

# Fixation and Non-Fixation of MESH in Transabdominal Preperitoneal Hernia Repair: A Randomized Study

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## ABSTRACT

**Background:** Transabdominal pre-peritoneal repair is a well-accepted method of inguinal hernia repair involving both options of fixation or non-fixation of mesh. Objective was to analyse the comparison between mesh fixation versus no-mesh fixation in laparoscopic inguinal hernia repair– TAPP, in terms of: operative time, post-operative pain, length of hospital stay and recurrence.

**Materials and Methods:** This prospective randomised study was conducted on a sample of 30 male patients who underwent TAPP inguinal hernia repair. 15 of these underwent fixation and the remaining 15 with non-fixation of mesh.

**Results:** Mesh fixation increases postoperative pain and operative time. No difference observed in terms of hospital stay between the 2 groups. Fixation doesn't prevent recurrence.

**Conclusion:** Mesh non-fixation can be utilised as a safe and effective approach in TAPP hernia repair.

**Keywords:** Transabdominal Pre-Peritoneal (TAPP) Repair; Mesh Fixation; Mesh Non-Fixation.

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## INTRODUCTION

The term "Hernia" is derived from the Latin word for rupture. An inguinal hernia is a protrusion of abdominal-cavity contents through the inguinal canal.<sup>1</sup> 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.<sup>2</sup> Men account for about 90% of all repairs performed.<sup>2</sup> Considering both operated and non-operated inguinal hernias, the lifetime prevalence rate is 47% for men up till the age of 75.<sup>3</sup> Laparoscopy gives a clear view of the myopectineal orifice, and repairs of both inguinal and femoral hernias can be done. It treats the 'point of origin' of hernia rather than 'point of presentation'. Laparoscopic repair of an inguinal hernia (unilateral, bilateral and recurrent) results in reduced incidence of postoperative pain with the decreased need for postoperative analgesia, shorter hospital stay and an earlier return to normal activities. Additionally, repair of recurrent hernias is facilitated by access to the virgin preperitoneal space in the laparoscopic repair. Cost has been a major point of criticism against the laparoscopic approach, particularly in term of disposable items of which a stapling device is the most expensive.

Non-fixation of the mesh is theoretically a predisposing factor for hernia recurrence due to the risk of mesh displacement. Some authors advocate the methodical fixation of the synthetic mesh as a valuable means to prevent hernia recurrence whereas others have reported no benefit of mesh fixation.<sup>4,7</sup> The longstanding standard practice for TAPP repair has been to use mesh fixation with tackers to prevent recurrence.

From the experiences of various surgeons it was derived that although mesh fixation comes with more post-operative pain due to use of tackers or sutures, but it reduces the chances of recurrence. Non fixation on the other hand reduces the operative time, decreases post-operative pain, but some studies showed increase in chances of recurrence due to mesh migration. Hence, we conducted our study in an attempt to resolve this controversy surrounding recurrence with mesh non fixation.

The purpose of this study was to determine whether elimination of fixing the mesh during trans-abdominal pre peritoneal inguinal hernia repair results in decreased postoperative pain or complications, or both, without increasing the incidence of hernia recurrence.

**MATERIALS AND METHODS**

This prospective randomised study was conducted in the Department of Surgery, Government Medical College and Rajindra Hospital, Patiala over a period of two years from October 2016 till October 2018.

A sample of 30 male patients to undergo TAPP inguinal hernia repair as an elective surgery were taken and randomisation done by draw of lots method by resident doctors. 15 of these underwent 2 point fixation of polypropylene mesh (by tackers or sutures) as group A and the remaining 15 with non-fixation of mesh in group B. Patients were blinded regarding the intervention. Assessment done at 1, 2 weeks and after 1 and 6 months. The objective of this study was to analyse the comparison between mesh fixation versus no-mesh fixation in laparoscopic inguinal hernia repair–TAPP, in terms of:

- Operative time
- Post-operative pain
- Length of hospital stay
- Recurrence.

**Inclusion Criteria**

- Consented for surgery with above methods.
- No previous major surgeries.
- Uncomplicated inguinal hernia
- No previous hernia surgery.
- Age > 18 yrs.
- ASA grade 1 or 2.

