



A Comparative Study of Laparoscopic (TEP) and Open Inguinal Hernia Repair (Lichtenstein Method): A Prospective Analytical Study

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Background: Laparoscopic inguinal hernia repair has emerged as a viable alternative to the open procedure. However, laparoscopic hernioplasty by totally extraperitoneal repair (TEP) technically eliminates the hazards of intra operational injuries. The present study was undertaken to compare the effectiveness of laparoscopic repair (TEP) Vs open (Lichtenstein Method) repair of inguinal hernia.

Methods: This prospective analytical study was conducted in the Department of General Surgery in a tertiary referral hospital during a period of 30 months from June 2018 to November 2020 comprising of total 150 patients with unilateral or bilateral inguinal hernia in two groups : laparoscopic TEP group (study group) and open mesh repair group (control group).

Results: Operative time for laparoscopic TEP hernioplasty was more (82.13 min) as compared to open repair (65.6min). In bilateral hernia cases, TEP had significantly lower operative time than open repair while in unilateral hernia cases open repair had lower operative time. The frequency of postoperative chronic pain was found to be more with laparoscopic TEP hernioplasty (12%) as compared to open (6.67%). Postoperative complication rate was 34.66% in the study group and 45.33% in the control group. Recovery was faster with laparoscopic repair with a mean postoperative hospital stay of 2.41days compared to 3.61days for open mesh repair. Only one recurrence was noted among TEP repair.

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Conclusion: Laparoscopic TEP hernioplasty offers a significant advantage over open Lichtenstein hernioplasty like early recovery, reduced hospital stay, lesser analgesic dose requirement, early resumption of normal activity and better quality of life in consideration with bodily pain.

Keywords: Laparoscopic repair; lichtenstein method; Inguinal hernia; hernioplasty; recurrence.

1. INTRODUCTION

Inguinal Hernia is one of the most common surgical conditions in the world which is especially more common in developing countries due to occupational exposure associated with heavy weight lifting. Its diagnosis is made mostly by clinical examination and if needed ultrasound scan can be done. The incidence of inguinal hernia in India is around 18% with 70% male predominance mostly due to their occupation. However, world literature suggests higher incidence of inguinal hernias are common, with a lifetime risk of 27% in men and 3% in women [1].

Inguinal hernia repair is one of the most common operations in general surgery. Despite more than 200 years of experience, the optimal surgical approach to inguinal hernia remains controversial. Surgeons and patients face many decisions when it comes to inguinal hernias: repair or no repair, mesh or no mesh, what kind of mesh, open or laparoscopic, extra-peritoneal or trans-abdominal, and so forth. Inguinal hernia repairs have morbidity and recurrence rates that are not inconsequential. The search for the gold standard repair continues [2]. Though laparoscopy has gained widespread acceptance in today's era of surgery, there is still a debate between laparoscopic and open hernia mesh repair. Several studies have shown the benefits of laparoscopic hernioplasty such as lesser postoperative pain and morbidity, wound complications, early resumption of activity and work. But it had some limitations such as longer operative time, harder learning curve and higher recurrence rate and complications [3-6]

Moreover, laparoscopic hernioplasty can be accomplished in two ways i.e. trans-abdominal preperitoneal repair (TAPP) and totally extraperitoneal repair (TEP) [7]. TEP, like Lichtenstein's open mesh repair, does not need invasion of the peritoneal cavity. Technically it eliminates the hazards of intra operational injuries. The current study was conducted to compare the treatment groups undergoing open (Lichtenstein) and laparoscopic repair (TEP) of hernia with respect to operative time, postoperative pain, complications, duration of

hospital stay, early recurrence rate and chronic pain assessment, also to decide regarding superiority between these two methods of surgery.

2. MATERIALS AND METHODS

After obtaining Institutional Ethical Committee approval and written informed consent from patients, this open label alternately randomized prospective study was conducted in the Department of General Surgery at Tertiary Care Centre of Central India, and was performed in a restricted period of time (30 months) from June 2018 to November 2020. A total of 150 healthy patients of age more than 18 years presented with unilateral or bilateral inguinal hernia and who underwent uncomplicated inguinal hernia repair either open (Lichtenstein Method) or laparoscopic (TEP) method were enrolled. Patients with complicated inguinal hernia & recurrent inguinal hernia, coagulopathy, severe cardio-pulmonary disease, deranged renal function and patients not willing for surgery were excluded from the study.

