ORIGINAL RESEARCH

Outcomes in Patients Undergoing Suture Fixation of Mesh in Laparoscopic Transabdominal Preperitoneal (TAPP) Repair of Inguinal Hernia

¹Dr. Prashant Nakrani, ²Dr. Sudhanshu Tiwari, ³Dr. Eeshita Gour, ⁴Dr. Drashti Kanpariya

^{1,2}Senior Resident, Govt Medical College and Hospital, Ratlam, Madhya Pradesh, India
³Senior Resident, M.G.M. Superspeciality, Indore, Madhya Pradesh, India
⁴Resident, Apollo International Hospitals Limited, Gandhinagar, India

Corresponding author

Dr. Prashant Nakrani

Senior Resident, Govt Medical College and Hospital, Ratlam, Madhya Pradesh, India

Received: 11 March, 2025

Accepted: 30 March, 2025

Published: 10 April, 2025

ABSTRACT

Introduction: The advent of laparoscopic techniques in repairing inguinal hernia has significantly improved outcomes of inguinal hernia surgery. However, acute and chronic postoperative pain after fixation of mesh with tacks and the cost of tacking devices are major hindrances to the widespread use of laparoscopic transabdominal preperitoneal (TAPP) repair in resource-poor settings. This study sought to introduce a method of mesh fixation that will reduce the cost of laparoscopic TAPP repair. **Objective:** To study the outcomes in the early postoperative period like pain, seroma, hematoma and neuralgia after fixation of mesh with suture in laparoscopic TAPP repair of inguinal hernia. **Subjects and methods:** This study was conducted from July 2023 to jan 2024. A total of 30 patients between ages 18 and 60 years with an inguinal hernia on any side and having an American Society of Anaesthesiologists (ASA) score of I/II were included in this study. Patients with a recurrent hernia, large scrotal hernia, strangulated and obstructed hernias, ASA III and ASA IV, prostatism, and chronic cough were excluded. Pre-operative and post-operative data of these patients were recorded on specially designed proforma. **Results:** The age range was 18 to 60 years with a mean age of 40. 25 years ± 12.24 S.D. It was found that mean pain score was 4.5 ± 0.50 and 6.35 ± 0.30 at 6 hours and 24 hours respectively. **Conclusion:** In TAPP repair, suture fixation of mesh had no significant difference in the rate of other early postoperative outcomes like seroma, hematoma, urinary retention, and neuralgia. Further multicentric studies with a longer duration of follow-up are needed to validate our results.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

INTRODUCTION

Historically, different techniques have been used in the repair of inguinal hernia. Among the many techniques introduced to decrease recurrence and complications associated with hernia repair. laparoscopic techniques have become widely available all over the world. Since the beginning of laparoscopic hernia repair in the early 1990s, many advancements have taken place leading to widespread acceptability of laparoscopic hernia repairs. As a result of the improvements in surgical techniques, prosthetic materials, and a better understanding of their use, the surgical outcome has improved significantly. The problems associated with hernia surgery are postoperative pain, prolonged hospital stay & recurrence. Compared to open surgery the laparoscopic technique is associated with a short period of stay and early return to work [1]. Thus in the

last 15 years, laparoscopic hernia repair has become a real option with recurrence rates of less than 1% and minimal long-term discomfort [2].

TAPP (transabdominal preperitoneal) repair and TEP (totally extraperitoneal) repair are the two most commonly performed procedures for the repair of laparoscopic hernia. In TAPP repair, a peritoneal flap is raised after gaining entry into the abdominal cavity, and the preperitoneal space is used for placing the mesh. Different materials are used for the fixation of mesh against the anterior abdominal wall including trans-fascial sutures (absorbable and non-absorbable), titanium tacks, fibrin glue, and synthetic sealants, all of which have advantages and disadvantages [3-5]. Titanium tacks are usually used for fixation of the mesh to the anterior abdominal wall, but they are also associated with complications such as nerve entrapment, erosion into the bowel and other hollow

viscera as well as the formation of dense adhesions and so-called tack hernias [6]. However acute and chronic postoperative pain have emerged as clinically most relevant negative impact factors. Moreover, titanium tacks are costly, making laparoscopic inguinal hernia repair unaffordable for our poor patients. To address the problem of postoperative pain and cost-effectiveness non-fixation of Mesh has been attempted; however, with non-fixation, the probability of mesh migration increases as reported in several cases in the literature [7]. Another novel method involves the use of vicryl 2/0 for mesh fixation which is cost-effective and has decreased probability of mesh migration and incidence of recurrence at six months compared to tack fixation [4].

