International Journal of Research in Medical Sciences
Zargar OU et al. Int J Res Med Sci. 2022 Oct;10(10):2240-2245
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20222530

Original Research Article

Comparative study of transabdominal preperitoneal versus open Lichtenstein hernia repair in primary inguinal hernia

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Received: 21 August 2022
Revised: 14 September 2022
Accepted: 16 September 2022

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ABSTRACT

Background: Inguinal hernia repair is one of the most commonly performed surgery in surgical practice and has evolved through various techniques. However, which technique is gold standard is still a topic of debate and the clinical studies are not adequate to show clear benefits of one technique over another. Objective was to compare the outcome of transabdominal preperitoneal repair (TAPP) versus open Lichtenstein tension free mesh repair in primary inguinal hernia.
Methods: This retrospective cohort study was conducted in a tertiary care hospital with sample size of 80 patients (40 cases in each group) and these patients were compared in terms of operative time, complications, duration of hospital stay, postoperative recovery, postoperative pain and timing of return to normal activity and work.
Results: On comparing the results of our study we found that in unilateral cases the operating time was greater in the TAPP group than the Lichtenstein group; however, in the bilateral cases, the operating time was significantly greater in the Lichtenstein repair group than the laparoscopic TAPP group. The incidence of post operative complications was lower in TAPP group (8.2%) then in open hernia repair group (21.6%). The time to return to normal activity was also lower for laparoscopic group in both unilateral and bilateral cases.
Conclusions: It can be concluded that laparoscopic TAPP repair offers significant advantage over open tension free mesh hernioplasty in terms of lesser post operative pain, lesser complications and early return to normal activity, better cosmetic outcomes, and less persisting pain but it is associated with a higher operative time depending on surgeon's expertise, more costly for the patient and there is no significant difference in early post operative complications.

Keywords: Hernia, Inguinal, Laparoscopy, Lichtenstein repair, Transabdominal pre-peritoneal repair

INTRODUCTION

Inguinal hernia repair is one of the most commonly performed surgical procedures in the world.[1] The Lichtenstein tension-free hernioplasty is currently one of the most popular techniques for repair of inguinal hernias.[2] It has been estimated that worldwide around 22 million inguinal hernia repair surgeries are being done each year.[3] This condition is affecting individuals of all age groups without any gender predisposition.[4] About 30% of patients with inguinal hernia are asymptomatic, and about 50% of patients are aware that they are suffering from hernia. Indirect inguinal hernia accounts for more than 70% cases of inguinal hernia. The incidence of incarcerated hernia has been found to be 3%. The incidence of recurrence after surgery varies from 4 to 9%.[5]

A large number of surgical approaches have been developed to treat inguinal hernias, the Lichtenstein

tension-free mesh-based repair remains the standard procedure to repair both recurrent and primary inguinal hernias. Meanwhile, the transabdominal preperitoneal procedure (TAPP) is a technique to repair the hernia by an intraperitoneal approach.[6] TAPP can be beneficial for treating bilateral hernia repair, large hernia defects, and recurrence following open repair. A large mesh can be placed with this technique to cover the direct, indirect and femoral spaces.[7]

In a Cochrane review which compared mesh repair with non-mesh open repair, the evidence was sufficient to conclude that the use of mesh was associated with a reduced recurrence rate.[8]

Laparoscopic approaches have better outcomes, but the learning curve for laparoscopic hernia repair is long and proper expertise is required. Laparoscopic approaches including transabdominal preperitoneal (TAPP) or totally extraperitoneal (TEP) repair offer specific benefits in patients with recurrent hernia after conventional open mesh hernioplasty, in patients having bilateral hernias, and those undergoing laparoscopy for other clean operative procedures.[9] A 2014 meta-analysis of studies comparing laparoscopic hernia repair with the open mesh hernioplasty technique for treatment of recurrent inguinal hernia concluded that despite the advantages of laparoscopic technique (including lesser postoperative pain and early recovery), operating time was significantly longer with the laparoscopic technique, and the choice between the two approaches depended largely on the expertise of the operating surgeon.[10]

The surgical trauma on the tissues is associated with intense inflammatory reaction of variable degrees depending on the length of incision line, amount of dissection done, use of foreign materials (mesh, tacker) and the outcomes are determined by any postoperative complication, nerve entrapment causing acute or chronic pain, healing of the wound and the recurrence rate.[11] These complications can result in a longer duration of hospital stay, long term use of analgesics and anti-inflammatory medications which affects the patient satisfaction and quality of life.[12]

Out of the two hernia repair techniques open and laparoscopic, which technique is better is still a matter of debate. According to The National Institute for Health and Care Excellence guidelines open surgical approach should be preferred in cases of primary unilateral inguinal hernias. However, many surgeons prefer to perform a laparoscopic procedure.[13] The advantages of laparoscopic approach over open surgical approach include less pain in the postoperative period and earlier recovery. The difference in the inflammatory response produced in the open surgery and laparoscopic hernia repair, is still a matter of debate due to the lack of studies regarding this aspect.[14] It is therefore important to consider the real benefits of the laparoscopic unilateral hernia repair since it is associated with an increase in the costs.

