

Laparoscopic totally extraperitoneal hernioplasty: Theodor Bilharz Research Institute preliminary experience

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Background

The two standard methods for inguinal hernioplasty is open and minimal access laparoscopic technique. Most laparoscopic surgeons use a transabdominal preperitoneal approach but totally extraperitoneal (TEP) approach potentially offers several advantages.

Objective

The aim in this study was to assess the learning curve, cost value, safety, and feasibility of TEP approach.

Patients and methods

Prospectively collected data on 185 consecutive patients submitted to laparoscopic TEP hernioplasty for inguinal hernia from 2016 to 2018 in Theodor Bilharz Research Institute Hospital. This study involved repair of primary, recurrent inguinal hernia and femoral hernia. The prolene mesh was used for groin hernia repair in all cases with and without fixation.

Results

All 185 cases started with the laparoscopic TEP technique with only four cases converted to transabdominal preperitoneal technique (2.1%). In 110 (60.7%) cases the mesh was placed without fixation. In 71 cases the mesh was fixed by Tackers or Histoacryl. In unilateral hernia, the mean operating time was 45 min, while in bilateral hernia it was 61 min. Intraoperative complications included three cases of inferior epigastric vessel injury which were managed by metallic clips of 5 mm. The mean pain score was 7.5, while the mean satisfaction score was 5.4. The mean hospital stay was 16.4 h. Regarding postoperative complications, 10 (5.5%) patients developed a postoperative seroma, four (2.1%) patients developed a hematoma, two (1.1%) patients developed a hydrocele, and five (2.7%) patients experienced neuropathic pain. There were three (1.1%) recurrent cases; all these cases were managed by open hernioplasty.

Conclusion

In this study, the laparoscopic TEP approach is found to be an effective, and safe technique regarding primary, recurrent open inguinal and femoral hernias with good learning curve to laparoscopic surgeon who started with transabdominal preperitoneal technique.

Keywords:

inguinal hernia, laparoscopic hernioplasty, total extraperitoneal approach

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Introduction

The most frequently performed operation in general surgery is inguinal hernia repair. Over a hundred years the standard method for inguinal hernia repair had minor changes until the introduction of synthetic mesh which can be placed by the open approach or by using a minimally access laparoscopic technique [1].

Laparoscopic hernioplasty evolved from the Stoppa operation with placing a prosthetic mesh in the preperitoneal space over the myopectineal orifice for the reinforcement of fascia transversalis. In the early 1990s, Arregui and Doin introduced the transabdominal preperitoneal technique (TAPP). With TAPP approach we can identify a missed additional direct or femoral

hernia during the operation. Then Phillips and McKernan described the totally extraperitoneal (TEP) approach of endoscopic hernioplasty without breaching the peritoneal cavity [2].

Recommendations of The Royal College of Surgeons of England for the laparoscopic approach are: bilateral hernias, groin hernia in women, recurrent hernias after open hernioplasty, and hernias in young men who are active or who complain of predominant groin pain [3].

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Initially, most laparoscopic surgeons used a TAPP technique to reach the preperitoneal space of the groin. This technique was more familiar and much easier than the one that required exposing the extraperitoneal space without breaching the peritoneal cavity laparoscopically. A totally extraperitoneal technique potentially offers several advantages. It might eliminate complications related to entering the peritoneal cavity to reach the extraperitoneal space and might reduce operative time especially for bilateral hernia repairs [4].

Patients and methods

A prospectively collected data on 185 patients submitted to laparoscopic TEP hernioplasty for inguinal hernia from 2016 to 2018 in Theodor Bilharz Research Institute Hospital. Inclusion and exclusion criteria are shown in Table 1.

All patients were subjected to history taking, general examination, and routine preoperative assessment including abdominal ultrasonography, informed written consent approved by the Ethics Committee of TBRI, evaluations of the operative time, and any intraoperative complications, postoperative pain score, need for analgesia, hospital stay, and postoperative complications.

All operations were performed by surgeons who have specialized in laparoscopic surgery. Prophylactic antibiotic was given on induction for all patients. Under general anesthesia, the patients were placed in supine position adducting the two arms, and a Foley catheter was inserted intraoperatively, which was removed immediately after operation.

