Original Article

OPEN ACCESS

Comparison Between Mesh Fixation and Non-Fixation in Laparoscopic Transabdominal Preperitoneal Inguinal Hernia Repair

Waleed Akbar[1], Rizwan Aziz[2], Sohaib Haider[3], Munazzah Aziz[4], Atiq-ur-Rehman[5], Tahira Hameed[6]

[1,5,6]Senior Registrar, [2]Professor & HOD Surgery, [3]Associate Professor, [4]Assistant Professor,
(Akbar Niazi Teaching Hospital/IMDC, Islamabad)

Authors Contribution

[1,5]Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work, Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. [2,3]Final approval of the version to be published, [4,6]Drafting the work or revising it critically for important intellectual content,

Funding Source: None
Conflict of Interest: None

Received: Sept 13, 2023
Accepted: Dec 27, 2023

Address of Correspondent
Dr. Waleed Akbar
Senior Registrar
Akbar Niazi Teaching Hospital/IMDC, Islamabad
waleedakbar999@gmail.com

ABSTRACT

Objectives: To compare mesh fixation and non-fixation in laparoscopic transabdominal preperitoneal inguinal hernia repair in terms of recurrence rate with mesh folding and non-folding.

Methodology: A comparative randomized controlled trial was conducted between October 2022 and March 2023 at General Surgery Department, Akbar Niazi Teaching Hospital, Islamabad. Consecutively 100 patients who underwent inguinal hernia surgery. The patient population was divided randomly into two groups. Group-A (Mesh fixation) was administered as a prolene mesh 6 x 11cm and fixed with cooper ligament and pubic symphysis, whereas Group-B (Non-fixation) was administered with the same mesh and placed in the fruchaud myopectineal orifice. The study endpoint in terms of recurrence rate, and mesh folding and non-folding between two groups was measured. The data was analyzed through SPSS v 23.

Results: The patients overall mean average age was 36.43±10.81 years. Unilateral hernia in all patients, 60% had right sided, and 40% had left sided. The recurrence rate, and mesh folding was evaluated in both groups during 1 month, 3rd month, and after 6 months completion of follow-up period. No patient developed recurrence in mesh fixation group-A, whereas three patients developed recurrence with mesh folding in non-fixation group-B ($p \geq 0.05$). The chronic pain was lowest and statistically significant difference in non-fixation group-B as compared to mesh fixation group-A ($p \leq 0.05$).

Conclusion: Mesh fixation in transabdominal preperitoneal inguinal hernias should be recommended for patients with inguinal hernias less than 4.0 cm in diameter.

Keywords: Hernia, Inguinal, Laparoscopy; Peritoneal cavity; Surgical fixation, Surgical mesh.

Cite this article as: Akbar W, Aziz R, Haider S, Aziz M, Rehman AU, Hameed T. Comparison Between Mesh Fixation and Non-Fixation in Laparoscopic Transabdominal Preperitoneal Inguinal Hernia Repair. Ann Pak Inst Med Sci. 2023; 19(4):509-513. doi. 10.48036/apims.v19i4.861.

Introduction

Inguinal hernia is a common disease and affects a huge adult population of the world. It is estimated that approximately 5-10% of adults experience an inguinal hernia. More than 20 million inguinal hernias are treated globally each year, making it one of the most frequently performed in surgery.[1] There are several ways and techniques to treat hernia. In 1992, first described endoscopic hernia repaired by Dulucq and gained popularity.[2]

Laparoscopic techniques for inguinal hernia surgery are indeed becoming more common in surgical practice. This minimally invasive technique is preferred by patients and surgeons due to several advantages.[3] These including; postoperative pain reduction, better cosmetic outcomes and start to return to daily activities.[4] Various techniques and methods of mesh placement are performed in inguinal hernia repair, and commonly used techniques are to the mesh, stabilize the mesh, and reduce the risk of early recurrence. The most popular method of mesh repair is the original definition of the total extraperitoneal

technique (TEP).[5] However, concerns have been raised about staples causing complications for example pubic injury, nerve damage, and mesh fixation causing chronic pain.[6]

The present surgical practice, minimally invasive and tension free hernia repair techniques are often preferred and considered the choice of procedure. Laparoscopic hernia repair, in particular, has been extensively studied and proven to be a viable alternative to, and in some cases superior to, the traditional open mesh repair technique, the Lichtenstein procedure.[7] The need for mesh fixation in laparoscopic hernia repair is controversial among surgeons. While some surgeons advocate mesh repair to reduce the risk of hernia recurrence, there are concerns about increased postoperative pain and surgical complications.[8]

Persistent postoperative groin pain has been reported to increase since the introduction of synthetic mesh in hernia repair. Reports in the literature vary from 10% to 54% of patients underwent hernia repair.[9] Postoperatively chronic pain is the complication that occurs after hernioplasty and can significantly affect the patient's quality of life. Chronic pain can affect patient life, work ability, sexual, and social activities. Other reported complications include; seroma, wound dehiscence and recurrence.[10] It was hypothesized that the mesh folding occur within 6 months of follow-up period in patients with non-fixation technique of laparoscopic inguinal hernia repair when they were presented with recurrence. The objective was to compare mesh fixation and non-fixation in laparoscopic transabdominal preperitoneal (TAPP) inguinal hernia repair in terms of recurrence rate with mesh folding and non-folding.

