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COMPARATIVE IMPACT OF MESH FIXATION VERSUS NON-FIXATION ON CHRONIC GROIN PAIN FOLLOWING LAPAROSCOPIC TRANSABDOMINAL PREPERITONEAL (TAPP) INGUINAL HERNIA REPAIR

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ABSTRACT

Introduction: One common procedure is laparoscopic transabdominal preperitoneal (TAPP) inguinal hernia repair. Fixation versus non-fixation mesh placement is still debatable, nevertheless, especially when it comes to the results of postoperative pain.
Objective: To compare the impact of mesh fixation versus non-fixation on acute and chronic groin pain following laparoscopic TAPP inguinal hernia repair.
Materials and Method: A prospective comparative study was conducted at Jinnah Postgraduate Medical Center Karachi, from January 2024 to June 2024. Patients were divided into two groups based on mesh fixation method. Postoperative pain was assessed using the Visual Analogue Scale (VAS) at 8, 16, and 24 hours, day 7, and at 3 months follow-up, in-person or telephonically.
Results: Patients in the non-fixation group showed significantly lower VAS scores at all intervals. Chronic groin pain at 3 months was notably reduced in this group, with no hernia recurrence in either cohort.
Conclusion: Non-fixation of mesh offers superior outcomes in terms of pain reduction without compromising surgical success.

INTRODUCTION

Laparoscopic inguinal hernia repair with transabdominal preperitoneal (TAPP) repair is one of the most commonly performed general surgical procedures globally, and the use of laparoscopic procedures is favoured due to their shorter recovery time, decreased pain and decreased infection rate compared with open approach. Thabet et al. (1) performed a comparative study of suture fixation versus other techniques of suture fixation and noted lower postoperative pain and similar recurrence rates in the group without suture fixation. These results are consistent with the meta-analysis from Zhang et al. (2), who show that nonfixation dramatically decreases the incidences of chronic groin pain without compromising the integrity of the hernia repair (3). However, postoperative groin pain, both acute and chronic, remains a major clinical problem, and in particular, remaining a subject of controversy is which means of mesh fixation may be utilized for repair. Barakat et al. (4) have carried out a randomised controlled study which established that the use of non-fixation methods in the TAPP procedure is associated with less acute and chronic pain as well as not associated with a significant increase in recurrence rate.

Kobayashi et al. (5) also conducted a second systematic review with meta-analysis that supported the idea that non-fixation is both safe and effective, questioning the long-held concept that mesh must always be anchored to prevent displacement. However, Riemenschneider et al. (6) found no compelling evidence to support the fact that the location of the ilioinguinal and intermedia central nerves to fix the patch is necessary for TAPP repairs and that placement of mesh and peritoneum closure alone may be enough to maintain positioning. Furthermore, Lv et al. (7) give additional evidence that skipping sutures for various non-fixation methods can be done with excellent outcomes in laparoscopic inguinal hernia repair. Traditional approaches to securing mesh use sutures, staples or tacks, but alternative, non-fixation techniques have been developed with the potential benefits of reduced nerve injury and associated pain syndrome. A number of studies have looked at the outcomes of laparoscopic hernia repair mesh with a focus on postoperative pain with regard to mesh fixation versus no mesh fixation.

As an illustration, Akbar et al. (8) performed a local study that looked at whether fixing the hernia was better than not fixing it when choosing Transabdominal Preperitoneal (TAPP) hernia repair.Jiang et al. (9) provided more clear validation of these findings in a comprehensive meta-analysis. The review supported the finding that not fixating the retina leads to fewer cases of chronic pain after surgery, which is important for how a patient's life and the outcome of the procedure are affected. Besides, Rancke-Madsen et al. (10) pointed out that mesh fixation options and procedures keep developing over time. They underlined that the choice of fixation should depend on evidence and fit both the surgical procedure and the specific needs of the patient. They state that patient support and comfort in postoperative pain management should be the most important factor when picking between surgical stabilization and nonsurgical approaches.