Operative techniques

Scrubbing of the abdomen starts from the nipple to the knees. The surgeon and the assistance stand on the

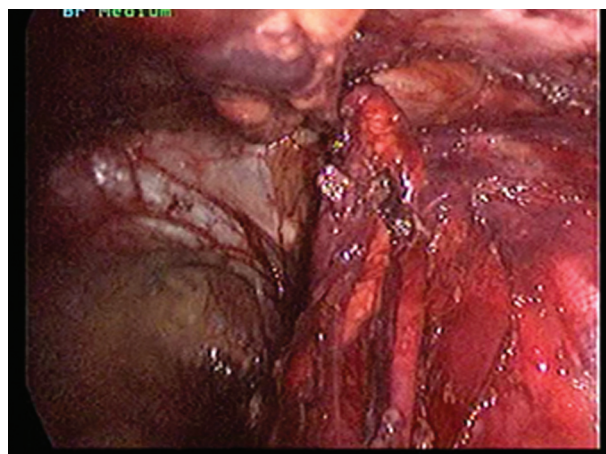
either side of the hernia beside the patient head while the screen and the laparoscopic set were placed on the side of the hernia beside the patient foot. Insufflation of extraperitoneal space was accomplished through an infraumbilical incision to the anterior rectus sheath on the same side of the hernia by the insertion of a 10 mm laparoscopic trocar into the preperitoneal cavity between the rectus muscle and the posterior rectus sheath. A 10 mm scope (0°) was used to bluntly dissect the preperitoneal space till the superior pubic remus is seen and then a 30° scope was used. Two other 5 mm working ports were inserted in the midline: one at the pubic tubercle and the other mid-way between the two ports. After dissection of the sac from the cord with the identification of the triangle of dome and pain (Fig. 1), we placed a 12×15 cm prolene mesh for inguinal repair in all cases. It was inserted through a 10 mm port and then it was laid in the preperitoneal space over the inguinal area with fixation by Tackers or Histoacryl (Covidin, USA) (2 cm was injected percutaneous by drop technique at the pubic tubercle and the triangle of pain) and others without fixation (The mesh was marked by two small metallic clips 5 mm at the pubic tubercle edge and the other at the anterior superior iliac spine edge which was checked by plain radiograph on erect position after 1 week) (Figs 2–5) followed by the release of the pneumoperitoneal gas. Then closing the anterior rectal sheath of 10 mm port by prolene 2/0 followed by skin closure.

Postoperative pain score for the first week was determined by asking each patient to express the level of postoperative pain in the range of 0 (no pain) to 10 (most pain). The score of hospital stay and patient's satisfaction was determined by a seven-point Likert-like verbal rating scale, starting with

Table 1 Inclusion and exclusion criteria

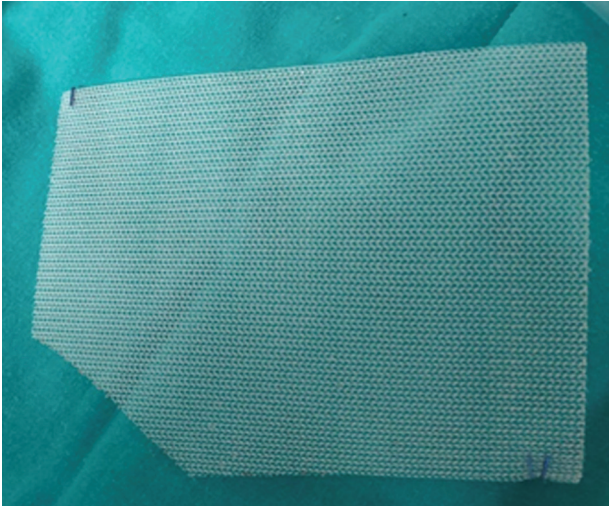
Inclusion criteria
Inguinal hernia (Bubonocele–funicular) and femoral hernia ranging from 12 to 60 years old and with good health ASA1 (American Society of Anesthesiology)
Recurrent inguinal hernia post open procedure
Exclusion criteria
Past history of lower abdominal surgical procedures
Complex inguinal hernia disease (irreducibility, strangulation, hydrocele of the cord, and obstruction)
Inguinoscrotal hernia
ASA more than 1
Age younger than 12 years and older than 60 years
Previous laparoscopic hernioplasty
Previous pelvic lymph node resection
Previous groin irradiation

Figure 1



After dissection of the sac.