Methodology

A comparative randomized controlled trial was conducted between October 2022 and March 2023 at General Surgery Department, Akbar Niazi Teaching Hospital, Islamabad. Sequel of acquiring study IRB from hospital ethics committee and a written consent from patients to participate voluntarily in this study. The study included consecutive 100 patients who underwent inguinal hernia surgery. The sample size was calculated using OpenEpi v 3.01 software for epidemiological studies, using the following parameters; pain scores (VAS) for mesh fixation and non-fixation were 1.1±0.4 and 2.0±0.4, respectively, from a previous study,[11] with an alpha (α) error of 5% and a test power of 80%. Male patients aged 18 years and older with unilateral inguinal hernia, recurrent hernia, and hernia ring diameter of ≤ 4 cm were included. Patients with history of lower abdomen surgery, hernia sac dropping into scrotum, irreducible hernia, general anesthesia intolerance, poor follow-up or compliance were excluded from the study.

The patient population enrolled in the study was assigned randomly into two groups of equal sizes (n=50, each group) by computerized method. A biostatistician with a computer-generated randomized sequence sealed in a transparent envelope to ensure anonymity. Group-A (Mesh fixation group) was administered as a prolene mesh 6 x 11cm and fixed with cooper ligament and pubic symphysis, whereas Group-B (Non-fixation group) was administered with the same mesh and placed in the fauchard myopectineal orifice, as direct and indirect to potential inguinal hernias. Deflation is achieved under direct laparoscopic vision to prevent displacement or folding of the mesh.

After general anesthesia was administered, patient was put in Trendelenburg position. After creating a pneumoperitoneum, the telescope was inserted through the umbilical port. The second and third incisions were made at the level of the navel to the left and right of the midline of the abdomen and ports inserted. Care was taken not to damage the epigastric artery inferiorly when opening the peritoneum. The peritoneum was closed with sutures. All procedure was performed by senior surgeons.

The primary endpoints of this study were the recurrence rate, and mesh folding between two groups. Secondary endpoints were chronic pain (assessed on VAS), and complications (e.g., seroma and wound dehiscence). Patient demographics, such as type of hernia, and postoperative follow-up data were recorded.

Patients were discharged after 24-48 h on oral analgesics, after examination and evaluation of surgery. After 7 days of discharge, the patient was called to the outpatient clinic. The presence of recurrence and mesh folding were noted by confirmation of MRI scan during follow-up period at 12 months.

The data analysis was done using SPSS v 23. Frequencies and percentages were presented for categorical data. Chi-square test was done to compare data parametric of categorical and independent sample t-test was performed to compare data parametric of continuous. The probability value of $p \leq 0.05$ was considered significantly.

Results

TAPP inguinal hernia repair was done in 100 patients. No patient was dropped out during study period. The patients overall mean average age was 36.43±10.81 years. Unilateral hernia in all patients, 60% had right sided, and 40% had left sided. The mean average duration of hospitalization of all patients was 1.7 days. The type of hernia in all patients, 92% had indirect hernia and 8% had direct hernia. The total study follow-up period was 1 year. Data of demographic variables between two groups was normal distributed and insignificant for normality (Table I).

Table I: Statistics of demographic data between two group. (n=100)

		Mesh fixation (n=50)	Non-fixation (n=50)	P value
Age (years)	Mean ± SD	36.74±11.21	36.12±10.41	1.00
Inguinal hernia side	Right	29 (29.0%)	31 (31.0%)	1.00
	Left	21 (21.0%)	19 (19.0%)	
Type of inguinal hernia	Direct	4 (4.0%)	4 (4.0%)	1.00
	Indirect	46 (46.0%)	46 (46.0%)	
Duration of hospitalization (days)	Mean ± SD	1.7±0.9	1.7±0.9	1.00

Table-II: Comparison recurrence rate and mesh folding in two groups. (n=100)

		Mesh fixation (n=50)	Non-fixation (n=50)	p value
Recurrence	1-12 months follow-up	0	3	.121
Mesh folding	1-12 months follow-up	0	3	.121

The recurrence rate, and mesh folding was evaluated in both groups up to 12 months of follow-up period. There was no patient developed recurrence in mesh fixation group-A, whereas three patients developed recurrence with mesh folding in non-fixation group-B (p = 0.121, Table II).

