

A RETROSPECTIVE ANALYSIS ON THE ADVANTAGES OF SUTURES VS TACKERS FOR PERITONEAL CLOSURE IN LAPAROSCOPIC INGUINAL HERNIA REPAIR

Sayed Mohammed Afsal*, Rajesh P, Joseph Francis

Department of General Surgery, Government Medical College Ernakulam, Kerala, 683503 India

ABSTRACT

Peritoneal closure is one of the essential steps in TAPP hernia repair. The different closing procedures have various strengths and weaknesses. Commonly used closing devices are the Hernia Stapler, Absorbable Tacker, Spiral Tacker, Extracorporeally knotted running suture and Clip guarded running suture. In present study we compared techniques of peritoneal closure with sutures or tackers following TAPP inguinal hernia repair at our tertiary hospital. Present study is a retrospective, observational & comparative study conducted in patients who underwent primary laparoscopic surgery for all type of inguinal hernia (TAPP). Mean duration required for peritoneal closure & Mean duration required for surgery was significantly less in peritoneal closure by tacker group as compared to suture group. Post-operative pain by VAS score on day 1 & day 7, was significantly less in suture fixation group as compared to tacker fixation group & difference was statistically significant. While on day 30 similar VAS scores were noted in both groups. In both groups, hospital stay was comparable, recurrence was noted in one patient while seroma was noted in two patients. No serious morbidity or any mortality was noted in study patients during study period. Suture group had advantages in VAS score on day 1,7 & cost of surgery. Thus, peritoneal closure with suture should be preferred over tackers for closure of the peritoneum in laparoscopic inguinal hernia repair surgery.

Keywords: Laparoscopic Hernia repair, Tacker, Mesh, Suture

INTRODUCTION

Surgical repair of hernias is considered one of the most commonly performed operation. An ideal hernia treatment technique should be associated with a low recurrence rate, high patient comfort, a short time return to work, and low cost. Laparoscopic hernia surgery is considerably more successful in meeting these criteria than open surgery.^{1,2}

Laparoscopic repair of inguinal hernias has become a widely accepted technique due to the efficacy and safety of this approach. The advantages of laparoscopic repair compared to open hernioplasty include better cosmetic effect, postoperative pain reduction, shorter hospitalization duration, faster returning to daily activities, Fewer complications, and lower risk of recurrence after surgery.³

* Corresponding Author:
drafsalsayed@gmail.com

Receiving Date: March 12, 2021
Acceptance Date: May 18, 2021
Publication Date: May 22, 2021

The new international guidelines of the Hernia Surge Group now only recommend the laparoscopic Total extraperitoneal repair (TEP) and Transabdominal preperitoneal repair (TAPP) techniques, open Lichtenstein tension free mesh repair and open Shouldice repair technique.¹ TAPP repair is associated with peritoneal defects or tears.

Non closure or insufficient closure of these defects can lead to bowel obstruction.⁵ This complication incidence ranges from 0.5-2.55% in the published literature.⁶ In the early postoperative period obstruction is mostly attributed to inadequate peritoneal closure and trocar site herniation.⁵

Peritoneal closure is one of the essential steps in TAPP hernia repair. The different closing procedures have various strengths and weaknesses. Commonly used closing devices are the Hernia Stapler, Absorbable Tacker, Spiral Tacker, Extracorporeally knotted running suture and Clip guarded running suture.

In present study we compared techniques of peritoneal closure with sutures or tackers following TAPP inguinal hernia repair with respect to the parameters of post-operative pain, requirement of post-operative analgesia, operating time, hospital stay and post-operative recovery, recurrence, at a tertiary care hospital.

MATERIAL AND METHODS

Present study is a retrospective, observational & comparative study conducted in Department of General Surgery, Government Medical College Ernakulam. Study period was from January 2019 to February 2020 (14 months). Institutional ethical committee clearance was obtained. Patient identity was kept confidential.

Inclusion criteria:

- Patients between 18 and 70 years of age, either gender, who underwent primary laparoscopic surgery for all type of inguinal hernia (TAPP) at our tertiary hospital.
- Exclusion criteria:
 - Hernias other than inguinal hernias.
 - Recurrent inguinal hernias.
 - Patients who had undergone previous abdominal surgeries

Clinical data was obtained from the medical records department and case sheets retrieved. The clinical data were collected retrospectively from all patients who underwent primary surgery for laparoscopic inguinal hernia repair (TAPP) & screened for eligibility for present study.

Eligible patients detail such as age, sex, co morbidity, history of previous surgery, relevant medical history, details regarding the preoperative morbid status, comorbidities, renal functions, serology status, clinical parameter, type of hernia, side of hernia, operative time, duration of peritoneal closure, postoperative pain measured by VAS scale (visual analogue scale) on postoperative day 1, 7 and 30 and recurrence were retrieved from the data capture sheet. Patients were divided according to method of peritoneal closure as group S (underwent closure with sutures) & group T (underwent closure with tackers).

