RESEARCH PAPER

TOTALLY EXTRAPERITONEAL (TEP) REPAIR OF INGUINAL HERNIA WITH MESH FIXATION VERSUS NON-FIXATION: A RETROSPECTIVE COMPARATIVE STUDY

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ABSTRACT

Background: Inguinal Hernia is a condition commonly encountered in clinical practice. Totally Extraperitoneal Repair (TEP) is one of the most popular techniques for inguinal hernia. To prevent the recurrence, a polypropylene mesh is used; it is placed in the preperitoneal space secured with tacks, sutures, or staples to ensure that it is immobile in its position, but this may irritate nerves that can lead to postoperative pain. Due to these challenges, many practitioners have started practising the non-fixation technique. The comparison of the clinical outcomes of TEP repair with mesh fixation and non-fixation is the main objective of this study.

Methods: 50 male patients were selected for this study; they underwent TEP inguinal hernia repair and were categorised into equal groups (n=25 each) based on technique with mesh fixation and non-fixation. Clinical parameters such as postoperative pain score, hospital stay duration, operative time, and complications were assessed. Statistical analysis was done by using the Chi-square test, t-test, and $p<0.05$ was considered statistically significant.

Results: Statistically insignificant difference observed in the operative time and pain score ($p>0.05$), but a significantly lower value in the no fixation group. A statistically significant difference ($p<0.05$) was observed in the intraoperative complications.

Conclusion: Based on findings, repair with non-fixation shows lesser postoperative pain, reduced operation time duration, fewer complications, and lower treatment costs when compared to mesh fixation.

Keywords: Clinical parameters, Treatment costs, Operative time, Preperitoneal space, Polypropylene mesh, Postoperative pain.

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INTRODUCTION

Inguinal hernias are the surgical conditions commonly encountered in clinical practice, with male predominance, and constitute approximately 75% of all abdominal wall hernias. It shows a significant burden of disease globally, with repair rates ranging from 10 to 28 per 100,000[1]. Traditional open procedures were replaced by minimally invasive techniques, because they are showing less postoperative pain, better patient comfort and recovery time[1].

In TEP repair of inguinal hernia is minimally invasive method, no need for entry into the peritoneal cavity[3,2]. TEP repair with mesh fixation reduce recurrence possibility and strengthens the abdominal cavity. In Mesh fixation polypropylene mesh is fixed with trackers and it is placed in the preperitoneal cavity, it prevents prevent mesh migration, mainly in large direct defects or large hernia sacs[4]. The trackers may irritate nerves and can cause chronic neurogenic pain[5, 6]. Due to these challenges, the non-fixation technique better choice for inguinal hernia repair.

This study was conducted to compare the clinical parameters such as operational time, post-operative pain, complication and length of stay with mesh fixation and non-fixation from a cohort of patients operated at a single centre.

MATERIALS AND METHODS

The retrospective study included fifty (50) male patients; they underwent TEP inguinal hernia repair. This study was performed in the General Surgery dept of Saveetha Medical College and Hospital, Chennai

(Tamil Nadu, India) over a period of 18 months (November 2022-April 2024). The total sample was divided into two cohorts (n=25 each), Group A Cohort was TEP repair with mesh fixation and Group B Cohort was non-fixation. The study was accepted by the ethical review board.

Inclusion Criteria

- Patients with TEP Repair with fixation and without fixation.

Exclusion Criteria

- Patients with improper medical records, open method procedures, and other than inguinal hernias.

Surgical Technique: The sample cases were performed by TEP hernia with a standard seven-step operative protocol. Initially, the infraumbilical (15mm) incision was given, and then a transverse incision was performed to access the rectus abdominis. A preperitoneal space was created to allow for the proper placement of the trocar. Two 5 mm working trocars were inserted, and the preperitoneal space was insufflated to a pressure of 10 mmHg with carbon dioxide.

By using gentle traction or parietalization, the hernia sac can be reduced. A standard-sized medium-weight polypropylene mesh (15cm x 10 cm; weight 80 gm/m^2; thickness 0.5 mm; pore size 0.5 cm x 0.7 cm) was used to standardized with previous studies and provided the same fixation methods were utilized (i.e. Non-absorbable tacker to Cooper's ligament and/or conjoint tendon) or not placed (Group B) with adequate mesh overlap of each hernia space, and without fixation of mesh and depended on either intra-abdominal pressure or adhesion formation to stabilize mesh. In Group A, sutures used included either 2-0 Vicryl, 2-0 PDS or 2-0 Babcock sutures as clinically indicated during the case.

