

**How to Cite:**

Aslam, V., Gulsharif, G., Billah, M., Jamil, T., Khan, A. G., & Hussain, S. A. (2023). Laparoscopic repair of inguinal hernia: prospective evaluation at lady reading hospital, Peshawar. *International Journal of Health Sciences*, 6(S7), 7080–7088. <https://doi.org/10.53730/ijhs.v6nS7.14059>

## **Laparoscopic repair of inguinal hernia: prospective evaluation at lady reading hospital, Peshawar**

**Viqar Aslam**

Associate Professor General Surgery, Lady Reading Hospital, Peshawar

**Gulsharif**

Assistant Professor General Surgery, Lady Reading Hospital, Peshawar

Corresponding author email: [gulafridi1@yahoo.com](mailto:gulafridi1@yahoo.com)

**Motasim Billah**

Assistant Professor Anatomy, Gajju Khan Medical College Swabi

**Tariq Jamil**

Associate Professor General Surgery, Bakhtawar Amin Medical College, Multan

**Ali Gohar Khan**

Associate Professor General Surgery, Fauji Foundation Hospital, Peshawar Cantt

**Syed Aamer Hussain**

Specialist Registrar General Surgery department, Ayub Teaching Hospital, Abbottabad

**Abstract**---Introduction: The hernioplasty or Open herniorrhaphy procedures have typically been used to repair inguinal hernias. The advent of minimal access surgery in the past ten years has changed the trends. Aim: The goal of this study is to govern the efficacy of minimal access surgery (Laparoscopic repair) in the treatment of inguinal hernia repair. Methods: This prospective descriptive study was held in the General Surgery department, Lady Reading Hospital, Peshawar during the period from January 2022 to September 2022. All patients above the age of 18 who presented with inguinal hernias had the choice of either laparoscopic or open surgery. In the study, those who opted for laparoscopic repair were included. Results: Seventy patients having 18-65 years of age with 32 years of median age at admission were included. Out of them 65 were male and 5 females. Most of the patients had age group 31-40 years, followed by 41-50 years. Ten (14.3%) patients had bilateral hernias, 45 (64.3%) unilateral right hernias, and 15 (21.4%) unilateral left hernias. Just 8 hernias (11.4%) were direct, while the remaining of hernias 62,

85.7%) were indirect. Three (4.2%) of repairs changed from TEP to TAPP, and two (2.9%) were converted to open mesh repairs. The most frequent complications with TEP were subcutaneous emphysema in 19 individuals (27.1%) and peritoneal breach leading to CO<sub>2</sub> leaking into the peritoneal cavity in 16 patients (22.9%). In 12 hours, the average VAS score was 7.2 (5 to 8), and at 24 and 48 hours after surgery, it was 4.2 (3-7) and 3.1 (1-4), respectively. Two (4%) of these repairs were converted to transabdominal repairs and two (4%) to open mesh repairs. The average postoperative stay in hospital was 3.42±4.2 days (range: 3-29 days), full ambulation took an average of 2.10±1.48 days (1-8 days), and the median time to resume daily activities was 6 days (range 3-40 days). The median total hospital stay was 3 days (range: 4-28 days). During the follow-up, no patient reported any neuralgias done with laparoscopic repair Conclusion: In developing countries with advancements, laparoscopic treatment of inguinal hernias might be considered safe both via trans-peritoneal approach and total extra peritoneal approach.

**Keywords**---Transabdominal approach, Extraperitoneal repair, seroma, laparoscopy and inguinal hernia.

## Introduction

One of the frequent general surgical procedures is the correction of inguinal hernias. Hernioplasty or open herniorrhaphy are the traditional treatments for inguinal hernias<sup>1-2</sup>. Yet the arrival of minimal access surgery in the past ten years has shifted the trends. Following the success of laparoscopic cholecystectomy, laparoscopic inguinal hernia repair was developed on the grounds that there would be less postoperative pain and discomfort, recurrent hernias could be repaired more easily, and bilateral hernias could be treated concomitantly with better aesthetics<sup>3-4</sup>. First Laparoscopic inguinal hernia repair was described by Ger<sup>5-6</sup>. The transabdominal preperitoneal (TAPP) approach was the first technique employed for this, but concerns about peritoneal cavity violation and the development of other problems, such as intestinal adhesions after peritoneal cavity invasion, remained<sup>7-8</sup>. Total extra-peritoneal (TEP) surgery, which is still regarded as an "advanced" laparoscopic treatment since it involves unknown anatomy and needs extensive training and laparoscopic experience, gradually gained popularity<sup>9</sup>. Inguinal hernia repair would be the next procedure performed using laparoscopic techniques after cholecystectomies. The majority of research comes from the west, which does not accurately represent the situation in underdeveloped nations like ours<sup>10-11</sup>. It was time for a study like this to be done to determine the effectiveness of minimal access surgery in our setting because there may be some uncertainty about whether these procedures can be employed in our setup.

