



**ORIGINAL RESEARCH PAPER**

**Medical Science**

**Effectivity of Laparoscopic Repair of Inguinal Hernia - Our Experience**

**KEY WORDS:** Hernia, Inguinal, TAPP, TEP, Lichtenstein repair, Complications

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**ABSTRACT**

Inguinal Hernia can be repaired by open method or laparoscopic method. In our study we have compared the effectivity of laparoscopic repair of inguinal hernia with open method. The traditional method of open repair of groin hernias using suturing has changed little in the 100 years following the introduction of **Bassini's method** in the late 19th century. The use of open tension-free methods of inguinal hernia repair using prosthetic mesh has only recently become widely adopted. The most common open technique in use that is popularised by **Lichtenstein and colleague** was used in our study. The two laparoscopic techniques are transabdominal preperitoneal (TAPP) or total extraperitoneal (TEP) approach, of which we used TEP in our study. We concluded that laparoscopic TEP technique was more effective in repair of inguinal hernia as compared to Lichtenstein repair.

**Introduction**

The first report of a hernia repair using laparoscopy was made in 1982 using laparoscopic closure of the neck of the sac<sup>2</sup>. The first reported use of prosthetic mesh for laparoscopic inguinal hernia repair was in 1991<sup>4,5</sup>. Laparoscopic approaches allow hernia repair without the need to open the abdominal wall. Instead, small incisions are made for the operating instruments and for a laparoscope. As with open mesh techniques, a mesh is generally used to close the defect in abdominal wall and prevent the intestine from protruding again through the abdominal wall. The main variations in laparoscopic approaches depend on whether or not the instruments enter the peritoneal cavity. The two laparoscopic techniques are transabdominal preperitoneal (TAPP) or total extraperitoneal (TEP) approach.

**Open method:**

The traditional method of open repair of groin hernias using suturing has changed little in the 100 years following the introduction of **Bassini's method** in the late 19th century. The use of open tension-free methods of inguinal hernia repair using prosthetic mesh has only recently become widely adopted<sup>1</sup>. The most common open technique in use is that popularised by **Lichtenstein and colleagues**. This involves the suturing of a mesh deep to the external oblique muscle, thus reinforcing the posterior wall of the inguinal canal and deep internal ring<sup>2</sup>. Open mesh repairs can be further classified as flat mesh (including, for example, the Lichtenstein method of repair), open preperitoneal mesh (including the Stoppa and Nyhus methods of repair) and the plug and mesh (including the Rutkow and Robbins repair).

**Transabdominal preperitoneal repair (TAPP)**

TAPP repair requires access to the peritoneal cavity with placement of mesh through a peritoneal incision<sup>6</sup>. A large piece of mesh is placed in the preperitoneal space covering all potential hernia sites in the inguinal region covering myopectineal orifice of Fruchaud. The peritoneum is then closed above the mesh, leaving it between the preperitoneal tissues and the abdominal wall, where it becomes incorporated by fibrous tissue.

**Totally extraperitoneal repair (TEP)**

TEP approach is a newer laparoscopic technique and was first reported in 1992<sup>7</sup>. In this method, the peritoneal cavity is not entered and mesh is used to seal the hernia from outside the peritoneum. The TEP approach is considered to be technically more difficult than the TAPP approach but it may lessen the risks of damage to the intra-abdominal organs and of adhesion formation leading to intestinal obstruction, risks which have been linked to the TAPP technique.

**Aim and Objectives**

**Aim :**

To find out effectivity of TEP technique compared with open Lichtenstein technique for repair of inguinal hernia.

**Objectives :**

1. To determine outcome of TEP repair of inguinal hernia in terms of –
  - a. Intra operative complications
  - b. Post operative complications
  - c. Doses of analgesic required
  - d. Duration of hospital stay
  - e. Time to resume to routine activities
  - f. Recurrence
2. Comparison of these outcomes with open Lichtenstein repair of inguinal hernia and to know whether TEP group is as effective as open group in repair of inguinal hernia

**Methods**

The study was carried out in AVBRH from academic year 2009-10 to 2011-12. 50 patients were enrolled in the study. 25 patients were operated by TEP technique and 25 patients were operated by open technique.

