



A Comparative Study between Laparoscopic Hernia Repair and Open Lichtenstein Mesh Repair

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Authors' contributions

This work was carried out in collaboration between all authors. Author AHS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors JBR and VDY managed the analyses of the study. Author VDY managed the literature searches and critically analyze the study. All authors read and approved the final manuscript.

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ABSTRACT

Background: A prospective comparative study of open inguinal hernia mesh repair with laparoscopic inguinal hernia mesh repair was performed in a tertiary care centre in a rural setup. This study was conducted with an objective to compare the effectiveness of each procedure and complications if any.

Methods: 50 cases of an inguinal hernia admitted in the tertiary care centre rural area were selected by nonprobability (purposive) sampling method. All patients with uncomplicated hernia treated by open or laparoscopic method were included. The age /sex, incidence, mode of presentation, surgical treatment and postoperative complications were all evaluated and compared with standard published literature.

Results: Postoperative wound infection developed in 4 cases of open hernioplasty and 1 case in laparoscopic surgery. Hematoma and seroma at the operated site were found in 2 cases of open

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hernioplasty. The duration of hospitalization was 3.23 days in case of open hernioplasty while 3.5 days in a laparoscopic hernia. The mean duration of procedure was 71.5 min in open surgery while 84.25 min in laparoscopic group.

Conclusion: There was the less post-operative complication in the laparoscopic group. Laparoscopic hernioplasty has a comparable result with an open procedure.

Keywords: *Inguinal hernia; total extraperitoneal (TEP); lichtenstein tension free hernioplasty; complications.*

1. INTRODUCTION

Inguinal hernia repair is one of the most frequently performed operations in general surgery. The standard method for hernia repair had changed little over a hundred years. Introduction of synthetic mesh had changed the scenario. It can be placed either by open or laparoscopic techniques. Laparoscopic hernia repair was first reported by L Ger and colleagues in 1990 [1]. However, it has not gained much acceptance till date due to its serious vascular and visceral complications.

In our Institutions, Inguinal hernia repair is one of the common surgeries performed regularly. The main aims of the study are:

1. To compare the outcome of both open and laparoscopic inguinal mesh repair, patient's duration of stay, complications that occur between open inguinal hernia mesh repair and laparoscopic hernia mesh repair and to arrive at a conclusion.
2. To evaluate the limitations of laparoscopic inguinal hernia mesh repair.
3. To compare the time taken for the surgery between open and laparoscopic inguinal hernia repair.

2. METHODOLOGY

The present study is a prospective study of 50 cases of an inguinal hernia admitted in tertiary care centre during the study period of September 2012 to August 2013. This study was approved by human research ethics committee. Written and informed consent was taken from the patients. All the laparoscopic TEP operation was performed by a single surgeon.

50 cases for the purpose of the survey were selected by the nonprobability (purposive) sampling method.

Inclusion Criteria

Adults above 18 years age, Unilateral, Primary inguinal hernia.

Exclusion Criteria

Complicated hernia, bilateral hernia. Associated groin condition like hydrocele, varicocele, etc. Recurrence and previous surgery with mesh in the same region. Patients in American Society of Anaesthesiologists (ASA) class IV (i.e., those who had systemic disease that is a constant threat to life) or Class V (i.e., those who were unlikely to survive for 24 hours, with or without operation), immunocompromised patients with Malignancy.

Choice of Procedure

The procedure was based on the personal preference of the patient, general condition and associated cost of the procedure.

Preoperative Treatment Included

- Optimization of precipitating factors

The type of anesthesia used was spinal anesthesia for open cases and general anesthesia for laparoscopic hernia mesh repair.

A single dose of preoperative broad spectrum antibiotic given. NSAIDs was given post-operative for two days and later as and when required.

TEP and open Lichtenstein tension-free hernioplasty:

TEP (Total Extraperitoneal Repair):

In this method after reducing the hernia contents, the mesh is placed laparoscopically.

Open Lichtenstein tension-free hernioplasty is done above the fascia transversalis after putting an incision in the inguinal region and mesh is fixed.

