	0(0.0%)	0.648	4(0.4%)	1(1.5%)	0.179	5(0.5%)	0(0.0%)	0.713
Peritoneal tear	14(1.3%)	1(2.3%)	0.593	14(1.3%)	1(1.5%)	0.897	14(1.3%)	1(3.4%)	0.325
Use of drain	19(1.8%)	1(2.3%)	0.815	18(1.7%)	2(3.1%)	0.430	19(1.8%)	1(3.4%)	0.503
Follow-up (year)	1.75±1.03	2.61±1.33	0.001	1.74±1.04	2.45±1.01	0.001	1.75±1.04	3.07±0.72	0.001

* Values expressed as frequency (N number and %); M±SD Mean ± standard deviation. PO Postoperative.

presentation, the surgical technique utilized during TAPP repair can decrease its incidence [22]. Marito et al. reported greater associations between seroma and hematoma following surgery in cases of indirect types of inguinal hernias and in cases where the hernia defect measured more than three centimetres (cm) [20]. Another study revealed that inguinal hernias of the direct type and glue or tackers were responsible for most cases of postoperative seroma development [23]. No significant predictors related to seroma production were found in our analysis. Neibuhr et al. linked the use of tackers as a mesh fixation technique with smaller hernial defects, younger ages, higher BMIs (Body mass index), and the presence of complications with chronic postoperative pain [24]. Another study reported that 10% of patients have postoperative chronic pain; however, no major perioperative characteristics were shown to be significantly related to the de-

velopment of chronic pain [25]. Similarly, we were unable to find any associations between the study variables and chronic inguinal pain (which affected 5% of the study group); the only exception was the larger hernial defect size observed in patients with this complication (P-value = 0.05). Beau et al., assessed the factors that predict laparoscopic treatment of groin hernias and chronic pain in 960 patients, with 9.3% of the patients being female. The study also revealed that perioperative pain, age > 45 years, female sex, a history of groin hernia repair, and a higher ASA score were predictive of chronic groin pain, which affected 6% of the patients [26]. There are numerous risk factors, including obesity, smoking, and diabetes mellitus, that are related to patient recurrence following hernia repair. Additional surgical considerations are needed, such as the technique of surgery, the experience of the surgeon, and the presence of any relevant postoperative complications like seroma formation. All of these findings were documented by Manjunath et al. documented all these findings and reported no correlation between recurrence and mesh type or fixing technique [27].

The recurrence rate in this study was 2.6%. Table 3 illustrates the significant distribution differences that resulted from the various mesh types and fixing techniques employed. According to a similar study, being over 50 years old and having acute postoperative complications are strongly associated with recurrence [28]. According to a study with over 15,000 patients who underwent TAPP repair, the recurrence rate following TAPP ranged from 0.7–4.8%, contingent upon the experience level and volume of the centre [29].

There are limitations to this study. Retrospective medical record reviews limit the data quality. The follow-up period, at 1.93 years, is relatively short when viewed in a smaller context. However, the findings can be explained by the community's high immigrant population explains the findings, as many residents leave for better opportunities or to return home. Future studies should investigate these restrictions. However, this study has several advantages despite these limitations. A larger sample size helps establish associations between the variables under investigation. To the best of our knowledge, this study is the first to assess the long-term results and details of the TAPP experience in Qatar.

CONCLUSION

The current results show that TAPP repair for inguinal hernias is feasible and effective and produces yielding outcomes comparable to those of previous studies. It is an excellent option for training junior staff as it does not significantly affect patient safety or increase complication rates. We did not discover any significant factors predicting postoperative complications from our analysis of the available data. Future research is needed to validate our recommendation that TAPP repair should be a common practice, particularly at teaching hospitals with follow-up programs.

ETHICAL DECLARATIONS

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Ethics Approval and Consent to Participate

The authors are accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. This study was approved by the Medical Research Center (MRC) and Institutional Review Board (IRB) of Hamad Medical Corporation (HMC) (MRC-01-23-862) and has, therefore, been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendment. The Research Ethics Committee of MRC waived the requirement for informed consent for this study.

Consent for Publication

Not applicable (no individual personal data included).

Availability of Data and Material

Data generated during this study are available from the corresponding author upon reasonable request.

Competing Interests

The author declares that there is no conflict of interest.

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Authors' Contributions

Ghali, MS: Conceptualization, Methodology, Investigation, Data Curation, Writing - Original Draft, Writing - Review and Editing the Final Draft. Ali A, Aljumaili H, and Al-Hashimy Y: Methodology, Investigation, Data Curation, Writing - Original Draft. All authors read and approved the final version of the manuscript.

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