Manual data collection from case sheets with regards to details of management, outcome, recurrence was retrieved, and data analysed descriptively from the data base. Postoperative pain and hernia recurrence during follow up is recorded in the Data capture sheet which is maintained in the out-patient department General Surgery.

All data was collected, managed and compiled in Microsoft Excel. All statistical analyses were done using SPSS 21.0 version [IBM SPSS Ltd., Chicago, IL, USA]. The quantitative variables will be expressed as Mean \pm Standard Deviation, and the qualitative variables were expressed as frequencies and percentages. Association between categorical variables of the data was analyzed by using Chi-square test (χ^2)/Fisher's Exact test. The mean comparison between groups will be analysed by using independent samples 't' test/Mann Whitney U test. In present study, p value less than 0.05 was considered as statistically significant.

RESULTS

We found 38 patients with suture fixation & 52 patients with tacker use during study period. In present study 61-70 years was most common age group (32 %), followed by 51-60 years (26 %) & 41-50 years (32 %). Male patients (92 %) were far more than female patients (8%). Results are presented in table 1 to 8.

Table 1: Age and gender distribution

	group S (n=38)		group T (n=52)		Total	
	No of patients	Percentage	No of patients	Percentage	No of patients	Percentage
Age group						
19-30	3	8	6	12	9	10
31-40	4	11	7	13	11	12
41-50	6	16	12	23	18	20
51-60	9	24	14	27	23	26
61-70	16	42	13	25	29	32
Gender						
Male	34	89	49	94	83	92
Female	4	11	3	6	7	8

Diabetes mellitus, hypertension, chronic obstructive pulmonary diseases were the most common comorbidities associated in study patients. 68 % from group S & 65 % from group T had no associated comorbidities.

Table 2: Co-morbidities present

Co-morbidities present	group S (n=38)		group T (n=52)	
	No of patients	Percentage	No of patients	Percentage
Diabetes Mellitus	5	13	13	25
Hypertension	8	21	8	15
Chronic Obstructive Pulmonary Diseases	5	13	3	6
Previous Surgery				
Hernioplasty	3	8	2	4
Appendicectomy	2	5	0	0
Nil	26	68	34	65

In suture fixation group most patients had left sided hernia (39%) while in tacker fixation group right sided hernia (40%) was common. Bilateral hernias were noted in 26% & 38% patients in suture group & tacker group respectively.

Table 3: Distribution according to side

Gender	group S (n=38)		group T (n=52)	
	No of patients	Percentage	No of patients	Percentage
Right	13	34	21	40
Left	15	39	11	21
Bilateral	10	26	20	38

In suture fixation group most patients had indirect inguinal hernia (37%) while in tacker fixation group indirect + direct inguinal hernia (52 %) was most common.

Table 4: Distribution according to type of hernia

Gender	group S (n=38)		group T (n=52)	
	No of patients	Percentage	No of patients	Percentage
Indirect Inguinal Hernia	14	37	16	31
Direct Inguinal Hernia	13	34	9	17
Indirect + Direct Inguinal Hernia	11	29	27	52

Mean duration required for peritoneal closure in suture group was 7.11 ± 0.41 min as compared to 3.22 ± 0.34 min in tacker group, difference was statistically significant.

Table 5: Distribution according to duration required for peritoneal closure

Duration required for peritoneal closure(min)	group S (n=38)		group T (n=52)	
	No of patients	Percentage	No of patients	Percentage
2 min or less	0	0	32	62
3-5 min	0	0	20	38
6- 10 min	29	76	0	0
>10 min	9	24	0	0
Mean duration	7.11 ± 0.41 min		3.22 ± 0.34 min	
p value	< 0.001 (Statistically significant)			

Mean duration required for surgery in suture fixation group was 123.2 ± 20.6 min as compared to 106.3 ± 12.8 min in tacker fixation group, difference was statistically significant.

Table 6: Distribution according to duration required for surgery

Duration required for surgery (min)	group S (n=38)		group T (n=52)	
	No of patients	Percentage	No of patients	Percentage
80-100 min	6	16	32	62
101-120 min	23	61	10	19
>120 min	9	24	10	19
Mean duration	123.2 ± 20.6 min		106.3 ± 12.8 min	
p value	< 0.001 (Statistically significant)			

Post-operative pain was measured on visual analog score (VAS). On day 1 & day 7, we noted significantly lesser VAS score in suture fixation group as compared to tacker fixation group & difference was statistically significant. While on day 30 similar VAS scores were noted in both groups & difference was not statistically significant.

