International Journal of Research in Medical Sciences
Kumar A et al. Int J Res Med Sci. 2023 May;11(5):1676-1681
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20231335

Original Research Article

Outcomes of usage of polypropylene mesh in TAPP hernia repair

Amit Kumar, Adeel Ahmed Malik, Gurbir Singh*, Agnishikha Bhat

Department of General Surgery, Government Medical College, Jammu, Jammu and Kashmir, India

Received: 08 March 2023
Revised: 10 April 2023
Accepted: 11 April 2023

***Correspondence:**
Dr. Gurbir Singh,
E-mail: khalsagurbir2510@gmail.com

ABSTRACT

Background: Repair of hernia has seen a paradigm shift from open technique to laparoscopic technique. Laparoscopic transabdominal preperitoneal mesh hernioplasty is the latest technique with several advantages over open repair. Polypropylene (PP) mesh is the most frequently preferred product, as are easily and cheaply available, provide enough strength for the technique with good biocompatibility and less tissue reaction. Objective was to study the outcome of usage of polypropylene mesh in TAPP hernia repair.
Methods: It was a prospective study on patients with diagnosis of inguinal hernia and underwent TAPP hernia repair with polypropylene mesh.
Results: Total of 60 patients were included. Majority of the patients (18; 30%) were in age groups of 46-55 years and 56-65 years. 67% cases of inguinal hernia were of indirect type, 30% direct type and 3% both direct and indirect. Right-sided inguinal hernia (57%) was more frequent, followed by left sided (23%) and bilateral (20%). Average time taken was 72 to 98 minutes with a mean of 81.33 minutes in the surgery for unilateral repair and 90 to 103 minutes with a mean of 97.66 minutes for bilateral repair. 40 (67%) patients returned to work within 2 weeks of surgery.
Conclusions: Inguinal hernia repair is a common surgical procedure performed on daily basis around the world. Delay in treatment can lead to complications. Laparoscopic approach has shown clear advantages regarding less postoperative pain, numbness, fast return to normal activities and decrease in the incidence of wound infection and hematoma. Polypropylene has proven physical, chemical and biological properties and is currently the most widely used allograft in laparoscopic inguinal hernias.

Keywords: Inguinal hernia, Post-operative pain, Polypropylene mesh, TAPP, TEP

INTRODUCTION

Hernia is an abnormal protrusion of a viscus or a part of viscus through an opening in the wall of its containing cavity. It tends to occur at natural areas of weakness, where muscles are not strong and are vulnerable to intra-abdominal pressure. In Latin, hernia means a rupture or tear. The term hernia is derived from the Greek word meaning an offshoot, a budding or bulge.[1] Inguinal hernia repair is one of the oldest operations ever documented. In fact, the first record of it dates back to Middle Ages. Today, hernia surgery is one of the commonest operations being performed.[2] Two-thirds of the patients may get heavy or dragging sensation, burning sharp pain or discomfort during coughing, defecation, micturition or sexual intercourse and these symptoms get worse by the end of the day and get relieved on resting while one third of patients are symptom free.[3] Diagnosis of inguinal hernia is mainly done clinically. Because of their frequency, inguinal hernias remain an important surgical problem. The estimated lifetime risk for inguinal hernia is 27% for men and 3% for women.[4] Major risk factors include male sex, increased age as well as family history of groin hernia that increases eight times the risk.[5,6] Other risk factors include chronic obstructive pulmonary disease, smoking, low body-mass index, high intra-abdominal pressure, history of open appendectomy, peritoneal dialysis.[6] Laparoscopic hernia repair is done by two methods: trans-abdominal preperitoneal (TAPP)

and totally extra-peritoneal (TEP) repair. Principal advantages of the laparoscopic approach over traditional surgeries reported in literature are reduced postoperative pain, shorter hospital stays and shorter periods of disability.[7]

Aim

Aim was to study the outcome of usage of polypropylene mesh in TAPP hernia repair.

METHODS

A prospective study was conducted in the department of general surgery, Government Medical College, Jammu from 1st November 2019 to 31st October 2020. A total of 60 patients were included in the study.

