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Original Research Article

A comparative study between laparoscopic inguinal hernia repair and open inguinal hernia repair

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ABSTRACT

Background: Repair of inguinal hernia by the laparoscopic hernioplasty over open hernioplasty is preferable in terms of less postoperative pain and morbidity, wound complications, postoperative pain, early resumption of activity and work and better cosmetic results. Laparoscopic hernioplasty by totally extraperitoneal repair (TEP) technically eliminates the hazards of intra operational injuries.
Methods: The study designed was an prospective, open labeled, randomized, comparative, two armed study during a period from December 2010–October 2012. After taking written consent from the patients were randomly allocated to two groups consisting 25 in each. Group OH were operated with open tension free Lichtenstein's hernioplasty. Group TEP operated by laparoscopic totally extraperitoneal repair using mesh. Surgical variables and clinical outcomes were measured.
Results: During the study no major life threatening complications were reported in either group only peritoneal breach was encountered intraoperatively in the TEP group and the difference found to be significant (p value = 0.000). Post operatively necessity of drain was seen in 9 patients out of 30 in TEP group. There were three (12%) cases of immediate mesh displacement in TEP group but none in the OH group. It was observed that the mean time taken to complete a laparoscopic hernia repair was significantly higher (p value = 0.000) in TEP compared to open procedure. The postoperative pain score and need of analgesics, presence of surgical site infections were more in OH group compared to TEP group. The time taken for resumption of daily activities and work was earlier in patients treated with TEP compared to open surgery ($p < 0.005$) and good significant cosmetic results was also observed with the same group only ($p < 0.00$).
Conclusions: Laparoscopic hernia repair is safe and provide less postoperative morbidity in experienced hands compared to open hernia repair.

Keywords: Inguinal hernia repair, Laparoscopic hernioplasty, Open hernioplasty

INTRODUCTION

Repair of inguinal hernia is one of the commonest operations performed by surgeons around the world. The treatment of this common problem has seen an evolution from the pure tissue repairs to the prosthetic repairs and in the recent past to laparoscopic repair. Preferred approach for open inguinal hernia repair is Lichtenstein's tension free inguinal hernioplasty using a prosthetic mesh.[1] The recurrence rate is less than 1% in experienced hands as compared to tissue repairs where it may be as high as 15%.[2] The postoperative morbidity is low and recovery is quick.

Laparoscopy had gained widespread acceptance in today's era of surgery. The advantages and efficacy of laparoscopic cholecystectomy over open cholecystectomy have been well documented and it has become the gold standard for management of gallstone disease.[3] Several studies have shown the benefit of the laparoscopic

hernioplasty over open hernioplasty (OH) in terms of less postoperative pain and morbidity, wound complications, postoperative pain, early resumption of activity and work and better cosmetic results.[4-6] But it had some limitations like twice longer operative time, longer learning curve, higher hospital cost, a potential for serious life threatening accidents and a higher recurrence rate especially immediately in early postoperative period as compared with open surgery.

Laparoscopic hernioplasty can be accomplished in two ways i.e. trans-abdominal preperitoneal repair (TAPP) and totally extraperitoneal repair (TEP). TEP, like open hernioplasty does not need invasion of the peritoneal cavity. Technically it eliminates the hazards of intra operational injuries. The objective of the study was to evaluate the safety and efficacy of laparoscopic total extraperitoneal repair (TEP) with the standard open anterior tension free repair (Lichtenstein's).

METHODS

A prospective, open labeled, randomized, comparative, two armed study was conducted in Department of surgery, Lokmanya Tilak Medical College, Mumbai, India during a period from December 2010–October 2012. A total of 50 patients with uncomplicated inguinal small or medium sized, direct or indirect, unilateral or bilateral hernias undergoing elective inguinal hernia surgery, who are fit for laparoscopy and general anesthesia, were included in the study.

Patients with complicated hernia (irreducible, obstructed, strangulated), those with large size sac, recurrent hernia were excluded. Also excluded were those unfit for general anesthesia, laparoscopy or pneumoperitoneum i.e. those with cardiac diseases (MI, IHD), respiratory diseases (chronic asthma, COPD), renal or hepatic diseases, bleeding disorders etc were excluded from the study.