**Inclusion criteria**

- All the patients who were willing and who were fit for general anesthesia (for TEP approach)

**Exclusion criteria :**

- Previous abdominal surgery
- Recurrent hernias
- Cardio respiratory insufficiency.
- Pediatric patients

Observations in Intra and Post operative Laparoscopic TEP Hernia Repair and Open Lichtenstein Hernia Repair were made as follows

**During Intra operative period –**

- nerve injury
- vascular injury
- visceral injury
- injury to vas
- conversion (applicable only for TEP repair)

**During Post operative period –**

- pain
- total dose of analgesic required
- seroma/haematoma
- urinary retention
- wound gape
- time to resume routine activities
- duration of hospital stay

**Observations and Results**

This study has been undertaken in 50 male patients who underwent surgical repair of inguinal hernias using either laparoscopic technique {Totally extraperitoneal repair (TEP)} or Open technique in AVBRH to compare recurrence rates and other outcomes after either of TEP Vs Open repair or inguinal Hernia.

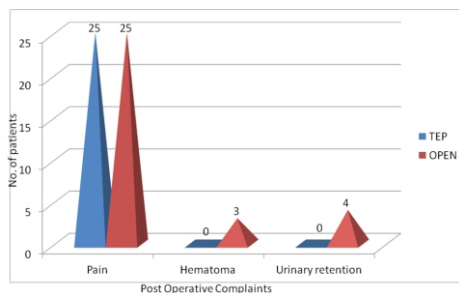
**DATA MANAGEMENT AND STATISTICAL ANALYSIS:**

- *Chi-Square test* or *Fisher exact test* were applied as appropriate for comparison of nominal data.
- For continuous data, *Unpaired t test* was applied to compare two groups.

**Table 1: Comparison of post-operative complaints in both the groups on day one**

POD 1	TEP		OPEN		p value
	N	%	N	%	
Pain	25	100	25	100	0.04
Hematoma	0	0	3	12	
Urinary retention	0	0	4	16	

P value was significant if <0.05

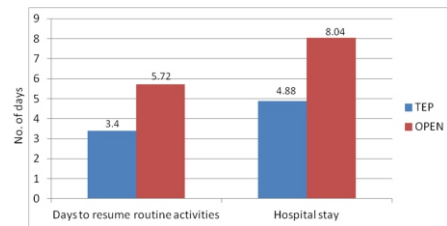


In our study, all patients treated with TEP and open method reported pain on day 1. Additionally, in case of open method, 12% and 16% patients reported hematoma and urinary retention respectively. Difference between them was significant.

**Table2: Comparison of days to resume routine activities and hospital stay in both the groups**

Parameters	TEP	OPEN	P value
	Mean±SD	Mean±SD	
Days to resume routine activities	3.4 ± 2.53	5.72 ± 2.59	0.002
Hospital stay	4.88 ± 2.57	8.04 ± 2.72	0.001

P value was significant if <0.05



Average days to resume routine activities in TEP group 3.4 ± 2.53 days was less than that in open surgery group 5.72 ± 2.59 days and this difference was statistically significant (P = 0.002)

Mean hospital stay for patients undergoing TEP was 4.88 ± 2.57 days which was significantly less than that in patients undergoing open surgery 8.04 ± 2.72 days.(P = 0.001)

**Table 3: Percentage of patients having complaints on follow up at 2 months in both groups**

Follow up on 2 months	TEP		OPEN	
	N	%	N	%
Recurrence	0	0	1	4
Mesh infection	1	4	0	0
No complaints	24	96	24	96
Total	25	100	25	100

Only 1 patient (4%) in TEP group report mesh infection while in remaining 96% no complaints were reported. In open surgery group 1 patient (4%) reported recurrence and in 96% no complaints were reported on 2<sup>nd</sup> month of follow up.

\*No complaints on 3<sup>rd</sup> follow up month in both the groups

**Discussion**

Surgical repair of inguinal hernias is a common procedure in adult men. Commonly, laparoscopic technique {Totally extraperitoneal repair (TEP)/Transabdominal preperitoneal repair (TAPP)} or Open methods are employed. A laparoscopic method of performing a tension-free repair has low recurrence rates and to be associated with substantially less pain in the immediate postoperative period and earlier return to normal activities than the open-repair technique<sup>8</sup>. The laparoscopic technique, however, requires general anesthesia, and it is more often associated with serious intraoperative complications than is open repair<sup>9</sup>, although such complications are infrequent.

**TEP versus Open approach**

Each approach has its advantage and limitations. Traditional surgical methods have high recurrence rate as compared to TEP. In 4 RCTs comparing TEP with open repair, the recurrence rate with TEP was 2.3% and the open recurrence rate was 2.9%<sup>10</sup>. In case of traditional methods, are used, outcomes after repair of recurrent hernias have been worse than after primary repair<sup>11,12</sup>. After the introduction of tension-free surgical repair with the use of prosthetic mesh, recurrence rates were reported to be <5%, and patients' comfort was reported to be substantially improved over that obtained by the traditional, tension-producing techniques<sup>13,14</sup>. A laparoscopic method of performing a tension-free repair has been reported with low recurrence rates and associated with substantially less pain in the immediate postoperative period and earlier return to normal activities than the open repair technique<sup>8,15</sup>.