Inclusion criteria

Primary or recurrent inguinal hernia. Reducible inguinal hernia. Indirect/direct inguinal hernia. Unilateral/bilateral inguinal hernia. Male or female patient age above 15 years.

Exclusion criteria

Patients of age less than 15 years. Strangulated or obstructed hernia. Irreducible hernia. Concurrent femoral hernia. Patients with untreated risk factors for recurrence like: prostatic enlargement, chronic obstructive airway disease, chronic constipation, patients not fit for general anesthesia. Prior pelvic surgery or prostatectomy. Patients with bleeding tendency.

The procedure was explained to the patients and the written informed consent was taken at the time of enrolment to this study. Surgeries were performed in the department of surgery by a senior operating surgeon from 1st November 2019 till 31st October 2020. A single dose of prophylactic i.v. antibiotic was given pre operatively 30 minutes before start of procedure. Postoperatively, patients were allowed orally after 6 hours and were encouraged for early ambulation from the day of surgery. Patients were discharged from hospital in day 2 of surgery if post operative course remained uneventful and advised to resume normal activity after a week. Antibiotics and analgesics were routinely prescribed to the patients post operatively, for varying periods depending upon the requirement of each and every patient. Patients were followed in SOPD after discharge and port site skin sutures were removed in day seven.

Assessment parameters

Intra-operative parameters

Operative time (minutes) was calculated from the time of incision for pneumoperitoneum till wound closure. Intra-operative complications such as a) access injury (due to Veress and trocars), b) fenestration injury to peritoneal flap, c) diathermy injury to gut, d) bleeding.

Postoperative parameters (during hospital stay)

Postoperative pain on day zero, day 1, and day 2. Postoperative complications (scrotal edema, seroma or hematoma). Start of early ambulation after few hours of surgery.

Follow-up parameters

Time to return to work. Wound infection. Neuralgia. Detection of recurrence (within 3 months).

Pain was measured using visual analogue scale (VAS) score.

Ambulation was measured as limited movement inside room, free movement outside the room and no movement. Time was calculated for the same from the time of surgery.

Duration of hospital stay included from the day of surgery to discharge. Patient was discharged when he was able to go to the bathroom without others assistance.

Follow-up was done after discharge at 1 week, 4 weeks and 3 months. During follow-up visits, complete physical examination will be done and all complications were recorded.

Ethical approval

The study was conducted after the ethical approval from the ethical committee of the institute.

Statistical analysis

Analysis was conducted with the help of Microsoft Excel and SPSS software for Windows. Variables were presented as mean and standard deviation for quantitative and percentages for qualitative or as deemed appropriate.

RESULTS

A total of 60 patients were included in the study. The age of the patients varied from 17 to 66 years with a mean age (±standard deviation) of 46.03±14.54 years. Majority of the patients (18; 30%) were in two age groups of 46 to 55 years and 56-65 years, while least (02; 4%) were in the age group of 36-45 years (Table 1). It was observed that 40 (67%) cases of inguinal hernia were of indirect type and 18 (30%) were of direct type. There were 02 (3%) cases, wherein both direct and indirect hernias were observed. Right-sided inguinal hernia (34; 57%) was more frequent, followed by left sided (14; 23%) and bilateral (6; 20%). It was observed that average time taken was 72 to 98 minutes with a mean of 81.33 minutes in the surgery for unilateral inguinal hernia. About 92%

surgery was completed within 90 minutes. It was observed that the surgery for bilateral inguinal hernia did not take much operating time. Average time taken was 90 to 103 minutes with a mean of 97.66 minutes. In about 83% of the patients, surgery was completed within 100 minutes. It was observed that most of the patients (44; 73%) ambulated within 24 hours, while (16;27%) in 1st post-operative day (Table 2).

Table 1: Age distribution of the patients admitted with inguinal hernia.