Aims and objectives

The aim of this study was to compare the outcome of transabdominal preperitoneal (TAPP) versus open Lichtenstein hernia repair in primary inguinal hernia in terms of operative time, complication rate, duration of hospital stay, postoperative recovery, return to work, cost effectiveness, scar size, and the detection of clinically insignificant (occult) hernia on the contralateral side in TAPP.

METHODS

This retrospective cohort study was conducted in the department of surgery, Government Medical College and Hospital, Jammu from April 2018 to April 2019 and cases fulfilling inclusion criteria were included in study.

A sample size of 80 patients was taken (40 cases in each group) and these patients were compared in terms of operative time, complications, duration of hospital stay, postoperative recovery, postoperative pain and timing of return to normal activity and work.

Inclusion criteria

The included patients were between 18 years and 75 years of age, of either sex, having hernia of the following types: unilateral or bilateral uncomplicated inguinal hernia, primary or recurrent inguinal hernia, or direct and indirect inguinal hernia.

Exclusion criteria

The exclusion criteria were obstructed/incarcerated hernia, prior laparoscopic hernia repair(s), massive scrotal hernias, prior groin irradiation, untreated bladder outlet obstruction (grade 3 benign prostatic hyperplasia/stricture urethra).

A written informed consent was taken from all the patients who participated in the study.

Two study groups were defined: open inguinal hernia repair group with the open (Lichtenstein) technique and the laparoscopic group (transabdominal preperitoneal-TAPP) technique. The data of all the patients including demography, any comorbidity, perioperative and survival data were collected. The time duration of the surgery was recorded. Lichtenstein tension free mesh repair was performed under spinal anesthesia with an inguinal incision, polypropylene mesh (7.5 × 15 cm, bio-mesh) fixation with 2.0 polyglactin interrupted sutures. TAPP required general anesthesia, with a three-trocar access. The same kind of polypropylene mesh was used (15 × 15 cm) and was placed in the preperitoneal space. All patients received equal analgesia at induction of anesthesia and during the immediate postoperative period (tramadol i.v. 100 mg and ketorolac i.v. 30 mg). They were discharged on analgesics containing combination of

oral paracetamol 500 mg and oral ibuprofen 400 mg every 8 hourly for 5 days. Follow-up of the patients was done till 30th postoperative day and pain score, return to work, scar size, recurrence, and complications (if any) were recorded as per the proforma. The outcomes recorded included the operation time, pain scores (visual analogue scale, VAS), and complications including wound hematoma formation, wound seroma formation, wound infection, groin pain, early recurrence, postoperative hospital stay, return to work and scar size. The recorded data was compiled and entered in a spreadsheet on Microsoft Excel and the analysis was performed on SPSS (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as mean and standard deviation, while the categorical variables were presented as frequencies and percentages. Student's independent t-test was employed for comparing continuous variables. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing the categorical variables. Statistically significant data was considered when the p value was less than 0.05. All p values were two tailed.

RESULTS

A sample size of 80 patients were included in this study divided into two groups. Each group (TAPP and Lichtenstein's repair group) had 40 participants.

Table 1: The table shows the baseline characters of the patients.

Baseline characters	TAPP group	Lichtenstein group
Mean age (years)	52.6±10.73	52.2±12.36
Males	40 (100%)	40 (100%)
Right-sided involvement	18 (46.7%)	20 (50.0%)
Left-sided involvement	13 (32.5%)	13 (32.5%)
Bilateral involvement	7 (17.5%)	6 (15.0%)
Direct	24 (60%)	17 (42.5%)
Indirect	16 (40%)	16 (40%)
Pantaloon	0 (0.0%)	7 (17.5%)

The mean age of the patients in the TAPP technique group was 52.6±10.73 years compared with 52.2±12.36 years in the Lichtenstein group. In the laparoscopic group, the youngest patient was 29 years old while the oldest was 74 years old. In the Lichtenstein group, the youngest patient was 31 years old, while the oldest was 72 years old. Using analysis of variance (ANOVA) no statistically significant variation in the age of patients was observed among the groups (p=0.967). All participants in both groups were males. In both groups, the incidence of right sided hernia was more common than the left side, the incidence being 47.5% in the TAPP group, and 50% in the Lichtenstein group). There was no statistically significant variation for the side involved (p=0.943) in the two groups. The incidence of direct hernias was found to be more common in the two groups (67.8% in the TAPP group, and 55.7% in the Lichtenstein group). With respect to the type of inguinal hernia, the two groups were statistically insignificant (p=0.112) (Table 1).

