



## COMPARITIVE STUDY BETWEEN POSTOPERATIVE OUTCOME OF TRANSABDOMINAL PREPERITONEAL REPAIR VS TOTALLY EXTRAPERITONEAL REPAIR FOR INGUINAL HERNIA REPAIR

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### ABSTRACT

**INTRODUCTION** Hernias are among the oldest known afflictions of humankind, and surgical repair of the inguinal hernia is the most common general surgery procedure performed today. Despite the high incidence, the technical aspects of hernia repair continue to evolve.

The introduction of laparoscopic techniques opened a new era in inguinal hernia repair. As there is a scarcity of data, that directly comparing laparoscopic TAPP and laparoscopic TEP and question remain about their relative merits and risks.

This study aims to compare post-operative outcomes of TAPP and TEP directly in order to determine which method is associated with better outcomes.

**MATERIALS AND METHODS** The purpose of this study is to compare post-operative outcomes and clinical effectiveness between laparoscopic TAPP and laparoscopic TEP for inguinal hernia repair. Duration of study was from September 2009 to August 2011.

Age eligible for study includes 18 years to 80 years. All patients with uncomplicated symptomatic inguinal hernia attending the out-patient department of surgery will be included. Diagnosis of inguinal hernia by clinical examination. Laparoscopic inguinal hernia repair done by either TEP or TAPP approach.

**RESULTS** Hernia is one of the common surgical problems presenting to our everyday outpatient department. We have been performing both TAPP and TEP procedures for hernia repair in the department. Both these procedures are well standardized. Duration of study was from September 2009 to August 2011. Age eligible for study was 18 years to 80 years. Highest incidence of the age was occur in both 30 to 40 yrs and 41 to 50 yrs, (25.33%) In this study, the predominant type of hernia operated was indirect inguinal hernia (61.33%). Pain was the common post-operative complication and it accounts for about 6.66%. There were no serious adverse events in TEP. **CONCLUSION** Totally Extra-peritoneal Repair (TEP) is preferred over Trans-abdominal Pre-peritoneal Repair (TAPP) for laparoscopic hernia repair because it preserves the peritoneal integrity and also has lesser post-operative pain. However, TEP repair has been associated with a steep learning curve. It's a technically demanding procedure because of the unfamiliar anatomy and requires lot of training and laparoscopic experience. A gradual shift towards TEP has been observed worldwide because of its advantages such as reduced risk of bowel injury, bowel adhesions and incisional hernia formation. Still TAPP repair holds good for huge hernia and in initial learning phase.

**KEYWORDS** : Hernia repair, TAPP, TEP

### INTRODUCTION

A hernia is defined as an area of weakness or complete disruption of the fibro muscular tissues of the body wall. Structures arising from the cavity contained by the body wall can pass through or herniate, through such a defect. While the definition is straight forward, the terminology is often misrepresented. It should be clear that hernia refers to the actual anatomic weakness or defect and hernia contents describe those structures that pass through the defect.

Hernias are among the oldest known afflictions of humankind, and surgical repair of the inguinal hernia is the most common general surgery procedure performed today.<sup>1,2,3</sup> Despite the high incidence, the technical aspects of hernia repair continue to evolve.

When the modern techniques for inguinal hernia repair were described in 19<sup>th</sup> century, recurrence was the problem.<sup>4,5,6</sup>

All conventional tissue repairs have a common problem in suture line tension. This tension is the prime cause for tissue or suture disruption causing hernia recurrence.

The advent of synthetic mesh made possible the bridging of large gaps in the tissues without tension, making it possible to cure every hernia, irrespective of its size or shape.

The "Lichtenstein" introduced his concept of "tension - free" repair of inguinal hernias using synthetic polypropylene mesh.<sup>7,8</sup> The introduction of laparoscopic techniques opened a new era in inguinal hernia repair.