All patients were clinically evaluated and underwent routine investigations for fitness. Even elderly patients with American Urological Association (AUA) Score for prostate of more than 6 also underwent evaluation for prostate by digital rectal examination, ultrasonography, and cystourethroscopy. After taking written consent from the patients were randomly allocated to one of the two arms of the study each group consisting 25 in each.

Group OH were operated with open tension free Lichtenstein's hernioplasty.[1,7]

Group TEP operated by laparoscopic totally extraperitoneal repair using mesh.[8-10]

Patients were admitted one day prior to surgery. They were operated as per allotted group and relevant operative findings were noted. The antibiotic protocol was perioperative antibiotics only, consisting of three intravenous doses of inj. ceftriaxone 1 gm. In patients with the drain, antibiotic was continued till the drain was removed.

The analgesic used was diclofenac sodium 50 mg tablet 12 hourly and pain was recorded on visual analogue score (VAS) at 0 min, 30 min, 1 hour, 2 hours, 4 hours, 6hours, 12 hours and 24 hours after surgery. The need for any rescue analgesic was also noted. The patients were encouraged to move in the early postoperative period and to take liquid diet on the evening of surgery. Foley's catheter, which was inserted in all patients in TEP group and elderly patients of OH group, was removed in the evening and the patients were discharged in the morning after surgery. The patients who had drains were discharged only after removal of the drain, which in most cases was done 48 hours after surgery. The patients were clinically evaluated for any mesh displacement before discharge.

Sutures were removed between 7-10 days. The wounds were checked and graded accordingly. Patients were evaluated on 1st week, 2nd week, 1 month, 2 month, 3 month and presence of any cough impulse, swelling, and signs of recurrence. Patients where recurrence was suspected both immediate and early were kept under close supervision, if found they were operated by standard open anterior Lichtenstein's repair. The scars were checked at each visit and the subjective and objective cosmetic results of scar accessed. Required surgical variables and clinical outcomes were noted and compared between the two groups during and after surgeries.

Statistical analysis

Descriptive statistics were used where ever is applicable. All the parameters were compared between the two groups. The mean age of the patients, time taken by patients to execute their daily activities and return to work, duration of stay were compared by using students't' test. The distribution and type of hernias, ease of detection, amount of bleeding during surgery, postoperative wound drainage, time taken for immediate mesh placement, need for rescue analgesics, postoperative surgical site infection rate and cosmetic results were compared by using Chi square test. The mean operative time for surgery, pain score was measured by using ANOVA. All values $p<0.05$ were considered statistically significant.

RESULTS

A total 50 patients were included in the study out of which OH group had 25 patients (28 hernioplasties) and TEP group had 25 patients (34 hernioplasties), allocated to each group randomly. There was no mortality or surgery related major complications in any group.

The mean age of the patients in two groups were compared. The maximum age of patient included in the study was 76 years (operated by TEP) and the minimum age was 17 years (operated by OH). The difference between the two groups was statistically insignificant (p value =0.630) as shown in Table 1.

Table 1: Comparison of mean age of the patients among the study groups.

Type	OH	TEP	Total
Mean age of patients	42.16±18.06	44.44±15.01	43.3±16.48

*p <0.05, considered statistically significant

The distribution of hernias based on side was compared between the groups. The number of bilateral hernias was found to be more in TEP group but this difference was not statistically significant (p value =0.106) as given in Table 2.

Table 3 describes the type of hernia in both the groups and reveals that in either group percentage of indirect hernias was more. The difference was not statistically significant (p value =0.374) and hence the two groups were equally well matched for type of hernia.

Table 2: Site of hernia among the study groups.

Laterality	OH	TEP	Total
Right	17(56%)	14(48%)	31 (52%)
Left	10(32%)	5(16%)	15 (24%)
Bilateral	3(12%)	11(36%)	14 (24%)
Total	30(100%)	30(100%)	60 (100%)

Table 3: Types of hernia among the study groups.

Types	OH	TEP	Total
Direct	7(16%)	10 (32%)	12 (24%)
Indirect	18 (64%)	16(56%)	30 (60%)
Direct + Indirect	5 (20%)	4 (12%)	8 (16%)
Total	30 (100%)	30 (100%)	60 (100%)

Table 4: Ease of detection of hernias.