Outcome Measures: The postoperative pain, assessed with the numerical pain rating scale (0-10) after 24 hours of surgery. Secondary outcomes of interest were operative time, length of hospitalisation, number of intra-operative complications (minor vessel bleeding) and number of post-operative complications (seroma formation, mesh migration and recurrent hernia). Preoperatively, all patients documented were subjected to demographics (age, sex) and hernia characteristics (direct vs. indirect vs. pantaloon vs. congenital; side of hernia).

Statistical analysis:

Jamovi software v.2.3 was used for Statistical analysis. The Chi-square statistic and the independent samples t-test were used for analysis, and $p<0.05$ was considered statistically significant. Categorical variables are reported as frequencies (%), and continuous variables are reported as mean ± standard deviation.

RESULTS

All fifty sample were male, showing a male predominance of inguinal hernias. Direct inguinal hernia was commonly observed in both groups (group A- 56%; group B- 52%). Indirect hernias made up 40% of the cases in each group, and pantaloon hernias 4% of all patients in each group. Congenital hernias were not present in group A but were present in 4% of the Group B patients. Group A had more left-sided hernias (40%) than group B (44%), while 36% of Group A patients had bilateral hernias compared to 24% of Group B patients. The chi-square analysis showed statistical insignificance regarding the side of hernia ($\chi^2 = 7.56$; $p = 0.563$) or the type of hernia ($\chi^2 = 6.70$; p value = 0.668) among the two groups. In the study overall, the reducibility rate was high (92%), while the rate of irreducible hernias was low (8%) [Table 1] [Figure 1].

The operative time taken for Group A was 90 minutes, and 60 minutes for Group B. The results indicate that Group B tended to have shorter operative times than Group A; however, the chi-square test yielded a non-significant p-value ($\chi^2 = 10.43$; $p = 0.052$) [Figure 2].

Analysis of hospital stay showed similar distributions among the groups. In Group A patients 36% were required three days hospital stay; 36% were discharged by day four; and 8% required a longer hospital stay, more than 5 days. For Group B patients, 44% were required three days hospital stay, 36% were required four days of hospitalization, and 4% of patients needed a longer hospital stay of more than 5 days. Based on results showed Group B patients required less duration of hospital stay than Group A patients. Results revealed statistically significant differences with respect to total length of stay ($\chi^2 = 1.39$; $p = 0.036$) between the two groups [Table 2] [Figure 3].

Postoperative pain assessment scores at 24 hours were notably lower in the Group B than Group A. Pain score of 1 was recorded in 48% of Group B patients versus 36% in the Group A patients. A pain score of 3 was reported in 20% of Group A patients but only 8% of Group B. Pain scores of 2 and 4 were similarly distributed between both groups at 40% and 4%, respectively. The mean pain score for Group A was 2 and 1 for Group B ($\chi^2 = 7.32$; $p = 0.112$) [Table 3] [Figure 4]. Results suggested a statistically insignificant difference between the two groups, but the clinical trend strongly favours the non-fixation technique for early postoperative comfort.

Intraoperative complications such as minor vessel bleeding were encountered in 8% (n=2) of in the Group A patients and none in Group B patients ($p = 0.003$), representing the sole intergroup difference in complication profile [Table 3]. No cases of mesh migration, seroma formation, or hernia recurrence

were reported in either group during the observation period.

DISCUSSION

Over the last few years, the management of inguinal hernias evolved significantly shifted from traditional open procedures to minimally invasive techniques with widespread use of laparoscopic techniques, specifically TEP repair. TEP repair has proved to be as an effective hernia repair procedure with the advantages of a minimally invasive surgical technique[9-11]. Therefore, the question concerning how best to fixate the mesh has become a clinically and economically important issue because using tackers incurs an additional expense for the procedure and introduces the potential for tacker-related complications.

The demographics in the study cohort — exclusively male, with mean age of approximately 56 years were consistent with the results of previous studies examining single-centre cohorts. Mohammed et al. and Nahid et al. reported their all-male cohorts were of mean age of ~56 years from their prospective randomized trials, while Adam et al. have cited mean ages of 55.8 and 52.2 years, respectively[12-14]. In this study, the Group A and B patients respectively had 56% and 52% of hernias that were direct inguinal hernias; in contrast, Mohammed et al. suggested that a significant portion of their cohort's hernias were indirect hernias, which may be due to the selection criteria and different age groups in the sample selection[12]. Regarding the time duration of operation, Group B required less time for operation, but results showed a statistically insignificant difference between the two groups ($p = 0.052$). These findings, in accordance with the meta-analyses of Sajid et al.[15] and Tam et al.[16], suggest that the removal of tacker placement from an operation will reduce the operative time[5,6].