Outcomes

Operation time (minutes)

In unilateral cases the operating time was greater in the case of the TAPP group (mean 56.7 minutes) compared with the Lichtenstein group (mean 42.9 minutes); which was statistically significant (p<0.001). On the other hand, in the bilateral cases, the operating time was significantly greater in the case of the Lichtenstein group (mean 78.5 minutes) compared with the TAPP group (mean 64.3 minutes), p=0.003 (Table 2).

Table 2. The table shows the outcomes for both groups.

Outcomes	TAPP group	Lichtenstein group
Operation time (minutes) (unilateral cases)	56.7±10.65	42.9±9.53
Operation time (minutes) (bilateral cases)	64.3±6.85	78.5±4.63
Pain scores (VAS) day 0 (unilateral cases)	32.6±7.83	42.84±5.73
Pain scores (VAS) day 1 (unilateral cases)	21.7±9.32	28.43±5.42
Pain scores (VAS) day 7 (unilateral cases)	8.5±5.42	17.4±6.43
Pain scores (VAS) day 0 (bilateral cases)	38.6 4.31	45.6±3.72
Pain scores (VAS) day 1 (bilateral cases)	25.76±6.32	35.5±3.75
Pain scores (VAS) day 7 (bilateral cases)	11.5±3.42	19.4±5.82
Postoperative stay (days) (unilateral cases)	1.8±0.721	2.5±0.831
Postoperative stay (days) (bilateral cases)	1.6±0.82	3.6±1.35
Overall complications	4 (10%)	9 (22.5%)
Return to work (days) (unilateral cases)	12.8±6.72	19.21±5.81
Return to work (days) (bilateral cases)	16.2±0.931	26.8±2.870

If we compare the pain scores in unilateral cases on postoperative day 0, day 1 and day 7 we found that they were significantly lower in the TAPP group (mean 32.6, 21.7, and 8.5 respectively) then in the Lichtenstein group (mean 42.8, 28.4, and 17.4 respectively), p<0.001 for each day. Regarding the bilateral cases the pain scores on postoperative day 0, day 1 and day 7 were also significantly lower in the TAPP group (mean 38.6, 25.7, and 11.5 respectively) compared with the Lichtenstein

group, on the same days (mean 45.6, 35.5, and 19.4 respectively), p=0.007 on day 0, p=0.003 on day 1, and p=0.005 on day 7 (Table 2).

Postoperative hospital-stay (days)

In unilateral cases, the postoperative hospital stay was significantly lower in the TAPP group (mean 1.8) compared with the Lichtenstein group (mean 2.5), p=0.048. In bilateral cases, it was also significantly lower in the TAPP group (mean 1.6) compared with the Lichtenstein group (mean 3.6), p=0.038 (Table 2).

Complications

The overall complication rate in the TAPP group was 10% while in the Lichtenstein group it was 22.5%. The spectrum of complications in the two groups was different, with wound infections, seromas and urinary retention being more common in the Lichtenstein group. The overall complication rate was not statistically significant (p=0.136) between the two groups. In one patient, TAPP had to be converted to Lichtenstein procedure due to dense adhesions at the operative site (Table 2).

Return to work (days)

In unilateral cases the patients significantly returned to work earlier in the TAPP group (mean 12.8 days) compared with the Lichtenstein group (mean 19.2), p<0.001. In bilateral cases also, the return to work was earlier in the TAPP group (mean 16.2 days) compared with the Lichtenstein group (mean 26.8), p<0.001 (Table 2).

Others

The TAPP repair was associated with minimal skin scars (~0.5 cm × 2 & 1 cm × 1) at the port sites, while the Lichtenstein repair had a large scar of around 6-8 cm size in the groin. There was a clinically occult contralateral inguinal hernias in two patients in the TAPP group which was found on initial diagnostic laparoscopy.