The technique of TEP:

A 10-mm sub umbilical incision was made. A transverse incision was then made on the anterior rectus sheath. Stay sutures taken over

anterior rectus sheath. A 10-mm Cannula without trocar was then introduced subumbilical incision in the preperitoneal space. A 10-mm 30° telescope was used. Blunt dissection was performed with the telescope. The other two working ports were placed. First, a 5-mm port is positioned about 2 cm above the pubic symphysis and second, 10 mm port was placed midway between the two ports in the midline. Dissections in preperitoneal space were performed by dividing the loose areolar tissue with the help of sharp and blunt dissection. The first landmark is the pubic bone which appears as white glistening structure in the midline was identified (Image 1). The hernia sac and Inferior Epigastric vessels were also identified. Parietalization of sac performed and

once the adhesions are lysed, or hernial sac is reduced, the anatomical landmarks like Cooper's ligament, ilio pubic tract, became visible. The sac was completely dissected from the cord structures (Image 2) and reduced. The lateral boundary of the dissection was the anterior superior iliac spine. Identified triangle of doom (Image 3) and the triangle of pain. We did not perform any dissection in the triangle of doom as it contains the external iliac vessels. Mesh was introduced through the 10-mm sub umbilical port. We used 15×11 cm polypropylene mesh. The mesh was placed over the space to cover the all the possible hernia sites. Mesh was fixed to the Cooper's ligament by tacker (Image 4).

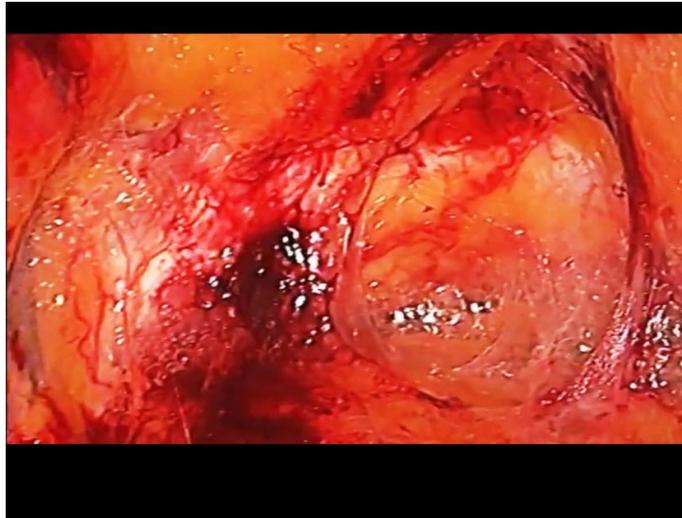


Image 1. Pubic bone with cooper's ligament

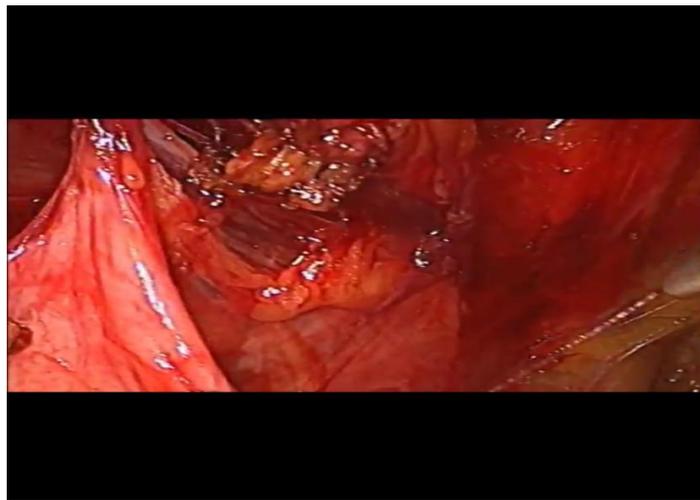


Image 2. Hernial Sac

Choice of procedures

The procedure was based on the patients wish, the general patient condition, and associated cost of the laparoscopic and open procedure.

Postoperative care and complications: post-operative complications like bleeding, wound infection, seroma, Orchitis and urinary retention were carefully monitored.

Discharge

Patients is discharged once fit and called on regular follow-up for one week, two weeks and at the end of month.

Statistical Methods used

Descriptive, Crosstabs, Chi-square and Independent – samples T-test.