Patients were investigated on an OPD basis. The demographic details, site of hernia namely right, left or bilateral and type of hernia was noted. Through clinical examination and laboratory investigations were done. Preoperative fitness was taken. Patients were admitted in the surgical wards one day prior to the surgery. Perioperative antibiotic inj ceftriaxone (1 gm) single dose was given. Out of 150 patients, 75 underwent laparoscopic repair (study group) and 75 underwent open repair (control group). All patients of the control group were administered spinal anesthesia while all patients in the study group were given general anesthesia. Patients were operated in surgical operation theaters by the consultant. In all patients per urethral catheter was placed in a perioperative period and it was removed before shifting the patient back to the ward. Postoperative urinary retention and need of recatheterization was noted. Tablet diclofenac 50 mg 12 hourly was used as an analgesic in the postoperative period. Pain was recorded on a visual analogue scale. Additional doses of analgesic were given as required and

noted. No antibiotic was prescribed postoperatively.

All operated patients were assessed for intraoperative complications, duration of surgery, postoperative complication and duration of hospital stay. Also patients were assessed for post-operative pain on postoperative day 1st, 2nd and 7th. The maximum score for a given patient was taken into account. Discharge was given as the patient had no gross complication needing hospitalization and minimum pain managed on tablet diclofenac. After discharge patients were followed up after 7 days for suture removal then after 2 weeks, 1 month, 3 months and after 6 months for the assessment of postoperative pain, complications like seroma, wound infection, wound gape, etc and recurrence rate.

2.1 Statistical Analysis

Continuous variables (demographic, operative time, blood loss, pain on VAS, hospital stay) were presented as Mean ± SD. Categorical variables were expressed in frequency and

percentages. Continuous variables were compared between 2 study groups performing independent t-test for normalized data and for non normalized data, Mann-Whitney test. Categorical variables were compared between 2 study groups by performing chi-square tests. For small numbers, Fisher exact test was used wherever applicable. p<0.05 was considered as statistical significance. Statistical software STATA version 14.0 was used for statistical analysis.

3. RESULTS AND OBSERVATIONS

A total of 150 patients were enrolled in the study, of whom 145 were male (96.66%) and 5 were female (3.33%). The mean age in the TEP group was 41.65± 2.77 (18 – 72) years and in the Open group it was 39.73±12.45 (18 – 64) years. The detailed demographic profile of patients is shown in Table 1.

In both the groups, the left side and indirect type of hernia was found to be more common as depicted in Fig. 1. Out of 150 cases 20 had both direct and indirect components.

Table 1. Distribution of patients according to demographic data

Demographic data		TEP (laparoscopic)	Open Hernia Repair
Age group in year	≤20	4 (5.33%)	3 (4%)
	21 - 30	10 (13.33%)	18 (24%)
	31 – 40	25 (33.33%)	18 (24%)
	41 – 50	13 (17.33%)	19 (25.33%)
	51 – 60	18 (24%)	13 (17.33%)
	>60	5 (6.67%)	4 (5.33%)
Sex	Male	72 (96%)	73 (97.33%)
	Female	3 (4%)	2 (2.66%)