DISCUSSION

The time taken to perform a particular surgical procedure depends on the expertise of the operating surgeon and also varies between the centres. This has got relevance because the duration of surgery has got cost implications. In our study, we found that the operative time for TAPP repair in unilateral hernia cases was significantly greater than that of the Lichtenstein repair.[15] Whereas, in the bilateral hernia the operating time for TAPP repair was less than that of the Lichtenstein repair on the two sides in the same sitting. A previous meta-analysis found a significant increase of 15.20 minutes in the mean operating time for laparoscopic inguinal hernia repair.[16] Ielpo et al recently reported that the Lichtenstein technique could decrease the operative time.[10]

In this study, one patient (2.5%) in the TAPP group had to be converted into the open repair on a table due to dense adhesions at the operating site. McCormack et al reported that 2.7% of the laparoscopic operations were converted to an open procedure.[17]

In this study, mean pain scores in the TAPP group were 32.6 on day 0, 21.7 on day 1, and 8.5 on day 7, while in the Lichtenstein group they were 42.8, 28.4, and 17.4 respectively for the unilateral cases. In the bilateral cases, we found a similar trend, but slightly higher pain scores in both groups. Similar results were found by Leigh Neumayer et al who found that on the day of surgery, the VAS was more in the laparoscopic group as compared to open group but there was a decrease in score difference after two weeks.[18]

The lower pain scores in the TAPP group lead to earlier discharge from the hospital and earlier return to work. The difference was more prominent in the bilateral group with a mean postoperative stay of 1.6 days in the TAPP group compared to 3.6 days in the Lichtenstein group. There was earlier return to work in the TAPP group. This can be attributed to the fact that there was absence of an inguinal incision or dissection of muscle in the groin during laparoscopic repair and the lower complication rate.

In our study, there were three cases of urinary retention, two cases of seroma formation, one case of wound infection, and one case of persistent pain in the Lichtenstein group. One of the three urinary retention cases had grade 2 prostatomegaly and was started on alpha-blockers afterward. The patient with seroma was managed conservatively while the one with wound infection was treated with oral antibiotics. In both the cases the mesh was preserved. The one patient with persistent pain at one month was managed conservatively using oral analgesics. In the TAPP group, there was one case of urinary retention and no case of seroma, hematoma, wound infection, visceral injury, or persistent pain was reported.

As compared with open Lichtenstein repair, TAPP hernia repair was more costly to the patient; as it requires a laparoscopic setup, fixation device, and larger size mesh. In case of unilateral hernia, operative time is longer in the laparoscopic group but in case of the bilateral hernia, operative time is lower in the laparoscopic group. Also, there was lesser postoperative hospital stay, earlier return to work and better cosmetic results in the TAPP group. The small (5 mm) port site scars were less marked than the large 6-8 cm groin scars. There was no early recurrence reported in our study in both groups; however, the follow-up duration of this study was short.

Aiolfi et al reported that TAPP significantly decreased early postoperative pain, return to work, hematoma, and wound infection compared to the Lichtenstein tension-free repair. However, seroma and hospital length of stay were similar between them.[19]

On the basis of our study it is suggested that open hernia repair, TAPP and other repairs were comparable in the short term and that further assessment on the long-term outcome is needed. Also the best treatment option will depend on the surgeon's expertise and choice of the patient.[20]

The limitations of our study include the small sample size, which also resulted in no females' inclusion in the study. The study was a single-center- single surgeon study. Also, in this study there was no segregation of patients in whom tackers were used and the rest and its effect on the post-operative pain. Due to non-availability of day care setup at our hospital the patients could not be discharged on the same day. Since the patients had to purchase some items of surgical supplies from the outside market, therefore exact cost and expenses of the surgery could not be estimated which also affected exact cost comparison. Another limitation of our study was that the follow-up period was short, therefore it was difficult to obtain long term results about the recurrence rate and chronic pain.

CONCLUSION

Based on our study it can be concluded that both Lichtenstein technique and TAPP repair are safe and reliable methods of inguinal hernia repair but the type of surgery depends on the expertise of surgeon and the choice of the patient. The advantages of TAPP repair included earlier toleration of oral feeds, lesser scar marks, better cosmetic results, lesser post-operative pain, decreased duration of hospital stay, earlier discharge from the hospital, earlier return to usual activities, and less persisting pain. Also, if a patient was suffering from occult hernia on the opposite side, it could easily be visualised and treated in the same sitting in TAPP. If we compare the complication rate between the two groups, we found that there was no significant difference between the two techniques but the chances of serious complications were high in the TAPP technique. The only limiting factor in TAPP repair was that it was more costly for the patient.

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

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Cite this article as: Zargar OU, Ashraf N, Albina A, Iqbal J, Dhingra NC. Comparative study of transabdominal preperitoneal versus open Lichtenstein hernia repair in primary inguinal hernia. Int J Res Med Sci 2022;10:2240-5.