During the literature review, two studies were found comparing early postoperative pain in suture fixation versus tack fixation of mesh in TAPP repair, these studies show lesser postoperative pain and analgesic consumption with suture fixation compared to tack fixation [4-5]. The mean pain score on day 1 in the suture group (4.63 ± 1.59) was found significantly lower than the tacker group (5.54 ± 1.68) with a pvalue of 0.0244. A similar study conducted by Oguz et al. compared suture versus tack as a peritoneum closure technique and also showed lesser postoperative pain with suture closure (1.7 ± 0.2) compared to tack closure (2.4±0.2) with a p-value of 0.027 [8]. However, studies comparing fixation of the mesh with suture versus tack in hernias of the ventral wall show no significant difference in pain after the operation following suture versus tack fixation p=0.38 [9-10]. Since early postoperative recovery has become an important factor in the evaluation of different laparoscopic techniques, this study intends to study the outcomes in the early postoperative period like pain, seroma, hematoma, scrotal swelling and time to return to routine activities after fixation of mesh with suture in laparoscopic TAPP repair of inguinal hernia.

MATERIALS & METHODS

This retrospective study was conducted in department of surgery, Dr Laxmi Narayan Pandey Government Medical College, Ratlam, M.P from July 2023 to Jan 2024. All patients between 18 and 60 years with unilateral inguinal hernia, admitted in Dr Laxmi Narayan Pandey Government Medical College, Ratlam, M.P. who underwent laparoscopic hernia repair were included in this study. Patients with a recurrent hernia, large scrotal hernia, strangulated and hernias, Society obstructed American of Anaesthesiologists (ASA) III and ASA IV, prostatism, and chronic cough were not included in the study.After approval from the institutional ethics committee, data of all inguinal hernia patients admitted and operated meeting the inclusion criteria were analyzed.A detailed case history, findings on clinical examinations and relevant demographic details. characteristics of hernia. associated comorbidities, operative notes and post operative progress records were analysed. Transabdominal Preperitoneal Mesh Hernioplasty (TAPP) with fixation of mesh to Coopers ligament and closure of peritoneal flap with vicryl 2/0 suture were included in this study. Data were analyzed using SPSS version 23.0 (IBM Corp., Armonk, NY). Mean ± SD was calculated for quantitative variables like age and visual analogue score. Frequencies and percentages were calculated for categorical variables like gender.

RESULTS

The study had 30 participants who presented with inguinal hernia ranging in age from 18 to 60 years (mean age of 41.55 years). 18 (60%) patients had direct inguinal hernia while 12(40%) had indirect. 20 (66.66%) patients had hernia on right side while 10 (33,33%)had on left sided inguinal hernia.(Table 1). Duration of surgery was 85.25 min and duration of surgery was more for indirect hernia as compared to direct hernia. Median hospital stay was 3.25 days. (Table 2). Post operative pain on VAS was 3.22 on post operative day one. Seroma formation, hematoma formation and scrotal swelling were observed in2,1 and 3 patients respectively. Injury to inferior epigastric artery was documented in 01 patient.(Table 3)

Table 1. Chines achiegt aprile actuals of the paracipants

Parameters	Total patients (n=30)
Age	41.55 +_10.25
Site	
Right	20
Left	10
Type of inguinal hernia	
Direct	18
Indirect	12
Associated co morbidities	
DM	08
Hypertension/ CAD	04

Table 2: Operative details

Parameters	Total patients (n=30)
Duration of surgery	85.25 +_ 10.25

Time period of hospital stay	3.25+- 1.80
Intra operative complications	Nil

Table 3: Details of post operative follow up

Parameters	Total patients (n=30)
Postoperative pain & discomfort	
At post operative period day 1	3.22+- 0.33
Seroma	2
Hematoma	1
Scrotal swelling	3
Time period for return to routine activities	
< than one week	21
> than one week	09

DISCUSSION

Advancements in laparoscopic surgical techniques have led to widespread acceptance of laparoscopic inguinal hernia repair among surgeons and patients. Patients who underwent laparoscopic inguinal hernia repair have less postoperative pain and tend to return early to work [11-15].

