



A Comparative Study Between Tacker Mesh Fixation And Suture Mesh Fixation In Laparoscopic Hernia Repair

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Abstract

Background: Randomised trials show that laparoscopic repairs are more efficacious than open surgeries. Several issues related to laparoscopic surgery have been reviewed like access to abdominal cavity, size of mesh, extent of overlap, etc. However, the prosthetic material and the technique of fixation are yet to be studied in detail in our study.

Objective: To compare the duration of surgery, duration of hospital stays, and post-operative complications in patients undergoing laparoscopic hernia repair (LHR) by using tacker fixation (TF) and suture fixation (SF) of mesh.

Material and Methods: It was a prospective comparative study was done among 50 patients for one year presenting with reducible inguinal hernia and planned for LHR. Patients were divided into group SF (n=25) and TF (n=25). Data was collected with using a case-study Performa and analysed using SPSS (v25).

Results: The mean age of 50 cases was 43.4±11.5 years and male preponderance. The mean duration of surgery in the SF was 73.6 minutes while in TF 51.4 minutes and differ significantly (p<0.05). The mean duration of hospital stay in the SF was 2.3 days and TF was 2.2 days. There was no difference in the post-operative pain and discomfort in the two groups. Only one case undergone SF had seroma (n=1, 2%). Out of 50 cases, 46 cases came for regular follow-up and none of them had recurrence as well as intestinal obstruction.

Conclusions: Both the surgical techniques were equally effective. But based on our data, the duration of surgery was less in TF group.

Keywords: Suture mesh fixation; Tracker mesh fixation; Laparoscopic hernial repair; Reducible inguinal hernia; Hernia repair; Mesh fixation

Introduction

Laparoscopic hernia repair has been used for the last few decades. [1] There are several benefits of laparoscopic repair, including a low recurrence rate [2], a shorter duration of hospital stays [3], and a low prevalence of wound-related complications. [3-4] Randomised trials show that laparoscopic repairs are more efficacious than open surgeries. [5-8] Several

issues related to laparoscopic surgery have been resolved, like access to the abdominal cavity, size of the mesh, extent of overlap, etc. However, the prosthetic material and the technique of fixation have yet to be studied in detail.

Various studies have shown that mesh has been fixed with single tacks [9], double layers of tacks [10], and transfascial tacks and sutures. [11] When mesh fixation is done using tacks, it is time-saving and convenient. [12] But the tensile strength of suture-fixed mesh is around 2.5 times greater than tack-fixation. [13]

All the layers of the abdominal wall are penetrated by the transfascial sutures, which enable mesh fixation to the fascial-muscular layer of the abdominal wall. [11-13] Still, certain issues are not resolved, like the number of sutures, placement of the sutures, and materials used (absorbable or nonabsorbable). [2,12] Few experimental studies have compared the above-mentioned statements. [14–17] With this background, our study aims to compare the duration of surgery, duration of hospital stays, and post-operative complications in patients undergoing laparoscopic hernia repair by using tacker fixation (TF) and suture fixation (SF) of mesh.

Materials and methods:

Study design and setting: It was a hospital-based prospective comparative study that was done for a period of 24 months. This study was approved by the Institute Ethical Committee, and all ethical standards of the Declaration of Helsinki were followed. Informed and written consent was obtained from all participants. The patients for the study were recruited from the cases admitted in the surgical ward of the Department of General Surgery at Sri Lakshmi Narayana Institute of Medical Sciences, Puducherry, who were diagnosed to have inguinal hernias and planned for laparoscopic hernia repair.

Study population: Patients in the age group of 20 to 60 years with no previous abdominal surgeries and diagnosed with reducible inguinal hernias were taken for the study. While patients with recurrent hernias, large irreducible hernias, patients with cardiac manifestations, patients with respiratory tract infections, and BPH (benign prostatic hyperplasia) with significant PVR (post-void residual urine) with significant CKD (chronic kidney disease), decompensated liver disease, and malignant ascites were excluded from the study,

Study procedure: A total of 50 patients who presented with reducible inguinal hernias during the study period were recruited as per the inclusion

criteria. Then the patients were sorted into groups SF (n = 25) and TF (n = 25) based on the surgeon's preference, including the type of mesh and tacks for the repair. All these patients underwent laparoscopic hernia repair by using tacker fixation (TF) and suture fixation (SF) of mesh.

Data collection: Data was collected with regards to age, sex, demographic characteristics, socioeconomic status, detailed history, and duration of complaints using a case proforma. A detailed general examination was done. The following data was extracted from the patient's history, clinical examination, and follow-up, including patient selection, clinical findings, laboratory investigations, diagnostic tests, complications during the hospital stay, and subsequent follow-up.

Statistical analysis

Statistical analysis was carried out using Statistical Package for the Social Sciences (SPSS) (Version 24.0, developed by IBM Corp., Armonk, New York) software and Sigma Statistics (Version 3.5). The data were analysed for normality before analysis. Descriptive statistics were calculated for all categorical variables and measured in terms of frequency and percentage. Continuous variables that followed a normal distribution were calculated and presented as mean and standard deviation (SD) or median with interquartile range (IQR). The data were analysed based on the type of variables and the normal distribution between the two groups. Categorical variables that follow a nonparametric distribution were analysed using Pearson's Chi-square test or two-tailed Fisher's exact test, and for parametric independent t-tests, a t-test was used to test the significance of the difference. Statistical significance was considered to be a p value of 0.05 for the data analysed.

