

Post-Operative Pain and Early Complications in Patients Undergoing Laparoscopic Transabdominal Preperitoneal Inguinal Hernia Repair using Mesh Fixation with Sutures versus Tackers

MANZOOR AHMED¹, VIJAY KUMAR², MUHAMMAD AKRAM³, MUHAMMAD ARSALAN⁴, ABDUL LATIF⁵, GHANSHAM⁶, KIRAN ABBAS⁷

^{1,2}Fellow Department of Surgery, Jinnah Postgraduate Medical Centre Karachi Pakistan

⁴Junior Registrar Department of Surgery, Bolan Medical College Quetta Pakistan

⁵Fellow Department of Surgery Sandeman Provincial Civil Hospital Quetta Pakistan

⁶Associate Professor Department of Surgery Jinnah Postgraduate Medical Centre Pakistan

⁷House Officer Department of Surgery Jinnah Postgraduate Medical Centre Pakistan

Correspondence to: Dr Manzoor Ahmed, Email: drmaznooahmed@gamil.com, Cell No. +923337206916

ABSTRACT

Objectives: To assess the postoperative pain and complications in patients who underwent laparoscopic preperitoneal inguinal hernia repair with mesh fixation using sutures as compared to tackers.

Methodology: A quasi-experimental study was conducted at the Department of Surgery, Jinnah Postgraduate Medical Center, Karachi between June 2019 to October 2019. A total number of 60 patients aged 20-60 years underwent laparoscopic transabdominal preperitoneal inguinal hernia repair. Patients were grouped into two. Group 1 included patients in whom mesh fixation was done using sutures while Group 2 had mesh fixation using tackers. Post-operative pain score was calculated using the visual analog scale after 24 hours of procedure. Early postoperative complications were also noted.

Results: Mean age of patients included in this study was 42.62±10.29 years. There were 37 (61.67%) male and 23 (38.33%) female patients. Mean body mass index (BMI) of patients was 24.52±3.99 Kg/m². There were 39 (65.00%) patients with ASA I and only 21 (35.00%) patients with ASA II. The mean post-operative pain score group 1 (sutures) was 3.67±0.92 versus 4.90±1.21 in patients of group 2 (tackers) with significant p-value of <0.0001. 7 (23.3%) patients in group 1 and 9 (30%) in Group 2 developed complications including urinary retention, seroma, and infection.

Conclusions: We found that mesh fixation using sutures is correlated with lower postoperative pain scores and complications as compared to mesh fixation using tackers.

Keywords: Inguinal hernia, hernioplasty, laparoscopic transabdominal preperitoneal inguinal hernia repair, visual analog scale

INTRODUCTION

One of the most frequently encountered abdominal wall hernia is the inguinal hernia. Inguinal hernia repair is a common procedure which can be done in open setting and laparoscopically. 1 Approximately, 20 million patients with inguinal hernia are treated worldwide, annually [2].

Recent advances have made it feasible to do hernia repair laparoscopically. Inguinal hernia is now most commonly treated laparoscopically by transabdominal preperitoneal (TAPP) repair and total extraperitoneal (TEP) repair [1]. Many surgeons prefer to manage inguinal hernia by laparoscopic TAPP because it is less time consuming, technically easier, and provides better visualization [2,3].

In the laparoscopic TAPP, a synthetic material is fixed in the preperitoneal portion via applying incision across the peritoneum. Once the prosthetic material is fixed to cover all inguinal hernia regions, the peritoneum is closed. The peritoneal reclosure can be performed using suture, tackler, or stapler [4,5].

The use of sutures have recently been started for the fixation of mesh and very few studies have compared the post-operative pain in these patients in comparison with the mesh placement using tacklers. A study conducted by Mehmood et al. found less post-operative pain in patients with mesh fixation with sutures 3.9+1.91 versus 5.93+1.79 in tackler group (p-value 0.001) [6]. Another study conducted by Kleidari et al. did not find any significant

difference in post-op pain score in tackler versus sutures group. In their study, pain score was 3.94 ± 1.49 in suture group versus 4.49 ± 1.19 in tackler group (p-value 0.10) [7,8]. The results of these two studies were inconsistent and there still exists a controversy whether sutures give optimum results or tacklers does. Till now there is no clear guideline on which technique should be used for mesh fixation in TAPP inguinal hernia repair. The previously published data is inconsistent in nature and local data is limited [9-12]. Therefore, the current study aimed to compare the postoperative pain and early complications in patients undergoing laparoscopic TAPP using Mesh Fixation with Sutures versus Tackers.