The complications like seroma and wound dehiscence were studied in both groups (Table III). There was no patient who developed wound dehiscence in both groups, whereas seroma developed in 2 patients of mesh fixation group-A, and in 3 patients of non-fixation group-B.

The chronic pain was assessed on VAS pain scale in both groups during 1st, 3rd, and 6th months (Table IV). There was insignificant difference in chronic pain score measured in non-fixation group as compared to mesh fixation group.

Table III: Comparison of complications developed in both groups. (n=100)

		Mesh fixation (n=50)	Non-fixation (n=50)	p value
Complications	Wound dehiscence	0	0	-
	Seroma	2	3	.500

Table IV: Comparison of chronic pain in both groups. (n=100)

		Mesh fixation (n=50)	Non-fixation (n=50)	p value
Chronic pain	1 month	2.12±1.0	1.97±1.0	.800
	3rd month	1.3±0.5	0.9±0.5	.001
	6 months at the end of follow-up period	0.9±0.2	0.4±0.1	.001

Discussion

In this study, TAPP inguinal hernia repair was studied. The laparoscopic approach is most commonly performed in hernia repair with TAPP and TEP techniques. Numerous studies have established the safety and effectiveness of laparoscopic surgeries.[12] The uniqueness of our study is that we assessed mesh folding and non-folding in mesh fixation and non-fixation techniques of inguinal hernia repair, whereas previous studies mostly demonstrated the recurrence rate, chronic pain, complications, quality of life, expense of surgery etc., in mesh fixation method and non-fixation method. There is no study to our knowledge to demonstrated on mesh folding and non-folding with recurrence rate. In our study, there were 3 patients who developed recurrence of inguinal hernia with mesh folding. The complications like seroma were developed in overall 5 patients of both groups, and chronic pain was measured significantly lowest in non-mesh fixation group. A study conducted by Acar et al and measured lowest chronic pain in non-mash fixation group. Complications like seroma was developed in 4 patients in non-mesh fixation group as compared to 3 patients developed seroma in mesh fixation group.[13] These results are comparable with our study.

Early complications after TEP may include urinary retention, epididymitis, wound infection, wound dehiscence, ileus, seroma, and hematoma. In current study, no patient developed urinary retention requiring a Foley catheter. Complications in our study were seroma in two patients in group-A and three patients in group-B.

There was no patient with wound dehiscence in our study. These results are comparable with Li et al study. In their study seroma was developed in 5 patients of mesh fixation group and in 4 patients of non-fixation group. The chronic pain was measured in their study was lowest in non-mesh fixation group.[11]

The recurrence rate is recorded 1–2% by Georgiou et al.[14] In a prospective study by Siddiqui et al reported the most common etiology of recurrence as lateral and medial fixation of mesh.[15] In this study, there was no recurrence reported in mesh fixation group-A, whereas 3 patients reported recurrence in group-B. There was insignificant difference measured in recurrence rate between the groups ($p = 0.121$).

TAPP inguinal hernioplasty should not be recommended for people who have no intolerance to general anesthesia, or have a hernia ring with a diameter of more than 4.0 cm, sliding hernia, or previous lower abdominal history of surgery.[16] Inadvertent TAPP inguinal hernia repair may lead to surgical failure or hernia recurrence in such patients. Therefore, TAPP inguinal hernia repair should be recommended as the preferred surgical approach for patients with inguinal hernias less than 4.0 cm in diameter without fixation alone.[17] The follow-up period of the study is on going and after two or three years we again collect the data from these patients for publication.

Conclusion

The study concluded that mesh fixation in transabdominal preperitoneal (TAPP) inguinal hernias should be recommended for patients with inguinal hernias less than 4.0 cm in diameter. This surgical procedure does not increase recurrence rates, reduces hospital costs, and improves postoperative quality of life.

