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Research Article

Comparative Study of Mesh Fixation and Non-Fixation in Transabdominal Pre-Peritoneal Inguinal Hernia Repair

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Abstract

Background: The fixation of the mesh remains unresolved in transabdominal preperitoneal inguinal hernia (TAPP). Surgeons had previously fixed the mesh using laparoscopic stapling devices, tacks, suturing techniques and recently adhesives. Fixation of mesh was done to prevent migration of mesh resulting in recurrence but many studies showed non fixation of mesh was not associated with any increased risk of hernia recurrence. Fixing the mesh not only increases the cost and duration of procedure but also could cause complications like post-operative pain. Hence, this study was an attempt to resolve this controversy surrounding recurrence with mesh non fixation.

Methods: A sample of 90 patients to undergo TAPP inguinal hernia repair as an elective surgery were taken. 45 patients underwent fixation of polypropylene mesh (by tackers or sutures) as group A and the remaining 45 with non-fixation of mesh in group B. The outcome of surgery in terms of post-operative pain, mesh migration and recurrence was recorded.

Results: Pain intensity had been assessed by a visual analogue scale - VAS (0 (no pain) to 10 (worst pain)). For the comparison of VAS pain after 24 hours, the minimum value of 2.00 and maximum value of 4.00 with Mean and SD value of 3.02 ± 0.39 were reported in Group A (n=45). The minimum value of 4.00 and maximum value of 6.00 with Mean and SD value of 5.02 ± 0.34 were reported in Group B (n=45). The total variable for VAS pain after 24 hours, variable between the two groups (n=90) with the minimum value of 2.00 and maximum value of 6.00 with Mean and SD value of 4.02 ± 1.07 were reported. Two (4.4%) cases from group A and 2 (4.4%) cases from group B with a total of 4 (4.4%) cases tested positive for the recurrence of 6th Month follow up.

Conclusion: Mesh fixation involves more operative time, more so with suture fixation. It involves more postoperative pain, both with tackers or suture fixation. Non-fixation during Transabdominal preperitoneal repair of inguinal hernias is as safe as mesh fixation with certain advantages. It does not lead to increased recurrence though it does not decrease the incidence of chronic groin pain. Collateral advantage would be decreased operative times, lesser post-operative pain, and decreased costs.

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Introduction

An inguinal hernia is a protrusion of abdominal-cavity contents through the inguinal canal. Groin hernias account for approximately 75% of all abdominal wall

hernias with a lifetime risk of an inguinal hernia in males and females being 27% and 3% respectively [1].

The two commonly used approaches to laparoscopic repair of inguinal hernia are the transabdominal

preperitoneal (TAPP) hernia repair and the totally extraperitoneal hernia repair (TEP) approaches. Non-fixation of the mesh is theoretically a predisposing factor for hernia recurrence due to the risk of mesh displacement. Non fixation reduces the operative time, decreases post-operative pain, but some studies showed increase in chances of recurrence due to mesh migration [2].

The mesh needs to remain in place until tissue integration is complete. Complete integration usually happens around 2-3 weeks after surgery. The purpose of this study was to determine whether elimination of fixing the mesh during transabdominal preperitoneal inguinal hernia repair results in decreased postoperative pain or complications, or both, without increasing the incidence of hernia recurrence [3].

The aim of this study was to determine whether elimination of fixing the mesh during transabdominal preperitoneal inguinal hernia repair results in decreased postoperative pain or complications, or both, without increasing the incidence of hernia recurrence.

MATERIALS AND METHOD

This prospective randomized study was conducted in the Department of General Surgery, at a tertiary care centre at Pondicherry following approval of institutional ethical committee (No.64/SVMCH/IEC-Cert/Mar 21). The patients were randomly assigned to two groups of 45. The study duration was 18 months (March 2021 – August 2022). A sample of 90 patients to undergo TAPP inguinal hernia repair as an elective surgery were taken. 45 patients underwent fixation of polypropylene mesh (by tackers or sutures) as group A and the remaining 45 with non-fixation of mesh in group B.

The patient's demographic characteristics including age, gender, hernia type and side were recorded. Then the patients with inguinal hernia requiring surgery underwent laparoscopic TAPP repair. Assessment of operative time, post-operative pain done in immediate post-operative period and mesh migration at 3weeks with ultrasound and recurrence after 6 months was recorded.

Statistical software: SPSS version 22 (IBM SPSS Statistics, Somers NY, USA) was used to analyse data. Categorical data was represented in the form of Frequencies and proportions. Chi-square test was used as test of significance for qualitative data. Continuous data was represented as mean and standard deviation.

RESULTS AND DISCUSSIONS:

The comparison of mean age between study groups were determined with Minimum and Maximum values of Mean and SD along with T and P value.

