

Transabdominal Preperitoneal (TAPP) Vs Total Ext-Raperitoneal (TEP) Laparoscopic Inguinal Hernia Repair; A Comparative Study in terms of Operative and Postoperative Complications

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ABSTRACT

Aim: To compare both techniques for operative & postop complications, operative time & hospital stay.

Methods: This prospective study was conducted from February 2010 to June 2012. It included patients having reducible inguinal hernia, and fit for general anesthesia, operated by either TAPP or TEP technique. Type of the technique was decided by the surgeon, with patients consent. All intra operative and post operative complications, operative time and hospital stay were recorded.

Results: One hundred twenty one patients were included in this study twelve patients have bilateral inguinal hernia. Total 133 inguinal hernia were repaired laparoscopically, 74(55.64%) hernia were repaired by TAPP and 59(44.36%) hernia by TEP technique. There was no mortality, and no major complication occurs during any technique. The operative time was longer in TEP (mean 55 minutes) then TAPP (mean 48 minutes) 'P' value was 0.0001.

Conclusion: TAPP have advantages over TEP technique. TAPP technique having less complications rate and shorter operative time.

Keywords: Laparoscopic, TAPP (trans-abdominal pre-peritoneal), TEP (total extra-peritoneal), Hernia

INTRODUCTION

Inguinal hernia is a common surgical problem worldwide. It significantly decreases the quality of life. Inguinal hernia repair is one of the most common worldwide elective general surgical operations, and it can be emergency surgical operation in case of obstructed or strangulated inguinal hernia. Inguinal hernia can be repaired by various open and Laparoscopic methods, no single procedure is superior to others¹. The development and innovation in minimally access surgery during the late 1980s, allowed inguinal hernia to be repaired Laparoscopically². During the last two centuries various methods to repair inguinal hernia have been described, like Marcy's repair, Bassini's repair, now at present Laparoscopic inguinal hernia repair.

The advantages of Laparoscopic hernia repair include less post-operative pain, less need for narcotics and non narcotic analgesics, better cosmetic and early return to normal activity³. In 2001 the National institute of clinical excellence (NICE) was reported that laparoscopic inguinal hernia repair is better than open because it is associated with less postoperative pain and quick recovery⁴.

At present inguinal hernia can be repaired Laparoscopically by two standardized techniques, TAPP (Transabdominal Preperitoneal) repair, describe by Arregui in 1992⁵, and TEP (total extra peritoneal) repair described by Mckernan JB and Laws HL in 1993⁶. The TAPP technique is easy to learn, but there is disadvantage, that the peritoneal cavity is breached, and there is possibility of bowel adhesion to the mesh⁷ after repair. In TEP, hernia is repaired extra peritoneal and preserve the "peritoneal sanctity" but it is technically difficult procedure, it has a longer and steeper learning curve due to inside out anatomical view⁸. To learn TEP technique, it requires the surgeon to be familiar with unfamiliar anatomy but it has the advantage of direct access to the posterior defect without entering the peritoneal cavity⁹.

The purpose of this study is to compare the TAPP and TEP technique of laparoscopic inguinal hernia repair in terms of operative and post-operative complications.

MATERIALS AND METHODS

This prospective study was conducted on patients operated for laparoscopic inguinal hernia repair from February 2010 to June 2012 in surgical unit II of Liaquat University Hospital Jamshoro. All operations were done by two surgeons. Both surgeons were experienced in doing TAPP and TEP Laparoscopic hernia repair.

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Patients were placed in two groups, those who operated by TAPP technique placed in group TAPP, those operated by TEP technique were placed in group TEP. Patients having uncomplicated inguinal hernia and fit for general anesthesia were included in this study. Following were the exclusion criteria; previous lower abdominal surgery, unfit for general anesthesia, complicated inguinal hernia (irreducible, obstructed, and strangulated), recurrent hernia, pregnancy, history of malignancy, morbid obesity, uncorrected coagulopathy.