Table 7: Visual analog score (VAS) for pain (DAY 1/7/30)

Visual analog score (VAS) for pain	group S (n=38)		group T (n=52)	
	No of patients	Percentage	No of patients	Percentage
VAS day 1				
3	25	66	0	0
4	11	29	2	4
5	1	3	19	37
6	0	0	22	42
7	1	3	9	17
Mean VAS	3.92 ± 0.63		5.83 ± 0.63	

p value	< 0.001 (Statistically significant)			
VAS day 7				
0	20	53	5	10
1	14	37	15	29
2	4	11	28	54
3	0	0	4	8
Mean VAS	0.92 ± 0.16		2.08 ± 0.31	
p value	< 0.001 (Statistically significant)			
VAS day 30				
0	36	95	47	90
1	0	0	1	2
2	2	5	3	6
3	0	0	1	2
Mean VAS	0.39 ± 0.1		0.41 ± 0.1	
p value	0.056 (Statistically not significant)			

Other characteristics such as lost to follow up, recurrence, seroma were studied. In both groups, hospital stay was comparable, recurrence was noted in one patient while seroma was noted in two patients. No serious morbidity or any mortality was noted in study patients during study period.

Table 8 : Other characteristics

Other characteristics	group S (n=38)		group T (n=52)	
	No of patients/ Mean ± SD	Percentage	No of patients/ Mean ± SD	Percentage
Hospital stay (days)	3.23 ± 1.69		3.62 ± 1.93	
Lost to follow up	0	0	2	4
Recurrence	1	3	1	2
Seroma	2	5	2	4

DISCUSSION

TAPP laparoscopic groin hernia entails development of peritoneal flaps to reach the preperitoneal plane making space and reducing the hernia sac. After mesh fixation in its position, the peritoneal defect must be closed well to isolate the mesh from exposure to abdominal viscera reducing adhesion and prevent internal herniation through the defect to preperitoneal space.⁷ The methods for peritoneal defect closure were classified to mechanical methods as tackers, clips and staples which may be associated with risk of nerve injuries, incomplete closure, laceration of peritoneal flaps, tacks site herniation.⁸

Bansal et al.,⁹ compared suture fixation with a tacker fixation & noted that the postoperative pain up to 1 month (1 h, 6 h 24 h, 1 week) was significantly lower in the suture group and the return to daily activities was significantly shorter in the suture group. The comparison of the fixation time was significantly in favour of the tacker group. Similar findings were noted in present study. Ross et al.,¹⁰ also noted post-operative pain score in suture closure group was lower than that in tacker closure group.

Mostafa H et al.,⁴ noted that hospital stay after repairing inguinal hernia repair in the tacker method group was significantly longer than that in the suturing method group. We noted similar duration of hospital stay in present study.

Kitamura et al.,¹¹ concluded that there is no difference in wound infection and bowel obstruction between peritoneal closure with tacker and suture. Lee et al.,¹² noted that there is no difference in TAPP inguinal hernia repair surgery complications between peritoneal closure with tacker and suture. Similar findings were noted in

present study. In study by S. Selvakumar et al.,¹³ noted that both tacker fixation and suture fixation had no recurrence, no inguinodynia. The results were comparable as far as seroma is concerned in 2 cases in each group.

While, in the study by Bagwan et al.,⁹ overall post-operative complications rate for tacker group was significantly higher than suture group. Important postoperative complications in both groups were hematomas, wound infections, airway infections, and urinary tract infection.

Moreover, the use of permanent fixation devices increases the costs and has been shown to be associated with postoperative groin pain, which reduces after the removal of tacks.^{14,15} Tackers being costly, suture fixation is a cost-effective alternative without compromising on patient's safety. In a country like our India where the affordability is poor, Suture fixation may ideally be practiced.

Tackers are associated with a certain amount of surgical trauma and complications such as neuralgia or paresthesia because of nerve entrapment. Pubalgia is caused by stapling of the prosthesis to Cooper's ligament. Bleeding or hematomas in Retzius space (muscular, corona mortis) also can occur. It has been postulated that placement of tacks can damage the nerves directly or indirectly, by fibrosis around the tack which can go on to involve the nerves.¹⁶ Chronic groin pain (CGP) most often occurs due to nerve damage during Laparoscopic inguinal hernia surgery (LIHS) which can be caused during dissection or fixation of mesh. Mesh fixation is usually done by laparoscopic tackers and multiple tacks were being used. Subsequently, in an attempt to reduce CGP, the number of tacks has now been reduced to two, one medially over the cooper's ligament and another laterally at the level of anterior superior iliac spine.^{17,18}

Present study was a single institution based, retrospective study with small sample size. Larger, multicentric, prospective trials are required for more scientific data.