Types	OH	TEP	Total
Easy	5 (16%)	12 (40%)	5 (16%)
Manipulation needed	22 (73%)	17 (57%)	22 (73%)
Difficult	3 (11%)	1 (3%)	3 (11%)

The ease of dissection was explained in Table 4. The more number of easy dissections in TEP can be explained probably by more number of direct sacs in the group (8 as opposed to 4). The difference was not found to be significant (p value =0.106).

There was no major life threatening complication in either group. The amount of bleeding occurring during both the procedures was minimal and comparable. The only complication encountered intraoperatively in the TEP group was peritoneal breach, and the difference found to be significant (p value =0.000) as shown in Table 5.

Table 5: Complications during surgery among the study groups.

Complications	OH	TEP	Total
Nil	30 (100%)	18 (60%)	48 (80%)
Peritoneal breach	0 (0%)	12 (40%)	12 (20%)
T0tal	30 (100%)	30 (100%)	60 (100%)

Post-operative wound drainage was not required in any of the open cases but in case of TEP need of drainage sought in case of 9 patients out of 30. Usually a no 14-16 romovac suction drain was kept in the preperitoneal space. In most cases the drain reduced to minimum on 2nd post-operative day and drain was removed. There were no drain related major complications. The difference in the two groups in regards to the need of drainage was statistically significant (p value =0.000) as in Figure 1.

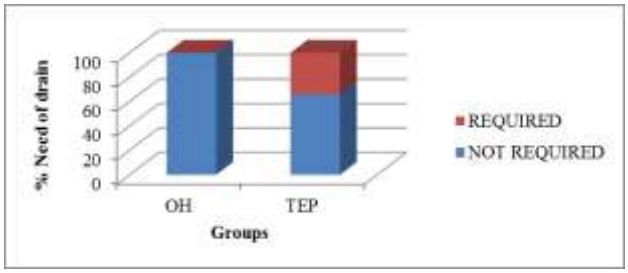

Figure 1: Need of drains post operatively among study groups.

There were three (12%) cases of immediate mesh displacement in TEP group but none in the OH group. Though not statistically significant (p value = 0.074), may be because of the small sample size, the immediate mesh displacement was found to be more in the TEP group as compared to the OH group as in Figure 2.

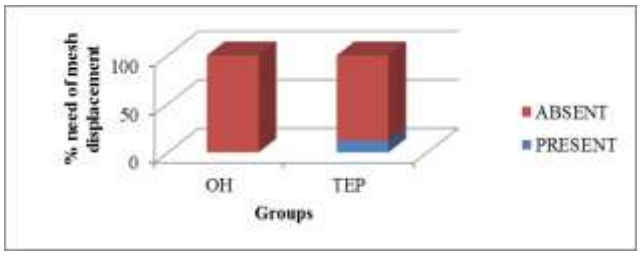

Figure 2: Need of mesh displacement among study groups.

The mean operative time for OH group was 55.24±8.84 min and that for TEP group was 72.08±10.55. Thus the mean time taken to complete a laparoscopic hernia repair

was significantly higher (p value =0.000) than the time to complete the open procedure.

On comparing the unilateral or bilateral variety, the time for TEP is shown to be significantly higher than the OH group (p value =0.000). On comparing the direct and indirect variety the time for each shown to be higher in TEP than OH group. In OH or TEP also the time taken to complete unilateral direct hernia was shown to be less than that of unilateral indirect and bilateral as given in Table 6.

Table 6: Mean operative time based on type and site of hernia.

Mean operative time (in min)	OH	TEP
Unilateral (D/I)	51.95	63.50
Direct	47.66	62.66
Indirect	53.33	68.30
Bilateral	76.00	80.66
Mean OP time	55.24	72.08

The mean hospital stay in both OH and TEP (3.80±0.76 and 3.80±1.00) respectively were almost similar (p value =1.00). The patients in TEP group had earlier recovery but due to presence of drain there stay was prolonged.

The VAS score values of TEP were always lower than that of OH group at the same hour and this difference was shown to be statistically significant. Thus laparoscopic TEP caused significantly less pain and hence was less morbid as given in Table 7.

Table 7: Postoperative pain score (VAS) among the study groups.