Although groin hernia repair is associated with excellent short and

large term outcomes, complications of the procedure exist and must be recognized.<sup>9,10</sup>

As there is a scarcity of data that directly comparing laparoscopic TAPP and laparoscopic TEP and question remain about their relative merits and risks.

This study aims to compare post-operative outcomes of TAPP and TEP directly in order to determine which method is associated with better outcomes.

### MATERIALS AND METHODS

The purpose of this study is to compare post-operative outcomes and clinical effectiveness between laparoscopic TAPP and laparoscopic TEP for inguinal hernia repair.

1. Duration of study was from September 2009 to August 2011.

### SELECTION OF STUDY SUBJECTS:

**Age eligible for study** : 18 years to 80 years  
**Genders eligible for study** : Both

### Inclusion Criteria:

1. All patients with uncomplicated symptomatic inguinal hernia attending the out-patient department of surgery will be included.
2. The diagnosis of inguinal hernia will be made clinically.

### Exclusion Criteria:

1. Co-morbid conditions making the patients unfit for general anaesthesia

2. Complicated hernia.
3. Uncorrectable coagulopathy.
4. Morbid obesity (Body Mass Index > 30).
5. Suspected intra-abdominal or pelvic malignancy

#### DATA COLLECTION:

1. Serious adverse events (including visceral injuries and vascular injuries)
2. Pain
3. Hernia recurrence
4. Conversion
5. Haematoma
6. Seroma
7. Wound/Superficial Infection
8. Mesh/Deep Infection
9. Port site hernia
10. Length of hospital stay (Days)
11. Time to return to usual activities (Days)
12. Persisting numbness

Through clinical examination and direct interview with the patient by Questionnaire method.

#### METHODOLOGY:

1. Diagnosis of inguinal hernia by clinical examination.
2. Checking for patient selection by above mentioned method.
3. Laparoscopic inguinal hernia repair done by either TEP or TAPP approach.

#### Pre—operative Preparation:

Single dose of injection Cefotaxim 1 gm i.v. will be given as prophylaxis preoperatively. Part will be shaved and cleaned properly. Patient will be catheterized before the start of the procedure.

#### Operative Procedure

##### General Anesthesia-

Patient will be placed in supine position with both upper limbs by the side of the patient. Induction will be done by succinyl choline and maintenance by O<sub>2</sub>+N<sub>2</sub>O+Halothane and Atracurium. Patients will be kept on intermittent positive pressure ventilation during the procedure.

##### Technique of TAPP repair:

Pneumoperitoneum upto 14 mmHg will be created with CO<sub>2</sub> using Veress needle at umbilicus. A standard 10 mm trocar will be placed 1 cm below the umbilicus for insertion of laparoscope. Two additional 5 mm trocars will be placed at the same level approximately<sup>5-6</sup> cm on either side of the umbilicus. The contents of the inguinal hernia (if any) will be pulled back into the abdomen. A short curved incision will be made lateral to the inguinal ring extending transversely below the semilunar line, to enable the formation of a peritoneal flap until the identification of the inferior epigastric vessels medially. The rectus muscle will be used to identify the pubic tubercle and Cooper's ligament.

After the dissection, a rolled piece of polypropylene mesh (10x15 cm) will be introduced via umbilical port into the abdomen. After unrolling the mesh, it will cover the entire inguinal area on the affected side. No tacker will be used to fix the mesh. The peritoneal flaps will be closed back to cover the mesh completely using absorbable suture 2-0 vicryl; this is to prevent adhesions between mesh and intestine. The CO<sub>2</sub> will be released, the midline trocar fascia will be closed, and then the other trocar sites will be closed with simple suture using 2-0 silk.

