



## Original Article

# Laparoscopic repair of inguinal hernia: Prospective evaluation at a tertiary care center

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### Abstract

**Background:** Treatment of groin hernias continues to evolve. The emergence of laparoscopic inguinal hernia surgery has challenged the conventional gold standard Lichtenstein's tension free mesh repair. Laparoscopic technique to achieve surgical correction over groin hernia is increasingly being practiced in our country, and it is imperative to test the overall outcome of this technique in a tertiary care setting.

**Objectives:** Current study was aimed at evaluating the per-operative events, early and late outcomes of laparoscopic groin hernia repair techniques. End points of evaluation were post-operative pain, hospital stay, resumption of normal activities, chronic pain and recurrence.

**Methods:** Within a 2-year period, 45 patients of groin hernias of different clinical types underwent laparoscopic inguinal hernia repair in Bangladesh Medical College Hospital were recruited in this prospective observational study. Preoperative findings, intraoperative course, postoperative and follow-up data were analyzed to evaluate the outcomes. Observations were made regarding operating time, operative hazards, post-operative pain, incidence of early post-operative morbidities, hospital stay, resumption of activities. Total 24 months follow-up was carried out with regards to normal activity, late complications notably chronic groin pain and recurrence.

**Results:** The mean age of  $38.1 \pm 11.1$  years, 27(60%) patients underwent TEP repair whereas, TAPP procedure was carried out in 18 patients (40%). For unilateral hernia repair using TEP technique, mean operative time was  $50.3 \pm 4.2$  mints and  $61.7 \pm 5.3$  mints for direct and indirect variety (D/I), with the corresponding rates for TAPP repair being  $65.0 \pm 2.2$  mints and  $72.8 \pm 3.2$  mints (D/I) respectively. Conversion rate to other operative procedure was 6.67%. The overall surgery related early post-operative morbidity was 7.4% (TEP) and 16.8% (TAPP). 3 out of 45 patients (6.67%) experienced chronic pain in the groin in the study. However, there was no single incidence of recurrence observed during the follow up period.

**Conclusion:** Laparoscopic groin hernia repair techniques are safe and feasible, offers the benefits of minimally invasive surgery and becoming the procedure of choice specially for bilateral and recurrent inguinal hernias.

**Keywords:** Inguinal hernia (IH), Lichtenstein's repair (LR), Laparoscopic inguinal hernia surgery (LIHS), Totally extra-peritoneal (TEP), Trans-abdominal pre-peritoneal (TAPP).

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### Introduction:

Over past several decades, minimal access surgery has undergone tremendous advances in instrumentation and expertise making an ever-expanding array of procedures amenable to laparoscopic techniques. With its diverse advantages, minimal access surgery has made foray in the hernia territory. At present, two laparoscopic procedures like totally extraperitoneal (TEP) and trans-abdominal preperitoneal (TAPP) techniques have been standardized and gained widespread acceptance

among surgeons where a large mesh is placed covering all the myo-pectineal weak points for inguinal, obturator and femoral hernia<sup>1</sup>. The main concerning issue with LIHS, however, is the recurrence. With the consistently reported low recurrence rates, focus has been drifted to other complications mostly the chronic groin pain after hernia surgery.

The aim of the study was to evaluate the effectiveness of LIHS with regards to operating time, immediate and early post-operative outcomes, hospital stay, late post-operative complications notably chronic groin pain and recurrence.

### Materials and Methods

A total number of 45 patients, age range of 18-65 years, underwent an elective LIHS for inguinal hernia between January 2014 to January 2016 in Bangladesh medical college hospital, were recruited in this prospective observational study. Strangulated hernia, patients unfit for general anesthesia, obesity, patients with pelvic irradiation and history of lower abdominal surgery.

Most of the hernia was repaired by TEP technique and rest were dealt with TAPP procedure. Operative and the post-operative factors were analyzed and the outcome measured. Patients were followed up at one week, one month, three months and thereafter yearly at OPD or by means of phone call. Pain experienced by the patients were categorized using ten-point numeric scale.

### Preoperative preparation:

LIHS (TEP and TAPP) is performed under general anesthesia. Base line investigations are carried out to assess the patients' fitness for general anesthesia. Foley's indwelling catheter is placed in every patient prior to surgery which is removed after 24 hours. Injection Ceftriaxone (1gm) i/v administered at the time of induction.

### Patient position and theater setup:

The patient lies supine with both arms tucked by the side. The patient is kept 15-30° head low position to facilitate creation of pneumatic space and move the bowel away from the operative field. The surgeon stands on the opposite side of hernia with the camera assistant next to him. TEP repair for bilateral hernias, surgeon changes the position to his convenience. Whereas, the position remains unchanged in TAPP technique. The monitor is placed at the foot end of the patient opposite to the surgeon.