CONCLUSION

According to our findings, there was no difference among the two techniques of peritoneal closure with tacker/ suture, in VAS score at day 30, hernia recurrence rate, hospital stay and complication rate. Suture group had advantages in VAS score on day 1,7 & cost of surgery. Thus, peritoneal closure with suture should be preferred over tackers for closure of the peritoneum in laparoscopic inguinal hernia repair surgery.

Conflict of Interest: None to declare

Source of funding: Nil

REFERENCES

1. Tolver MA, Rosenberg J. Pain during sexual activity before and after laparoscopic inguinal hernia repair. *Surg Endosc.* 2015;29(12):3722-3725.
2. Oguz, H., Karagulle, E., Turk, E. et al. Comparison of peritoneal closure techniques in laparoscopic transabdominal preperitoneal inguinal hernia repair: a prospective randomized study. *Hernia* 2015;19, 879–885.
3. Hoseini M, Mousavie SH, Farazmand B, Jodai E, Negahi A. Comparison of peritoneum closure with suturing or tacker or using dual mesh without peritoneal closure in laparoscopic inguinal hernia repair. *J Adv Pharm Edu Res* 2019;9(S2):150-153.
4. The Hernia Surg Group, International guidelines for groin hernia management. *Hernia* 2018;22:1–165.
5. McKay R. Preperitoneal herniation and bowel obstruction post laparoscopic inguinal hernia repair: case report and review of the literature. *Hernia.* 2008;12:535-537
6. Bringman S, Blomqvist P. Intestinal obstruction after inguinal and femoral hernia repair: a study of 33.275 operations during 1992-2000 in Sweden. *Hernia.* 2005;9:178-183
7. Sharma D, Yadav K, Hazrah P, Borgharia S, Lal R, Thomas S. Prospective randomized trial comparing laparoscopic transabdominal preperitoneal (TAPP) and laparoscopic totally extra peritoneal (TEP) approach for bilateral inguinal hernias. *Int J Surg* 2015;Oct;22:110–7.
8. Bittner R, Leibl BJ, Jäger C, Kraft B, Ulrich M, Schwarz J. TAPP - Stuttgart technique and result of a large single center series. *J Minim Access Surg* 2006;Sep;2(3):155–9.
9. Mayer F, Niebuhr H, Lechner M. When is mesh fixation in TAPP-repair of primary inguinal hernia repair necessary? The register-based analysis of 11, 230 cases. *Surg Endosc.* 2016;30:4363-71

10. Bansal VK, Misra MC, Babu D, Singhal P, Rao K, Sagar R, et al., Comparison of long-term outcome and quality of life after laparoscopic repair of incisional and ventral hernias with suture fixation with and without tacks: a prospective, randomized, controlled study. *Surg Endosc*, 2012, 26(12):3476–85.
11. Ross SW, Oommen B, Kim M, Walters AL, Augenstein VA, Heniford BT. Tacks, staples, or suture: method of peritoneal closure in laparoscopic transabdominal preperitoneal inguinal hernia repair effects early quality of life. *Surgical endoscopy*. 2015;29(7):1686-93.
12. Kitamura RK, Choi J, Lynn E, Divino CM. Suture versus tack fixation of mesh in laparoscopic umbilical hernia repair. *JSL: Journal of the Society of Laparoendoscopic Surgeons*. 2013;17(4):560.
13. Lee SR, Park S-S. The novel technique of transabdominal preperitoneal hernioplasty herniorrhaphy for direct inguinal hernia: suture repair of hernia defect wall. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2018;28(1):83-8.
14. Selvakumar S, Sankar SS, Balaji P. Comparative study on suture fixation vs tacker fixation for laparoscopic inguinal hernia repair – TAPP, *Global Journal For Research Analysis*, 2019;8(3):52-54.
15. Morrison JE Jr, Jacobs VR. Laparoscopic preperitoneal inguinal hernia repair using preformed polyester mesh without fixation: Prospective study with 1-year follow-up results in a rural setting. *Surg Laparosc Endosc Percutan Tech* 2008;18:33-9.
16. Lau H, Patil NG, Yuen WK, Lee F. Prevalence and severity of chronic groin pain after endoscopic totally extraperitoneal inguinal hernioplasty. *Surg Endosc* 2003;17:1620-3.
17. Stark E, Oestreich K, Wendl K, Rumstadt B, Hagemüller E. Nerve irritation after laparoscopic hernia repair. *Surg Endosc*, 1999; 13(9): 878–881.
18. Felix E, Scott S, Crafton B, Geis P, Duncan T, Sewell R, McKernan B. Causes of recurrence after laparoscopic hernioplasty. A multicenter study. *Surg Endosc*, 1998;12(3):226–231.