References

1. Sartori A, De Luca M, Clemente N, De Luca A, Scaffidi G, Vendramin E, et al. Is human fibrin sealant a possible choice for the fixation of laparoscopic inguinal hernia repair? A single center experience and the analysis of the results after 326 TAPP in two years. G Chir. 2018;39(5):309-314.
2. Gudigopuram SV, Raguthu CC, Gajjela H, Kela I, Kakarala CL, Hassan M, et al. Inguinal hernia mesh repair: The factors to consider when deciding between open versus laparoscopic repair. Cureus. 2021;13(11):e19628. https://doi.org/10.7759/cureus.19628
3. Chen DC, Morrison J. State of the art: open mesh-based inguinal hernia repair. Hernia. 2019;23(3):485-492. https://doi.org/10.1007/s10029-019-01983-z
4. Bansal VK, Misra MC, Babu D, Singhal P, Rao K, Sagar R, et al. Comparison of long-term outcome and quality of life after laparoscopic repair of incisional and ventral hernias with suture fixation with and without tacks: a prospective, randomized, controlled study. Surg Endosc. 2012;26(12):3476-3485. https://doi.org/10.1007/s00464-012-2390-5
5. Gutlic N, Rogmark P, Nordin P, Petersson U, Montgomery A. Impact of mesh fixation on chronic pain in total extraperitoneal inguinal hernia repair (TEP): a nationwide register-based study. Ann Surg. 2016;263(6):1199-1206. https://doi.org/10.1097/SLA.0000000000001306
6. Choi BJ, Jeong WJ, Lee SC. Fibrin glue versus staple mesh fixation in single-port laparoscopic totally extraperitoneal inguinal hernia repair: A propensity score-matched analysis. Int J Surg. 2018;53(5):32-37. https://doi.org/10.1016/j.ijsu.2018.01.029
7. Silecchia G, Campanile FC, Sanchez L, Ceccarelli G, Antinori A, Ansaloni L, et al. Laparoscopic ventral/incisional hernia repair: updated guidelines from the EAES and EHS endorsed Consensus Development Conference. Surg Endosc. 2015;29(11):2463-2484. https://doi.org/10.1007/s00464-015-4293-8
8. Campos VA, Palacio DS, Glina FP, Tustumi F, Bernardo WM, Sousa AV. Laparoscopic treatment of giant hiatal hernia with or without mesh reinforcement: a systematic review and meta-analysis. Int J Surg. 2020;77(5):97-104. https://doi.org/10.1016/j.ijsu.2020.02.036
9. Sajid MS, Ladwa N, Kalra L, Hutson K, Sains P, Baig MK. A meta-analysis examining the use of tacker fixation versus no-fixation of mesh in laparoscopic inguinal hernia repair. Int J Surg. 2012;10(5):224-231. https://doi.org/10.1016/j.ijsu.2012.03.001
10. Abbas AE, Abd Ellatif ME, Noaman N, Negm A, El-Morsy G, Amin M, et al. Patient-perspective quality of life after laparoscopic and open hernia repair: a controlled randomized trial. Surg Endosc. 2012;26(11):2465-2470. https://doi.org/10.1007/s00464-012-2212-9
11. Li W, Sun D, Sun Y, Cen Y, Li S, Xu Q, et al. The effect of transabdominal preperitoneal (TAPP) inguinal hernioplasty on chronic pain and quality of life of patients: mesh fixation versus non-fixation. Surg Endosc. 2017;31(10):4238-4243. https://doi.org/10.1007/s00464-017-5485-1
12. Lomnicki J, Leszko AM, Kulis D, Szura M. Current treatment of the inguinal hernia: the role of the totally extraperitoneal (TEP) hernia repair. Folia Med Crac. 2018;58(3):103-114.
13. Acar A, Kabak I, Tolan HK, Canbak T. Comparison between Mesh Fixation and Non-Fixation in Patients Undergoing Total Extraperitoneal Inguinal Hernia Repair. Niger J Clin Pract. 2020;23(7):897-899. https://doi.org/10.4103/njcp.njcp_398_19
14. Georgiou E, Schoina E, Markantonis SL, Karalis V, Athanasopoulos PG, Chrysoheris P, et al. Laparoscopic total extraperitoneal inguinal hernia repair: Retrospective study on prosthetic materials, postoperative management, and quality of life. Medicine.2018;97(52):e13974. https://doi.org/10.1097/MD.0000000000013974

15. Siddiqui MR, Kovzel M, Brennan SJ, Priest OH, Preston SR, Soon Y. The role of the laparoendoscopic single site totally extraperitoneal approach to inguinal hernia repairs: a review and meta-analysis of the literature. Can J Surg. 2014;57(2):116-126. https://doi.org/10.1503/cjs.010612
16. Kara H, Arikan AE, Dulgeroglu O, Moldur DE, Uras C. Management of occult contralateral inguinal hernia: diagnosis and treatment with laparoscopic totally extra peritoneal repair. Surg Laparosc Endosc Percutan Tech. 2020;30(3):245-248. https://doi.org/10.1097/SLE.0000000000000765
17. Verma N, Krishnendu S, Chandak AV, Singam A, Chandak VC, Chakole V. Effectiveness of Transverse Abdominis Plane Block as a Method of Regional Anaesthesia in Unilateral Inguinal Hernia Repair. J Evol Med Dent Sci. 2020;9(42):3097-3102. https://doi.org/10.14260/jemds/2020/680