**Exclusion Criteria**

- Previous laparotomies.
- Obstructed, strangulated inguinal hernias
- Patients who underwent open hernia surgery in the past
- Paediatric population
- Co morbidities like uncontrolled diabetes, seizure disorder, uncontrolled hypertension.
- Obese with BMI >30
- High anaesthetic risk

After getting ethical clearance certificate, informed written consent was taken after informing the participants about the possible

benefits, risks and implications of the study. Strict confidentiality of their personal details and information related to the study was maintained at all level. Data was entered in Microsoft Excel and analysis was done by appropriate statistical tests.

**RESULTS**

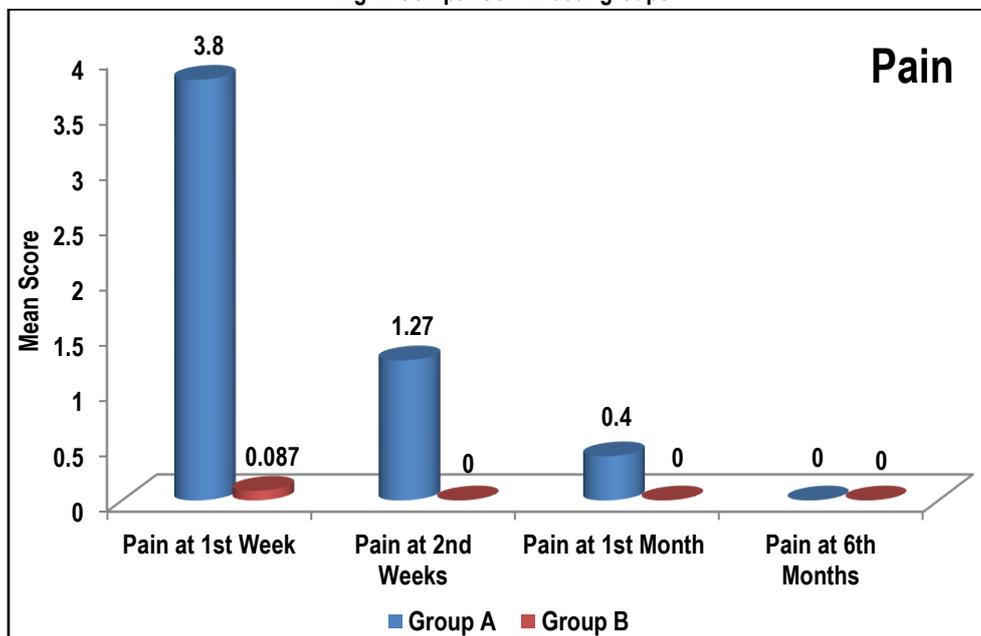
This study has been carried out at our institute Rajindra Hospital, Patiala for a period of 2 years from October 2016 till October 2018. In this study, initially a total of 41 patients were found eligible. But, 11 were excluded based on the inclusion criteria and those who didn't want to participate. So, a total of 30 male patients of symptomatic inguinal hernia who had undergone laparoscopic TAPP repair were studied. The following data makes an attempt to summarize the details of observations noted during the study. The results of present study are given below:

**Group A: Fixation**

**Group B: Non-Fixation**

- All our patients were in the age group of 18-70 yrs. The mean age incidence in the present study was 51.07 years in fixation group and 44.53 years in non-fixation group. P – value was 0.266, which was statistically non-significant.
- In our study, in fixation group there were 40% indirect and 60% direct hernias. Of the non-fixation group, there were 53.33% indirect hernias and 46.67% direct hernias. Analysis of type wise distribution gave non- significant results (p=0.464).
- Out of a total of 30 hernias, there were 8 left sided and 22 right sided hernias. Of these, 4 each of left sided were included in fixation group and 11 each of right sided hernias included in non-fixation group. P-value was not significant.
- Post-operative pain: according to visual analogue scale(VAS)
- From Fig 1, it was inferred that patients included in the fixation group experienced more pain at the end of 1<sup>st</sup> week. P- value was analysed to be 0.001 by t-test , which signifies highly significant results.