Transabdominal preperitoneal (TAPP) repair and totally extraperitoneal (TEP) repair are the two commonly used laparoscopic techniques of inguinal hernia repair. After dissecting the hernia sac, both techniques use the preperitoneal space for mesh placement. Thereafter, the mesh is secured against the anterior wall of the abdomen. The crucial step in an inguinal hernia repair is the fixation of mesh which is associated with vascular and neurological complications [16,17]. Most commonly, the mesh is tethered against the abdominal wall with titanium tacks. Titanium tacks have been associated with complications such as nerve entrapment, erosion into the bowel and other hollow viscera, and formation of dense adhesions and so-called tack hernias [6,7]. In previous studies, chronic neuralgia has been reported in approximately 14 % of hernia repairs that used titanium tacks [18-20]. The most vulnerable nerves subject to injury during laparoscopic repair are the lateral cutaneous nerve of the thigh, genitofemoral nerve, the iliohypogastric, and the ilioinguinal nerves [1]. In the mentioned nerves, the nerve known to be injured in particular is the lateral cutaneous nerve (0.1 -10 % of cases) [21-24]. The nerve injury occurs due to entrapment of the nerve in the staple tacks. Stark et al. reported a 4.2% incidence of neuralgia [25].

Based on the findings in the above citations, it is evident that postoperative pain and neuralgia can be expected after TAPP repair. In order to tackle the problem of postoperative pain and neuralgia after fixation of mesh with titanium tacks, different methods are being used such as changing the orientation of endotacker to vertical while placing tacks and applying a smaller number of tacks [16,17]. However, with the non-fixation, the probability of mesh migration increases in several cases reported in the literature [7]. Different authors have reported alternative mesh fixation methods such as absorbable tacks, human fibrin glue (tissucol), synthetic sealants, and transfascial absorbable and non-absorbable sutures [1,3-5]. These methods are reported to be associated with less postoperative pain and neuralgia [4,5].In our study, the early postoperative pain was found to be significantly less in suture fixation as compared to tack fixation reported in other studies. [4,5,8]

Laparoscopic hernia surgery benefts patients because it produces less post operative pain, enables patients to return to normal activity and work more quickly. In spite of several proven benefts of laparoscopic hernia repair few factors prevent the lap hernia repair from becoming as popular as lap. cholecystectomy. The most common factor is the material cost of the fixation devices.Suture fixation ifused in TAPP repair eliminates the use of the expensive fixation device. A study by Aziz SS et al., found urinary retention, formation of seroma, and scrotal hematoma in 4.16%, 2.78% and 2.78% of cases under tacker fixation respectively. No seroma formation was observed in suture fixation group [26]. Dandey A et al., found seroma formation in one case of tacker fixation group and none in suture group. The mean duration to return to routine wok was 1.42 days and 1.16 days, and mean duration to return to office work was 4.29 days and 4.95 days in in suture and tacker groups respectively [27]. Similarly, in present study, majority participants were returned to routine within 7 days after surgery and returned to work within 2 weeks.

CONCLUSIONS

In laparoscopic transabdominal preperitoneal repair, suture fixation of the mesh is a good alternative to other fixation devices in a rural tertiary care centers with limited resources with good success rate and minimal complication rates. Further multicentric studies with a longer duration of follow-up are needed to validate our results. In addition, other important outcome variables such as chronic pain, hernia recurrence, and incidence of mesh migration need to be compared in both techniques.

REFERENCES

1. Lovisetto F, Zonta S, Rota E, et al.: Use of human fibrin glue (Tissucol) versus staples for mesh fixation in laparoscopic transabdominal preperitoneal

hernioplasty: a prospective, randomized study. Ann Surg. 2007, 245:222-31. 10.1097/01.sla.0000245832.59478.c6