Figure 2



The prolene mesh used in our study.

Figure 4



Mesh placement.

1=extremely dissatisfied, 2=dissatisfied, 3=somewhat dissatisfied, 4=undecided, 5=somewhat satisfied, 6=satisfied, and ending by 7=extremely satisfied.

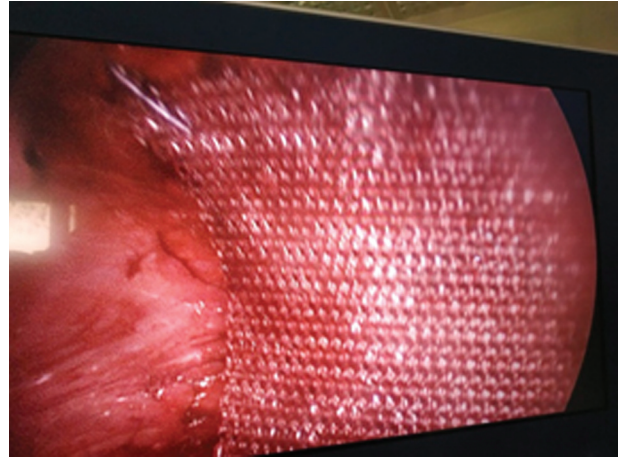
The aim of our study was to assess the learning curve, safety, and feasibility of TEP approach regarding intraoperative and postoperative parameters (Table 2).

Results were collected, tabulated, and evaluated based mainly on the learning curve, cost value, safety, and feasibility of TEP approach.

Statistical analysis

Our statistical analysis was determined by the nonparametric test using the T test for groups' comparisons and accepting a significance level at $P=0.05$ while presenting our data as median range.

Figure 3



Marking of the anterior superior iliac spine edge with single clip.

Figure 5



Postoperative plain radiography (Erect position).

Approval of the study

Approval of the study by our local Ethics Committee in Theodor Bilhariz Research Institute and conducted as per the Helsinki II Declaration. An IRB form and written consent form were obtained from all patients after detailed explanation of the procedures and its possible complications.

Results

In all, 185 consecutive patients submitted to laparoscopic TEP hernioplasty for inguinal hernia from 2016 to 2018 in Theodor Bilhariz Research Institute Hospital. There were 173 men and 12 women with a median age of 36 years (range: 16–60 years): 185 hernias (20 bilateral, 165 unilateral), 181 cases of inguinal hernioplasty (42 direct, 139 indirect), and four femoral hernias were done. Eight (4%) patients underwent recurrent hernia repairs (Table 3).

All cases (185) were subjected to laparoscopic TEP technique with four cases converted to TAPP (2.1%) due to breaching of the peritoneum with no need to

Table 2 Intraoperative and postoperative parameters

Intraoperative
Operating time
Rate of conversion from TEP to TAPP or to open technique
Complications, for example, injury to vas deference, inferior epigastric vessels, etc.
Postoperative
Pain score, need for analgesia, the patient's wound satisfaction, hospital stay, and resumption to
Usual activities
Complications, for example, hematoma, recurrence, hydrocele, etc.

TAPP, transabdominal preperitoneal technique; TEP, totally extraperitoneal.

Table 4 Patients' operative data

Success rate	181 (97.8)
Fixation	
Without	110 (60.7)
With	
Tackers	51 (28.2)
Histoacryl	20 (11.1)
Operating time (min)	
Unilateral	45 (30–75)
Bilateral	61 (53–95)
Intraoperative complications	
Inferior epigastric vessel injury	3 (1.6)

Date are represented as (mean±SD) and *n* (%).

convert it to open surgery. In 110 (60.7%) cases, the mesh was placed without fixation. In 71 cases, the mesh was fixed [51 (28.2%) cases by Tackers and 20 (11.1%) cases by Histoacryl]. Our mean operating time for unilateral hernioplasty was 45 min (30–75 min), while in the bilateral one it was 61 min (53–95 min). Intraoperative complications included three cases of inferior epigastric vessel injury which were managed by metallic clips of 5 mm (Table 4). There was improvement in operative times and length of hospital stay with increasing numbers of cases. The learning curve for the laparoscopic surgeon who started with the TAPP technique shows a great difference to those started with the TEP technique presented by decreasing the operative time in those started by TAPP technique than in those started by the TEPP technique.