**Fig 1: Comparison in both groups**



- We have observed that mesh fixation increases the incidence of post-operative pain significantly at the end of 2<sup>nd</sup> week with p-value as 0.002.
- When pain was compared at the end of 1 month, mean was calculated as 0.40 in the fixation group and 0.00 in non-fixation group. P-value for this analysis was found to be 0.072, which showed non-significant results.
- None of our 30 patients experienced any pain at 6 months. Patients need follow up for a longer time in case they continue to experience pain.
- Mean operative time for mesh fixation group was 101 minutes and non-fixation group was 89.33 minutes. P-value was analysed to be 0.006, which showed that mesh fixation significantly increases the operative time.
- Mean hospital stay for fixation group was observed to be 2.80 days and in non-fixation group as 2.53 days. It was seen in the above table that most of the patients were discharged on 2<sup>nd</sup> or 3<sup>rd</sup> post op day. P-Value was observed to be 0.537 and hence, it was seen that there is no significant difference in terms of hospital stay in the 2 groups.
- 2 patients had recurrence in the fixation group and none in the non-fixation group. By chi square test, p-value was found to be 0.143, which is insignificant. Hence, we infer that mesh fixation doesn't reduce the chances of recurrence.
- In the mesh fixation group, 8 patients underwent tacker fixation and 7 patients underwent suture fixation. Total cost incurred for the procedure was analysed by chi square test and p-value was found to be 0.003, which was significant.

## DISCUSSION

Inguinal hernias are the most common type of hernia. Inguinal hernia repair contributes significantly to general surgeon's workload. The issue of fixation of the mesh remains unresolved in TAPP inguinal hernia repair. Surgeons have previously fixed the mesh using laparoscopic stapling devices, tacks, suturing techniques and recently adhesives. Fixation of mesh is done to prevent migration of mesh resulting in recurrence but many studies showed non fixation of mesh is not associated with any increased risk of hernia recurrence. Fixing the mesh not only increases the cost and duration of procedure but also can cause complications like post-operative pain. 30 patients were studied and 15 in each group of fixation and non-fixation. All the patients studied were male.

### Age

As we looked at different articles of research in literature, we found that most of their results matched with our result.<sup>8,9</sup> We can infer from the gathered information that middle age of around 50 years has maximum incidence of inguinal hernia.

### Type of Hernia

Both direct and indirect types were included in our study and analysis gave non-significant results. Other authors, who have previously studied this topic have also had similar non-significant results.<sup>10,11</sup> So, we can emphasise here on the advantage of laparoscopic repair where it covers the entire myopectineal orifice of Fruchaud, hence, addressing all types of groin hernias. Indirect, direct inguinal and femoral hernias can be rectified through the

same approach. Exact cause of hernia can be found and we can address the problem at the point of origin. We can also identify any occult hernias and rectify the problem in the same sitting.

### Side of Hernia

In our study, P-value was not significant. Literature suggests that delayed descent of the right testis is responsible for the higher incidence of right sided indirect hernias. Right sided direct hernias can occur following surgeries like appendectomy and injury to ilioinguinal nerve is explained as the reason behind the muscle weakness.<sup>1</sup> So, based on results derived from our study and similar other studies and the existing literature, we arrive at the conclusion that hernia has right sided predominance.

### Post-Operative Pain

Pain intensity had been assessed by a visual analogue scale - VAS (0 (no pain) to 10 (worst pain)). In our study, post-operative pain was studied at the end of 1<sup>st</sup> week, 2 weeks, 1 month and 6 months. Pain at the end of 1<sup>st</sup> week was found to be significantly more (p=0.001) with mesh fixation whether tacker or suture was used. 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. Similarly, at the end of 2<sup>nd</sup> week, pain was observed to be significantly more in the fixation group, both with tacker and suture fixation. P-value was found to be <0.05, which was statistically significant. 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 thought that the causes of chronic pain could be hernia recurrence, excessive scar tissue formation, pain from the bulk of the mesh, meshoma formation, or mesh-related excess fibrosis.<sup>12</sup> Results similar to our study were found by other surgeons as well.<sup>10</sup>

### Operative Time

In our study, operating time was significantly more in mesh fixation group as compared to non-fixation group (p<0.05). Suture fixation was found to have significantly more operative time when compared to non-fixation. We believe that intracorporeal suturing increases the operative time, which can be overcome with increasing experience. Comparing our study with existing literature, it was found that mesh fixation takes more time, if fixation is done with suture. Other studies mostly compared tacker fixation with non-fixation, which is why they call tacker fixation comparable to non-fixation in terms of operative time.