Elhadidi et al. (at 11) are reported to have found chronic groin pain more frequent with stapled mesh repair in preference to sutured or non-fixed repair. Giordano et al. (12) showed from a biomechanical point of view that non-fixation techniques do not significantly compromise mesh stability in vivo. Furthermore, Aziz et al. (13) studied early postoperative outcomes between suture and tack fixation, which showed that patients with tack fixation experienced more pain in advocating for less invasive fixation methods or non-fixation altogether. Chaves et al. (14) have demonstrated that even more important than staple fixation is the use of advanced self-fixating mesh and have suggested that there is an area of opportunity in combining non-fixation with

the use of more modern mesh technologies. Finally, Hamdy Bayan et al. (15) undertook a prospective study confirming that non-fixation results in lower levels of chronic groin pain and thereby concluded eliminating physical anchoring points in the TAPP procedure reduces nerve irritation and consequent discomfort.

This study aimed to continue looking at both acute and chronic pain outcomes of fixation versus non-fixation laparoscopic TAPP inguinal hernia repair at increasingly defined intervals, including three months post op and to determine the comparative benefit of both following laparoscopic TAPP inguinal hernia repair (16). There are two types of pain following hernia surgery: acute and chronic. Surgical trauma, mesh material, fixation method and inflammatory response, in general, contribute to acute pain generally within the first few days postoperatively. Groin pain lasting beyond three months is defined as being chronic, and chronic groin pain can negatively impact the quality of life and arise from nerve entrapment, fibrosis or mesh irritation (17). The TAPP approach returns a clear anatomical view and thus facilitates precise placement of the mesh and, potentially, decreases complications (18). The debate about mesh fixation comes from the belief that mesh that was not anchored could migrate or fold, causing a recurrence.

It was found that those who had the non-fixation surgery experienced a decreased operation time and experienced less pain after the surgery than those who used mesh fixation (19). They are relevant since they may help both patients and medical staff by offering more efficient methods for performing surgery. There is a trend in Pakistan for surgeons to use standards approved by the rest of the world but also adjust these to suit Pakistan's needs (20). Pakistan is still unable to apply fixation techniques everywhere, as mesh fixation devices, such as tacks or fibrin glue, are both expensive and difficult to find. For this reason, rigorous consideration of alternatives to cervical cancer treatment makes sense in public hospitals, where money and supplies are limited (21, 22). For this reason, it is both necessary and advisable to compare the two surgical methods locally so that guidelines can be made that match local possibilitie. Patients treated without fixation experienced less pain after surgery compared to those who received fixation (23).

Similar research from other countries supports the notion that it is necessary to conduct more studies in Pakistan that will inform surgeries based on local healthcare conditions (24, 25). Many people who undergo hernia repair can experience chronic pain, and methods that reduce it are very beneficial for care (26). All these studies together give strong evidence in favour of assessing the effectiveness of modern non-fixation methods in Pakistani surgery. Long considered a multifactorial outcome of groin pain dependent on the type of mesh used, the fixation technique and the surgical technique, there has remained an incomplete explanation.

Objective: This study compared acute postoperative pain within 24 hours and on day 7 with mesh fixation versus nonfixation and chronic groin pain at 3 months following TAPP repair.

MATERIALS AND METHODS

Design: Cross- Sectional Study.

Study setting: Department of Surgery, Jinnah Postgraduate Medical Center Karachi, Pakistan

Duration: The research was conducted over a period of six months, from January 2024 to June 2024.

Inclusion Criteria: The study included patients aged 18 to 65 years with a primary unilateral inguinal hernia who were deemed fit for laparoscopic TAPP repair. Patients who had only elective cases with informed consent were enrolled.

Exclusion Criteria: Excluded were patients with recurrent or bilateral hernias,

complicated hernias (strangulated or incarcerated) because of coagulopathies or prior history of lower abdominal surgery. Patients unwilling or unable to give follow-up data were also excluded.