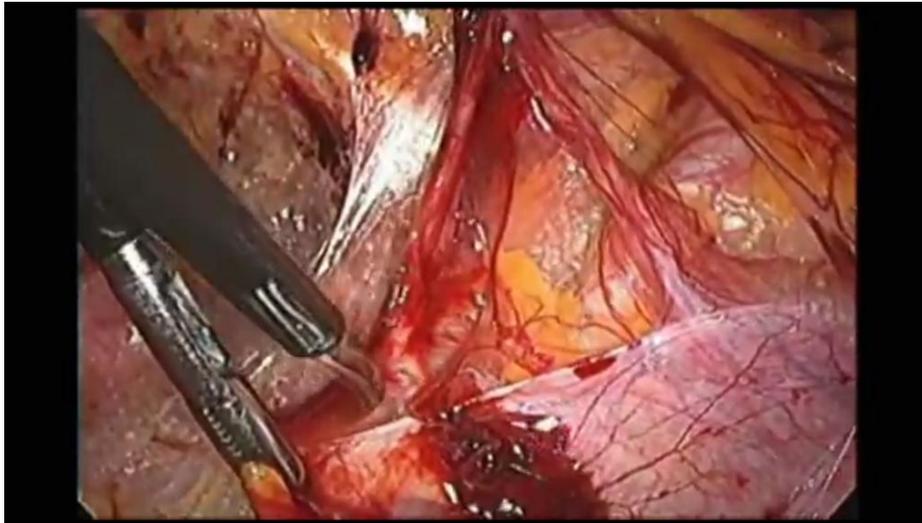


Image 3. Triangle of doom



Image 4. Mesh is fixed with tacker

3. RESULTS

In our study, we analyzed total 50 patients, of whom 30 were operated using open technique and 20 posted for laparoscopic inguinal hernioplasty.

In our study the minimum age at which occurrence of a hernia was 21 years and the eldest being at 80 years. All the patients in the study were men.

Of all the patients analyzed 42% presented with left sided groin swelling and rest 58% with right sided groin swelling.

In our study, we found that right inguinal hernia was more common 58% of the study group presented with right inguinal swelling.

74% of the patients presented within the first year of onset of complaints while 26% presented after one year.

Hypertension was the most common associated illness with eight people suffering from it, Diabetes mellitus was seen in 4 people.

Right direct hernia was observed in 18 cases being the most frequent type while left indirect the least prevalent.

3.1 Duration of Surgery

In our study, we found that the mean time taken for open inguinal hernia repair (hernioplasty) was about 71.5 minutes compared to the average duration of 84.25 minutes taken for laparoscopic inguinal hernia repair.

3.2 Post-operative Complications

3 (10%) cases of urinary retention in open hernioplasty as compared to 1(5%) in laparoscopic hernioplasty. Wound infection seen in 4 (13.33%) cases in an open group as compared to 1 (5%) in laparoscopically operated cases. Orchitis was more prevalent in the laparoscopic hernioplasty patient with incidence among 3 (15%) cases as compared to 1 (3.33%) in open group. 2 (6.67%) cases of seroma were found in the hernioplasty group whereas none in laparoscopic repair group.

Overall postoperative complications were fewer in laparoscopic hernia repairs when compared to the open hernia repair group which may be due

to less sample size of laparoscopic inguinal hernioplasty patients (n=20).

Further, the p-value is not significant between the two groups.

3.3 Duration of Hospital Stay

The mean length of the hospital was found to be 3.23 days for the open hernioplasty. Compared to the laparoscopic hernia group, which was around 3.5 days but the p-value is insignificant.

4. DISCUSSION

4.1 Age and Sex

Last 5year data from the Danish national hospital register were included. All groin hernia repaired during last five years were identified. Study population covered n=5,639,885 persons including 2,799,105 males and 2,840,780 females [2]. Within this population, 88.6% males and 11.4% females. Inguinal hernias comprised 97% of groin hernia repairs (90.2% males, 9.8% females) [2]. Patients between 0–5 years and 75–80 years constituted the two dominant groups for inguinal hernia repair [2]. There is a bimodal peak with the highest incidence in older age group. In our study, 11 cases were in 15-44 age group and 16 cases in >65 age group. Gupta et al. reported an incidence of 96% males while Charles et al. reported 93.2% of all the cases to be males [3,4]. Our findings are corresponding with the literature. The age incidence of our study matches with the above study. The sex incidence of our study does not correlate with the other studies; it may be due to the shy nature of the Indian women that it may not have presented to us. The male preponderance is due to strenuous activity.

The right sided hernia is more common in the literature. In Bisher Saeed A et al. evaluated inguinal hernias and found that 70.8% were right sided, 33.3% were left sided, 45.8% were indirect inguinal hernias, and 58.3% were direct inguinal hernias [5]. Alam et study also found the incidence of a right-sided hernia is more common [6]. In our study also right sided inguinal hernia is more common. Right side dominance is because of later descent of right testis [7].

In the present study 30 cases, each underwent Lichtenstein repair while 20 cases underwent TEP. The procedure was chosen based on patient's choice, need and financial status.