### Hospital Stay

Laparoscopic surgery is a boon to surgical fraternity with its advantage of shorter hospital stay, faster recovery and earlier return to normal activities. In our study, mean hospital stay for fixation group was observed to be 2.80 days and in non-fixation group as 2.53 days. Other surgeons are too of similar opinion in this regard.<sup>10,11,13</sup> Thus, we may conclude from all the above studies that laparoscopic inguinal hernia surgery has the advantage of shorter hospital stay, irrespective of mesh fixation or non-fixation, thus reducing the overall hospital expenses. This is helpful in developing countries like India where there is a large gap between demand and supply of medical care. It is also helpful in developed nations, where laparoscopic hernia surgery is emerging as a day care procedure. Most of the patients are discharged on 2<sup>nd</sup> postoperative day. In the event of severe pain, stay might be increased.

### Recurrence

In our study, 2 patients had recurrence in the fixation group and none in the non-fixation group. By chi square test, p value was found to be 0.143, which is insignificant. Recurrence mainly is caused due to inappropriate size or improper placement of the mesh. We retrospectively analysed that we had recurrence due to improper preperitoneal space creation, leading to mesh displacement and uprolling. We worked on this aspect to nullify recurrence in the other cases. Results similar to our study were published by many authors.<sup>10,11,14</sup>

Smith et al. (1999)<sup>9</sup> showed in their study that stapling the mesh made no statistically significant difference to the incidence of recurrence, port-site hernia, or chronic groin pain in this study. They concluded that it is not necessary to secure an appropriately placed 10 × 15-cm piece of mesh during a laparoscopic TAPP inguinal hernia repair. Some authors emphasised the importance of size of the defect in this decision to fix the mesh.<sup>9,15</sup> The World Guidelines for groin hernia<sup>16</sup> recommended to fix the mesh in M3 hernias (large medial) in both TEP and TAPP to reduce the risk of recurrence. For recurrent hernias after anterior repair, posterior repair is recommended and vice-versa. Hence, looking at the views of all the above authors, the consensus derived is that non-fixation of the mesh is a safe procedure, which doesn't increase the chances of recurrence, provided the proper sizing and placement of the mesh. For large (>4cm) and medial hernias, fixation of the mesh is recommended.

### Cost Analysis

Tacker fixation had significantly higher cost in comparison to suture fixation and non-fixation groups (p<0.05). Avoiding mesh fixation reduces cost and doesn't have any increased chances of recurrence. This makes non-fixation method more suitable for the common man. Guidelines for laparoscopic (TAPP) and endoscopic (TEP) treatment of inguinal hernia recommended that cost reduction measures should be considered like increase in the case load, shortening of the learning curve and improvement of surgical performance by standardizing the technique and systematic training.<sup>17</sup> Other recommendations included using nondisposable trocars and instruments, avoidance of "tacker" fixation and implantation of low-cost meshes. The World Guidelines for groin hernia management<sup>16</sup> recommended day-case laparoscopic inguinal hernia repair with minimal use of disposables as the cost effective approach.

### Other Complications

We did not have any laparoscopy or general anaesthesia related complication in our study. Also, there was no incidence of seroma, wound infection, port-site hernia or hematoma.

### CONCLUSIONS

Mesh fixation involves more operative time, more so with suture fixation. It involves more postoperative pain, both with tacker or suture fixation. Also, it comes with more cost, mainly with tacker fixation. 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.