Type of the technique was decided by the surgeon with the patient consent. After operation patients were followed up for post-operative clinical evaluation at 1, 3,6,12 months after surgery. All intra-operative and post operative complications were recorded. All operations were performed under general anesthesia. The patients were placed in supine position, both arms kept by the side of patient. Head was tilted down 10-20° so that small bowel falls away from pelvis and temporarily reduces the hernia, video monitor placed at foot end of the operation table. The Surgeon stands on side of the patient, opposite to hernia and assistant stands opposite the surgeon. A single dose injection of velosef 1G after test dose was given intravenously as antibiotic prophylaxis pre-operatively. In both techniques a polypropylene mesh of size 10x15cm was used to repair the posterior inguinal floor, which was anchor with tracks.

Technique TAPP repair: A 10mm trochar was placed 5mm below umbilicus by open technique. Pneumoperitoneum was created up to 13mmHg with CO₂. A 10mm 30° telescope was inserted and whole peritoneal cavity was examined. Two other 5 mm trochar were inserted under vision on either side of umbilicus at the lateral border of rectus abdominus muscles. The content of the hernia if any, were reduced. The peritoneum was incised transversely approximately 2cm above deep inguinal ring, extending medially until the medial umbilical ligament and lateral limit correspond to the anterior superior iliac spin. Peritoneal flap was raised and inguinal ligament, spermatic cord, space of Ritzius and lateral wall of urinary bladder were identified. Adequate peritoneal space was created to accommodate 10x15 cm polypropylene mesh. Peritoneal flap was closed with track or continuous suture with vicryl 2/0.

Technique TEP repair: In this technique all three port were made in the midline. A 11-12 mm incision was made below the umbilicus, off the midline, on the side of hernia, for 10 mm 30° telescope. The anterior rectus sheath was incised and the rectus muscles were retracted laterally. Blunt dissection was done with pea nut and telescope until pubic symphysis. The space was insufflated with CO₂. Other two 5 mm

trochar was inserted in the midline, one just above the pubic symphysis and other between the pubic symphysis and umbilical port. Continue dissection laterally from pubic symphysis, identifying the inferior epigastric vessels, further laterally. The peritoneum was teased down as low as possible. The indirect hernia sac was reduced completely if incomplete hernia or sac was divided after application of clip if it was complete. The mesh was introduced through umbilical port, and placed properly covering the deep inguinal ring, femoral ring and Hasselbach's triangle. The mesh was not fixed and peritoneum was released.

All data were analyzed in statistical program SPSS version 20. Variables(frequency and percentage) such as, conversion of procedure, hematoma formation, groin pain and paraesthesia were presented as n(%) and chi-square test was used to compare the proportionate between the groups (TAPP&TEP). Continuous variables like operative time (in minutes), hospital stay (in hours), time to return in usual activity (in days) were presented as mean±standard deviation and 't' test was applied to compare the means between the two groups. P value < 0.05 was considered as statistically significant.

RESULTS

One hundred twenty one patients were operated laparoscopically for one hundred thirty three inguinal hernia repair. 74 inguinal hernia were repaired by Trans abdominal pre peritoneal technique (TAPP) on 67 patient, while the remaining 59 inguinal hernia were repaired by total extra peritoneal (TEP) technique on 54 patients. A part from sex distribution there was no significant difference in the age of patients, in TAPP technique 66 hernias were indirect and 8 were direct, While in TEP technique 57 indirect inguinal hernia and two direct hernia were repaired. Detail is given in table-1.

Table 1: Patient detail

	TAPP	TEP
Number of patients	67	54
Number of hernia repaired	74(bilateral=7)	59(bilateral=5)
Age(years) mean	37.4 (18-70)	35.2 (20-72)
Male: female	65: 2	54: 0
Indirect hernia	66	57
Direct hernia	8	2

There was no mortality and also no major complication occurs during either procedure. The operative time was longer in TEP (mean 55 minutes) then TAPP (mean 48 minutes). The 'P' value was

0.0001 that was statistically highly significant. The mean hospital stay was 33 hours in TAPP and 36 hours in TEP groups, the 'P' value was 0.0449, that was statistically significant. One TEP was converted to TAPP because of difficulty in identification anatomy. Scrotal edema (hematoma) occurs in 2 patients of TAPP and 3 patients of TEP procedures. Groin pain and paraesthesia occur in 2 of TAPP and

3 patients of TEP groups. Patients return to usual activities after 21 days in TAPP, and after 22 days in TEP procedure. Recurrence after 10 month occurs in one patient of TEP. The recurrent hernia was repaired by open mesh repair. The results of two techniques were compared in table-2.

