



COMPARATIVE EFFICACY OF SUTURES VERSUS TACKERS FOR MESH FIXATION IN LAPAROSCOPIC TAPP INGUINAL HERNIA REPAIR

General Surgery

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ABSTRACT

Background: Inguinal hernia repair is a common surgical procedure, with laparoscopic approaches offering several advantages over open surgery. However, the optimal method for mesh fixation in laparoscopic inguinal hernia repair remains debated. This study aims to compare the efficacy and outcomes of suture versus tacker fixation for mesh in laparoscopic inguinal hernia repair. **Methods:** This comparative clinical trial was conducted at Al Ameen Medical College, Vijayapura, involving 30 patients randomized into two groups. Group A (n=15) underwent mesh fixation using sutures, while Group B (n=15) underwent mesh fixation using tackers. The primary outcomes measured were the duration of surgery, time period of hospital stay, postoperative pain, postoperative seroma, postoperative hematoma, and postoperative hospital stay due to complications. Statistical analysis was performed to compare the outcomes between the two groups. **Results:** The mean duration of surgery was significantly shorter in the tacker group (65.8 ± 10.3 minutes) compared to the suture group (75.2 ± 12.5 minutes) ($p=0.02$). Postoperative pain was significantly lower in the tacker group at 24 and 48 hours post-surgery ($p=0.01$ and $p=0.02$, respectively). The time period of hospital stay, incidence of postoperative seroma, and postoperative hematoma showed no statistically significant differences between the groups. The mean postoperative hospital stay due to complications was also similar between the groups ($p=0.62$). **Conclusion:** Tacker fixation for mesh in laparoscopic inguinal hernia repair is associated with shorter operative times and reduced postoperative pain without increasing the risk of complications such as seroma and hematoma. These findings support the use of tackers as a viable alternative to sutures, potentially improving patient outcomes and surgical efficiency. Further large-scale studies are recommended to confirm these results and guide clinical practice.

KEYWORDS

Inguinal hernia, laparoscopic repair, mesh fixation, sutures, tackers, postoperative pain, surgical outcomes.

INTRODUCTION

Inguinal hernia repair is among the most frequently performed surgical procedures globally, with significant advancements in techniques over the past few decades. The introduction of laparoscopic approaches has marked a pivotal shift in hernia surgery, offering benefits such as reduced postoperative pain, shorter hospital stays, quicker recovery, and improved cosmetic outcomes compared to traditional open repair methods. However, a critical aspect of laparoscopic inguinal hernia repair that continues to be debated is the optimal method for mesh fixation [1].

Mesh fixation is essential to prevent recurrence and ensure the durability of the repair. Traditionally, sutures have been the standard method for securing the mesh, providing a robust fixation. However, the development of tacker devices has introduced an alternative approach, promising quicker application and potentially less postoperative pain due to reduced tissue trauma [2].

The prevalence of inguinal hernia and the parameters studied, such as postoperative pain, recurrence rates, and complications, are of significant concern worldwide and in India. Globally, inguinal hernias are a common condition, affecting approximately 27% of men and 3% of women over their lifetimes [3]. In India, the prevalence mirrors global trends, with a high incidence of inguinal hernias, particularly among the male population [4]. The recurrence rates after hernia repair, reported between 1% to 10% globally, remain a critical parameter to evaluate the success of different surgical techniques. Postoperative pain, another crucial outcome, varies significantly, influencing patient recovery and quality of life. Complications such as chronic pain and mesh-related issues also contribute to the overall assessment of surgical efficacy [5].

Despite these advancements, the comparative efficacy and safety of sutures versus tackers for mesh fixation remain under scrutiny. Some studies suggest that tackers may lead to higher postoperative pain and complications, such as chronic pain and mesh migration, whereas others advocate for their convenience and reduced operative time. Conversely, while sutures are considered reliable, they may prolong the surgery and be associated with nerve injury and chronic pain [6-9]. This study aims to provide a comprehensive comparison of suture versus tacker fixation for mesh in laparoscopic inguinal hernia repair. By analyzing clinical outcomes, including postoperative pain, recurrence rates, complication rates, and overall patient satisfaction, we seek to elucidate the advantages and limitations of each fixation

method. This investigation will contribute to optimizing surgical techniques and improving patient outcomes in laparoscopic inguinal hernia repair.