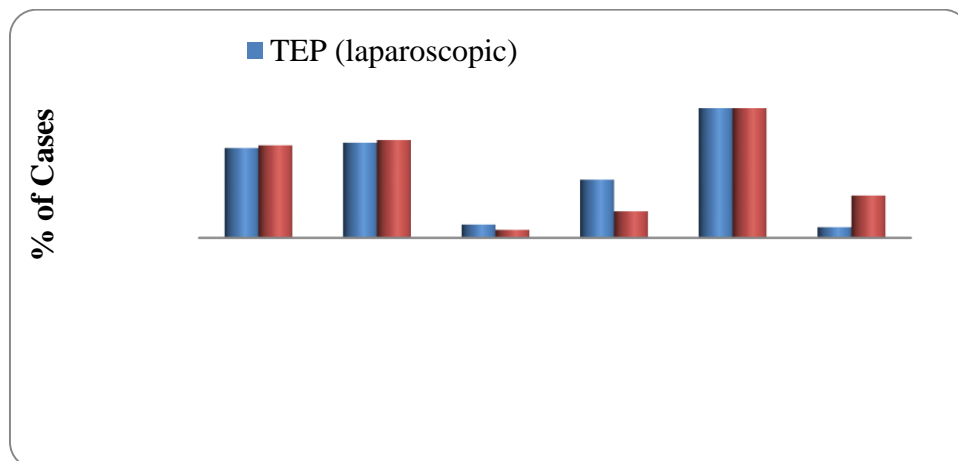


Fig. 1. Site of hernia and type of hernia

The operative time for laparoscopic TEP hernioplasty was more than open Lichtenstein's repair while intraoperative blood loss, post operative pain and hospital stay (days) was significantly more in open inguinal hernia repair group as shown in Table 2.

Postoperative complication rate was 34.66% in the study group and 45.33% in the control group. However subcutaneous emphysema was exclusively seen in TEP hernioplasty which is secondary to CO2 insufflation and not seen in the open repair. The other complications are depicted in Fig. 2.

Table 3 shows that blood loss; pain on VAS and hospital stay was significantly higher in open inguinal hernia repair than TEP repair in both unilateral as well as bilateral hernia repair whereas, operative time was significantly higher in bilateral open inguinal hernia repair than bilateral laparoscopic TEP inguinal hernia repair.

Chronic pain at 6 months was significantly higher in Laparoscopic hernia repair group (9; 12%) than Open inguinal Hernia (5; 6.67%) (P=0.001, HS). Out of 150 subjects, 1 from the laparoscopic group had recurrence. It was not statistically significant. (P = 1.000, NS).

Table 2. Comparison of mean of different study parameters between 2 groups

Parameters	TEP (laparoscopic)	Open Repair	p-value
Operative time (min)	82.13±10.94	65.6±17.18	<0.0001,HS
Blood loss	12.8±4.81	23.2±8.24	<0.0001,HS
Pain on VAS	4.84±0.71	5.16±0.79	0.0103,S
Hospital stay (days)	2.41±0.73	3.61±1.38	<0.0001,HS