Results:

The mean age of all cases was 43.411.5 years, ranging between 21 and 58 years. All 50 (100%) patients presented with a reducible inguinal hernia. About 68% of patients had no comorbidities, while the rest had comorbidities, as represented by 16% having type-2 diabetes, 10% having hypertension, and only 6% having both. Among them, 30 patients (60%) had right-sided hernias, while the rest of 20 patients (40%) presented on the left side. (Figure 1)

The majority of the patients (n = 43; 86%) had an indirect hernia, while only seven patients (14%) had a direct hernia. All 50 patients underwent laparoscopic hernioplasty. The comparisons for the suture and taper fixation groups are presented in **Table 1**.

The mean duration of surgery in all cases was 62.513.06 minutes, and the median duration was 90 minutes. The minimum time required was 45 minutes, and the maximum time required was 90 minutes. The mean duration of hospital stay in all cases was 2.30.65 days and ranged from two to four days. In post-operative follow-up, no wound infection was found in all 50 cases, while pain and discomfort were present in 12 (24%) patients. Among them, only one patient presented with seroma (2%). On follow-up, 46 patients (92%) had complete and regular follow-up with no history or signs of recurrence or intestinal obstruction. The details of the surgery and post-operative complications in both groups are presented in **Table 2**.

Discussion:

McKernan JB and Laws HL first described the laparoscopic procedure for prosthetic repair of inguinal hernias using an extraperitoneal approach [18], which showed substantial improvement in the reduction of wound infection, occurrence of seroma and hematoma, chronic pain after surgery, and quality of life compared to open hernia repair. [19–21]

Granting that laparoscopic hernial repair was considered the preferred and acceptable method for hernial repair among the surgeons and for patients too, the methods of mesh fixation were studied and understood inadequately. [17,22-23] Among the methods of mesh fixation, it takes either staple, glue, sutures, or the tack method, yet the principal method remains for safe fixation and to prevent mesh migration. Many problems arise due to the tensile strength of the sutures when compared to the tacks. [13,17,23] When compared to open hernia repair, laparoscopic hernia repair has less postoperative pain and complications. [12,14,16,22–26]

It has been a recollection that pain generally presents after the surgical repair with sutures for any surgery. As for the hernial repair, pain is more common in suture fixation when compared to tack fixation. [22–24] As sutures penetrated the full thickness of the

abdominal wall musculature and the fascia, which further led to the local muscle ischemia, that resulted in pain post-operatively. [2,14,22] The pain results from the tack mesh fixation due to the multiple tacks that penetrate the parietal peritoneum. [17,23,24] In our study, we found no difference in postoperative pain in patients who underwent suture and tack mesh fixation for the hernial repair. A study done by Kitamura RK et al. [22], Nguyen SQ et al. [17], and Aziz SS et al. [23] also showed that there was no significant difference in postoperative pain among the patients who underwent suture and tack mesh fixation, which was consistent with our study findings.

Similarly, in our study, no difference was found between the groups for the postoperative complication rates, as only one patient who underwent suture fixation had seroma, while the other patients had no complication. Added to that, no recurrences or intestinal obstructions were found in our study during the follow-up. Nguyen SQ et al. [17] also showed no difference between the suture and tack mesh fixation groups for the post-operative complication, which was comparable to our study findings. Also, similar findings were found in the study done by Kitamura RK et al. [22], with no differences in the post-operative complication rate.

The duration of the surgery and hospital stays were also found to be similar between both groups in our study yet tack fixation (median 50 minutes) had a reduced surgical time when compared to the suture technique (median 75 minutes). It was similar to the study done by Nguyen SQ et al. [17], which had similar findings to our study. In general, tack repair reduces the surgical time; consider suturing. [10,11,27] In our study, we emphasised only the duration of the mesh repair, and the rest of the procedure timing was not considered due to the presence of adhesiolysis and peritoneal contents dissection from the anterior abdominal wall, which must be taken care of before the mesh fixation might take a significant amount of operating time. Thus, both surgical techniques are equally effective. But the duration of surgery is shorter with TF mesh procedure.

The main limitation of the study was the smaller sample size. Since it is a single-centre study, the results cannot be generalised. Added to that, small

differences in pain after surgery were difficult to elicit between the groups, which requires a longer duration of follow-up. Also, patients were not randomised to the groups; it was based on the surgeon's preference for the fixation. This further requires larger controlled trials to determine the most optimal method.

Conclusion:

Based on our findings, it has been found that the mean duration of surgery is less in tacker mesh fixation compared to suture mesh fixation, yet the duration of hospital stay is almost equal in both groups. Post-operative complications such as seroma were present and were more common in suture mesh fixation than tacker mesh fixation. The wound infection and recurrence are almost absent in both suture and tacker mesh fixation.

Abbreviations: Tacker fixation - TF; Suture fixation - SF; Benign Prostate Hyperplasia - BPH.

Footnotes:

Ethical issues: The study was approved by the Institutional Human Ethics Committee and followed the principles laid down in the declaration of Helsinki.

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Figure legend:

Figure 1 - Presentation of hernia among the study participants.

The pie-chart shows the presentation of the hernia among the study participants, where 60% of the study participants presented with right sided inguinal hernia and the rest of the study participants (40%) had the hernia at the left side.

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