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Study on Early Postoperative Outcomes in Suture Versus Tacker Fixation of Mesh in TAPP

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Abstract: ***Background: Laparoscopic methods for repairing inguinal hernias have greatly enhanced the outcomes of inguinal hernia surgery. The acute and chronic pain following mesh fixation with tacks and the high cost of these tacking devices remain significant barriers to the widespread adoption of laparoscopic transabdominal preperitoneal (TAPP) repair. This study aimed to propose a method for mesh fixation that could lower the expenses of laparoscopic TAPP repair and potentially alleviate postoperative pain. Objective: The purpose of this study was to compare suture versus tack fixation of the mesh in laparoscopic TAPP repair of inguinal hernias, so as to analyze differences in early postoperative outcomes such as pain, seroma, and urinary retention. Subjects and methods: A total of 30 patients aged between 18 and 60 years with inguinal hernia on either side and an American Society of Anaesthesiologists (ASA) score of I/II were part of this research. Those with a recurrent hernia, large scrotal hernia, strangulated and obstructed hernias, ASA III and ASA IV status, prostatism, and chronic cough were not included. Group A consisted of 15 patients (tack fixation group), whereas Group B comprised 15 patients (suture fixation group). The Visual Analogue Scale (VAS) serves as a tool for quantifying subjective experiences like pain intensity, anxiety, and other difficult - to - quantify sensations. Healthcare settings commonly use it for both clinical and research purposes. Results: We evaluated pain using a visual analogue scale during the early postoperative period and calculated the mean pain in two groups. We found that group A's mean pain score was 5, while group B's was 3. The p - value was less than 0.01 in POD 1, which is statistically significant. Conclusion: In our study, results suggest that suture fixation with mesh is less painful than tack fixation in the early postoperative period. There is no significant difference in hematoma and seroma formation in the early postoperative period.***

Keywords: suture fixation, tack fixation, inguinal hernia, transabdominal preperitoneal repair

1. Introduction

Laparoscopic procedures are now commonly available worldwide to reduce the risk of recurrence and complications related to hernia repair. Numerous improvements have led to the widespread use of laparoscopic hernia repairs [1, 2]. The surgical outcome has greatly improved because of advancements in prosthetic materials, surgical procedures, and a greater understanding of how to use them. Recurrence, extended hospitalization, and postoperative pain are the issues that come with hernia surgery. Compared to open surgery, the laparoscopic approach leads to a shorter hospital stay and an earlier return to work, making it a more cost - effective experience. (3 - 5). Additionally, the minimally invasive nature of laparoscopic hernia repairs reduces the overall trauma to the body, which contributes to quicker recovery times and less postoperative discomfort for patients. As a result, many healthcare providers are increasingly recommending this method as the preferred option for hernia correction. (6, 7)

This study compared early postoperative pain in tack fixation against prolene suture fixation since it has become a significant aspect in evaluating laparoscopic methods. We also evaluated seroma, hematoma, and urine retention in these two procedures. The main objective of this study is to compare the early postoperative pain following suture fixation of mesh with mesh fixation using tack in TAPP repair.

2. Materials and Methods

Study Design:
A prospective randomized controlled study

Population:
Patients diagnosed with inguinal hernia of any side were admitted to KGMCH, Asaripallam. Detailed history collected from the patients. We explained the purpose of the study to all patients and obtained their consent. The study enrolled a total of 30 patients, with 15 allocated for tack fixation and another 15 for suture fixation of mesh (table 1).

Inclusion criteria:
Inguinal hernias affect patients between the ages of 18 and 60. The clinical examination and ultrasonogram provide the diagnosis.

Exclusion criteria:
1) Patients who were not willing to accept TAPP
2) recurrent hernia
3) Cardiovascular Disease and Absolute Contraindications for Laparoscopic Surgery
4) large scrotal hernia
5) obstructed hernia/strangulated hernia

Study center:
The Department of General Surgery at Government Kanyakumari Medical College and Hospital conducts a study.

Study period:
JULY 2024 to December 2024

Sample size: 30 patients

Data collected using:
- Clinical examination
- Ultrasonogram
- Visual analogue scale

VAS is a horizontal line, often 10 cm long, with endpoints that define the extremes of the experience under measurement: The left end of the VAS represents the minimum level, while the right end represents the maximum level. The patient marks a point on the line that corresponds to their experience. This method allows for a straightforward visual representation of the patient's perception of pain or discomfort. Clinicians can then use this information to tailor treatment plans and monitor changes over time, ensuring a more personalized approach to patient care. This value represents the intensity of the subjective experience, usually on a scale of 0–10.