Age group (in years)	Frequency	Percentage
15-24	6	10
25-35	14	23
36-45	2	4
46-55	18	30
56-65	18	30
>65	2	3
Total	60	100

Mean±SD = 46.03±14.54 years, Range = 17-66 years

Table 2: Day of ambulation.

Day of ambulation	Frequency	Percentage
Immediately (<24 hours)	44	73
1st post-operative day	16	27
2nd post-operative day	0	0
3rd or more	0	0
Total	60	100

Table 3: Distribution of patients according to VAS score.

VAS score	Frequency	Percentage
1-3 (mild)	54	90
4-6 (moderate)	06	10
7-10 (severe)	0	0
Total	60	100

Pain was assessed by visual analogue scale score. Majority of the patients (54; 90%) in the present study had mild pain. Mean VAS score was 2.1 with maximum score of 4 and min of 1 (Table 3). Out of thirty patients no patient was discharge on first post-operated day were as majority (40; 67%) of patients discharge on 2nd post-operative day. 18 (30%) were discharged on the third postoperative day. Only 02 (03%) patients required to prolong their stay in the hospital for 4 or more days. Mean duration of postoperative hospital stay was2.33±0.55 (Table 4). In the present study, 40 (67%) patients returned to work within 2 weeks of surgery done. Only 20 (33%) patients prolonged their period of return to work to more than 2 weeks. Mean time to return to work was 12.73, with range from 10 to 15 days (Table 5). Although the list of complications following hernia surgery is a large one, yet only minor complications were encountered in the present study- 02 (3.33%) patients developed seroma, 02 (3.33%) developed wound infection, while 04 (6.67%) developed scrotal edema and 02 (3.33%) had intraoperatively bleeding due to injury to inferior epigastric artery (Table 6).

Table 4: Distribution of patients according to post-operative hospital stay.

Post-operative hospital stay (days)	Frequency	Percentage
<1	0	0
2	40	67
3	18	30
4 and more	02	03
Total	60	100

Table 5: Distribution of patients according to period of return to work.

Period of return to work (weeks)	Frequency	Percentage
1-2	40	67
>2	20	33
Total	60	100

Mean =12.73; Range =10 to 15 days.

Table 6: Intra/post-operative complications observed (n=30).

Intra/Post-operative complications	Frequency	Percentage
Seroma	02	3.33
Wound infection	02	3.33
Scrotal edema	04	6.67
Bleeding	02	3.33
Total	10	16.66

Postoperative recurrence

All patients were closely followed up for a period of three months after surgery. There was no evidence of early recurrence for a period of three months.

DISCUSSION

In this study, there were all male patients. Novik et al also took up all male patients in their prospective study, whereas; in studies conducted by Mitura et al most patients were males.[8,9] Mitura et al included 42 male and 8 female in his study and in the study by Situma et al 88 (81%) were male and 20 (19%) female.[10,11] In most of the available studies on the subject, male ratio predominated. With regard to age in the present study, all patients were in the range of 17 to 66 years with majority being in two age groups of 46 to 55 years (18;30%) and 56-65 years (18; 30%). The mean age (±standard deviation) was 46.03±14.54 years. Mitura et al observed mean age of 45 years, which is similar to our study.[9] In a study by Desarda mean age recorded was 50.5 years.[12] Whereas Desarda et al recorded mean