Time	OH	TEP	P value
0 minutes	2.48±1.86	1.20±1.08	0.000
6 hours	5.24±2.06	2.68±0.94	0.000
12 hours	5.76±1.96	3.44±1.38	0.000
24 hours	6.32±2.81	3.76±1.53	0.000

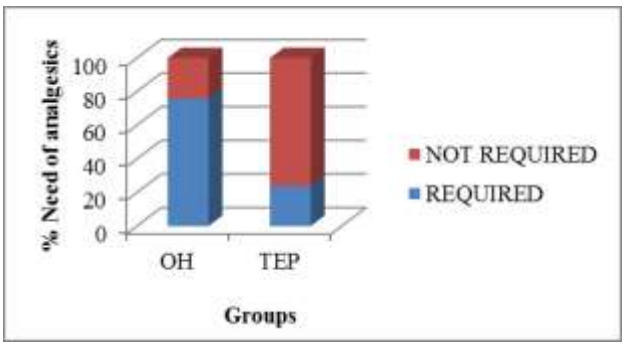

Figure 3: Need of analgesia post operatively among study groups.

As shown in the Figure 3 patients in the OH group (19 out of 25) required additional doses of analgesics than the routine twice daily inj. diclofenac 50 mg BD, to curb their pain. In TEP group however the requirement of additional analgesics was very less i.e. 24% (6 out of 25) and the difference was statistically significant (p value=0.000).

The postoperative surgical site infection rate was found to be very less in case of TEP as shown in the Table 8. There was no major wound related complication in either group. Patients with wound infections were treated with antibiotics and local measures. The difference in the two groups was not statistically significant (p value =0.059) as given in Figure 4.

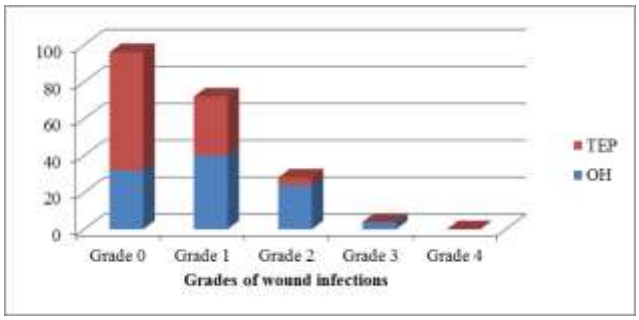

Figure 4: Comparisons of incidence of postoperative surgical site infection.

The mean time taken by patients to execute their daily activities was 4.56±2.51 in TEP group as compared to OH group 5.76±1.26 days and the difference was statistically significant. The mean time to return to work also was significantly lower in the TEP group (20.40±2.56 vs. 16.84±5.55 in OH group). Thus patients in TEP group returned to their work early as shown in Table 8.

Table 8: Comparison of resumption of daily activities and work between two groups.

Grades	OH	TEP	P value
Resumption of daily activities	5.76± 1.26	4.56±2.51	0.03
Resumption of work	20.40± 2.56	16.84±5.55	0.005

The subjective and objective cosmetic results were assessed by the patients. Most of the patients who underwent TEP exhibited satisfactory cosmetic results compared to OH group and this difference is statistically significant (p value =0.00) as in Table 10.

Some degree of chronic wound pain was observed in patients of OH group (16%) which was completely absent in TEP group. This difference among the two groups were not significant (p value =0.065) and presence of paraesthesia was also higher in OH group (24%) when compared to TEP group (8%) and p value is 0.074 as shown in Figure 5.

Table 9: Comparison of subjective and objective results among study groups.

Subjective cosmetic results	OH	TEP	Objective cosmetic results	OH	TEP
Does not matter	12 (40%)	2 (8%)	Barely visible	0 (0%)	22 (76%)
Not satisfied	13(44 %)	4 (12%)	Small well healed	9 (28%)	8 (24%)
Satisfied	5 (16%)	24 (80%)	Large well healed	17 (60%)	0 (0%)
			Complicated scar	4 (12%)	0 (0%)
Total	30 (100%)	30 (100 %)		30 (100 %)	30 (100 %)

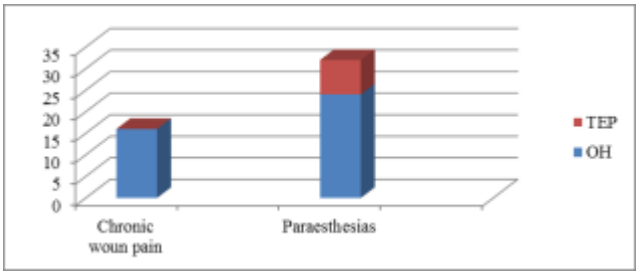

Figure 5: Comparisons of postoperative wound pain and paraesthesia among study groups.