A 10-12% of patients showed postoperative pain, and it might be because of the nerve entrapment by tackers[5]. This study results suggested that Group B patients showed lower pain levels at 24 hours having a pain score of 1 and a few patients had a pain score of more than 3 or equal to 3. Even though these results were statistically insignificant ($p = 0.112$), this data supported a repair with non-fixation.

According to study results, minor vessel bleeding was observed in the 8% of Group A patients using tackers, which shows a statistically significant value ($p=0.003$). Minor bleeding associated with using tackers because of the proximity of Cooper's ligament and the corona mortis.

The use of non-absorbable tackers was expensive, which represents a major financial concern, so the repair without tackers has a distinct cost-saving benefit without compromise in their effectiveness[15, 19].

This study has several limitations, such as a limited sample size, inclusion of only male patients, and a lack of structured post-discharge follow-up. This leads to statistical inaccuracy in the data and prevents the assessment of postoperative complications. Further studies are needed with larger patient samples, including female patients, and consider longer post-operative follow-up to establish evidence supporting the two techniques.

CONCLUSION

The results of the present study suggested that repair with non-fixation shows very few complications and a lower cost of treatment than mesh fixation. In accordance with these study results, TEP repair with non-fixation could be the preferred choice for the inguinal hernia repair.

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Tables

Table 1. Comparison of hernia characteristics between Mesh Fixation Group and Non-Fixation group

Parameter	Mesh Fixation (n=25)	Non-Fixation (n=25)
Side: Right	24%	44%
Side: Left	40%	32%
Side: Bilateral	36%	24%
Type: Direct	56%	52%
Type: Indirect	40%	40%
Type: Pantaloon	4%	4%
Type: Congenital	0%	4%
Reducible	92%	92%
Irreducible	8%	8%

Table 2. Comparison of Postoperative pain scores and hospital stay between Mesh Fixation Group and Non-Fixation group

Parameter	Mesh Fixation (n=25)	Non-Fixation (n=25)
Hospital Stay: 2 days	20%	16%
Hospital Stay: 3 days	36%	44%
Hospital Stay: 4 days	36%	36%
Hospital Stay: >5 days	8%	4%
Pain Score 1	36%	48%
Pain Score 2	40%	40%
Pain Score 3	20%	8%
Pain Score 4	4%	4%

Table 3. Postoperative complications: comparative analysis of Mesh Fixation Group and Non-Fixation group

Complication	Mesh Fixation (n=25)	Non-Fixation (n=25)
Minor Vessel Bleeding	8% (n=2)	0%
Mesh Migration	0%	0%
Seroma Formation	0%	0%
Hernia Recurrence	0%	0%

Figure Legends

Figure 1: Pie Charts Showing Proportional Distribution of Hernia Types among Mesh Fixation and Non-Fixation Groups

Figure 2: Figure showing Comparison of Operative Time between Mesh Fixation and Non-Fixation Groups

Figure 3: Line Graph illustrating Distribution of Length of Hospital stay in Mesh Group and Non-Mesh Groups

Figure 4: Postoperative Pain Scores at 24 hours in Mesh Fixation and Non-Mesh Fixation Groups

Figure 1

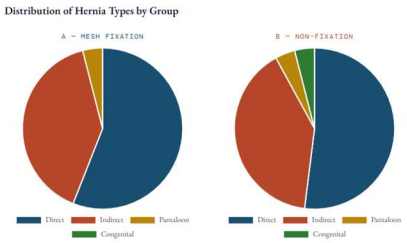


Figure 2

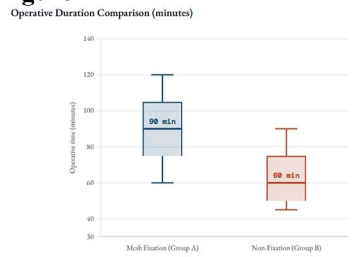
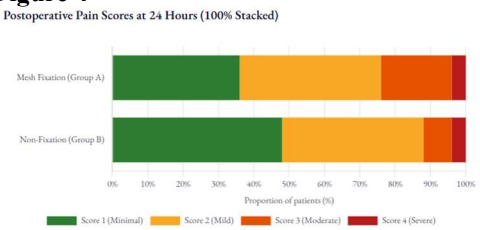


Figure 3

Figure 4



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