METHODOLOGY

A quasi experimental study was carried out at the Department of General Surgery, Jinnah Postgraduate Medical Center, Karachi between June 2019 to October 2019. Ethical approval was obtained from the Institutional Review Board (IRB) of JPMC prior to the study (Reference number # CPSP/REU/SGR-2016-186-8165). A non-probability convenience sampling technique was employed. The sample size for this study was calculated using online software available at <http://www.openepi.com/SampleSize/SSMean.htm> by taking postoperative pain score 3.90+1.91 in mesh fixation using sutures versus 5.93+1.79 in mesh fixation using

tackers,7 at level of significance 0.05 and power of test 0.80, the calculated sample size for this study is 14 patients in each group. We took 30 patients in each group to make the results of our study more reliable. So a total number of 60 patients were included in this study. All patients between the ages of 20 to 60 years with diagnosed hernia underwent TAPP inguinal hernia repair. Both genders include male and female. Patients with duration of inguinal hernia < 1 year. Patients with diagnosis of large hernia extending to scrotum diagnosed on ultrasound reporting and morbidly obese patients (patients with BMI > 35 kg/m² were excluded from the study. Informed verbal and written consent was obtained from participants. It was ensured that patient confidentiality and anonymity was maintained at all times.

Patients were categorized into two groups. Each patient was randomly assigned to either group. The patients were requested to pick up one folded paper from the jar. Patients were divided into Group I and Group II depending upon the folded paper chosen by them. Group I; in these patients mesh fixation was done using sutures and Group II; in these patients mesh fixation was done using tackers.

Both of these procedures were performed using consultant surgeons experienced in laparoscopic surgery and having 3 years of post-fellowship experience. Investigators served as assistant in all these procedures. Post-operative pain score was calculated using the visual analog scale (VAS) chart after 24 hours of surgical procedure according to the criteria given in the operational definitions. Rescue analgesics (Paracetamol 500 mg, or diclofenac sodium 50 mg) was given if the pain score was more than 7. Data regarding other study variables such as patient's age, gender, duration of inguinal hernia, and BMI of patients. All the gathered information was noted on a predesigned proforma.

Data analysis was carried out using SPSS version 24.0. For all continuous variables, mean and standard deviation were determined. These variables included age, height, weight, body mass index, duration of inguinal hernia and postoperative pain score. Categorical variables like gender and ASA status were calculated and presented as frequency and percentage. Independent sample t-test was applied to compare post-operative pain score in sutures versus tackers group. Stratification of confounder variables e.g. age, gender, BMI and duration of inguinal hernia was done. Post-stratification independent sample t-test was applied. P-value <0.05 was taken as a significant difference.

RESULTS

Out of a total of 60 patients, 37 (61.67%) were male. A mean age of patients was 42.62 ± 10.29 years. Mean body mass index (BMI) of patients was 24.52±3.99 Kg/m². Mean duration of inguinal hernia of patients was 6.40 ± 2.88 months.

We reported a mean postoperative pain score of 4.28±1.24. On comparison of mean postoperative pain score between the groups, the mean post-operative pain score group 1 (sutures) was 3.67±0.92 versus 4.90±1.21 in patients of group 2 (trackers). This difference was statistically significant with p-value of <0.0001.

Table 1. Sociodemographic and Clinical Characteristics of Study Participants

Variables	N (%)
Age ± SD	42.62 ± 10.29
Body Mass Index (BMI) in kg/m ²	24.52 ± 3.99
Gender	
Male	37 (61.67%)
Female	23 (38.33%)
Duration of hernia in months	6.40 ± 2.88
Mean Postoperative Pain Score	4.28 ± 1.24

Table 2. Comparison of Mean Postoperative Pain Score between the Groups.

Groups	Postoperative Pain Score		P-value
	Mean	S.D.	
Group 1 (Sutures)	3.67	0.92	<0.0001
Group 2 (Trackers)	4.90	1.21	

We found that irrespective of the age and the body mass index (BMI) of the patients, group 1 resulted in significantly lesser pain scores than group 2. Patients in Group 2 with a duration of inguinal hernia of 7 to 12 months had significantly higher pain scores as compared to group 1 (p=0.0001).