DISCUSSION

Laparoscopic surgery has led to many changes in the management of surgical patients and significantly reduced the morbidity associated with open surgical procedures.[11] At present, the laparoscopic repair of hernias gained clinical importance in patients with bilateral or recurrent hernias or in patients. It has no surgical weakness postoperatively.[12]

In the present study, time taken the laparoscopic procedures was more than the OH group and time taken for direct hernia was less than that of indirect hernia in both the groups. This was similar to the results Bring man et al and Go.[13,14] But the time taken to daily activities and to work was significantly less in the laparoscopy group, this argument seems to be of little worth.[15-17]

There was no major complication observed in either group like any major vascular injury, visceral injury or bladder perforation only intraoperative inadvertent peritoneal breach was seen that difference was not significant between the two groups and the findings are consistent with the observations made by Ramshaw et al.[18]

In this study the postoperative pain following laparoscopic surgery was lower than that of open surgery at any given time and this difference was statistically significant $p<0.05$. This may be attributed to reduction in the size of incision, no need of extra or bilateral incisions in case of bilateral hernias, minimal dissection and less handling of cord structures. Same observations was also made by Fujita et al, Winslow et al and Pokorny et al.[19-21] based on the VAS scores at various hours and the need for additional analgesics.

The main detractors to laparoscopic TEP were mesh displacement in early postoperative period and early recurrence.[2,4,22] In this study, mesh displacement was observed in 2 cases in immediate postoperative period. They were operated by open anterior Lichtenstein's repair and the mesh was found displaced intra operatively, defects were properly closed and mesh suture fixed over them. Recurrence and mesh displacement was also found to be more common in TEP as observed in many other studies like that of Liem et al and Neumayer et al.[2,4]

The postoperative hospital stay in both laparoscopic and open group was shown to be almost equal in our study. Whereas most of the studies in literature like that of Colak et al have reported a shorter hospital stay in laparoscopic group.[6] This may be due to the fact that we do not tend to discharge those patients of TEP in which drain was kept, till the drain is out. This is in contrast to most of the studies they send the patients home with drain which is removed later during follow up.

It was found that the resumption of daily activities and work was earlier in the laparoscopic group than open group. This difference is highly significant statistically. The earlier return to activity was due to less pain in the postoperative period and less chances of cord edema in the postoperative period.[23-25] These findings were comparable to other studies in the literature mainly by Lal.[5]

The incidence of wound infection though slightly higher after OH, was not found to be statistically significant. This was similar to the results of study by Winslow et al.[20] Laparoscopic TEP in general had better cosmetic results both subjectively and objectively as similar to earlier observations.[19,23] The postoperative scars were small and hide easily as compared to a relatively longer scar in inguinal region after open repair. The difference was statistically significant $p<0.05$.

Chronic wound related pain described as boring pain or sensation of mesh pricking in the groin was found to be more in case of OH group than TEP but the difference was not statistically significant. Wound related paraesthesias are found to be more common in OH group. Patients mainly complained of hyper or hypo aesthesia around the scar. This is mainly related to nerve injuries which occur in OH due to cutting of nerves and also use of electrocautery near them. In no case the late wound related complications were very severe. Though mentioned in the literature we did not encounter any case of testicular atrophy and late postoperative hydrocele.[26,27]

CONCLUSION

Laparoscopic hernia repair is safe and provide less postoperative morbidity in experienced hands and definitely had many advantages over open repair such as early resumption of daily activities and work, better subjective and objective cosmetic results with some limitations like more operative time, need of drainage and high recurrence rate. For bilateral and recurrent inguinal hernias laparoscopic approach is recommended.

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Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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