

A Comparison of Open Preperitoneal versus Laparoscopic Totally Extra Peritoneal (TEP) Inguinal Hernioplasty

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ABSTRACT

Introduction: This study was conducted on 100 patients having various types of hernia at a tertiary care centre of western part of India. Clinical and operative outcomes were compared between these two fundamentally similar but technically different methods of doing the hernia surgery, to determine which technique is advantageous for treatment of patients. Complications related to both the methods are noted.

Methods: Patients were allocated to either open preperitoneal hernioplasty (n=50) or laparoscopic hernioplasty (n=50) as per selection criteria. The standard open preperitoneal hernioplasty and laparoscopic Total Extra Peritoneal (TEP) hernioplasty was performed in all patients in this study. Patients were followed up clinically to evaluate post-operative outcomes analysis according to study protocol.

Results: The clinical long term outcome was comparable in both the groups. Open preperitoneal hernioplasty is age old method to deal with all types of hernia in emergency and high anaesthetic risk patients. While laparoscopic hernia repair has

emerged as modern day versatile method of hernioplasty with continuous refinements in it.

Keywords: Groin Hernia, Stoppa's Repair, TEP Laparoscopic Hernioplasty, Seroma, Wound Infection.


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Article History:

Received: 02-04-2016, Revised: 27-04-2016, Accepted: 23-05-2016

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2016.2.3.065	

INTRODUCTION

The term hernia in Greek means "bulge or off shoot."¹ Hernia is defined as area of weakness or complete disruption of fibro muscular tissue of the body wall.² Hernias are among the oldest known afflictions of humankind and surgical repair of inguinal hernia is the most common general surgery procedure performed till date.²

So there is emergence of wide variety of methods of hernia repair throughout the history. Inguinal hernia was first repaired laparoscopically soon after the introduction of laparoscopic cholecystectomy. However unlike laparoscopic cholecystectomy, which was very quickly accepted by surgical community, laparoscopic hernia repair has remained a contentious issue since its inception.³

Sir Astley Paston Cooper said that "No disease of human body, belonging to the province of surgeon, requires in its treatment a better combination of accurate anatomical knowledge with surgical skill than hernia in all its varieties."⁴ Halsted in 1892 said that "If no other field was offered to the surgeon for his activity than herniotomy, it would be worthwhile to become a surgeon and to

devote the entire life to this service."⁵ Such is the vastness and importance of this disease.

During days when muscular repair was prevalent, high recurrence rate was a significant problem. With the introduction of tension free mesh repair, the Lichtenstein Repair, recurrence rate reduced significantly.⁶ Investigators and surgeons then started facing unique problem of chronic groin pain, foreign body sensation in operated part. These were probably related to regional nerves injuries, stitch ligation or entrapment of nerves and tension repair of hernia.^{7,8}

Various methods to counteract these issues are being explored continuously. Preperitoneal placement of mesh by both open (Stoppa's)² method and laparoscopic Totally Extra Peritoneal (TEP) method avoids regional nerves dissection, their exposure to bio reactive synthetic mesh and entrapment in fixation. This has led forward to achieve the goal of patient comfort. However, preperitoneal mesh placement by open method could not be adopted with open arms for unknown reasons, while laparoscopic method is about to be established as gold standard.

AIMS AND OBJECTIVES

The aim of this study was to ascertain that comparison of pre peritoneal mesh repair by open and laparoscopic method in view of;

- Patient selection
- Operative time
- Post-operative pain
- Complications
- Hospital stay
- Return to work
- Recurrence rate

MATERIALS AND METHODS

We present the study of 100 patients, 50 open and 50 laparoscopic hernia surgery cases, from 30.01.2008 to 22.12.2010 operated at a tertiary care centre hospital at western India region. Patients are investigated for elective surgery on OPD bases. Those patients, who are fit, are admitted a day prior to surgery. Patients of uncomplicated primary inguinal hernia, whose cardio respiratory status is good and fit for surgery, undergoes laparoscopic TEP hernioplasty. Patients of uncomplicated or complicated hernia, who are unfit for general anaesthesia, undergo open pre peritoneal hernioplasty.