The total age variable between the two groups with the minimum value of 19.00 and maximum value of 62.00 with Mean and SD value of 39.13 ± 13.03 were reported. T value and P value were 2.425 and 0.017 respectively shown in **Table (1)**. The P value denoted the test is statistically insignificant. As we looked at different articles of research in literature, we found that most of their results matched with our result. We can infer from the gathered information that middle age of

around 50 years has maximum incidence of inguinal hernia.

Pain intensity had been assessed by a visual analogue scale - VAS (0 (no pain) to 10 (worst pain)). For the comparison of VAS pain after 24 hours, the minimum value of 2.00 and maximum value of 4.00 with Mean and SD value of 3.02 ± 0.39 were reported in Group A (n=45). The minimum value of 4.00 and maximum value of 6.00 with Mean and SD value of 5.02 ± 0.34 were reported in Group B (n=45). The total variable for VAS pain after 24 hours, variable between the two groups (n=90) with the minimum value of 2.00 and maximum value of 6.00 with Mean and SD value of 4.02 ± 1.07 were reported. T value and P value were -25.738 and 0.0001 respectively presented in **Table (2)**. The P value denoted the test is statistically significant, but in a study by Moreno-Egea and colleagues, on 170 patients who underwent TEP approach with or without mesh fixation randomized into two equal groups, the mean pain, according to visual analogue scale score in the first 24 hours, was statistically insignificant [4].

Pain with fixation was thought to be due to nerve irritation or entrapment with fixation devices, foreign body sensation to mesh or fibrosis in inguinal region. We managed the pain with analgesics, requirement of which was significantly more in fixation group, both with suture or tacker fixation. Pain was analysed to be comparable in both groups in our study at the end of 1 month and 6 months on follow up. We attributed the causes of chronic pain to hernia recurrence, excessive scar tissue formation, pain from the bulk of the mesh, meshoma formation, or mesh-related excess fibrosis. Results similar to our study were found by other surgeons as well.

In a long series done by **Tam et al.**, it was found that there was no significant difference between groups in postoperative pain, with a weighted mean difference of -0.20 (p=0.19) on day 1, but there was a statistically significant increase in the incidence of pain when more than six tacks were used (p=0.008) [5].

Raghu et al. in their study on 30 patients who were randomized to two groups inferred that postoperative pain was significantly less in the non-fixation group compared with the mesh fixation group [6].

Moreover, the study by Buyukasik et al, where pain scores were determined by numeric pain rating scale, reported that pain was significantly higher in the mesh fixation group (p=0.034) [7].

The comparison of mean VAS pain after 10th day between study groups were the minimum value of 1.00 and maximum value of 1.00 with Mean and SD value of 1.00 ± 0.00 were reported in Group A (n=3). The minimum value of 1.00 and maximum value of 2.00 with Mean and SD value of 1.28 ± 0.49 were reported in Group B (n=7). The total variable for VAS pain after 10th day between the two groups (n=10) with the minimum value of 1.00 and maximum value of 2.00 with Mean and SD value of 1.20 ± 0.42 given in **Table (3)**. T value and P value were -0.980 and 0.356 respectively. The p-value denotes the test is statistically insignificant. Comparison of mean Operative duration in minutes between the study groups were determined with 70.00 and maximum value of 100.00 with Mean and SD value

of 80.20 ± 6.35 were reported in Group B (n=45). The total Operative duration in minutes between the two groups (n=90) with the minimum value of 54.00 and maximum value of 100.00 with Mean and SD value of 73.02 ± 10.21 shown in **Table (4)**. t- value and p-value were 9.366 and 0.0001 respectively. The p-value denoted the test is statistically significant.

Amongst 90 (100%) cases, the diagnosis distributed between the groups and age distribution between the groups were studied shown in **Table (5,6)**. The recurrence of 6th Month follow up between the groups were illustrated in **Table (7)**.

We believe that intracorporeal suturing increases the operative time, which can be overcome with increasing experience. There was significant difference in operative time between mesh fixation group and mesh non fixation group so fixation is a major factor that increases operative time [8].

Comparing our study with existing literature, it was found that mesh fixation takes more time, if fixation is done with suture. Mostly, other studies compared tacker fixation with non- fixation which is why they inferred tacker fixation comparable to non-fixation in terms of operative time.

Most recent meta-analysis did not find a statistically significant difference in operating times in the two groups. Our study revealed that fixation of mesh indeed leads to significantly increased operative time.

All 90 (100%) cases, the recurrence of 6th Month follow up between the groups were studied. 2 (4.4%) cases from group A and 2 (4.4%) cases from group B with a total of 4 (4.4%) cases tested positive for the recurrence of 6th Month follow up. 43 (95.6%) cases from group A and 43 (95.6%) cases from group B with a total of 86 (95.6%) cases tested negative

for the recurrence of 6th Month follow up. Chi Square value and P value were 0.000 and 1.00 respectively. The P value denoted the test is statistically insignificant.