Both laparoscopic and open techniques can be routinely performed as day cases in fit patients; however laparoscope repair is performed under general anesthesia and it is more often associated with serious intra-operative complications than is open repair<sup>9,16</sup> although such complications are infrequent. Open repair can be performed under local anesthesia and patients are discharged within a few hours. Several studies reported earlier return to both activity and work in the laparoscopic groups compared with open repair. This is estimated to equate to an

absolute difference of about 7 days in terms of time off work<sup>17</sup>.

A significant reduction in postoperative pain occurred in the laparoscopic procedures<sup>17</sup>. Chronic persisting groin pain or numbness was common after open hernia repair, a complication increasingly recognized as a significant cause of morbidity<sup>18</sup>. Both the TAPP and TEP techniques cause very significantly less persisting pain or numbness with an incidence of about 2%<sup>19</sup>. The EU Hernia Trialists Collaboration<sup>10</sup> examined 34 eligible trials with a total of 6042 patients. There were 19 serious complications: 15 in the TAPP group, 4 in the open technique and none in the TEP technique. Complications reduce with experience.<sup>20</sup>

Laparoscopic surgery allows bilateral hernias to be repaired through the same three small incisions; there was no effective increase in postoperative pain or recovery time. Both laparoscopic approaches allow assessment and treatment of the contralateral side at the same operation without the need for further incisions, very little further dissection and minimal postoperative pain. In open surgery a further large incision is required in the opposite groin, considerably impairing postoperative mobility and the increased likelihood of admission to hospital.

**Cushieri** observed that the laparoscopic surgeries requires tremendous hand - to- eye co-ordination and lose a lot of maneuverability as well as sensory and tactile feedback'. As a result, laparoscopic inguinal hernia repair has a long learning curve (estimated to be 50-100 for TEP)<sup>21,22</sup>. Further, TEP is reported to have poor reproducibility and has a long learning curve which puts patients at risk until the surgeon is proficient.

**Intra operative complications**

Intraoperative, immediate postoperative and life-threatening complications were more frequent in the laparoscopic-repair patients than in the open repair patients, although rates of long-term complications and mortality rates were similar in the two groups. These results are consistent with other's findings<sup>23</sup>

In a study by **Neumayer** in 2164 patients, intraoperative complications (e.g., problems with anesthesia, injuries to spermatic cords or blood vessels) were significantly more common in the group that underwent laparoscopic repair (4.8 versus 1.9 percent in the open mesh group). Life-threatening complications (e.g. myocardial infarction, ischemia, arrhythmia) were uncommon but occurred significantly more often with laparoscopic repair (1.1 versus 0.1 percent). However, in our study, we found no intra-operative complication (especially injury to vas and anesthetic complications) in both the groups, indicating that both the procedures are safe in terms of intra-operative complications.

**Post operative complications**

**Post-operative pain:**

In our study, all patients treated with TEP and open method reported pain on Day 1. Additionally, in case of open method, 12% & 16% patients reported hematoma and urinary retention respectively. We found that pain was reduced to 76% in patients treated with TEP. However 100% patients treated with open method reported pain on Day 2. Additional 12% patients treated with open method reported hematoma.

Patients treated with open method, pain persist till day 7, though it reduced to 44%, 24%, 12%, 8% and 4% on Day 3, 4, 5, 6, and 7 respectively. No pain was reported in patients treated with TEP on these days. These findings suggest that the TEP was associated with significantly less pain as compared to Open technique. Pain persists for 2 days in case of TEP and till 7 days. In case of open method, the results of our study are in the line with published literature.

In a study by **Neumayer** in 2164 patients, the laparoscopic-surgery had less pain initially than the open-surgery on the day of surgery and at two week and returned to normal activities one day earlier<sup>24</sup>.

In a study by **Kumar** in 560 patients, 30.0% reported chronic groin pain or discomfort, which was significantly more common after open repair than after laparoscopic repair (38.3% versus 22.5%; p<0.01) Chronic groin pain or discomfort restricted daily physical or sporting activity in 18.1 per cent of the patients. The patients who had open repair complained of significantly more restriction of daily physical activity than patients who underwent laparoscopic repair.