##### Technique of TEP Procedure:

All three ports will be made in the midline. A 10 mm port just below the umbilicus will be made for telescope. The rectus muscle will be retracted laterally after incising the rectus sheath and a blunt dissection done using the telescope to create preperitoneal space

until the pubis is felt. Two 5 mm ports will be made, one just above the pubis and the other in the midline between 10 mm port and 5 mm pubis port. The entire posterior floor will be dissected and the anatomical landmarks recognized. A single sheet of mesh will be introduced. If the peritoneum or hernial sac gets inadvertently opened during dissection, it will be sutured or ligated with a chromic endoloop, if possible. The mesh will be left in the preperitoneal space adequately covering the deep inguinal ring, Hasselback's triangle and femoral hernia site. No tacker will be used to fix the mesh. The CO<sub>2</sub> will be released. The 10 mm port fascia will be closed using 1-0 vicryl, and then the 5mm port sites will be closed with simple suture using 2-0 silk.

Any intra-operative complications like vascular, nerve or vas injury, peritoneal breach and serious visceral injuries will be recorded. The operative time will be recorded as the time from the incision until the last skin stitch.

Any conversions from totally extra peritoneal technique to transabdominal preperitoneal technique and from laparoscopic to open repair will be recorded with the specific reason for conversion.

For postoperative pain relief, injection diclofenac sodium 75 mg i.m. and for vomiting injection ondansetron 8 mg i.v. will be given post-operatively in the recovery room to all patients. Pain will be recorded at 1, 6, 24 hours after operation, at the time of discharge and during follow up on a Visual Analogue Scale (VAS) with end points labeled as no pain and worst possible pain on a scale of 10. Visual analogue scale No pain to Worst possible pain 012345678910 Extra analgesic and antiemetic requirements, post-operative time to resume feeding, return of bowel activity, total hospital stay, any urinary retention will be the other variables measured post-operatively.

Complications including haematoma / seroma formation and wound infections will be recorded:

#### Recurrence and cosmesis will be recorded during follow-up.

4. Post -operative outcomes assessed on the basis of primary and secondary outcomes by clinical examination and direct interview with the patient through a Questionnaire.
5. Follow up was done at outpatient department at 3 months, (months to look for late complications like recurrent hernia and mesh infection or rejection).
6. Post operative outcomes were compared between TAPP and TEP group and statistically analysed using Chi-square test and the significance noted.

The below mentioned statistical tools were used in this study. The information collected regarding all the selected cases were recorded in a Master Chart. Data analysis was done with the help of computer using Epidemiological Information Package (EPI 2010) developed by Centre for Disease Control, Atlanta.

Using this software range, frequencies, percentages, means, standard deviations, chi square and 'p' Values were calculated by One way ANOVA and 't' test. Kruskal Wallis chi—square test was used to test the significance of difference between quantitative variables éuid Yate's chi square test for qualitative variables.

A 'p' value less than 0.05 is taken to denote significant relationship.

#### RESULTS

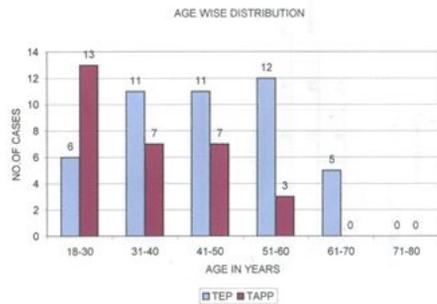
Hernia is one of the common surgical problems presenting to our everyday outpatient department. We have been performing both TAPP and TEP procedures for hernia repair in the department. Both these procedures are well standardized. Duration of study was from September 2009 to August 2011. Age eligible for study was 18 years to 80 years. Highest incidence of the age was occur in both 30 to 40 yrs and 41 to 50 yrs, (25.33%) shown in table 1, chart 1

#### Table – 1

**Age wise distribution**

Age in years	TEP	TAPP	TOTAL	%
18-30	6	13	19	21.33
31-40	11	7	18	25.33
41-50	11	7	18	25.33
51-60	12	3	15	20.00
61-70	5	0	5	6.66
71-80	0	0	0	1.33
TOTAL	45	30	75	100