## Methods

This prospective descriptive study was held in the general surgery department, Lady Reading Hospital, Peshawar during the period from January 2022

September 2022. All patients above the age of 18 who presented with inguinal hernias had the choice of either open or laparoscopic surgery. In the study, those who selected laparoscopic repair were included. Age above 18 years and elective laparoscopic hernia repair are included in the study. Those patients were excluded who chose open repair, had complex hernias such as obstructed or strangulated hernias, untreatable coagulopathy, were pregnant, or were deemed ineligible for general anesthesia. After receiving written informed consent from each patient, they were all enrolled in the study. Clinical examination was done to thoroughly evaluate the individuals who had inguinal or inguinoscrotal swelling.

The swelling duration, any associations with symptoms like discomfort, stomach distension, constipation, vomiting, changes in swelling size in erect or supine posture, or straining were all noted in the history. The blood pressure, pulse, comorbidities, and inguinoscrotal evaluation counting surface, size, reducibility, fluctuation and cough impulse were all noted during the physical examination. After uncomplicated inguinal hernia was clinically diagnosed, each patient had the laparoscopic surgery after the informed written consent was obtained.

Investigations were conducted to determine the patient's suitability for anesthesia which included a chest radiograph, random blood sugar, complete hemogram, creatinine, electrolytes and urea. Total extraperitoneal (TEP) and transabdominal (TAPP) approaches have been used most frequently for laparoscopic procedures.. Following steps were taken: 1. Direct telescoping dissection under vision was used to separate the extra-peritoneum. 2. Indirect hernias were proximally ligated and the distal sac left as it was, whereas direct hernias were reduced. 3. Meshes were not fixed; rather were left in place before the preperitoneal space was deflated, with the theory that the peritoneum's pressure would keep them there. 4. No lightweight or 3-D meshes were applied; only flat, heavyweight polypropylene mesh (10-15cm) were applied. Under general anesthesia, patients underwent procedures. All conversions from laparoscopic to open repair and from TEP to TAPP were noted along with the precise conversion cause. Before surgery, all of the patients got a test dose of ceftriaxone. Just before the start of procedure, 1 gm of inj. ceftriaxone was injected IV and it was repetitive eight and sixteen hours later. Prior to surgery, it was recommended to all patients to void because no catheterization was done. Following the procedure, a typical analgesic regimen (75mg IM diclofenac sodium eight hourly for 24 hours) was given, followed by 50mg diclofenac sodium tablet given peroral as needed for pain treatment. For another five days, oral cefixime was given. Operative time and intraoperative problems such as peritoneal breach, pneumoperitoneum, and nerve, vessel, or injury to the vas deferens were identified. The seroma, hematoma, wound infection and subcutaneous emphysema were observed postoperatively. The postoperative pain was assessed using a visual analogue scale pain rating system.

Soon after the patient had recovered from anesthesia, feeding was begun. Following surgery, patients were examined in the OPD at 1, 2, 4, and 12 weeks to look for any recurrence or other problems. All information was entered into a computer, and SPSS version 22.0 was used for data analysis.

**Result:** Seventy patients were included with 18-65 years with 32 years of median age at admission out of which 65 were male and 5 were females. Most patients

had the age group of 31–40 years , followed by 41–50 years. Ten (14.3%) patients had bilateral hernias, 45 (64.3%) unilateral right hernias, and 15 (21.4%) unilateral left hernias were present. Just 8 hernias (11.4%) were direct, while the remaining hernias 62,( 85.7%) were indirect (Table 1).