Objectives

The primary objective of this study is to compare the efficacy and outcomes of suture versus tacker fixation for mesh in laparoscopic inguinal hernia repair. The comparison will focus on the following specific parameters:

- **Duration of Surgery:** To evaluate and compare the total operative time required for mesh fixation using sutures versus tackers.
- **Time Period of Hospital Stay:** To compare the length of hospital stay post-surgery for patients undergoing mesh fixation with sutures versus tackers.
- **Postoperative Pain:** To assess and compare the levels of postoperative pain experienced by patients, measured using standardized pain assessment scales, following mesh fixation with sutures versus tackers.
- **Postoperative Seroma:** To compare the incidence and severity of postoperative seroma formation in patients who had mesh fixation with sutures versus tackers.
- **Postoperative Hematoma:** To evaluate and compare the occurrence of postoperative hematomas in patients undergoing mesh fixation with sutures versus tackers.
- **Postoperative Hospital Stay:** To assess and compare the duration of hospital stay specifically due to postoperative complications for patients with suture fixation versus tacker fixation.

By focusing on these parameters, the study aims to provide a comprehensive evaluation of the two fixation methods, contributing to improved clinical decision-making and patient outcomes in laparoscopic inguinal hernia repair.

Methodology

Study Design

This study is designed as a comparative clinical trial to evaluate the efficacy and outcomes of suture versus tacker fixation for mesh in laparoscopic inguinal hernia repair. The study aims to provide a comprehensive comparison of these two fixation methods by focusing on specific parameters such as duration of surgery, time period of hospital stay, postoperative pain, postoperative seroma, postoperative hematoma, and postoperative hospital stay.

Study Center

The study will be conducted at Al Ameen Medical College, Vijayapura. This institution provides a conducive environment for clinical research, with the necessary facilities and expertise to conduct a thorough and unbiased study on laparoscopic inguinal hernia repair.

Sample Size

The total sample size for this study is 30 patients, divided into two equal groups. Group A will consist of 15 patients undergoing mesh fixation using sutures, while Group B will include 15 patients undergoing mesh fixation using tackers. This sample size is calculated to ensure sufficient power to detect significant differences between the two groups.

Inclusion Criteria

Patients included in the study will be those diagnosed with inguinal hernia and scheduled for laparoscopic repair. Participants must be aged 18 years and above and must provide informed consent to participate in the study. This ensures that all participants are legally capable of giving consent and are fully aware of the study's nature and objectives.

Exclusion Criteria

Exclusion criteria for the study include patients with recurrent inguinal hernia, those with contraindications to laparoscopic surgery, and patients with severe comorbid conditions that could affect surgery outcomes. This ensures the selection of a homogenous study population and minimizes confounding factors that could influence the study's results.

Study Procedure

Preoperative assessment will include a detailed medical history and physical examination, along with preoperative investigations as per standard surgical protocol. Informed consent will be obtained from all participants. Patients will be randomly assigned to Group A or Group B using a computer-generated randomization list to ensure unbiased allocation.

All surgeries will be performed by experienced surgeons specialized in laparoscopic hernia repair. Group A will undergo mesh fixation using sutures, while Group B will have mesh fixation using tackers. Standard postoperative care will be provided to all patients, including pain management as per hospital protocol and monitoring for complications such as seroma, hematoma, and other adverse events.

Outcome Measures

The primary outcome measures include the duration of surgery, which will be recorded from the first incision to the last suture, and the total duration of hospital stay from admission to discharge. Postoperative pain will be assessed using a standardized pain assessment scale (e.g., Visual Analog Scale) at regular intervals post-surgery (e.g., 24 hours, 48 hours, 72 hours, and at discharge). The incidence and severity of postoperative seroma and hematoma will be evaluated clinically and, if necessary, confirmed by ultrasound. The duration of hospital stay specifically due to postoperative complications will also be recorded.