**CHART 1**

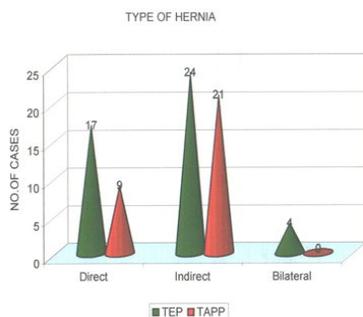


In this study, the predominant type of hernia operated was indirect inguinal hernia (61.33%). Shown in table 2, chart 2

**Table – 2 Type of Hernia**

Type	TEP	TAPP	No. of Cases	Percentage
Direct	17	9	25	33.33
Indirect	24	21	46	61.33
Bilateral	4	0	4	5.33
TOTAL	45	30	75	100

**CHART 2**

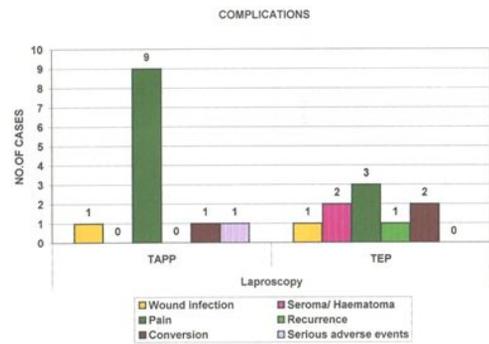


Pain was the common post- operative complication and it accounts for about 6.66%. There were no serious adverse events in TEP. Shown in table 3, chart 3.

**Table – 3 Post- Operative Complications**

Complications	Laprosopy			
	TAPP (n=30)	%	TEP (n=45)	%
Wound infection	1	3.33	1	2.22
Seroma / Haematoma	0	0	2	4.44
Pain	9	30.0	3	6.66
Recurrence	0	0	1	2.22
Conversion	1	3.33	2	4.44
Serious adverse events	1	3.33	0	0

**CHART 3**



Complications were compared in both TEP AND TAPP methods as in table 4. Pain was more in TAPP method and 'P' Value was significant in pain only. Duration of the hospital stay was less in TEP in 38 patients, shown in table 5.

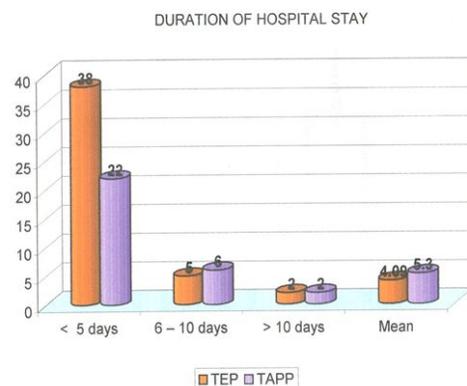
**Table – 4 Complications**

Complications	Pain	Wound Infection	Conversion
TEP(n=45)	6.66%	2.2%	4.4%
TAPP (n=30)	30%	3.3%	3.3%
'P' Value	0.048 Significant	1.000 Not Significant	1.000 Not Significate

**Table – 5 Duration if Hospital Stay**

Duration in Days	TEP	TAPP
< 5 days	38	22
6-10 days	5	6
> 10 days	2	2
Mean	4.09	5.3
S.D.	2.79	3.53

**CHART 4**



**DISCUSSION**

**Age**

In our patients age ranged from 18 to 80 years. More than 75 percent over 31 years. The maximum incidence was in the age group of 31-50 years (50.66%).

**Type of Hernia :**

In 75 cases studied 46 cases were of indirect inguinal hernias (61.33%). 25 cases were direct inguinal hemias (31.33) and 4 were bilateral hernia (5.33%).

Indirect inguinal hernias were more common  
Post-operative complications:

Post-operative pain in patients undergoing TAPP (30%) was found to be more than patients undergoing TEP, (6.6%) which was statistically significant. P value is 0.048.

The post-operative wound infection in TAPP group was 3.3% when compared to TEP group which was 2.2%. P value is 1.000 which was not statistically significant.