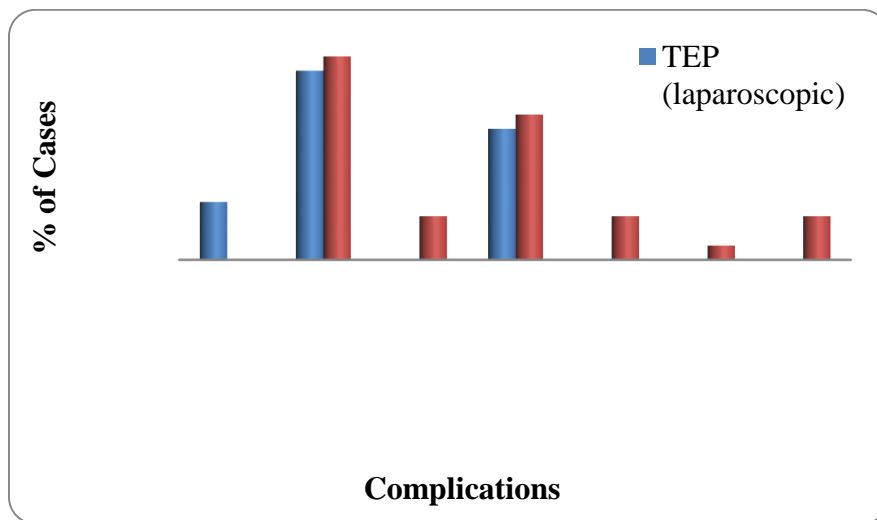


Fig. 2. Comparison of post-operative complications between two groups

Table 3. Unilateral and Bilateral hernia parameters among the study groups

Parameter	Laterality	TEP(laparoscopic)	Open Repair	p-value
Operative time	Unilateral	67.66 ± 6.49	62.91 ± 11.06	<0.452,NS
	Bilateral	92.35 ± 4.47	130 ± 10	0.0040,HS
Blood loss	Unilateral	12.28 ± 4.22	21.94 ± 5.47	<0.0001,HS
	Bilateral	20 ± 7.07	53.33 ± 5.77	0.0005,HS
Pain on VAS	Unilateral	4.8 ± 0.71	5.08 ± 0.70	0.0189,S
	Bilateral	5.4 ± 0.54	7 ± 0	0.0027,HS
Hospital stay	Unilateral	2.38 ± 0.75	3.51 ± 1.28	<0.0001,HS
	Bilateral	2.8 ± 0.45	6.0 ± 1.73	0.0062,HS
Complications	Unilateral	19 (50)	19(50)	0.919,NS
	Bilateral	4(57.1)	3(42.9)	0.408,NS
Recurrence	Unilateral	1(100)	0	0.309,NS
	Bilateral	0	0	--



Image 1. Clinical Photographs of site of hernia: a) Right inguinal hernia; b) Left indirect inguinal hernia; c) Bilateral inguinal hernia

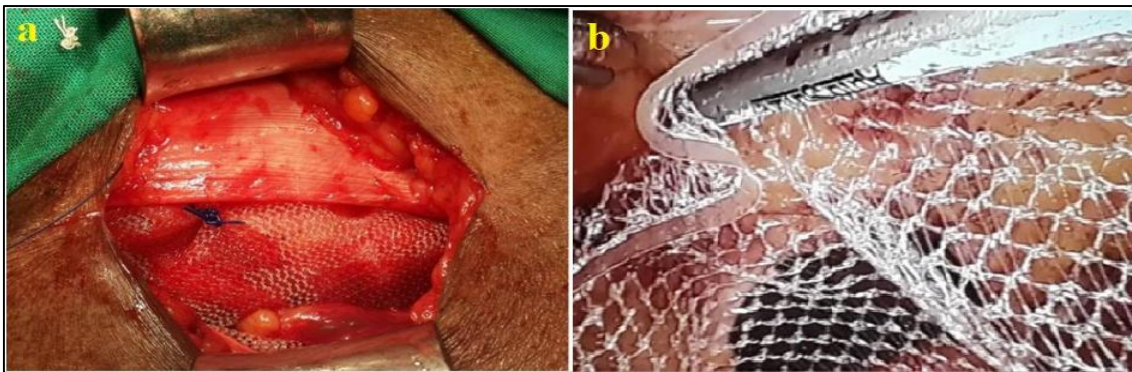


Image 2. Clinical Photographs of inguinal hernia repair by: a) Lichtenstein hernioplasty; b) TEP hernioplasty

4. DISCUSSION

In the present study, the mean age of patients was comparable and found no significant difference in both the groups; this is similar to earlier studies done by Hamza et al. [3] and Sudarshan et al [4]. The male preponderance (96.66%) was seen as reported in literature [8, 9]. The left sided inguinal hernia was the most common which is in contrast with the previous studies [10, 11]. Out of 150 patients, 75 in the open hernioplasty group and 75 patients in the laparoscopic hernia repair group (TEP) whereas the follow-up period was 6 months. This patient distribution and follow up period was significantly less compared to study conducted by Neymayer et al. [12].

The overall mean operative time was less in open repair than in laparoscopic repair. This is in accordance with any laparoscopic surgeries, which are time consuming, but for few surgeries the operative time did not vary much whether the repair is for unilateral or bilateral hernia in laparoscopic repair. On the contrary the operative time for bilateral open hernia repair was definitely more than that for unilateral repair. Hamza et al. [3] and Rathod et al. [5] reported similar results where laparoscopic mesh repair took longer than Lichtenstein's open mesh repair.