<b>Characteristics</b>	<b>n</b>	<b>%/Range</b>
Total no of patients	70	
Males	65	92.8
Females	5	7.2
Median duration of presentation (months)	14.7	range 1-150 months
Median age (years)	32	range 18-65 years
Side		
Left	15	21.4
Right	45	64.3
Bilateral	10	14.3
Type of hernia		
Indirect	60	85.7
Direct	8	11.4
Both	2	2.9

Three (4.2%) of repairs changed from TEP to TAPP, and two (2.9%) were changed to open mesh repairs (Table 2). Orchidectomy was performed in addition to repair of hernia in 2 patients who had undescended testicles, one using TEP and one TAPP.

<b>Type of repair performed</b>	<b>n</b>	<b>%</b>
TEP-unilateral	30	42.8
TEP	43	61.4
TAPP	4	5.7
TEP-bilateral	1	1.4
TAPP-bilateral	6	8.5
TAPP-unilateral	7	10
TEP to open	2	2.9
TEP to TAPP	3	4.2
Total	70	100

TAPP: transabdominal preperitoneal; TEP: total extra-peritoneal

The most frequent complications with TEP were subcutaneous emphysema in 19 individuals (27.1%) and peritoneal breach leading to CO<sub>2</sub> leaking into the peritoneal cavity in 16 patients (22.9%). (Table 3).

<b>Complications (intraoperative and postoperative)</b>	<b>n</b>	<b>%</b>
Subcutaneous emphysema	19	27.1
Peritoneal breach	16	22.9
Bleeding	5	7.2

Pneumoscrotum	12	17.1
Vas injury	3	4.2
Wound infection	5	7.2
Seroma	3	4.2
Urinary retention	3	4.2
Recurrence	2	2.9
Conversion to open	3	4.2

In order to release the intraperitoneal CO<sub>2</sub> in 8 (11.4%) patients, a Veress needle was placed above the umbilicus. It became unmanageable in one patient, leading to the need for open correction. Other issues included wound infection in 5 patients (7.2%), vas injury in 3 patients (4.2%), recurrence in 2 patient (2.9%), seroma in 3 patients (4.9%), urinary retention in 3 patients (4.2%), hemorrhage because of inferior epigastric artery injury in 5 patients (7.2%), and vascular adherence of sac in one patient (1.4%), due to a long-lasting hernia with dense extraperitoneal adhesions that cannot be treated by laparoscopy and had to be repaired by open technique.

Twelve (17.1%) patients experienced pneumoscrotum during surgery, which was treated by desufflation; it did not last during the healing process. Except for one case, every case of subcutaneous emphysema healed within 24 hours; only one case required 48 hours. Due to pneumoperitoneum that could not be controlled by a Veress needle in one patient and there is a densely adherent vascular sac which causes hemorrhage need open hernioplasty repair. Due to chronic pneumoperitoneum in one case from inferior epigastric artery injury and a big hole in the sac in the other were converted from TEP to TAPP repair. The duration of the procedure was 50 to 175 minutes (Table 4).

**Table 4:** The postoperative and operative characteristics of the patients

Parameters	Mean/Median and Standard deviation	Range
Mean operative time for bilateral TEP (min)	110	NA
Mean operative time for unilateral TEP (min)	82.96±29.81	50-175
Mean operative time for bilateral TAPP (min)	149±47.31	80-180
Mean operative time for unilateral TAPP (min)	97.1±10.40	75-110
Mean VAS score at 24 hours	4.2±1.8	3-7
Mean VAS score at 12 hours	7.2±2	5-8
Mean time taken for full ambulation (days)	2.10±1.48	1-8
Mean VAS score at 48 hours	3.1±1.4	1-4
Median total hospital stay (days)	3	4-28
Mean postoperative stay (days)	3.42±4.2	3-29
Mean satisfaction score at 12 weeks ( out of 10)	8.94	4-10
Median time taken to return to normal activity (days)	6	3-40

Urinary retention seen in three patients. In 12 hours, the average VAS score was 7.2 (5 to 8), and at 24 and 48 hours after surgery, it was 4.2 (3-7) and 3.1 (1-4),

respectively. Two (4%) of these repairs were changed to transabdominal repairs and two (4%) to open mesh repairs. The average postoperative stay in hospital was  $3.42 \pm 4.2$  days (range: 3-29 days), full ambulation took an average of  $2.10 \pm 1.48$  days (1-8 days), and the median time to resume daily activities was 6 days (range 3-40 days). The median total hospital stay was 3 days (range: 4-28 days). During the follow-up, neuralgia was not reported in laparoscopic repair.