age of the patients as 51.55±16.35 years.[13] In the present study, 18 patients (30%) were having direct hernia, 40 (67%) indirect and 02 patient (3%) had both direct and indirect hernia. Desarda reported direct hernia in 25%, indirect in 74% and both direct and indirect in 1% patients in his study.[12] In another study conducted by Xuan et al 32.3% direct hernias, 55.9% indirect hernias and 11% both direct and indirect hernias were included.[14] Shah et al reported 47 patients with 51 groin hernias, direct hernia was present in 25.5% of the cases, indirect in 76.6% and both direct and indirect in 8.5%.[15] In the present study, with regards to side of hernia, 34 (57%) patients had right side hernia, 14 (23%) had left side hernia, while 12 (20%) patients had bilateral. Almost similar results were obtained by Desarda on 400 patients. He observed right side hernia in 54%, left side in 31% and bilateral in 15% patients.[12] Rodriguez et al out of 836 patients, reported right side hernia in 49%, left side hernia in 46% and bilateral hernia in 3.4% patients.[16] Similarly, Kalra et al reported 68.3% patients had hernia on the right side while 31.7% had it on the left side.[17] In the present study, it was observed that mean operating time for surgery was 81.33±5.79 minutes (range 72-98 minutes) for unilateral hernia. In 92% of patients, surgery was completed within 90 minutes. Xuan et al reported that in unilateral TAPP Hernia repair with a prolene mesh average duration of TAPP hernia repair was 57.1±17.3minutes.[14] In another study by Ghani et al mean operative duration in unilateral TAPP repair was 60.13±14.76 minutes.[18] Rather et al in his study observed mean operative time of 55 minutes (range 40-110 minutes) in TAPP hernia repair.[19] Mean operating time in the present study was little more than that what has been reported in the literature. This might be in due to lesser number of cases taken up in present study. In the present study, it was observed that mean time duration for surgery was 97.66±4.58 minutes (range 90-103 minutes) for bilateral hernia. 83% surgeries were completed within 100 minutes. In a study by Xuan et al on bilateral TAPP hernia repair with a prolene mesh, average duration of TAPP hernia repair was 80.3±10.6 minutes, which is comparable to the present study.[14] In another study by Eisa et al mean operative time was 82.52±22.73 minutes for bilateral hernia.[20] Again mean operating time in present study was little more in comparison to other available series in the literature. In the present study, a total of 44 (73%) patients were ambulatory within 24 hours, 16 (27%) were ambulatory in 1st post operative day. In a study by Shakya et al average time taken for full ambulation postoperatively was 2.05±1.39 days (range 1-10 days).[21] In the present study, postoperative pain was assessed by using the visual analogue scale (1 to 10) score. It was observed that majority (54; 90%) of patients had mild pain (VAS 1-3), 06 (10%) patients had moderate pain (VAS 4-6). No patient had severe pain (VAS 7-10) postoperatively. Eisa et al did TAPP hernia repair in 45 patients and found that 22% patients developed moderate pain, and 30 patients (67%) had mild pain.[20] In another study by Xuan et al six cases experienced moderate pain (19.4%), and 25 cases had mild pain (80.6%).[14] Results were similar to our study. In the present study, no patients were discharged within 24 hours of surgery. 40 (67%) patients were discharged on first postoperative day and 18 (30%) were discharged on second postoperative day. Only 02 (03%) patients had prolonged hospital stay which was more than 3 days. So majority of patients were discharged by 2nd post-op day and mean duration of hospital stay was 2.33±0.55 days and range from 2 to 4 days. In a study conducted by Xuan et al the mean time of postoperative hospital stay was 3.9±1.4 days (range: 2-7 days).[14] Salma et al reported over all averaged 3.7 days hospital stay post-operatively.[22] In a study conducted by Shah et al the average hospital stay was 3.2 (range 2-6) days.[15] Similarly Rather et al reported the mean hospital stay in the study to be 1.2 days (1-3 days).[19] In the present study, 40 patients (67%) returned to work within 1 to 2 weeks, whereas; 20 patients (33%) patients took more than 2 weeks to return to work. Mean time to return to work was 12.73 days (10-15 days). Xuan et al reported time to return to normal activities after hospital discharge was 0 to 7 days in 7 (22.6%) patients and 8-14 days in 23 (74.2%) patients. Sharma et al reported11.8±2.35 days as time to return to normal activities.[23] In study by Elwan et al the mean time to return to work after TAPP was 14.4 days which is comparable to our study. Rather et al observed that mean time to return to work after TAPP was 15.1 (12-21 days). With regard to postoperative complications, in majority of the patients (50; 83.34%) no complications were observed; 02 (3.33%) patient presented with seroma, another 02 (3.33%) presented with wound infection that subsided within one week, 04 (6.67%) patients developed scrotal edema and 02 (3.33%) patients had intra-operative bleeding due to injury to inferior epigastric artery. No other major complications like severe postoperative pain, major infection, bowel injury, bladder injury, spermatic cord injury etc was reported. In a study conducted by Cawich et al the incidence of scrotal edema was (1.9%) in his series.[24] The incidence of complications reported in larger series by Tzovaras et al was 1.06%.[25] In a study by Rather et al seroma was present in 4 (3.57%) patients.[19] In the present study 1 (3.33%) patient developed wound infection. Chalkoo et al in their study on 130 cases observed (2: 1.54%) cases with port site infections.[26] Shah et al observed 2 cases of port site infections in a study on 30 cases for TAPP hernia repair.[15] In present study, 02 (3.33%) patient had intra-operative bleeding due to injury to inferior epigastric artery that was managed. In a study by Rather et al bleeding observed in 1 (0.89%) of cases, because of injury to inferior epigastric artery.[19] Cawich et al encounter inferior epigastric artery injury in one of 88 cases of TAPP hernia repair in their study.[24] In the present study, there was no recurrence noted in patients on whom TAPP hernia repair was done till the end of the final presentation of the research work. Eisa et al did not notice any recurrence during the early postoperative