The mean pain score was 7.5 while the mean satisfaction score was 5.4. With regard to hospital stay, the average was 16.4 h (6–24 h). With a median follow-up time of 12 months (6–18 months) from the data collected (*n*=181), 10 (5.5%) patients developed a postoperative seroma, four (2.1%) patients developed a hematoma, two (1.1%) patients developed a hydrocele, and five (2.7%) patients experienced neuropathic pain, all of which required no surgical interventions. There were three (1.1%) recurrent

Table 3 Patients' preoperative data

Age	36.2±7.43
Sex	
Male	173 (78)
Female	12 (12)
Site of hernia	
Inguinal	
Direct	42 (22.7)
Indirect	139 (75.2)
Femoral	4 (2.1)
Type of hernia	
Primary	177 (95.6)
Recurrent	8 (4.4)
Side of hernia	
Unilateral	165 (89.2)
Bilateral	20 (10.8)

Date are represented as (mean±SD) and *n* (%).

Table 5 Patients' postoperative data

Pain score	7.5±0.24
Patient satisfaction score	5.4±0.79
Hospital stay (h)	16.4±0.40
Early postoperative complications	
Seroma	10 (5.5)
Hematoma	4 (2.1)
Hydrocele	2 (1.1)
Late postoperative complications	
Neuropathic pain	5 (2.7)
Recurrence	3 (1.6)

Date are represented as (mean±SD) and *n* (%).

cases, two of them were in the cases without fixation, and one case was fixed by Histoacryl. All these cases were managed by open hernioplasty (Table 5).

Discussion

In the last two decades, laparoscopic hernia repair has proven advantages over open surgical technique in early discharge from hospital and early return to work [5,6].

From 37 studies, The National Institute for Health and Clinical Excellence carefully assess all the evidence for the laparoscopic technique in inguinal hernia surgery with proven earlier return to work and decreased postoperative pain but with more operating time required (average 13.3 min longer) [7].

Still the optimal technique for inguinal hernia repair is being debated. But with an experienced laparoscopic surgeon, the laparoscopic TEP hernia repair is documented as an ideal choice for inguinal hernioplasty in numerous studies [8–10].

Many surgeons still have not adopted this technique because of the long learning curve although most

surgeons now agree that the laparoscopic approach is a viable option for inguinal hernioplasty, especially for bilateral and recurrent hernias. Laparoscopic hernioplasty is more difficult to learn than most other advanced laparoscopic procedures because of a complex anatomy in an unfamiliar space [11].

We present our preliminary experience of laparoscopic TEP hernioplasty in TBRI for the repair of inguinal hernias using a prosthetic mesh. Most of our patients in our study were men, and most of our repairs were unilateral indirect inguinal. There was improvement in operative times and length of hospital stay with increasing numbers of cases. The learning curve for the laparoscopic surgeon who started with the TAPP technique shows great difference to those started with TEP technique. Early postoperative complications were infrequent and over 6 months follow-up only three cases have recurrent hernias. The surgery was satisfactory for all cases. Over the past few years, several mesh fixation techniques have been proposed for laparoscopic inguinal hernioplasty, starting from biological and nonbiological glues, to permanent and absorbable tacks, to without fixation. The use of a self-gripping mesh in the open inguinal hernia repair over the short term improves pain and recurrence outcome [12].

In our study, we have 110 cases with mesh fixation, 51 with tackers fixations, and 20 with Histoacryl injection.

Conclusion

In our study, laparoscopic TEP approach is an effective and safe technique regarding primary, recurrent open inguinal and femoral hernias with good learning curve

to laparoscopic surgeon who started with TAPP technique. We need a more larger scale to master this approach.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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