## Discussion

Ger explained about the first laparoscopic hernia repair. Several studies have confirmed that laparoscopic surgery has comparable outcomes in relations of recurrence in comparison to open repair, but with the additional benefit of decreased wound infection and postoperative pain, as well as an early return to activities<sup>12-13</sup>. These benefits have caused the traditional open hernia surgery to gradually give way to the laparoscopic approach. The TAPP method was first used to treat inguinal hernias. Initially, TAPP was the most frequently used laparoscopic treatment, and numerous studies showed that it was effective and had outcomes that were parallel with open hernia repair<sup>14-15</sup>. Although the laparoscopic repair was difficult to be mastered, the author needed to do TEP first but few studies demonstrated that the TAPP must be learnt before TEP because TEP is thought to have a steeper curve of learning than TAPP. But, we went onto TEP first due to a number of benefits including no peritoneal laceration and no need for suturing<sup>17-18</sup>. The current study emphasizes the immediate effects of laparoscopic repair, primarily by TEP in our constrained scenario<sup>18</sup>.

Several other comparable studies have noted a shorter recovery time following laparoscopic repair. Wilson et al. also discovered that laparoscopic repair took less time for patients to recover in comparison to Lichtenstein repair (median 7 and 10 days vs. 14 and 21 days, respectively)<sup>19</sup>. Also, the laparoscopic group was shown to have a lower postoperative VAS pain score. In comparing TEP repair and open repair, Eklund et al. discovered that five years after surgery, 2.1% of patients done with repair by laparoscopic method remained in pain, compared to 3.8% of those who had open repair<sup>20</sup>. Laparoscopic repair is associated with less pain postoperatively, quicker return to work, shorter convalescence, according to comprehensive meta-analyses and the VA Study. No individual in our research, who had laparoscopic repair complained of neuralgia or decreased sensitivity.

Several series have recorded conversion rates from TEP to open repair of up to 3.6%. The conversion rate in this study is 4.2%.

There were no hematomas or visceral injuries in the current study. In general, the complexities were reasonable and comparable to those in other series<sup>21</sup>. Another issue was subcutaneous emphysema, which increased CO<sub>2</sub> retention and caused older patients' extubation to be somewhat delayed. In the study by Winslow et al, the incidence of postoperative urine retention was greater in the group managed with TEP (7.9%)<sup>22</sup>. However, in the current investigation, there were 3 (4.2%) instances of postoperative urine retention. As is typical procedure, all of the patients were asked to urinate before surgery, therefore we don't think preoperative catheterization is necessary for laparoscopic repair. In the study by Lal et al., seroma production occurred in 12% of cases, and it has been reported

that 1% to 20% of TEP cases result in postoperative seromas collection. This was observed in our setting in the 1<sup>st</sup> 2 cases; following that, we consistently began to maintain a suction drain in the preperitoneal area, thereby eliminating the possibility of this issue in subsequent cases<sup>23</sup>.

Wilson et al concluded that cord seromas were the most often occurring consequence of laparoscopic surgery, while bruising was more common following open mesh repair. In our laparoscopic patients, no hematoma was observed at all, perhaps as a result of our practice of maintaining the drains on a regular basis<sup>24</sup>.

In our study, three individuals (4.2%) experienced an infection at the port site. In prior research, hematomas and severe wound infections were also mentioned. If the right mesh size is utilized, Heikkinen et al. observed that both Lichtenstein and laparoscopic hernioplasty have less incidence of recurrence after a 5-year follow-up<sup>25</sup>. In a 52-month follow-up following laparoscopic and tension-free hernioplasty, Butlers discovered that recurrence rates were less and comparable<sup>26</sup>. After a 28-month follow-up, Schmidt et al meta-analysis comparing laparoscopic and open hernia repair reports a recurrence rate of 5.4% for laparoscopic treatment and 2.8% for open repair. Recurrences were identified by Liem et al in 22 patients who underwent laparoscopic surgery (at 2 years, recurrence rate were 4.1%; at 4 years 5.1%) and in 43 patients who underwent open surgery (at 2 years, recurrence rate were 6.8%; at 4 years 11.0%;  $p=0.006$ )<sup>27</sup>.