period or during follow-up.[20] Similarly, Xuan et al and Cawich et al in their study did not observe any recurrence, whereas Weiser et al reported that incidence of recurrence after TAPP was around 0-3%.[14,24,27]

Limitation of the study was that it was conducted with limited sample size during covid pandemic.

CONCLUSION

Inguinal hernia repair is a common surgical procedure being performed on daily basis around the world as inguinal hernia is quite frequent and exempts no age and ranks. Inguinal hernia besides causing discomfort, affects the output in daily routine of the patients and delay in treatment can lead to complications, sometimes life threatening as well. The laparoscopic approach has gained popularity since last decade or so due to few advantages over open methods. The type of mesh to be used in laparoscopic approach has also initiated a debate amongst the surgical fraternity. Earlier more costly meshes were used for laparoscopic repair but now evidence supports use of simple prolene mesh in laparoscopic hernia repair. In present study, although the study cohort is less yet our experience reveals that polypropylene mesh used in laparoscopic hernia (TAPP) is equally good and has no disadvantage and hence can be widely used to decrease cost of laparoscopic hernia surgery.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Abrahamson J. Hernias. In: Schwartz SI, edr. Maingot's Abdominal Operation. 10th edn. PH International; 1989:506.
2. Neumayer L, Giobbie-Hurder A, Jonasson O, Fitzgibbons Jr R, Dunlop D, Gibbs J, et al. Open mesh versus laparoscopic mesh repair of inguinal hernia. N Engl J Med. 2004;350(18):1819-27.
3. Hair A, Paterson C, Wright D, Baxter JN, O'Dwyer PJ. What effect does the duration of an inguinal hernia have on patient symptoms? J Am Coll Surg. 2001;193(2):125-9.
4. Primatesta P, Goldacre MJ. Inguinal hernia repair: incidence of elective and emergency surgery, readmission and mortality. Int J Epidemiol. 1996;25:835-9.
5. Burcharth J, Pommegurd HC, Rossenberg J. The inheritance of groin hernia, a systematic review. Hernia. 2013;17:183-9.
6. Lau H, Fang C, Yuen WK, Patil NG. Risk factors for inguinal hernia in adult males: a case-control study. Surgery. 2007;141(2):262-6.
7. Mahon D, Decadt B, Rhodes M. Prospective randomized trial of laparoscopic (Transabdominal Preperitoneal) versus open (mesh) repair for bilateral and recurrent inguinal hernia. Surg Endosc. 2003;17:1386-90.
8. Novik B, Hagedorn S, Mörk UB, Dahlin K, Skullman S, Dalenbäck J. Fibrin glue for securing the mesh in laparoscopic totally extraperitoneal inguinal hernia repair: a study with a 40-month prospective follow-up period. Surg Endosc Other Intervent Tech. 2006;20:462-7.
9. Mitura C, Romanchuk N, Wroblewski T. Early results of inguinal hernia repair method Desarda in 17 operated patients. A preliminary report. Arch Minimal. 2006;1:18-22.
10. Mitura K, Romanczuk M. Comparison between two methods of inguinal hernia surgery- Lichtenstein and Desarda. Pol Merkur Lekarski. 2008;24(143):392-5.