Ayyaz et al. (9) found in their study on 63 patients in the study in two groups that only

one recurrence was encountered in 5- year follow-up in the group of non-fixation. However,

in the study by Sajid et al., (10) four patients developed recurrent inguinal hernia in 691 patients having mesh fixation and three patients developed recurrent inguinal hernia in 691 patients having nonmesh fixation.

In contrast, other studies done by Buyukasik et al.,(11), Messaris et al.,(12) and Chauhan and Chheda (13) reported that there was no recurrence seen in all patients in the follow-up period.

In the study by Taylor et al. (14) on 360 patients (two equal groups), pain was moderate to severe and was experienced by 2% of fixated repairs, but not reported by any patient with non-fixation of mesh, with no significant difference (P=0.06).

In the current study, recurrence occurred in 2 cases from mesh fixation group and 2 cases from mesh non-fixation group. When compared with previous studies, there is no statistical significance in respect to recurrence.

Conclusion: Non-fixation of mesh offers less operative time, less postoperative pain and comes at a lesser cost than fixation. Fixation and non-fixation have comparable results in terms of hospital stay and recurrence. Hence, recurrence can't be prevented with mesh fixation. So, we can conclude that mesh fixation doesn't offer any advantage over non- fixation. Hence, mesh non -fixation can be utilised as a safe and effective approach in TAPP hernia repair. More studies, with a larger sample size, are required in this field to make a definitive opinion.

Table-1: Comparison of mean age between study groups (N=90)

Variable	Groups	N	Mean ± SD	Min	Max	t-value	p-value
Age	Group A	45	42.38 ± 13.68	19.00	62.00	2.425	0.017
	Group B	45	35.89 ± 11.61	19.00	57.00		
	Total	90	39.13 ± 13.03	19.00	62.00		

Table-2: Comparison of Mean VAS pain after 24 hrs between study groups (n=90)

Variable	Group	N	Mean ± SD	Min	Max	t-value	p-value
VAS Pain After 24hours	Group A	45	3.02 ± 0.39	2.00	4.00	-25.738	0.0001
	Group B	45	5.02 ± 0.34	4.00	6.00		
	Total	90	4.02 ± 1.07	2.00	6.00		

Table-3: Comparison of Mean VAS pain after 10th day between study groups (n=10)

Variable	Groups	N	Mean ± SD	Min	Max	t-value	p-value
VAS Pain After 10 th day	Group A	3	1.00 ± 0.00	1.00	1.00	-0.980	0.356
	Group B	7	1.28 ± 0.49	1.00	2.00		
	Total	10	1.20 ± 0.42	1.00	2.00		

Table -4 Comparison of mean operative duration in minutes between study groups (N=90)

Variable	Groups	N	Mean ± SD	Min	Max	t-value	p-value
Operative duration in Minutes	Group-A	45	65.84 ± 8.07	54.00	90.00	-9.366	0.0001
	Group-B	45	80.20 ± 6.35	70.00	100.00		
	Total	90	73.02 ±10.21	54.00	100.00		

Table-5: Diagnosis with Group distribution

Diagnosis	Groups		Total N (%)
	Group An (%)	Group Bn (%)	
Bilateral direct Inguinal Hernia	3 (6.7%)	2 (4.4%)	5 (5.6%)
Left direct Inguinal Hernia	13 (28.9%)	10 (22.2%)	23 (25.6%)
Left Indirect Inguinal Hernia	9 (20.0%)	10 (22.2%)	19 (21.1%)
Left recurrent Inguinal Hernia	0 (0%)	1 (2.2%)	1 (1.1%)
Right direct Inguinal Hernia	11 (24.4%)	1 (2.2%)	12 (13.3%)
Right Indirect	7 (15.6%)	20 (44.4%)	27 (30.0%)

Table-6 Age distribution with Group distribution

Age-Groups (In years)	Groups		Total N (%)
	Group An (%)	Group Bn (%)	
<25	10 (22.2%)	12 (26.7%)	22 (24.4%)
26 – 35	5 (11.1%)	12 (26.7%)	17 (18.9%)
36 – 45	4 (8.9%)	8 (17.8%)	12 (13.3%)
46 – 55	20 (44.4%)	11 (24.4%)	31 (34.4%)
>55	6 (13.3%)	2 (4.4%)	8 (8.9%)
Total	45 (100%)	45 (100%)	90 (100%)
Chi-Square value	9.010	p-value	0.061

Table-7 Recurrence of 6th Month follow up with Group distribution

Recurrence 6 th Month follow up	Groups		Total N (%)
	Group A n (%)	Group B n (%)	
Positive	2 (4.4%)	2 (4.4%)	4 (4.4%)
Negative	43 (95.6%)	43 (95.6%)	86 (95.6%)
Total	45 (100%)	45 (100%)	90 (100%)
Chi-Square Value	0.000	p-value	1.000

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