### Surgical Techniques Technique of TEP procedure;

A 10 mm infraumbilical transverse incision is made. The anterior rectus sheath is exposed and another transverse incision is made on it to one side of midline. The margins of the incised sheath are held in stay sutures using 1/0 vicryl sutures. The rectus muscle is retracted laterally from the midline and by finger dissection a space is created between rectus muscle and the posterior rectus sheath. A balloon dissector was used to create sub-rectus canal, the initial preperitoneal working space. Working space is further widened by the telescope tip as needed. Under direct vision two 5mm working ports were placed in the midline just above the symphysis pubis and midway between 10 mm port and supra-pubic port. Dissection in extra-peritoneal space begins by dividing the loose areolar tissue starting from midline and gradually extends laterally using sharp and blunt dissection. The type of the hernia (direct or indirect) is ascertained in relation to the inferior epigastric vessels. Reduction of the sac was attempted in all cases. However, in case of stubborn indirect hernias with dense adhesions, sac was divided at the deep ring. Obturator, genito-femoral and lateral cutaneous nerve was identified. Triangle of doom and Hasselbachs triangle were defined. After completion of the dissection, a half rolled 15/12 cm poly propylene mesh was introduced via the 10 mm port. Mesh was spread to cover the entire myo-pectineal orifices of the affected side and fixed using tackers.

Pneumoperitoneum was finally released. 10mm port was closed using 1/0 vicryl suture and skin incisions were closed with intra dermal sutures.

### Technique of TAPP procedure

Pneumoperitoneum was created through a sub-umbilical 10 mm port inserted in an open method. Two additional 5 mm working ports were placed under direct vision to avoid injury to inferior epigastric vessels and the underlying bowel on either side of the umbilicus for effective triangulation. The hernia defect is inspected and the type of the hernia (direct or indirect) is confirmed by the position of the defect in relation to the inferior epigastric vessels and cord structures. The peritoneum was incised at a point midway between groin crease and the umbilicus, generally 4-6 cm superior to deep ring, extending transversely laterally up to anterior superior iliac spine and medially up to medial umbilical ligament to create a peritoneal flap. The peritoneal flap is raised above

and below and the sac is reduced by sharp and blunt dissection from the adjacent structures. After adequate reduction of sac and defining all the anatomical landmarks as in TEP repair, a wide 15/12 cm proline mesh was placed and secured with tackers to cover the defects completely. Finally, the peritoneal defect was closed with 2/0 vicryl suture or tackers. The pneumoperitoneum was released and the 10 mm port was closed using 1/0 vicryl suture. The skin incisions were closed with intradermal sutures or staplers.

### Post operative care

Oral liquids allowed 6 hours after surgery and soft diet started thereafter and progressed to normal diet in the next day. Sitting up in the bed and early movements were encouraged. Urinary catheter usually removed in the next morning. Ketorolac injection 30 mg i/v was used for pain control whereas, injection paracetamol or tramadol hydrochloride was reserved in contra-indications. Patients were mostly discharged on 2<sup>nd</sup> post-operative day on oral antibiotics and analgesics with instructions to attend the follow-up on 7<sup>th</sup> post-operative day. Full range of activities were advised to resume in a week or so.

### Results

**Table-I. Patient demographic and clinical profile (n=45)**

Variable	Frequency	%
Age(years)		
≤ 25	5	11.1
26-35	12	26.67
36-45	15	33.33
46-55	8	17.78
56-65	5	11.11
Mean ± SD	38.1±11.1 years	
Range	(18-65) years	
Comorbidity		
Diabetes	7	15.56
Hypertension	4	8.89
COPD	4	8.89
IHD	3	6.67
Prostatic Enlargement	2	4.44
Ankylosing Spondylitis	1	2.22

**Table-II. Characteristics of hernia and procedure performed**

	Total	TEP	TAPP
Unilateral hernias			
Indirect	25	15	10
Direct	12	08	04
Bilateral hernias			
Indirect	04	02	02
Direct	04	02	02
Total	45	27	18

**Table 3. Intra-operative events and outcome**

Parameters	TEP (n= 27)	TAPP (n=18)
Operative time(minutes) Unilateral		
Direct	50.3±4.2	65.0±2.2
Indirect	61.7±5.3	72.8±3.2
Bilateral		
Direct	71.0±4.3	77.5±8.1
Indirect	84.0±2.8	109±11.78
Injury to viscera	Nil	Nil
Injury to vas deferens	Nil	Nil
Injury to gonadal vessels	01 (3.7%)	01 (5.5%)
Inferior epigastric vascular injury	01 (3.7%)	Nil
Injury to major vessels	Nil	Nil
Surgical emphysema	01 (3.7%)	Nil
Inadvertent Peritoneal breach	02 (7.4%)	Nil
Conversion to other procedure	02 (7.4%) to TAPP	1 (5.5%) to Open
Reoperation	Nil	Nil
Use of drains	02 (7.4%)	Nil