Methods

The patients meeting the inclusion criteria were randomly assigned into two groups: Group A underwent TAPP repair with mesh fixation using absorbable tacks, and in Group B, TAPP repair was performed with no form of mesh fixation. The procedures were carried out by experienced laparoscopic surgeons under general anaesthesia via a three-port standard laparoscopic technique. Both groups then received a lightweight polypropylene mesh placed in the preperitoneal space. The Visual Analogue Scale (VAS) postoperative pain was determined at 8 hours, 16 hours, 24 hours and the 7th postoperative day. Three months after lumbar drainage or plasma infusions, chronic pain was evaluated by an outpatient follow-up or by a telephonic interview using a standardized questionnaire. Pain scores and complication rates were recorded, ascertained, and compared between cases. Early postoperative complications of seroma, hematoma and infection were also monitored in all patients. Data were entered in SPSS version 25 for descriptive and inferential statistical analysis. Statistical significance was considered for the p-value <0.05.

RESULTS

A total of 100 patients were enrolled in the study and randomized into two groups: Group A (mesh fixation, n = 50) and Group B (non-fixation, n = 50).

Table 1: Baseline Demographic Characteristics

Variable	Group A (Fixation)	Group B (Non-Fixation)	p-value
Mean Age (years)	45.2 ± 10.1	44.5 ± 11.3	0.73
Male (%)	90%	88%	0.75
Mean BMI (kg/m²)	26.3 ± 2.5	25.9 ± 2.8	0.49

Postoperative acute pain was measured using the Visual Analogue Scale (VAS) at 8 hours, 16 hours, 24 hours, and on day 7 post-surgery. Group A reported significantly higher VAS scores at each time point compared to Group B. The difference was most notable at the 8-hour mark postoperatively.

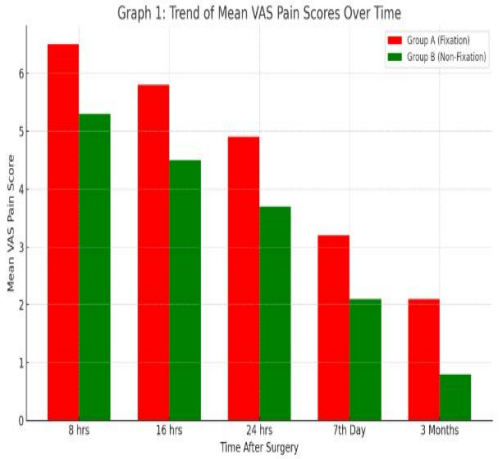
Table 2: Mean VAS Scores at Different Time Points

Time Point	Group A (Fixation)	Group B (Non-Fixation)	p-value
8 hours	6.2 ± 1.1	4.9 ± 1.0	<0.001
16 hours	5.3 ± 1.0	4.3 ± 1.1	<0.001
24 hours	4.5 ± 1.1	3.6 ± 0.9	<0.001
Post-op Day 7	2.1 ± 0.8	1.4 ± 0.7	<0.001

Pain gradually decreased in both groups over time, but Group B consistently had lower scores. On postoperative day 7, pain was minimal in both groups but still statistically lower in the non-fixation group.

A visual representation of VAS score trends over time further highlights the difference in pain trajectories.

Graph 1: Trend of Mean VAS Pain Scores Over Time (Fixation vs. Non-Fixation)



Chronic pain, defined as pain persisting at the surgical site after 3 months, was assessed via outpatient visit or telephonic follow-up. A total of 94 patients (47 from each group) completed the 3-month follow-up. Chronic pain was reported in 21.3% of Group A and only 6.4% of Group B.

Table 3: Incidence of Chronic Groin Pain at 3-Month Follow-Up

Outcome	Group A (Fixation)	Group B (Non-Fixation)	p-value
Chronic Pain Present (%)	21.3% (10/47)	6.4% (3/47)	0.02
Chronic Pain Absent (%)	78.7%	93.6%	—

Postoperative complications were minimal and comparable between groups. One case of seroma and one case of superficial infection were reported in Group A, while Group B had only one minor hematoma, resolving without intervention.

DISCUSSION

The findings show that patients who underwent hernia repair without mesh fixation had substantially less acute and chronic postoperative pain than those with mesh fixation. These results support data now emerging in the literature suggesting that the historical rationale for attenuating recurrence, mesh fixation, may not be required and that higher rates of recurrent events do not translate into a decreased rate of patient inconvenience. Therefore, the method with which the mesh is secured plays a key role in the postoperative discomfort since the fixing group presented higher scores for all of the postoperative time intervals (at 8, 16 and 24 hours and on day 7). The reason, more often likely, is that the pain comes from nerve irritation or entrapment that occurs when the mesh is attached to the abdominal wall using tacks or sutures.