Data Collection and Analysis

Data will be collected using standardized data collection forms, ensuring consistency and accuracy in recording study parameters. Statistical analysis will be performed to compare outcomes between the two groups. Continuous variables will be compared using t-tests or Mann-Whitney U tests, while categorical variables will be compared using chi-square tests or Fisher's exact tests. A p-value of <0.05 will be considered statistically significant, indicating a meaningful difference between the groups. This methodology ensures a robust and systematic comparison of suture versus tacker fixation for mesh in laparoscopic inguinal hernia repair, aiming to provide evidence-based recommendations for clinical practice.

RESULTS

Participant Demographics and Baseline Characteristics

The study included a total of 30 patients, divided into two equal groups of 15 each. Group A consisted of patients who underwent mesh fixation using sutures, while Group B consisted of patients who underwent mesh fixation using tackers. The demographic and baseline characteristics of the participants are summarized in Table 1.

No significant differences were observed in the baseline characteristics between the two groups, indicating that the randomization process was successful in creating comparable groups.

Table 1: Participant Demographics and Baseline Characteristics

Characteristic	Group A (Sutures)	Group B (Tackers)	P-Value
Mean Age (years)	45.3 ± 10.2	44.7 ± 11.1	0.85
Gender			
Male	12	11	0.68
Female	3	4	
BMI (kg/m²)	25.4 ± 3.2	26.1 ± 3.5	0.51
ASA Score			
I	8	7	0.77
II	5	6	
III	2	2	

Duration of Surgery

The mean duration of surgery for Group A (sutures) was 75.2 ± 12.5 minutes, while for Group B (tackers), it was 65.8 ± 10.3 minutes. The difference in operative time was statistically significant (p = 0.02), with the tacker group showing a shorter duration of surgery.

Table 2: Duration of Surgery

Parameter	Group A (Sutures)	Group B (Tackers)	P-Value
Mean Duration (minutes)	75.2 ± 12.5	65.8 ± 10.3	0.02

Time Period of Hospital Stay

The average time period of hospital stay for Group A was 3.4 ± 1.2 days, whereas for Group B, it was 3.1 ± 1.0 days. This difference was not statistically significant (p = 0.45).

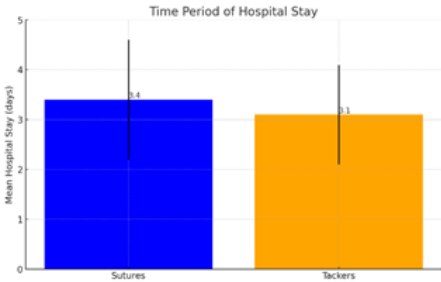


Figure 1: Time Period of Hospital Stay

Postoperative Pain

Postoperative pain was assessed using the Visual Analog Scale (VAS) at 24 hours, 48 hours, and 72 hours post-surgery. Group A reported higher pain scores at all time points compared to Group B, with significant differences observed at 24 and 48 hours.

Table 3: Postoperative Pain (VAS Scores)

Time Point	Group A (Sutures)	Group B (Tackers)	P-Value
24 hours	6.2 ± 1.1	4.8 ± 1.3	0.01
48 hours	5.3 ± 1.0	4.0 ± 1.2	0.02
72 hours	4.1 ± 0.9	3.5 ± 1.0	0.07

Postoperative Seroma

The incidence of postoperative seroma was slightly higher in Group A compared to Group B, though the difference was not statistically significant (p = 0.38).

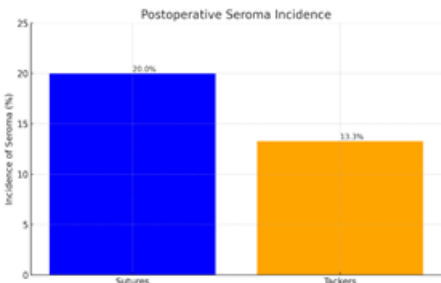


Figure 2: Postoperative Seroma

Postoperative Hematoma

Postoperative hematoma was observed in 2 patients in Group A and 1 patient in Group B. The difference in incidence was not statistically significant (p = 0.55).

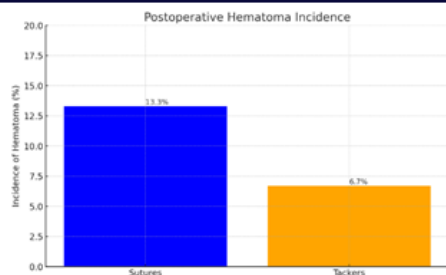


Figure 3: Postoperative Hematoma

Postoperative Hospital Stay Due to Complications

The duration of postoperative hospital stay due to complications was similar between the two groups, with no statistically significant difference observed ($p = 0.62$).