Conversion Rate in patients undergoing TAPP was found to be 3.3% when compared to undergoing TEP which was 4.4%. P value is 1.000 which was not statistically significant.

There was a recurrence in one case in TEP group at 1 month followup.

There was one case which had a bowel injury (Serious adverse events) in TAPP group which was repaired.

The mean duration of post-operative hospital stay in TEP group was 4.09 days when compared to TAPP which was 5.3 days.

In our study TAPP patients had higher post-operative pain and had a longer postoperative hospital stay when compared to TEP patients.

Laparoscopic Inguinal Hernia Repair (LIHR) has got comparable results in comparison to tension free open hernia repair (OHR). Many studies have shown that LIHR gives similar results in terms of recurrence as compared with OHR,<sup>11,12,13</sup> but with the added advantage of less chances of post operative, pain, wound infection and early return to activity.

In a study by Arvidasson D et al<sup>8</sup> compared 5 years recurrence rates of laparoscopic inguinal hernia repair Vs Shouldice repair of primary inguinal hernia which is considered the gold standard for open non-mesh repair of hernia.<sup>14,15,16,17</sup> The cumulative recurrence rate after 5 years was 6.6% in the TAPP group and 6.7% in the Shouldice group. Wara et al have demonstrated that laparoscopic repair compared favourably with Lichtenstein repair for primary indirect and direct hernias, unilateral and bilateral hernias, and recurrent hernias but was inferior for primary bilateral hernias.<sup>18,19</sup>

There have been 4 non randomized comparative studies that have compared the 2 techniques i.e. TAPP vs TEP.<sup>20,21</sup> The results of these comparative trials have shown that the 2 techniques are comparable with regard to the complications such as vascular and visceral injury. However, the port site recurrence was shown to be higher in the TAPP compared with TEP technique. The operating time and the cost of the procedure were not compared in any of the trials.

In a comparative trial of 491 consecutive herniorrhaphies by Kald et al, TAPP was compared with TEP.<sup>22,23</sup> Hernia recurrence was shown to be higher in the TAPP group after a mean follow up of 23 and 7 months respectively. Other complications were similar with both the techniques. However, serious intra-abdominal complications occurred in the TAPP group patients with bowel obstruction and one with severe neuralgia. These complications were not seen with a completely pre-peritoneal TEP approach. Although the TEP method is technically more difficult, the mean operative time in TAPP and TEP groups were similar. The mean hospital stay and the times to final recovery were also similar in the TAPP and TEP groups. There is only one randomized controlled trial comparing, TAPP with TEP repair. In this RCT, 52 patients were randomized to either TAPP or TEP.<sup>24</sup> The study showed that the 2 techniques were similar with regard to the complications, time to return to activities and hernia recurrence. However, the length of stay was shorter in the TAPP group (3.7 vs 4.4 days; p=0.03).

However, since there is only one RCT involving only 52 patients, the Cochrane database review 2005 has concluded that there are insufficient data comparing TAPP and TEP techniques of laparoscopic inguinal hernia repair.

## LIMITATIONS OF THE STUDY

1. The sample size selected should be more.
2. Follow up of patients after 1 month was difficult due to poor compliance of the patients.
3. TEP has a long learning curve hence complications tend to occur in initial period.

## CONCLUSION

Totally Extra-peritoneal Repair (TEP) is preferred over Trans-abdominal Pre-peritoneal Repair (TAPP) for laparoscopic hernia repair because it preserves the peritoneal integrity and also has lesser post-operative pain. However, TEP repair has been associated with a steep learning curve. It's a technically demanding procedure because of the unfamiliar anatomy and requires lot of training and laparoscopic experience. A gradual shift towards TEP has been observed worldwide because of its advantages such as reduced risk of bowel injury, bowel adhesions and incisional hernia formation. Still TAPP repair holds good for huge hernia and in initial learning phase.

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