3. Procedure

We performed the surgery under general anesthesia. All 30 patients underwent transabdominal preperitoneal mesh hernioplasty. This method involves the use of three laparoscopic ports that provide access to the intraperitoneal space, from which peritoneal flaps are raised to reach the preperitoneal space. We then dissect the hernial sac in the inguinal region to extract its contents. We apply the mesh, secure it to the anterior abdominal wall with sutures and tacks, and then sew the peritoneal flaps together to seal the opening.

The suture fixation group in our study underwent mesh fixation, using three 2'0 prolene stitches against the anterior abdominal wall and the Cooper's ligament as anchors. We avoided suturing the triangle of doom and the triangle of pain. This meticulous approach minimizes the risk of complications associated with nerve injury in these sensitive areas. Additionally, by carefully securing the mesh and ensuring proper alignment of the tissues, we aim to enhance the overall outcomes and reduce the likelihood of hernia recurrence.

The tack fixation group underwent mesh fixation with three absorbable tacks fixed against the anterior abdominal wall and Cooper's ligament. We avoided applying tacks in the Triangle of Doom and Triangle of Pain.

Statistical Analysis:
We used the SPSS software version to analyze the data. We subjected the collected data to various statistical tests to determine the significance of the findings. We calculated descriptive statistics to summarize the participants' responses and used inferential statistics to draw conclusions about the broader population based on the sample.

4. Results

This study enrolled a total of 30 patients.15 patients underwent suture fixation with 2.0 prolene, and 15 underwent fixation using tacks (fig.1). During the immediate postoperative period, all patients received analgesics, and we calculated their pain scores using a visual analogue scale at 6 hours after surgery, postoperative day 1, and pod 7.

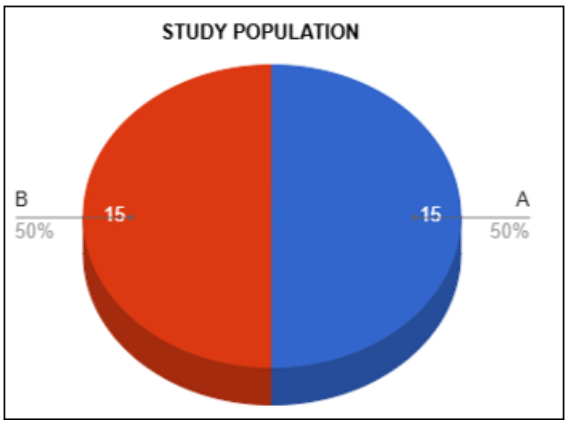


Figure 1: Study Population

Table 1: Study population

	Group A (Tack fixation)	Group B (Suture Fixation)
Male	15	15
Female	0	0

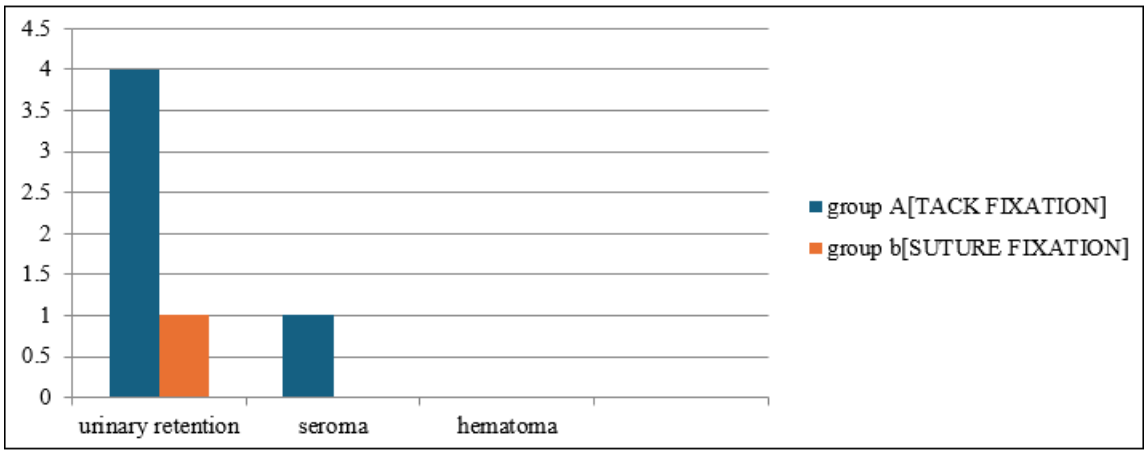
Post - operatively all patients were administered the same analgesics (injection paracetamol 1 gram and tablet Acelofenac 100mg as required). Results in early post operative period

Table 2: Mean pain at 6 hours, POD 1 and POD 7

Mean pain [VAS]	group A, n =15	group B, n =15	P Value
6 hours	5	3	0.0032
POD 1	3	1	0.008
POD 7	1	1	1

Table 3: Early postoperative complications

	Group A Tack Fixation n=15	Group B Suture Fixation n=15
Urinary Retention	4	1
Seroma	1	0
Hematoma	0	0



Bar diagram 1: Early postoperative outcomes in TAPP

The mean pain levels for group A and group B were 5 and 3, respectively, during the 6 hours following surgery. The p - value is less than 0.01, indicating statistical significance (see table 2). Compared to group A, group B patients experienced less pain during the postoperative period; one patient in group B reported experiencing urinary retention on the first postoperative day. Out of 15 patients in Group A, four developed urinary retention. Other complications, such as hematoma and seroma, do not significantly differ between these two groups. These findings suggest that while both groups experienced some complications, the incidence of urinary retention was notably higher in group A.