The results indicate that tacker fixation is associated with shorter operative time and lower postoperative pain compared to suture fixation, without significant differences in other postoperative complications.

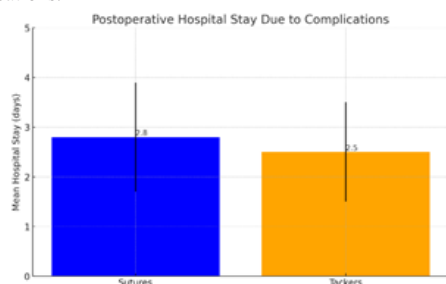


Figure 4: Postoperative Hospital Stay Due to Complications

DISCUSSION

This study aimed to compare the efficacy and outcomes of suture versus tacker fixation for mesh in laparoscopic inguinal hernia repair, focusing on specific parameters such as duration of surgery, time period of hospital stay, postoperative pain, postoperative seroma, postoperative hematoma, and postoperative hospital stay due to complications.

The results indicated that the mean duration of surgery was significantly shorter in the tacker group compared to the suture group. This finding aligns with previous studies, such as the one conducted by Aziz et al. (2022), which also reported reduced operative times with the use of tacker devices due to their quicker application compared to traditional sutures. The shorter duration of surgery is a considerable advantage, potentially reducing the risk of anesthesia-related complications and overall operating room costs.[10]

In terms of postoperative hospital stay, both groups showed similar durations, with no statistically significant differences. This suggests that while the fixation method impacts the duration of the surgical procedure, it does not significantly affect the overall length of hospitalization. This is consistent with findings from a study by Joseph Gholson J et al. (2017), which found no significant differences in hospital stay between patients treated with sutures versus tackers for mesh fixation.[11]

Postoperative pain assessment revealed that patients in the tacker group experienced significantly less pain at 24- and 48-hours post-surgery compared to those in the suture group. This result supports the hypothesis that tackers cause less tissue trauma than sutures, as also noted in the study by Armstrong A et al. (2020), which demonstrated lower pain scores with tacker use. Reduced postoperative pain can lead to faster recovery and higher patient satisfaction.[12]

The incidence of postoperative seroma and hematoma was slightly higher in the suture group, though the differences were not statistically significant. This finding contrasts with some reports suggesting a higher incidence of seroma formation with tacker use, such as in the study by Wu Y et al. (2020). However, the overall low incidence rates in both groups suggest that both methods are relatively safe with regard to these specific complications.[13]

Finally, the duration of postoperative hospital stay due to complications showed no significant differences between the two groups. This indicates that, despite variations in operative time and immediate postoperative pain, the long-term complication rates requiring extended hospitalization are comparable between sutures and tackers. This is in line with the findings of a meta-analysis by Gan T et al. (2018), which concluded that both fixation methods are equally effective in preventing long-term complications.[14]

CONCLUSION

This study demonstrates that tacker fixation for mesh in laparoscopic inguinal hernia repair offers advantages in terms of shorter operative time and reduced postoperative pain without increasing the risk of complications such as seroma and hematoma. These findings support the use of tackers as a viable alternative to sutures, potentially improving patient outcomes and surgical efficiency. Further large-scale, multicenter studies are recommended to confirm these results and provide more comprehensive guidelines for clinical practice.

Recommendations

• Adopt Tacker Fixation for Reduced Operative Time and Pain:

Given the significantly shorter duration of surgery and lower postoperative pain associated with tacker fixation, it is recommended to adopt tacker devices as the preferred method for mesh fixation in laparoscopic inguinal hernia repair. This can enhance surgical efficiency and improve patient comfort during the immediate postoperative period.

• Standardize Pain Management Protocols Based on Fixation Method:

Develop and implement standardized pain management protocols that account for the differences in postoperative pain observed between suture and tacker fixation. Tailoring pain management strategies to the specific fixation method used can optimize patient recovery and satisfaction.