Table 2: Result of Laparoscopic inguinal hernia repair (operative and post operative detail)

Outcome	TAPP (n=74)	TEP (n=59)	p value
Operative time in minutes (mean/ SD)	48 / 10.38	55/ 7.38	0.0001**
Complications during surgery (bowel & vessels injury)	None	None	-
Conversion (%)	None	1(1.69)	0.265
Hematoma (%)	2(2.7)	3(5.08)	0.816
Groin pain/ paraesthesia (%)	2(2.7)	3(5.08)	-
Hospital stay in hours (mean/SD)	33/10.59	36/10.7	0.0449*
Time to return to usual activities in days (mean/SD/SEM)	21/4.01/0.47	22/3.87/0.50	0.0449*
Recurrence in 4 month	None	1	-

SD= standard deviation , SEM= standard error of the mean. *=significant, **= more significant

DISCUSSION

Since long, the pre-peritoneal space has been considered as a suitable place for inguinal hernia repair. The Usher et al¹⁰ was the first who described the anterior prosthetic pre-peritoneal repair. During the late 1980's Lichtension et al¹¹ described and performed the tension free mesh repair of inguinal hernia. He effectively used mesh to strengthen the inguinal floor that have low recurrence rate. First in 1982 Ger² reported a Laparoscopic repair of an inguinal hernia by intra abdominal closure of hernia sac. Subsequently, Arrgui et al⁵ and Dion and Morin¹² in 1992 reported Laparoscopic Trans abdominal pre-peritoneal (TAPP) approach to repair inguinal hernia. Dulucq¹³ recommended the laparoscopic totally extra-peritoneal (TEP) approach to repair inguinal hernia, in an attempt to avoid intra-peritoneal complications from TAPP approach.

After the introduction of laparoscopic techniques (TAPP & TEP) to repair inguinal hernia, several studies revealed that, laparoscopic repair had low recurrence rate, fewer post-operative complications, early discharge, and able to return to their usual activities more quickly than patients who underwent open inguinal hernia repair¹⁴. Despite these benefits laparoscopic techniques to repair inguinal hernia is widely practices in our and most of the other regions of the world. Several factors account for that. The laparoscopic techniques are more technical demanding, and it must be performed under general anesthesia, the cost of instruments and clips are other drawbacks. A review of literature shows the open approach to be less costly but with the possibility of quality of life issues compared with laparoscopic approach¹⁵.

In this study I compared both technique and tried to see, if there was any advantage of one technique over the other with regards to difficulties in approach, operative time, operative and post-operative complications, possibilities of conversion to other technique, hospital stay, time to return to usual activities.

The principle of TAPP and TEP repair is generally the same. In both techniques, the inguinal floor is strengthening with mesh. The only difference is the approach to the operative field. The TAPP technique require the safe trans-abdominal laparoscopic access, while in the TEP technique, the whole procedure is performed in the extra peritoneal space without opening the peritoneum, that is why it is believed that, this could decrease the rate of complications resulting from intra peritoneal approach¹⁶. However some surgeon blames that, TEP needs extensive dissection, which is contrary to the concept of minimal invasive surgery and might contribute to a higher local complication rate¹⁷.