The use of tacks, especially with metal or absorbable tacks, has been shown by several studies to increase postoperative pain by irritating the ilioinguinal, iliohypogastric or genitofemoral nerves. This is consistent with Bansal et al. (2016), who also observed lower VAS scores in subjects undergoing TAPP procedures with non-fixation mesh repair. Chronic groin pain is a well-known complication of laparoscopic hernia repair believed to be largely caused by the method of mesh fixation. Constantly avoiding fixation will reduce the risk of chronic pain due to fibrosis around the tack site, neuroma formation and nerve entrapment.

According to Sajid et al. (2012) and Lal et al. (2018), non-fixation techniques dramatically reduce the risk of long-term pain without increasing the risk of recurrence. Surgeons often worry that when non-fixation is used, the mesh can move out of position and may allow a hernia to come back. All throughout the three-month observation, neither group had more incidents or damage to the repair, meaning that the structural integrity was not impacted by treatment without fixation. Similarly, studies that have tracked patients for a longer period also find that the recurrence rates for fixation and non-fixation methods are almost the same. Results from a randomized controlled trial by Kukleta et al. (2012) reveal that patients

without fixation experienced results that were as safe as those had they been fixed, suggesting that non-fixation is just as safe in specific patients.

According to Sajid et al. (2012) and Lal et al. (2018), non-fixation techniques decrease the risk of future long-term pain without leading to increased recurrence rates. Surgery also raises the risk of mesh migration and recurring hernia if the mesh holds no place. Additionally, no recurrences were observed in any group over the three-month follow-up period, indicating that short-term, non-fixation does not negatively impact the structural integrity of the repair. Similar recurrence rates are shown in other large-scale studies with long follow-ups after familiar and non-familiar means of fixation. Similarly, Aletta al (2012) performed a randomized controlled trial reporting non-significance in recurrence rates after non-fixation in selected patients after 5 years.

However, results showed that the non-fixed group had better outcomes consistently, implicating the surgical technique over external pain control. However, a study has limitations. First, the follow-up period was relatively short, and although no recurrences were seen, longer-term data is needed to confirm the durability of the repair. Second, although the VAS scale is a validated and widely used means by which to assess pain, it is inherently subjective and sensitive to the subject's respective pain thresholds and psychological states. Third, while the sample size is sufficient to demonstrate statistical significance on pain outcomes, the sample is insufficient to detect infrequent complications like late recurrence and rare mesh-related issues. However, the strengths of the study include randomization of treatment, standardized surgical technique and the use of objective methods for follow-up data collection.

Experienced laparoscopic surgeons performed all surgeries, reducing technique variability and assuring the reliability of results. Furthermore, patients excluded from analysis for confounding factors were excluded, resulting in a more homogenous study population and decreasing the variability in comparisons between the two groups. All the findings support a change in the style of surgery to patient-centred and pain-minimizing techniques, more particularly for primary, uncomplicated inguinal hernias. Nevertheless, these findings need to be validated by larger multicenter studies and the long-term recurrence rates assessed. Nonfixation holds promise as a promising standard for the future as surgical techniques evolve, as long as patient outcomes are optimized with the least amount of discomfort possible.

CONCLUSION

This study proves that TAPP laparoscopic inguinal hernia repair using non-fixed mesh has significantly less acute and chronic postoperative pain than mesh fixation. Patients in the non-fixation group exhibited lower Visual Analogue Scale (VAS) scores over multiple postoperative intervals and had a reduced incidence of chronic groin pain at three months. The study outcomes address concerns about the safety and results of not using fixated mesh during inguinal hernia repair, which could mean patients feel more comfortable and have a quicker recovery after their first surgery. Patients with repeated, long-lasting hernia recurrences may have their treatment adapted based on how effective not fixing them was. These efforts may lead to the creation of safe and welcoming surgery procedures.

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