Table 1. Duration of the surgery

	Laparoscopic repair	Open hernia repair	P value
Mean Duration of Surgery(S.D.)	84.25(19.35)	71.5 (16.56)	0.016

Table 2. Post-operative complications

Complications	Laparoscopic repair (n=20)	Open Hernia repair (n=30)	P Value
Urinary Retention	1(5%)	3(10%)	0.641
Wound Infection	1(5%)	4(13.33%)	0.636
Orchitis	3(15%)	1 (3.33%)	0.289
Hematoma/Seroma	0 (0%)	2 (6.67%)	0.510
Injuries to Spermatocord, Vessels and Bowel	0(0%)	0	-----

Table 3. Duration of stay (no. of days)

	Laparoscopic repair	Open hernia repair	P value
Mean Duration of Stay (S.d)	3.50 (1.1)	3.23(0.89)	0.352

The mean duration for hernioplasty in our study was 71.5 min. Time for laparoscopic inguinal hernia repair (TEP) was 84.25 min. Reviewing Cochrane database, K McCormak et al. [8] also found that duration of operation was longer in the laparoscopic groups (WMD 14.81 minutes, 95% CI 13.98 to 15.64; p<0001).

4.2 Postoperative Complications

In our study the postoperative complications like hematoma/ seroma and wound infection, urinary retention were comparatively lower in the laparoscopic hernia repair group 0%, 5%, 5% compared to that of the hernioplasty group 6.67%, 13.33% and 10% respectively. As hernia surgery is a clean operation, it does not require routine antibiotic prophylaxis. However, as we are practicing in a rural area with overcrowded population and reduced local and general hygiene in villages, we made a policy to administer the pre-operative single dose of antibiotic. Even in the presence of antibiotic prophylaxis, we had a little higher wound infection rate probably because of poor personal local and general hygiene by the patients.

The incidence of Orchitis was higher in the laparoscopic group at 15% as compared to 3.33% in open group. Cochrane review also suggests that operative complications were uncommon for both techniques but more frequent in the laparoscopic group for visceral (Overall 8/2315 versus 1/2599) and vascular (Overall 7/2498 versus 5/2758) injuries

[8]. A systemic review by Cochrane collaboration showed trans abdominal preperitoneal (TAP) was associated increased risk of a port-site hernia and visceral organ injury and also concluded that there are insufficient data to prove the relative effectiveness of the TEP and TAP repair for inguinal hernia [9]. During laparoscopy most common vascular injuries involving the Inferior Epigastric and spermatic vessels [8]. The external iliac, profunda and obturator vessels are at also the risk, and previous lower abdominal surgery is a risk factor [10]. Vidovic et al. [11]. Reported a higher rate of urinary retention following TEP which was successfully managed by per urethral catheterization. In our study, urinary retention was more common in open hernia group probably because of spinal anesthesia and patients with older age group might have associated benign prostatic hyperplasia. The overall rate of vascular injury during laparoscopic repairs was 0.09% as against no reported cases during open operations [9]. In the present study, we did not encounter any case of vascular injury probably because of small sample size (n=20). In our study, we found the higher rate of Orchitis following TEP is possibly because of extensive dissection during TEP leads to thrombosis of vascular plexus or foreign body reaction to mesh.

In our study, we found that the mean period of hospitalization was slightly higher 3.5 days in case of laparoscopic hernia repair with 3.23 days in cases of hernioplasty but not statistically

significant. The post-operative days spent in the hospital were almost comparable in both groups. Cochrane review also state that length of hospital stay did not differ between open and laparoscopy groups (WMD -0.04 days, 95% CI -0.08 to 0.00; $p=0.05$ [8]).

The cost of anesthesia while surgery is a factor to consider while selecting patients for surgery and cost of operation is increased when general anesthesia is used. We did not consider cost factor in this study because of Shree Krishna Hospital is an affiliated with charutar arogya mandal and pramukh swami medical college which provide cheap and affordable health care like a trust hospital. Additionally, we are using autoclavable reusable instruments which also helps in cost cutting. The study comparing the cost of TEP and open inguinal hernia repair revealed that cost for TEP is \$852 more as compared to open hernia repair. However, this study did not show the cost saving arising from the faster recuperation and early re-entry into the workforce [12]. Operating cost can also be reduced by avoiding the use of disposable instrument [13].

Limitations of the study: There were few limitations to the study, due to less number of laparoscopic surgeries in this year; we could not have the same number in both groups for easy comparisons. Since the study period was for a short duration, long – term outcomes and results/recurrences cannot be assessed.

5. CONCLUSION

Laparoscopic TEP has comparable results with open Lichtenstein tension-free hernioplasty with fewer complications. For unilateral primary inguinal hernia either laparoscopy or open hernia repair with mesh has an equivalent result. The major drawback with laparoscopic TEP is its learning curve. However, in experienced hand, TEP is as good as open surgery with better cosmesis and less post-operative pain.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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