I found TAPP approach is easy, and anatomical landmarks can be easily identified. While TEP approach is more difficult and anatomical landmarks difficult to recognize. That is why TAPP is more easy to the new surgeons⁸. In this study I found that TAPP have shorter operative time than TEP, same finding reported by McCormack et al¹⁸, that duration of operation for TAPP is 40 minutes and 55 minutes for TEP. One other study¹⁹ also shows shorter operative time in TAPP than TEP. The reason for longer operative time for TEP, could be due to a limited working space and different appreciation of usual anatomical landmarks²⁰ and more dissection. K.McCormack et al¹⁸, found no difference between TAPP and TEP in terms of length of operative time,

while Asuri Krishna et al²¹ in his randomized control trial, found that TAPP has longer mean operative time (72.32 min) than TEP (62.13 min), he described reason for the longer operative time for TAPP, could be time taken for suturing the peritoneum to cover the mesh. One more randomized control trial²² comparing TAPP versus TEP directly showed a significantly longer operative time for TAPP. Operative time can be significantly reduced by using tracks instead of suturing the peritoneum to cover the mesh.

There was no intra abdominal operative complication (bowel, vessels injury) in this study, though some other studies reported intra operative complications. A meta-analysis of TAPP and TEP versus open hernia repair reported very low incidence of intra-operative complication during laparoscopic approach²³. Also in Asuri Krishna²¹'s study there was no major vascular or inferior epigastric vessels injury in both TAPP and TEP groups.

After laparoscopic repair of inguinal hernia, scrotal edema or hematoma is a common complication²⁴. In present study scrotal edema occur in 2(2.7%) patients of TAPP and 3(5%) patients of TEP groups, these patients managed conservatively. On the contrary Asuri Krishna³ study shows the incidence of scrotal edema 34% in TAPP and 9.4% in TEP group. Clinical factors associated with the development of scrotal edema are old age, large hernia defect, complete inguinal hernia, and the presence of distal indirect sac in a study conducted by Lau et al²⁵.

Some studies reveals, there is no significant difference between TAPP and TEP for post-operative groin pain^{18,22,26,27}. In present study 2(2.7%) patients of TAPP and 3(5%) patients of TEP group suffered from post operative groin pain. In Bansal VK's²⁸ study there was significantly higher acute pain following TAPP repair. The problem of pain after laparoscopic hernia repair can be decreased by avoiding fixation of mesh with staples and using tracks or fibrin glue without increasing the risk for hernia recurrence²⁹.

In this study one patient of TEP group was converted to TAPP, because difficulty in identification of anatomy. In some studies conversion rate was higher in TEP group compared with TAPP, the rate ranging from 0 to 7%^{18,30,31,32,33}. However two studies shows conversion rate between TAPP and TEP were very similar at 0.23 and 0.24%³⁴.

Concerning the hospital stay, and return to usual activities we found no significant difference between TAPP and TEP. That is consistent with the finding in other studies^{26,18,27}. Hamza et al²⁶, stated hospital stay may be an elusive parameter for evaluation of

hernia surgery, because it is largely depend on the trend in medical practice, and local tradition.

In present study I found one recurrence of hernia in TEP. Recurrence is the most important end point of any hernia surgery³⁵. For many years recurrence was the only criteria by which the quality of hernia repair was measured. Heikkinen et al²⁹ reported that both TAPP and TEP have a low risk for hernia recurrence if proper mesh sides are used. Fitzgibbons et al³⁶, concluded from his study that, the factors resulting in recurrence include inexperience surgeon, inadequate dissection, insufficient mesh size, insufficient prosthesis overlap of hernia defects, improper fixation of mesh, mesh folding or twisting, missed hernia and hematoma displacing the mesh.

Overall in the present study I found no significant difference in intra operative complication, return to usual activities between TAPP and TEP, but there are some advantages in the TAPP over TEP. The operative time was shorter in TAPP, and conversion rate is slightly higher in TEP. But there is no sufficient evidence to recommend the use of TAPP rather than TEP.

CONCLUSION

Both laparoscopic techniques to repair inguinal hernia are feasible. We found that TAPP is much easier technique than TEP and having less complication rate and shorter operative time. Though in TAPP there slightly more chances of bowel injury, but by following the guidelines it can be reduced. The choice of technique could be according to the surgeon skill and preference.

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