## **Conclusion**

In developing countries with advancements, laparoscopic treatment of inguinal hernias might be considered safe both via trans-peritoneal approach and total extra peritoneal approach. The present study has a few limitations, including a small sample size, a brief follow-up time, and the fact that it is a descriptive study. Yet this is just the beginning; but in future, this study might serve as the foundation for additional research of this kind. Although we first had to convert to open repair owing to a number of factors, we later learned that TEP could be securely changed to TAPP if necessary. In the absence of difficulties, we could even treat recurrences laparoscopically which occurred after laparoscopic repair.

The majority of TEP's foes were intraoperative, and because they could be well handled, none of these surgical problems had an impact on the long-term prognosis of patients. This suggests that laparoscopic repair of hernia has certain advantages to open repair, particularly in terms of ability to return to work, postoperative pain and cosmetic appearance. This analysis also demonstrates that, even when a surgeon is still learning, laparoscopic repair of hernia can be undertaken by TEP first with excellent anatomy knowledge and safety precautions. We have examined our mistakes for recurrences, and we strongly believe that in the years to come we should work towards having no recurrences and conversion at all.

## References

1. Siddaiah-Subramanya M, Ashrafi D, Memon B, Memon MA. Causes of recurrence in laparoscopic inguinal hernia repair. *Hernia*. 2018 Dec;22:975-86.
2. Prabhu AS, Carbonell A, Hope W, Warren J, Higgins R, Jacob B, Blatnik J, Haskins I, Alkhatib H, Tastaldi L, Fafaj A. Robotic inguinal vs transabdominal laparoscopic inguinal hernia repair: the RIVAL randomized clinical trial. *JAMA surgery*. 2020 May 1;155(5):380-7.
3. Chong AJ, Fevrier HB, Herrinton LJ. Long-term follow-up of pediatric open and laparoscopic inguinal hernia repair. *Journal of Pediatric Surgery*. 2019 Oct 1;54(10):2138-44.
4. Esposito C, Escolino M, Cortese G, Aprea G, Turrà F, Farina A, Roberti A, Cerulo M, Settini A. Twenty-year experience with laparoscopic inguinal hernia repair in infants and children: considerations and results on 1833 hernia repairs. *Surgical endoscopy*. 2017 Mar;31:1461-8.
5. LeBlanc K, Dickens E, Gonzalez A, Gamagami R, Pierce R, Balentine C, Voeller G, Prospective Hernia Study Group. Prospective, multicenter, pairwise analysis of robotic-assisted inguinal hernia repair with open and laparoscopic inguinal hernia repair: early results from the Prospective Hernia Study. *Hernia*. 2020 Oct;24:1069-81.
6. Li J, Bao P, Shao X, Cheng T. The management of indirect inguinal hernia sac in laparoscopic inguinal hernia repair: a systematic review of literature. *Surgical Laparoscopy Endoscopy & Percutaneous Techniques*. 2021 Oct 1;31(5):645-53.
7. Dhanani NH, Olavarria OA, Wootton S, Petsalis M, Lyons NB, Ko TC, Kao LS, Liang MK. Contralateral exploration and repair of occult inguinal hernias during laparoscopic inguinal hernia repair: systematic review and Markov decision process. *BJS open*. 2021 Mar;5(2):zraa020.
8. Khoraki J, Gomez PP, Mazzini GS, Pessoa BM, Browning MG, Aquilina GR, Salluzzo JL, Wolfe LG, Campos GM. Perioperative outcomes and cost of robotic-assisted versus laparoscopic inguinal hernia repair. *Surgical endoscopy*. 2020 Aug;34:3496-507.
9. Hayashi K, Ishimaru T, Kawashima H. Reoperation after laparoscopic inguinal hernia repair in children: a retrospective review. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2019 Oct 1;29(10):1264-70.
10. Forester B, Attaar M, Chirayil S, Kuchta K, Denham W, Linn JG, Haggerty SP, Ujiki M. Predictors of chronic pain after laparoscopic inguinal hernia repair. *Surgery*. 2021 Mar 1;169(3):586-94.
11. Edelman DS. Robotic inguinal hernia repair. *The American Surgeon*. 2017 Dec;83(12):1418-21.
12. Sakon M, Sekino Y, Okada M, Seki H, Munakata Y. Laparoscopic inguinal hernioplasty after robot-assisted laparoscopic radical prostatectomy. *Hernia*. 2017 Oct;21:745-8.
13. Usmani F, Wijerathne S, Malik S, Yeo C, Rao J, Lomanto D. Effect of direct defect closure during laparoscopic inguinal hernia repair ("TEP/TAPP plus" technique) on post-operative outcomes. *Hernia*. 2020 Feb;24:167-71.
14. Chan IH, Tam PK. Laparoscopic inguinal hernia repair in infants and children: state-of-the-art technique. *European Journal of Pediatric Surgery*. 2017 Dec;27(06):465-71.