**Table 4: Comparison of results from other studies regarding pain**

Reference	Laparoscopic	Open	Comment
<b>TEP versus flat mesh</b>			
Bringman, 2003 <sup>25</sup>	1 (0-3)	2(0-6)	VAS (0-10) median (range)
Colak, 2003 <sup>26</sup>	2.73 (1.69)	4.61(1.77)	VAS (0-10) mean (SD)
Lai, 2003 <sup>27</sup>	1.76(1.4)	2.74(1.5)	VAS (favours TEP)
<b>TEP versus preperitoneal mesh</b>			
Champault, 1997 <sup>28</sup>	NR	NR	Ratios given (favours TEP)
Suter, 2002 <sup>29</sup>	3.3 (0-9)	3.36(0-8)	VAS maximum (range)
<b>TEP versus plug and mesh</b>			
Bringman, 2003 <sup>25</sup>	1 (0-3)	2(0-7)	VAS (0-10) median (range)
Khoury, 1998 <sup>30</sup>	3	7	VAS (0-10) 'average'

The results show that pain was less in patients who underwent laparoscopic repair.

**Other Complications:**

In our study, apart from pam. hematoma and urinary retention were observed in patients treated with open technique. We also found wound gaping in patients treated with open technique. These complications were not reported in patients who underwent laparoscopic repair.

Immediate postoperative complications (e.g.. hematoma, pain) were slightly more common with OPEN repair. In our study, 12% patients treated with open method reported hematoma on Day 1 to Day 3 and 4% on Day 4. No hematoma was seen in patients who underwent laparoscopic repair.

In a systematic review, **McCormack** reported significantly fewer hematomas in the TEP groups (Comparison 02:04 RR 0.44, 95% CI 0.33 to 0.58, p<0.0001) compared to open technique. In a study by **Pokorny** in 365 patients, the rates of perioperative (p=0.09) and long term complications (p=0.13) were comparable<sup>31</sup>

**Days to resume routine activities**

In our study, average days to resume routine activities in TEP group 3.4 ± 2.53 days was significantly less than that in open surgery group 5.72 ± 2.59 days.( P = 0.002). This signifies that TEP technique was associated with less mortality and faster recovery as compared to open technique.

According to the literature, the patients who underwent a laparoscopic repair returned to their usual activities one day sooner than those who underwent an open repair<sup>32</sup>.

In a study by **Neumayer** in 2164 patients, patients who underwent a laparoscopic repair returned to normal activities one day earlier (adjusted hazard ratio for a shorter time to return to normal activities, 1.2; 95 percent confidence interval, 1.1 to 1.3) than those who underwent an open repair.

**Mean hospital stay**

Mean hospital stay for patients undergoing TEP was 4.88 ± 2.57 days which was significantly less than that in patients undergoing open surgery 8.04 ± 2.72days.(P = 0.001). This result again signifies that TEP technique was associated with less mortality and faster recovery as compared to open technique. Significantly lesser

hospital stay with TEP technique could be because of a significant reduction in postoperative pain with the laparoscopic procedures<sup>17</sup>. Chronic persisting groin pain or numbness was common after open hernia repair, a complication increasingly recognized as a significant cause of morbidity [9]. TEP techniques cause very significantly less persisting pain or numbness with an incidence of about 2%<sup>19</sup>

### Recurrence

In our study, 4% patients who underwent open surgery had recurrence at 1 month of follow up. No recurrence was seen in case of patients who underwent TEP surgery. The reason of low recurrence in our study was because of performance of surgeries by experienced surgeons.

Traditional surgical methods have high recurrence rate as compared to TEP. In 4 RCTs comparing TEP with open repair, the recurrence rate with TEP was 2.3% and the open recurrence rate was 2.9%<sup>10</sup>. In case of traditional methods, outcomes after repair of recurrent hernias have been worse than after primary repair<sup>11,12</sup>. After the introduction of tension-free surgical repair with the use of prosthetic mesh, recurrence rates were reported to be < 5%, and patients' comfort was reported to be substantially improved over that obtained by the traditional, tension-producing techniques<sup>8,15</sup>

In a study by **Neumayer** in 2164 patients, among hernia repairs performed by highly experienced surgeons, recurrence rates did not vary significantly according to the type of procedure: laparoscopic group (5.1%) Vs open group (4.1%). For less experienced surgeons performing repairs, the recurrence rate was greater after laparoscopic procedures (12.3 percent) than after open procedures (2.5 percent).

### Conclusion

We found that the laparoscopic technique (TEP) was associated with significantly less pain, other complications, days to resume routine activities and hospital stay as compared to Open technique. We also found less recurrence with laparoscopic technique (TEP). We conclude that the laparoscopic technique was superior to the open technique of tension-free repair, both in terms of recurrence rates and in terms of safety. A large prospective study should be undertaken to substantiate the findings of our study.

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