No patient was converted from laparoscopic repair to open repair due to technical difficulties or peritoneal tears which is well correlated with other studies done by Wang et al. [13]. No other serious intraoperative complications like visceral and vascular injury were observed in present study as reported by other studies. Postoperative complications in the TEP group were subcutaneous emphysema (4), cord edema (13), urinary retention (9). Thus, a total of 26 of 75 patients had complications, 34.66%. While in open inguinal hernia repair group cord edema (14), scrotal edema (3), urinary retention (10), seroma (3), wound infection (1), wound gape (3) were seen. So, of the total 34 of 75 patients, it was 45.33%. However, the laparoscopic repair had fewer postoperative complications as compared to open inguinal hernia repair which is comparable with the previous studies [14, 15]. In contrast to this Neumayer et al. [12] and Pironi et al. [16] show higher complication rates in laparoscopic groups.

Post-operative pain for laparoscopic hernia was lower than that of open mesh repair by visual analogue scale assessment on 24 hr and was statistically significant which is in accordance with the study done by Mahon et al. [17] and Anadol et al. [18]. In patients who underwent open surgery, pain score was higher for bilateral

hernias than for unilateral hernias. For laparoscopic hernia, there was no significant difference. Recovery was faster with laparoscopic repair with a mean postoperative hospital stay of 2.41 days and compared to 3.61 days for open mesh repair, this result was similar to the study conducted by Paganini et al. [19].

The incidence of chronic pain after hernioplasty varies widely. It lies between 0 and 75% after open mesh and 0 and 29% after laparoscopic repair [20, 21]. The frequency of pain that affects daily activities is reported to be in the range of 5-6% [22]. Several authors report mesh repair to result in less chronic pain than non-mesh, and laparoscopic less than open mesh repair [23, 24]. Other studies have reported higher rates of chronic pain among patients who have had open operation [25, 26]. In the present study, the incidence of chronic pain at 6 months was 12 % in the TEP repair group and 6.67 % in the open inguinal hernia repair group which was statistically significant, (p 0.001, HS). These results are not in line with those of previous studies. Lichtenstein et al recommended preserving the nerves in the inguinal canal to minimize the incidence of chronic groin pain. In one study dividing the inguinal nerves did not reduce the incidence of chronic groin pain [27]. The typical postoperative pain occurs immediately after surgery, is easily managed with analgesics, and subsides as the wound heals. Chronic neuralgia is an often incapacitating pain with hyperesthesia, paresthesia and dysesthesia.

Recurrence rate varies between 0.2% and 15% and it depends on the technique applied; only a better technique mainly concentrating on strengthening of the posterior wall can reduce the recurrence rate less than 2% [28]. Laparoscopic surgery has shown recurrence rates as less as 0.25% to 2% [29]. In the current study, a total of 1 recurrence was observed in the TEP repair group at the end of 6 months, this finding correlated with the other studies [15, 19].

Cost factor was not studied as the study was conducted in a government run hospital, all the facilities including mesh and instruments were available free of cost. There is certainly a reason for continuing to use the laparoscopic technique for hernia repair. It is clear that the technique already offers advantages in some indications and these should be expanded and the technique should be offered on a wider basis. The choice of the procedure should be made on a case by case basis considering the operative

fitness, patient preference and cost involved. Due to the SARS-CoV-2 (COVID 19) pandemic and lockdown in the year 2020, cases were registered in lesser numbers than expected. Therefore, the sample size was small.

5. CONCLUSION

Laparoscopic TEP hernioplasty offers a significant advantage over open Lichtenstein hernioplasty such as early recovery, reduced hospital stay, lesser analgesic dose requirement, early resumption of normal activity and better quality of life in consideration with bodily pain. For bilateral hernia laparoscopic repair is more preferable as compared to open repair, which results in reduced operative period, as same port placement may be utilized for both side hernia repairs. In terms of short term results laparoscopic surgery is better than the open mesh repairs but the long term results of laparoscopic and open mesh repairs are still awaited, for that further studies and meta-analysis are suggested for interested researchers.

ETHICAL APPROVAL AND CONSENT

After obtaining Institutional Ethical Committee approval and written informed consent from patients, this open label alternately randomized prospective study was conducted in the Department of General Surgery at Tertiary Care Centre of Central India, and was performed in a restricted period of time (30 months) from June 2018 to November 2020.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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