5. Discussion

Improvements in laparoscopic surgical methods have resulted in the broad acceptance of laparoscopic inguinal hernia repair by both surgeons and patients [1, 2]. Individuals who have had laparoscopic inguinal hernia repair experience reduced postoperative pain and generally return to work sooner, as well as have shorter hospital stays and fewer postoperative complications. [8 - 10]

The two main laparoscopic techniques for inguinal hernia repair are transabdominal preperitoneal (TAPP) repair and totally extraperitoneal (TEP) repair. (11.13) We position the mesh in the preperitoneal space after dissecting the hernia sac. The next step involves securing the mesh against the anterior abdominal wall. A crucial element in inguinal hernia repair is the attachment of the mesh, which can lead to vascular and nerve - related complications [14 - 15].

Various researchers have reported chronic neuralgia in approximately 14% of hernia repairs using titanium tacks [14, 15]. Most frequently, the condition affects the lateral cutaneous nerve of the thigh, the genitofemoral nerve, the iliohypogastric nerve, and the ilioinguinal nerve. These nerves play crucial roles in sensation and motor function, and their impairment can lead to significant postoperative complications. Understanding the anatomical pathways and potential risk factors associated with nerve injury during surgery is essential for improving patient outcomes and minimizing chronic pain. Among these nerves, the lateral cutaneous nerve is particularly known to sustain injuries due to compression from the staple tacks.

More precise and minimal placement of sutures reduces irritation to surrounding nerves, a common cause of chronic pain. It helps to secure the mesh more firmly in place, minimizing the risk of it migrating or shifting over time. This ensures that the mesh stays in its intended position, preventing recurrence of the hernia. Suture fixation allows for greater flexibility in positioning the mesh during surgery. Surgeons can adjust the mesh's placement more easily before securing it with sutures, ensuring that it covers the hernia defect adequately and providing optimal tension across the repair site. If staples or tacks cause long - term inflammation, the suture method may be a more biocompatible option, lowering the risk of complications such as fibrosis or mesh - related infection. Sutures are generally more cost - effective and widely available compared to specialized tacks or staples, making suture fixation a practical choice in settings where cost is a factor or specific tacking devices may not be available.

Suture fixation typically requires more time than other methods like stapling or tacking due to the meticulous placement of multiple sutures to secure the mesh, potentially lengthening the surgery's duration. Improper placement of the sutures can lead to complications, like knotting, slippage, or incorrect placement. This can lead to mesh displacement, recurrence of the hernia, or injury to surrounding tissues. Researchers have also reported reducing postoperative pain using other methods like fibrin glue and synthetic sealants [16 - 19]. Researchers have also reported that using human fibrin glue for mesh fixation reduces pain and neuralgia during the postoperative period [15, 16].

In our research, we observed that the early postoperative pain was considerably lower in the suture fixation group than in the tack fixation group ($p < 0.01$). This substantiates our hypothesis that the average pain levels following suture fixation and tack fixation are significantly different, with less pain noted in the suture fixation group. Patients who had TAPP repair with sutures for mesh fixation reported less postoperative pain. (20) In our study, no patients reported experiencing hematomas. Only one patient developed seroma in group A. These findings suggest that suture fixation may be a preferable technique for minimizing postoperative discomfort in TAPP repairs. We need to conduct further research to investigate the long - term outcomes and potential complications of both fixation methods.

Our study's limitation lies in its single - centered design, which only analyzes early outcomes and a limited number of variables.

6. Conclusions

In our study of laparoscopic transabdominal preperitoneal repair, suture fixation of the mesh is less painful than tack fixation of the mesh. We need to conduct further studies with a longer duration of follow - up to validate our results. We need to compare other outcomes like chronic pain, recurrence, mesh migration, and neuralgia across both repairs.

The tack fixation group underwent mesh fixation with three absorbable tacks fixed against the anterior abdominal wall and Cooper's ligament. We avoided applying tacks in the Triangle of Doom and Triangle of Pain. We administered the same analgesics (injection of paracetamol, 1 gram, and tablet Acelofenac, 100 mg, as required) to all patients post - operatively.

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