All the patients were operated by senior consultant surgeon of the department and operative procedure has remained uniform. General anaesthesia was given for laparoscopic cases and spinal or local anaesthesia was used for open cases. Operative time was measured from start of skin incision to complete closure of all incisions. Open pre peritoneal hernioplasty or Stoppa's repair² is followed at our institute. Transverse skin incision is made and canal opened layerwise. Hernia is reduced, inferior epigastric vessels ligated and cut, fascia transversalis cut to open pre peritoneal space. Cooper's ligament is identified. 3" * 6" prolene mesh is fixed with vicryl 3-0 to cooper's ligament and spread in pre peritoneal space covering direct, indirect inguinal hernia and femoral hernia openings. Fascia transversalis is closed. Darning done with prolene and wound is closed layerwise.

We follow laparoscopic TEP hernioplasty method at our institute as hernia is extra peritoneal disease and looking at pros and cons of TEP and TAPP, TEP is preferable method. Following standard surgical method is done at our institute for laparoscopic TEP hernioplasty.^{5,9} Under head low position, infra umbilical skin incision is made, anterior rectus sheath is cut, rectus muscle is retracted laterally and space is created between muscle and posterior rectus sheath. Finger is inserted in this space exiting from arcuate line into pre peritoneal space, doing blunt dissection bilaterally to create space. Trocar is inserted and pneumo pre peritoneum is created. Two other working ports are inserted. Medial and lateral dissection is done to identify landmarks like pubic tubercle, cooper's ligament, iliopubic tract, cord structures, vas, gonadal vessels, indirect sac and inferior epigastric vessels. Direct or indirect hernia is reduced. Enough space is created for a 15*15 cm prolene mesh to be spread in this area. There is approximately 25-30% reduction in size of the prolene mesh over the period of time¹⁰, so we use 15*15 cm mesh. Mesh is fixed with helical tackler at cooper's ligament and spread medially beyond pubic symphysis and laterally at least 5 cm beyond deep inguinal ring. Compression dressing is done on inguinal region to prevent seroma formation.

Post operatively, open patients are given scrotal support and discharged on 2nd day if uncomplicated. Patients of laparoscopic method are kept NBM till paralytic ileus passes, encouraged early mobilization and discharged on 2nd day if uncomplicated. Intensity of post-operative pain was measured using Visual Analogue Score (VAS)¹¹ which consisted of a 10 cm line calibrated only at 0 and 10. 0 representing no pain and 10 representing most severe pain imaginable.³ P0= No pain; P1= 1-3, mild pain; P2= 4-6, moderate pain; P3= 7-10, severe pain.

On follow up, data are noted as

- Chronic pain (VAS)
- Examination of wound
- Port site hernia
- Recurrence of hernia
- Other complications if any.

RESULTS AND DISCUSSION

Hernia is extensively studied since decades now. The principle underlying pre peritoneal hernioplasty has its basis in Pascal's hydrostatic principle, which states that "pressure of a fluid is evenly distributed across the wall of its container." The intra-abdominal pressure will be evenly distributed across a mesh placed between the high pressure region (intra-abdominal) and the hernia orifice. The intra-abdominal pressure acting via the peritoneal envelope holds the prosthesis solidly against abdominal wall.⁹ Advantages of open pre peritoneal hernioplasty are as follows:

1. Can be done under LA, when patient is unfit for SA or GA
2. Can be done in complicated hernia patients
3. Shorter learning curve as compared to laparoscopic repair.

LAPAROSCOPIC HERNIOPLASTY

Advantages⁴

- Decreased wound size, so decreases surgical site infection (SSI)
- Better cosmesis
- Improved vision
- Simultaneous correction of bilateral, direct, indirect and femoral hernia
- Better patient compliance
- Decreased hospital stay and early return to work
- Cost effectiveness

Disadvantages⁴

- Complications related to GA, couldn't be done under LA or SA
- Difficult learning curve
- Bowel, bladder and vascular injuries while trocar insertion
- Port site infection
- Port site hernia

Indications of Laparoscopic Hernia Surgery

- Uncomplicated direct or indirect inguinal hernia, femoral hernia
- Bilateral inguinal hernia
- Recurrent inguinal hernia because this approach is through virgin area.