11. Situma SM, Kaggwa S, Masiira NM, Mutumba SK. Comparison of Desarda versus modified Bassini inguinal Hernia repair: a randomized controlled trial. East Cent Afr J Surg. 2009;14(2):70-6.
12. Desarda MP. Inguinal herniorrhaphy with an undetached strip of external oblique aponeurosis: a new approach used in 400 patients. Eur J Surg. 2001;167(6):443-8.
13. Desarda MP, Ghosh A. Comparative study of open mesh repair and Desarda's no-mesh repair in a district hospital in India. East Cent Afr J Surg. 2006;11(2):28-34.
14. Xuan NT, Son NH. Laparoscopic transabdominal preperitoneal technique for inguinal hernia repair in adults. Cureus. 2020;12(6):e8692.
15. Shah T, Rajbhandari AP, Rijal B, Koirala R, Shakya A. Laparoscopic groin hernia repair: a systematic institutional study. Acta Scient Gastroint Disord. 2020;3(8):2-8.
16. Rodríguez PR, Delgado FR, Gonzalez OL, Surgeon G, Cabrera FO, Cabrera JR, et al. Randomized controlled trial comparing open prosthesis repair and Desarda's no mesh repair for inguinal hernia (A study of 836 patients). Cochrane Database Syst Rev. 2010;12:114-22.
17. Kalra T, Soni RK, Sinha A. comparing early outcomes using non absorbable polypropylene mesh and partially absorbable composite mesh through laparoscopic transabdominal preperitoneal repair of inguinal hernia. J Clin Diagn Res. 2017;11(8):13-6.
18. Ghani A, Khalil J, Khan MI, Khan H. Laparoscopic transabdominal preperitoneal versus lichtenstein tension free repair for inguinal hernia. Pak J Surg. 2012;28(1):6-11.
19. Rather ZM, Islam MN, Lone ZG. Laparoscopic trans-abdominal pre-peritoneal mesh hernioplasty for inguinal hernias: a tertiary care institute experience. Int J Adv Res. 2018;6:1324-8.
20. Eisa A, Gaber A, Harb TT. Laparoscopic transabdominal preperitoneal inguinal hernia repair. Egypt J Surg. 2014;33:86-9.
21. Shakya VC, Sood S, Bhattarai BK, Agrawal CS, Adhikary S. Laparoscopic inguinal hernia repair: a

prospective evaluation at Eastern Nepal. Pan Afr Med J. 2014;17.
22. 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(5):1062-6.
23. 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;22:110-7.
24. Cawich SO, Mohanty SK, Bonadie KO, Simpson LK, Johnson PB, Shah S, et al. Laparoscopic inguinal hernia repair in a developing nation: short-term outcomes in 103 consecutive procedures. J Surg Tech Case Rep. 2013;5(1):13-7.
25. Tzovaras G, Symeonidis D, Koukoulis G, Baloyiannis I, Georgopoulou S, Pratsas C, et al. Long-term results after laparoscopic transabdominal preperitoneal (TAPP) inguinal hernia repair under spinal anesthesia. Hernia. 2012;16:641-5.
26. Chalkoo M, Mir MA, Makhdoomi H. Laparoscopic transabdominal preperitoneal mesh hernioplasty: a medical college experience. Surg Sci. 2016;07:107-13.
27. Weiser HF, Klinge B. Endoscopic hernia repair, experiences and characteristic features. Visz Chir. 2000;35:316-20.

Cite this article as: Kumar A, Malik AA, Singh G, Bhat A. Outcomes of usage of polypropylene mesh in TAPP hernia repair. Int J Res Med Sci 2023;11:1676-81.