15. Ilonzo N, Gribben J, Neifert S, Pettke E, Leitman IM. Laparoscopic inguinal hernia repair in women: trends, disparities, and postoperative outcomes. *The American Journal of Surgery*. 2019 Oct 1;218(4):726-9.
16. Sharma A, Chelawat P. Endo-laparoscopic inguinal hernia repair: What is its role?. *Asian journal of endoscopic surgery*. 2017 May;10(2):111-8.
17. Fernandez-Alberti J, Iriarte F, Croceri RE, Medina P, Porto EA, Pirchi DE. Laparoscopic treatment (reTAPP) for recurrence after laparoscopic inguinal hernia repair. *Hernia*. 2021 Oct 1:1-7.
18. Tavares K, Mayo J, Bogenberger K, Davis SS, Yheulon C. Fibrin versus cyanoacrylate glue for fixation in laparoscopic inguinal hernia repair: a network meta-analysis and indirect comparison. *Hernia*. 2020 Oct;24:927-35.
19. Goksoy B, Azamat IF, Yilmaz G, Sert O, Onur E. The learning curve of laparoscopic inguinal hernia repair: a comparison of three inexperienced surgeons. *Videosurgery and Other Miniinvasive Techniques*. 2021 Jun 2;16(2):336-46.
20. Habib Bedwani NA, Kelada M, Smart N, Szydlo R, Patten DK, Bhargava A. Glue versus mechanical mesh fixation in laparoscopic inguinal hernia repair: meta-analysis and trial sequential analysis of randomized clinical trials. *British Journal of Surgery*. 2021 Jan;108(1):14-23.
21. Van Batavia JP, Tong C, Chu DI, Kawal T, Srinivasan AK. Laparoscopic inguinal hernia repair by modified peritoneal leaflet closure: Description and initial results in children. *Journal of pediatric urology*. 2018 Jun 1;14(3):272-e1.
22. Li J, Gong W, Liu Q. Intraoperative adjunctive techniques to reduce seroma formation in laparoscopic inguinal hernioplasty: a systematic review. *Hernia*. 2019 Aug 1;23:723-31.
23. Wang K, Cai J, Lu YC, Li XW, Zhai GM, He WB, Guo XS, Wu GQ. A faster and simpler operation method for laparoscopic inguinal hernia repair in children. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2020 June 1;30(6):706-11.
24. Mathew KG, Pokhrel G. Closing peritoneal tear during laparoscopic inguinal hernia repair: simple and effective technique. *Hernia*. 2020 Oct;24:1121-4.
25. Podolsky D, Novitsky Y. Robotic inguinal hernia repair. *Surgical Clinics*. 2020 Apr 1;100(2):409-15.
26. Patel LY, Lapin B, Gitelis ME, Brown C, Linn JG, Haggerty S, Denham W, Butt Z, Barrera E, Joehl R, Carbray J. Long-term patterns and predictors of pain following laparoscopic inguinal hernia repair: a patient-centered analysis. *Surgical endoscopy*. 2017 May;31:2109-21.
27. Perez AJ, Strassle PD, Sadava EE, Gaber C, Schlottmann F. Nationwide analysis of inpatient laparoscopic versus open inguinal hernia repair. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2020 Mar 1;30(3):292-8.