**Table - IV. Early post-operative events and complications**

	TEP(n=27)	TAPP(n=18)
Urinary retention	01(3.7%)	01(5.6%)
Seroma/hematoma	01(3.7%)	01(5.6%)
Scrotal swelling	Nil	01(5.6%)
Funiculitis	Nil	01(5.6%)
Ecchymosis	01(3.7%)	Nil
Ischemic orchitis/orchialgia	Nil	Nil
Port site infection	Nil	Nil
Intestinal obstruction	Nil	Nil

**Table 5. Late post-operative complications**

Parameters	Total (n=45)
Chronic wound infection/discharging sinus formation	Nil
Mesh infection	Nil
Sensory loss over scrotum/thigh	Nil
Chronic groin pain	3 (6.67%)
Port site hernia	Nil
Recurrence	Nil

### Discussion

The complications, commonly encountered in LIHS are hemorrhage and visceral ( bowel and bladder) injury. Inferior epigastric and gonadal vessels are the frequent source of bleeding. Mostly bleeding is handled with diathermy coagulation, suture ligation or clips, whereas few demands step in to other procedures. The most dangerous of all, is the iliac vessel injury (Triangle of Doom) which requires an emergency conversion. On the other hand, pre-operative urinary catheterization (TAPP and TEP) and avoidance of dissection beyond the medial umbilical ligament (TAPP) is advocated to avoid bladder injury.

Inadvertent peritoneal breach is may occur in the TEP procedure , leading to leak of insufflated gas into the peritoneal cavity resulted in the obliteration of the precious working space. In another literature, the incidence was 7% for the same<sup>2</sup>. We have experienced two incidences of peritoneal tear in 7.4% of the TEP repair.

TEP repair is less time consuming than the TAPP technique as it avoids peritoneal tear and its mandatory closure, saving precious operating time. Operative time reported by large series are between 30-45 min and 40-65 min for TEP and TAPP repairs respectively<sup>3</sup>. In our study operative time was 60.3 min and 71 min respectively.

Seroma, cord structure injury related complications like funiculitis, ischemic orchitis are well recognized specially after handling long standing complete sac. A multi-center randomized comparison documented these incidence as in the range of (5-25) %<sup>4</sup>.

Unmanageable peritoneal dent, ongoing hemorrhage from the gonadal and inferior epigastric vessels and inability to separate densely adherent sac from cord structures are the usual reasons for conversion. A large

randomized trial of 1042 patients listed a conversion rate of 1.2%<sup>15</sup>. In their well conducted study of 3100 patients. In our study 3 (6.67%) patients required conversion. The value was on the higher side due to smaller sample size.

Incidence of groin pain is reported around 6 % depending on the techniques attempted (range 1-16%)<sup>6</sup>. We have noticed as 3 (6.67) % patients complained about having long standing nagging pain in the groin in our study period.

In the largest American trial to-date, randomized 1983 patients to open or laparoscopic repair<sup>7</sup>. After two-years of follow-up with 85% of the patients, reported twofold more recurrences (10.1% vs 4.9%), a slightly higher complication rate (39.0% vs 33.4%) but reduced pain and earlier return to work in the laparoscopic arm than in open arm. Our study showed no recurrence rate after a complete 2 years of follow up.

Treating bilateral inguinal hernia in the same sitting, is another sector where laparoscopy might dictate in future and already has get labeled as "gold standard" in some literatures. In conjunction to the benefits of minimal access surgery, it cuts down the risk of complications at the contra-lateral side and alleviates patients stress of waiting for a second operation. One study reviewed 2880 patients with bilateral hernias repaired by TAPP and compared them to 7240 patients with unilateral TAPP repairs. Pain, disability, recovery, reoperation ad recurrence rates were similar between the two groups<sup>8</sup>.

### Conclusion

Laparoscopic approach is the current refinement and an accepted surgical alternative to open repair for groin hernia. LIHS offers the benefits of minimal access surgery like reduced morbidity, faster recovery and better cosmesis contrary to the open procedure and a gradual drift towards this technique has been observed worldwide. Patients with bilateral inguinal hernia could harvest major benefits from minimal access techniques as both defects are dealt in a same operation and resources without need for additional ports or incisions with equal therapeutic outcome. Clear understanding of the laparoscopic anatomy, considerable skills and great deal of experience is required to get an uneventful outcome.

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