Contra indications of Laparoscopic Hernia Surgery

- Severe cardio respiratory compromised patient
- Prior retro pubic surgery e.g prostatectomy

- Complicated hernia i.e. incarcerated, obstructed, irreducible, strangulated types
- Pelvic lymph node dissection and irradiation
- Intra-abdominal adhesion, sepsis or abscess.

All age group patients can undergo laparoscopic as well as open hernioplasty methods. The only limiting factors are:

- Risk of anaesthesia
- Patient's will

Table 1: Age and Method of Hernioplasty

Age Group (years)	Laparoscopic	Open
10-19	5	2
20-29	2	7
30-39	7	9
40-49	15	11
50-59	12	7
60-69	9	14
Total	50(100%)	50(100%)

Table 2: Operative time (Mean in Minutes)

Laterality	Laparoscopic	Open
Unilateral	77	91
Bilateral	112	114

Table 3: Rate of conversion to open

	Rate of conversion to open
Our study	2%
Palanivelu et al ¹³	<2%

Table 4: Rate of inadvertent pneumoperitoneum

	Rate of inadvertent pneumoperitoneum
Our study	7/50 (14%)
Palanivelu et al ¹³	11/410 (2.68%)

Table 5: Comparison of fixation and non-fixation of mesh in laparoscopic repair with respect to recurrence and operative time.

Laparoscopic hernioplasty		
Recurrence	Fixation	Non fixation
	0/29 (0%)	1/21 (4.76%)
Operative time (Mean in minutes)		
Unilateral	97	72
Bilateral	125	97

Table 6: Post-operative pain and type of hernioplasty. (at day 3)

VAS at day 3	Open	Laparoscopic
P0	0	0
P1	17(34%)	24(43%)
P2	33(66%)	26(52%)
P3	0	0
Total	50	50

Table 7: Post-operative pain and type of hernioplasty. (at day 30)

VAS at day 30	Open	Laparoscopic
P0	39(78%)	48(96%)
P1	11(22%)	2(4%)
P2	0	0
P3	0	0
Total	50	50

Table 8: Comparison of duration of hospital stay

Method of Hernioplasty	Mean total duration of hospital stay in days	Mean post-operative duration of hospital stay in days
Laparoscopy	3.92	2.2
Open	4.76	2.32

Table 9: Comparison of return to work

	Return to work (Mean in days)
Laparoscopic hernioplasty	5.6
Open hernioplasty	6.5

Table 10: Rate of early complications

Early Complication	Laparoscopic	Open
Surgical emphysema	3(6%)	Not applicable
Urine retention	Not applicable	3(6%)
Scrotal swelling/ Hematoma	5(10%)	7(14%)
Seroma	8(16%)	7(14%)
Wound infection	7(14%)	11(22%)
Mesh infection	0	0
Injury to nerves	0	0
Injury to vas	0	0
Injury to vessels	0	0
Injury to Bowel/Bladder	0	0
Mortality	0	0
Total patients	50	50

Table 11: Rate of late complications

Late Complication	Laparoscopic	Open
Chronic pain	0	0
Port site hernia	0	Not applicable
Recurrence	1(2%)	0

These two factors decide to which type of hernioplasty the patient goes. Although it was thought that laparoscopy is more preferred for young patients and opens for old age patients, no such distribution is noted in our study. (Table 1)

In unilateral laparoscopic repair, decreased operative time is due to no fixation of mesh in some patients. In unilateral open hernioplasty, increased operative time is due to addition of darning as a routine step. In bilateral hernia, operative times are

comparable between both methods. Average operative time for TEP is 68 min and for open repair is 54 min.¹² (Table 2,3)

There is somewhat higher incidence of inadvertent pneumo peritoneum in our study, indicating why this technique is considered difficult and has difficult learning curve. (Table 4)