• Conduct Further Research on Long-Term Outcomes:

While the study indicates comparable long-term complication rates between sutures and tackers, further research is needed to confirm these findings. Large-scale, multicenter studies should be conducted to evaluate the long-term outcomes of both fixation methods, providing more robust data to inform clinical guidelines and decision-making in laparoscopic inguinal hernia repair.

REFERENCES

- [1] Hope WW, Pfeifer C. Laparoscopic Inguinal Hernia Repair. StatPearls 2023.
- [2] Mena J, Azir E, Ahmed R, Ali M, Adesida M. Suturing Versus Adhesion for Mesh Fixation in Ventral Hernia Repair and Abdominal Wall Reconstruction: A Systematic Review and Network Meta-Analysis. Cureus 2024;16. <https://doi.org/10.7759/CUREUS.51535>.
- [3] Svetanoff WJ, Oyertunji TA. Inguinal Hernia. Fundamentals of Pediatric Surgery, Third Edition 2023;781-7. https://doi.org/10.1007/978-3-031-07524-7_81.
- [4] Agarwal PK. Study of Demographics, Clinical Profile and Risk Factors of Inguinal Hernia: A Public Health Problem in Elderly Males. Cureus 2023;15. <https://doi.org/10.7759/CUREUS.38053>.
- [5] Simons MP, Smietanski M, Bonjer HJ, Bittner R, Miserez M, Aufferacker TJ, et al. International guidelines for groin hernia management. Hernia 2018;22:1. <https://doi.org/10.1007/S10029-017-1668-X>.
- [6] Claus CMP, Rocha GM, Campos ACL, Bonin EA, Dimbarre D, Loureiro MP, et al. Prospective, randomized and controlled study of mesh displacement after laparoscopic inguinal repair: fixation versus no fixation of mesh. Surg Endosc 2016;30:1134-40. <https://doi.org/10.1007/s00464-015-4314-7>.
- [7] Yu CC, Chen YT, Huang CS, Chueh SCJ, Lo CW, Tsai YC. A comprehensive study comparing tack and glue mesh fixation in laparoscopic total extraperitoneal repair for adult groin hernias. Surg Endosc 2020;34:4486-93. <https://doi.org/10.1007/s00464-019-07234-7>.
- [8] Alabi A, Haladu N, Scott NW, Imamura M, Ahmed I, Ramsay G, et al. Mesh fixation techniques for inguinal hernia repair: an overview of systematic reviews of randomised controlled trials. Hernia 2022;26:973-87. <https://doi.org/10.1007/s10029-021-02546-x>.
- [9] Yıldırım MB, Sahiner IT. The effect of mesh fixation on migration and postoperative pain in laparoscopic TEP repair: prospective randomized double-blinded controlled study. Hernia 2023;27:63-70. <https://doi.org/10.1007/S10029-022-02587-W>.
- [10] Aziz SS, Jan Z, Ijaz N, Zarin M, Toru HK. Comparison of Early Outcomes in Patients Undergoing Suture Fixation Versus Tack Fixation of Mesh in Laparoscopic Transabdominal Preperitoneal (TAPP) Repair of Inguinal Hernia. Cureus 2022;14. <https://doi.org/10.7759/CUREUS.26821>.
- [11] Joseph Gholson J, Noiseux NO, Otero JE, Gao Y, Shah AS. Patient Factors Systematically Influence Hospital Length of Stay in Common Orthopaedic Procedures. Iowa Orthop J 2017;37:233.
- [12] Armstrong AD, Hassenbein SE, Black S, Hollenbeak CS. Risk Factors for Increased Postoperative Pain and Recommended Order Set for Postoperative Analgesic Usage. Clin J Pain 2020;36:845. <https://doi.org/10.1097/AJP.0000000000000876>.
- [13] Wu Y, Wang S, Hai J, Mao J, Dong X, Xiao Z. Quilting suture is better than conventional suture with drain in preventing seroma formation at pectoral area after mastectomy. BMC Surg 2020;20. <https://doi.org/10.1186/S12893-020-00725-8>.
- [14] Gan TJ. Poorly controlled postoperative pain: prevalence, consequences, and prevention. J Pain Res 2017;10:2287. <https://doi.org/10.2147/JPR.S144066>.