- Wall ML, Cherian T, Lotz JC: Laparoscopic hernia repair--the best option?. Acta Chir Belg. 2008, 108:186-91. 10.1080/00015458.2008.11680200
- Kukleta JF, Freytag C, Weber M: Efficiency and safety of mesh fixation in laparoscopic inguinal hernia repair using n-butyl cyanoacrylate: long-term biocompatibility in over 1,300 mesh fixations. Hernia. 2012, 16:153-62. 10.1007/s10029-011-0887-9
- Kleidari B, Mahmoudieh M, Yaribakht M, Homaei Z: Mesh fixation in TAPP laparoscopic hernia repair: introduction of a new method in a prospective randomized trial. Surg Endosc. 2014, 28:531-6. 10.1007/s00464-013-3198-7
- Abdelhamid MS: Transabdominal pre-peritoneal inguinal hernia repair with external fixation. Hernia. 2011, 15:185-8. 10.1007/s10029-010-0766-9
- Reynvoet E, Berrevoet F: Pros and cons of tacking in laparoscopic hernia repair. Surg Technol Int. 2014, 25:136-40.
- Sandhu AS, Kumar A, Kumar BN: Mesh erosion into urinary bladder following laparoscopic inguinal hernia repair. J Minim Access Surg. 2017, 13:139-42. 10.4103/0972-9941.195579
- 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, 19:879-85. 10.1007/s10029-015-1431-0
- Wassenaar E, Schoenmaeckers E, Raymakers J, van der Palen J, Rakic S: Mesh-fixation method and pain and quality of life after laparoscopic ventral or incisional hernia repair: a randomized trial of three fixation techniques. Surg Endosc. 2010, 24:1296-302. 10.1007/s00464-009-0763-1
- Kitamura RK, Choi J, Lynn E, Divino CM: Suture versus tack fixation of mesh in laparoscopic umbilical hernia repair. JSLS. 2013, 17:560-4. 10.4293/108680813X13693422520044
- Salma U, Ahmed I, Ishtiaq S: A comparison of post operative pain and hospital stay between Lichtenstein's repair and laparoscopic transabdominal preperitoneal (TAPP) repair of inguinal hernia: a randomized controlled trial. Pak J Med Sci. 2015, 31:1062-6. 10.12669/pjms.315.4811
- Bueno J, Serralta A, Planells M, Rodero D: Inguinodynia after two inguinal herniorrhaphy methods. Surg LaparoscEndoscPercutan Tech. 2004, 14:210-4. 10.1097/01.sle.0000136660.50669.89
- 13. Mahon D, Decadt B, Rhodes M: Prospective randomized trial of laparoscopic (transabdominal preperitoneal) vs open (mesh) repair for bilateral and recurrent inguinal hernia. Surg Endosc. 2003, 17:1386-90. 10.1007/s00464-002-9223-x
- Onofrio L, Cafaro D, Manzo F, Cristiano SF, Sgromo B, Ussia G: Tension-free laparoscopic versus open inguinal hernia repair (Article in Italian). Minerva Chir. 2004, 59:369-77.
- 15. Smith JR, Demers ML, Pollack R, Gregory S: Prospective comparison between laparoscopic preperitoneal herniorrhaphy and open mesh herniorrhaphy. Am Surg. 2001, 67:115-7; discussion 117-8.

- Katkhouda N: A new technique for laparoscopic hernia repair using fibrin sealant. Surg Technol Int. 2004, 12:120-6.
- 17. Langrehr JM, Schmidt SC, Neuhaus P: Initial experience with the use of fibrin sealant for the fixation of the prosthetic mesh in laparoscopic transabdominal preperitoneal hernia repair. RozhlChir. 2005, 84:399-402.
- Rosier EM, Iadarola MJ, Coghill RC: Reproducibility of pain measurement and pain perception. Pain. 2002, 98:205-16. 10.1016/s0304-3959(02)00048-9
- Felix EL, Michas C, McKnight RL: Laparoscopic repair of recurrent groin hernias. Surg LaparoscEndosc. 1994, 4:200-4.
- Kapiris SA, Brough WA, Royston CM, O'Boyle C, Sedman PC: Laparoscopic transabdominal preperitoneal (TAPP) hernia repair. A 7-year twocenter experience in 3017patients. Surg Endosc. 2001, 15:972-5. 10.1007/s004640080090
- 21. Quilici PJ, Greaney EM Jr, Quilici J, Anderson S: Laparoscopic inguinal hernia repair: optimal technical variations and results in 1700 cases. Am Surg. 2000, 66:848-52.
- 22. Totté E, Van Hee R, Kox G, Hendrickx L, van Zwieten KJ: Surgical anatomy of the inguinal region: implications during inguinal laparoscopic herniorrhaphy. Eur Surg Res. 2005, 37:185-90. 10.1159/000085967
- Broin EO, Horner C, Mealy K, Kerin MJ, Gillen P, O'Brien M, Tanner WA: Meralgia paraesthetica following laparoscopic inguinal hernia repair. An anatomical analysis. Surg Endosc. 1995, 9:76-8. 10.1007/BF00187893
- 24. Felix EL, Harbertson N, Vartanian S: Laparoscopic hernioplasty: significant complications. Surg Endosc. 1999, 13:328-31. 10.1007/s004649900982
- 25. Stark E, Oestreich K, Wendl K, Rumstadt B, Hagmüller E: Nerve irritation after laparoscopic hernia repair. Surg Endosc. 1999, 13:878-81. 10.1007/s004649901124
- 26. Kleidari B, Mahmoudieh M, Yaribakht M, Homaei Z. Mesh fixation in TAPP laparoscopic hernia repair: introduction of a new method in a prospective randomized trial. Surg Endosc 2014; 28:531-6.
- 27. Dandey A, Pal AK, Agrawal M, Kumar A, Anand A, Pahwa HS, Singh KK, Sonkar AA. Comparative evaluation of outcomes in different techniques of mesh fixation in totally extraperitoneal hernioplasty. Int J pair of groin hernias. A multi-institutional retrospective analysis. Surg Endosc. 1994, 8:1316-22; discussion 1322-3. 10.1007/BF00188291