Variable	Group 1 (Sutures)	Group 2 (Trackers)	P-value
Age Group			
20-40 Years	3.83 ± 0.72	4.92 ± 0.95	0.004
41-60 years	3.55 ± 1.04	4.88 ± 1.41	0.003
Gender			
Male	3.50 ± 0.89	4.82 ± 1.42	0.002
Female	4.00 ± 0.94	5.00 ± 0.91	0.018
Body Mass Index			
BMI ≤24.99 Kg/m ²	3.78 ± 0.81	4.81 ± 1.22	0.006
BMI ≥25.00 Kg/m ²	3.50 ± 1.09	5.00 ± 1.24	0.003
Duration of Inguinal Hernia			
1-6 months	3.67 ± 1.09	4.80 ± 1.32	0.011
7-12 months	3.67 ± 0.65	5.00 ± 1.13	0.0001

Upon assessing the postoperative complications, it was found that about 7 (23.3%) patients in group 1 developed complications while in group 2, nine (30%) patients suffered from complications. In the suture group, 4 patients developed postoperative urinary retention which was resolved after 72 hours of procedure. Scrotal hematoma was observed in 3 patients however, no intervention was needed. In the tackers group, 5 patients developed transient urinary retention. 2 patients developed port-site infection and two patients had incisional hernia of < 7 mm in size at the site of entry. There was no statistically significant difference noted between the two categories of patients with respect to the frequency of complications (p = 0.559).

DISCUSSION

Inguinal hernia is very common among elderly men, globally. 10,11 With the introduction of novel techniques which are less invasive and more cost effective, a lot of opportunities have risen to improve patient outcomes. The objective of laparoscopic hernia mesh repair is to have minimum procedure time and quicker recovery. 12 This is only achievable when postoperative complications and pain is minimized and managed adequately. The current study

compared the postoperative pain scores and early postoperative complications in patients with inguinal hernia repaired with mesh fixation using sutures as compared to tackers.

We found that patients who were treated with sutures had significantly less postoperative scores on the visual analog scale moreover the frequency of complications were also fewer in the suture group. Therefore, the authors of the current paper recommend using sutures to perform mesh fixation.

The current findings were supported by another similar study by Oguz et al., who demonstrated that in the suture group postoperatively at day 1 of hernia repair, the mean pain scores were significantly lower than those in tackers group ($p=0.027$). 13 Similarly,

A study by Muysoms et al. revealed contradictory findings stating that patients in whom mesh fixation was done using double row or tackers had a significant shorter procedure time in comparison to the patients treated with both sutures and tackers (74 vs 96 min; $p = 0.014$). Moreover, a significantly lower mean postoperative score at four hours was noted in the double row of tackers ($p = 0.028$). 14 Interestingly, Moreno Egea showed that cyanoacrylate which is a tissue adhesive can be used to replace sutures in inguinal hernia mesh repair. It was found that use of cyanoacrylate substantially lowered the mean of procedure time, reduced postoperative pain, and use of analgesia ($P < .001$). 15 Meanwhile, Sajid et al., reviewed five randomized controlled trials to evaluate the efficiency of tackers versus glue mesh fixation and found no significant difference between the two techniques. However, it was found that glue mesh fixation was correlated with a decreased risk for chronic groin pain among patients as compared to tackers. 16 This indicates that glue or tissue adhesives are more superior to sutures however, comparable to tackers in terms of postoperative pain and hospitalization duration. In the present study, there was a significant difference in mean postoperative pain score between the two groups. In our study, the mean post-operative pain score was 3.67 ± 0.92 in sutures group versus 4.90 ± 1.21 in tackers group.

With the introduction of more novel techniques, the patient outcomes for inguinal hernia repair have improved significantly. 17 The objective of the surgeon is to offer a treatment plan associated with the least postoperative pain, minimum procedure time, lowest possible complication rates, and reduced hospitalization with quick recovery. Mesh fixation is a crucial part of the hernia repair which decreases the risk of hernia recurrence. 18 Since, multiple options are available to the surgeon including tackers, sutures, glue, and tissue adhesives, it is not easy to decide which is the optimum choice. Earlier studies even voted against mesh fixation and regarded it as unnecessary. 19 Some concerns regarding use of trackers for mesh fixation is the risk of pubic osteitis, neuralgia, urinary retention, and chronic groin pain. 20

CONCLUSION

The current study indicated that mesh fixation using sutures is associated with less postoperative pain as compared to mesh fixation using tackers. Mesh fixation is a crucial part of the inguinal hernia repair. The technique

used for mesh fixation influences postoperative complications, hospitalization, duration of procedure, and pain. Therefore, it must be done using the most optimum techniques available to the surgeon.