Operative time is reduced in non-fixation laparoscopic hernioplasty, only at cost of increased rate of recurrence, as compared to fixation group. In the early years of laparoscopic hernia repair, a strong fixation seemed to be the most important factor in prevention of recurrence. But with growing sizes of mesh and true macro porous material being available, the belief in strength has reduced and given way to concern of acute and chronic pain caused possibly by fixation. The controversy of fixing and non-fixing the mesh is under scrutiny. There are reports of both, excellent results of non-fixation as well as alarming results demonstrating increased risk of recurrence.¹⁴ (Table 5)

Pain in laparoscopy is less as compared to open. Once the effect of SA is gone, patient has pain in open method. (Table 6)

Most patients have no pain after 1 month of surgery. In laparoscopy as well as open hernioplasty, incidence of chronic pain at operative site is zero in our study. This is probably due to: (Table 7)

1. Better understanding of anatomy
2. No energy use. Dissection and fixation below ilio pubic tract
3. Fixation at cooper's ligament rather than pubic bone.

All these measures prevent nerve damage, help decreasing incidence of chronic pain at operative site.

Table 8 shows that Post-operative stay in both methods is comparable. But total stay is more in open cases because open cases patients often have associated illness like hypertension, chronic cough, COPD that requires medical stabilization and they become fit for surgery only then. With increasing experience in laparoscopic technique, we can move towards implementation of "Day Care Surgery" for laparoscopic hernioplasty. Outpatient TEP was safe and effective with success rate of 97%. Post-operative pain was mild and more than 90% of patients resumed normal outdoor activities within a week. Outpatient TEP may emerge to become the preferred method for management of inguinal hernia.¹⁵

Table 9 shows that return to routine work is approximately 1 day earlier with laparoscopic repair. This suggests need for implementing "patient's education session" for teaching them the advantage of this minimally invasive method. So that they can understand that they can resume routine work as early as possible without undue side effects. Thus, we can still decrease the mean days of return to routine work. Majority of patients returned to routine work within 3-5 days after TEP hernioplasty.¹³

Table 10 shows that most common complication for laparoscopic hernioplasty is seroma and for open hernioplasty is wound infection. Percutaneous needle aspiration was done for seroma to solve the problem. Wound infections were managed with dressing and antibiotic cover.

Table 11 shows that zero incidence of port site hernia reflects routine practice of closing all port of 10 mm size with sutures. Eight out of nine studies showed port site hernia in a review by Dr SSV Rao. Comparative studies showed rates of 0% to 3.7%. In all those studies where cases of port site hernia are reported, TAPP was associated with higher rate than TEP.¹⁶ Very low recurrence rate in both methods indicate versatility of these methods.

CONCLUSION

Open pre peritoneal hernioplasty is a versatile and time tested method of treating all types of groin hernias like direct, indirect, femoral, complicated, obstructed, strangulated, recurrent and for patients having high anaesthetic risk due to associated co-morbidities. It is an important asset in the armamentarium of a general surgeon because this can be executed in any basic operative set up with very satisfying results. Open preperitoneal repair is not performed routinely and surgeons may have to learn the procedure before implementing into current surgical practice. It is a simple procedure with less steep learning curve as compared to laparoscopic hernioplasty.

On the other hand, minimal access surgery, laparoscopy and endoscopy are demands of modern edge society with proven advantages of less post-operative pain, less duration of hospital stay; less time to return to routine work and less early and late post-operative complications. With the use of fixation and larger size of mesh to reduce incidence of recurrence, laparoscopic method becomes a bit costlier as compared to open. It can be considered as alternative and can be applied to selective group of patients. Because of steep learning curve, cost and availability of equipments; its access may be limited.

Longer duration studies with more volume and a longer period of follow up is required to justify use of one procedure over the other. In the current scenario, we conclude that both can be performed depending on patient's and surgeon's preference.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

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Cite this article as: Nilay Adhvaryu, Mukesh Suvera, M V Pipalia. A Comparison of Open Preperitoneal versus Laparoscopic Totally Extra Peritoneal (TEP) Inguinal Hernioplasty. Int J Med Res Prof. 2016; 2(3):288-92.