### REFERENCES

1. Fitzgibbons Jr RJ, Forse RA. Groin hernias in adults. *New England Journal of Medicine*. 2015 Feb 19;372(8):756-63.
2. Wikipedia contributors. Inguinal hernia surgery [Internet]. *Wikipedia, The Free Encyclopedia*.; [cited 2018Nov25]. Available from: [https://en.wikipedia.org/w/index.php?title=Inguinal\\_hernia\\_surgery&oldid=864030190](https://en.wikipedia.org/w/index.php?title=Inguinal_hernia_surgery&oldid=864030190)
3. Abramson JH, Gofin J, Hopp C, Makler A, Epstein LM. The epidemiology of inguinal hernia. A survey in western Jerusalem. *Journal of Epidemiology & Community Health*. 1978 Mar 1;32(1):59-67.
4. Fitzgibbons RJ, Puri V. Laparoscopic inguinal hernia repair. *American Surgeon*. 2006 Mar;72(3):197-206.
5. Lau H, Patil NG. Selective non-stapling of mesh during unilateral endoscopic total extraperitoneal inguinal hernioplasty: a case-control study. *Archives of Surgery*. 2003 Dec 1;138(12):1352-5.
6. Parshad R, Kumar R, Hazrah P, Bal S. A randomized comparison of the early outcome of stapled and unstapled techniques of laparoscopic total extraperitoneal inguinal hernia repair. *JSL: Journal of the Society of Laparoendoscopic Surgeons*. 2005 Oct;9(4):403.
7. Liem MS, van Duyn EB, van der Graaf Y, van Vroonhoven TJ, Coala Trial Group. Recurrences after conventional anterior and laparoscopic inguinal hernia repair: a randomized comparison. *Annals of surgery*. 2003 Jan;237(1):136.
8. Smith AI, Royston CM, Sedman PC. Stapled and nonstapled laparoscopic transabdominal preperitoneal (TAPP) inguinal hernia repair. *Surgical endoscopy*. 1999 Aug 1;13(8):804-6.
9. Mayer F, Niebuhr H, Lechner M, Dinnewitzer A, Köhler G, Hukauf M et al. When is mesh fixation in TAPP-repair of primary inguinal hernia repair necessary? The register-based analysis of 11,230 cases. *Surgical endoscopy*. 2016 Oct 1;30(10):4363-71.
10. Darwish A, Hegab A. Tack fixation versus nonfixation of mesh in laparoscopic transabdominal preperitoneal hernia repair. *The Egyptian Journal of Surgery*. 2016 Oct 1;35(4):327-.
11. Sajid MS, Ladwa N, Kalra L, Hutson K, Sains P, Baig MK. A meta-analysis examining the use of tacker fixation versus non-fixation of mesh in laparoscopic inguinal hernia repair. *International Journal of Surgery*. 2012 Jan 1;10(5):224-31.
12. Bjurström MF, Nicol AL, Amid PK, Chen DC. Pain control following inguinal herniorrhaphy: current perspectives. *Journal of pain research*. 2014;7:277.
13. Srivastava, A, Singh, R, Pal, L.S. A Comparative Study in Laparoscopic Inguinal Hernia Repair between Fixation Vs. Non-Fixation of Mesh. *Journal of Evidence Based Medicine and Healthcare*. 2016;3(14): 490-2.
14. Kapiris S, Mavromatis T, Andrikopoulos S, Georgiades C, Floros D, Diamantopoulos G. Laparoscopic transabdominal preperitoneal hernia repair (TAPP): stapling the mesh is not mandatory. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2009 Jun 1;19(3):419-22.
15. 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. *Surgical endoscopy*. 2017 Oct 1;31(10):4238-43.

16. Simons MP, Aufenacker TJ, Berrevoet F, Bingener J, Bisgaard T, Bittner R et al. World guidelines for groin hernia management. The HerniaSurge Group. Key Questions, Statements and Recommendations. Available at: <https://www.europerianherniasociety.eu/sites/www.europerianherniasociety.eu/files/medias/PDF/HerniaSurgeGuidelinesStatementsRecommendations.pdf>

17. Bittner R, Arregui ME, Bisgaard T, Dudai M, Ferzli GS, Fitzgibbons RJ et al. Guidelines for laparoscopic (TAPP) and endoscopic (TEP) treatment of inguinal hernia [International Endohernia Society (IEHS)]. *Surgical endoscopy*. 2011 Sep 1;25(9):2773.

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