REFERENCES

- Burcharth J, Pedersen M, Bisgaard T, Pedersen C, Rosenberg J. Nationwide prevalence of groin hernia repair. *PLoS one*. 2013 Jan 14;8(1):e54367.
- Köckerling F, Simons MP. Current concepts of inguinal hernia repair. *Visceral medicine*. 2018;34(2):145-50.
- Waite KE, Herman MA, Doyle PJ. Comparison of robotic versus laparoscopic transabdominal preperitoneal (TAPP) inguinal hernia repair. *Journal of robotic surgery*. 2016 Sep;10(3):239-44.
- Kapiris SA, Brough WA, Royston CM, O'Boyle C, Sedman PC. Laparoscopic transabdominal preperitoneal (TAPP) hernia repair. *Surgical endoscopy*. 2001 Sep;15(9):972-5.
- Leibl BJ, Jäger C, Kraft B, Kraft K, Schwarz J, Ulrich M, Bittner R. Laparoscopic hernia repair—TAPP or/and TEP?. *Langenbeck's archives of surgery*. 2005 Apr;390(2):77-82.
- Mehmood Z, Ahmed I, Shafiqatullah. Trans abdominal preperitoneal inguinal hernia repair: mesh fixation by polyglactin suture versus tacker. *J Surg Pak*. 2017;22(3):76-8.
- Kleidari B, Mahmoudieh M, Yarbakht M, Homaei Z. Mesh fixation in TAPP laparoscopic hernia repair: introduction of a new method in a prospective randomized trial. *Surg Endosc*. 2014;28(2):531-6.
- Taylor C, Layani L, Liew V, Ghusn M, Crampton N, White S. Laparoscopic inguinal hernia repair without mesh fixation, early results of a large randomised clinical trial. *Surgical endoscopy*. 2008 Mar;22(3):757-62.
- Sajid MS, Ladwa N, Kalra L, Hutson K, Sains P, Baig MK. A meta-analysis examining the use of tacker fixation versus no-fixation of mesh in laparoscopic inguinal hernia repair. *International journal of surgery*. 2012 Jan 1;10(5):224-31.
- Sanders DL, Waydia S. A systematic review of randomised control trials assessing mesh fixation in open inguinal hernia repair. *Hernia*. 2014 Apr;18(2):165-76.
- Khajanchee YS, Urbach DR, Swanstrom LL, Hansen PD. Outcomes of laparoscopic herniorrhaphy without fixation of mesh to the abdominal wall. *Surgical endoscopy*. 2001 Oct;15(10):1102-7.
- Spitz JD, Arregui ME. Sutureless laparoscopic extraperitoneal inguinal herniorrhaphy using reusable instruments: two hundred three repairs without recurrence. *Surgical Laparoscopy Endoscopy & Percutaneous Techniques*. 2000 Feb 1;10(1):24-9.
- Oguz H, Karagulle E, Turk E, Moray G. Comparison of peritoneal closure techniques in laparoscopic transabdominal preperitoneal inguinal hernia repair: a prospective randomized study. *Hernia*. 2015 Dec;19(6):879-85.
- Muysoms F, Vander Mijnsbrugge G, Pletinckx P, Boldo E, Jacobs I, Michiels M, Ceulemans R. Randomized clinical trial of mesh fixation with "double crown" versus "sutures and tackers" in laparoscopic ventral hernia repair. *Hernia*. 2013 Oct;17(5):603-12.
- Moreno-Egea A. Is it possible to eliminate sutures in open (Lichtenstein technique) and laparoscopic (totally extraperitoneal endoscopic) inguinal hernia repair? A randomized controlled trial with tissue adhesive (n-hexyl- α -cyanoacrylate). *Surgical innovation*. 2014 Dec;21(6):590-9.
- Sajid MS, Ladwa N, Kalra L, McFall M, Baig MK, Sains P. A meta-analysis examining the use of tacker mesh fixation versus glue mesh fixation in laparoscopic inguinal hernia repair. *The American Journal of Surgery*. 2013 Jul 1;206(1):103-11.
- Donkor C, Gonzalez A, Gallas MR, Helbig M, Weinstein C, Rodriguez J. Current perspectives in robotic hernia repair. *Robotic Surgery: Research and Reviews*. 2017;4:57.
- Mayer F, Niebuhr H, Lechner M, Dinnewitzer A, Köhler G, Hukauf M, Fortelny RH, Bittner R, Köckerling F. 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;30(10):4363-71.
- Beattie GC, Kumar S, Nixon SJ. Laparoscopic total extraperitoneal hernia repair: mesh fixation is unnecessary. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2000 Apr;10(2):71-3.
- Chandra P, Phalgune D, Shah S. Comparison of the clinical outcome and complications in laparoscopic hernia repair of inguinal hernia with mesh fixation using fibrin glue vs tacker. *Indian Journal of Surgery*. 2016 Dec 1;78(6):464-70.