

Polypropylene mesh versus double face mesh in totally extraperitoneal laparoscopic inguinal hernia repair

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Background

Inguinal hernia is the commonest type of hernia. Repair of the inguinal hernia is one of the most widely recognized surgeries done all over the world. With the advancement in knowledge, laparoscopic hernioplasty has become very popular, accounting for ~15–20% of hernia repair, with great results.

Objectives

In this study, we have tried to determine if there is a significant difference between using conventional polypropylene mesh and double face mesh (polypropylene +vicryl) in totally extraperitoneal (TEP) laparoscopic hernia repair.

Patients and methods

This study had been conducted on 20 patients with inguinal hernia, who were divided into two groups. Group A represented patients who underwent TEP repair of an inguinal hernia using polypropylene mesh, and group B represented patients who underwent TEP repair of inguinal hernia with double face mesh.

Results

Regarding operative time, same operative time was seen in both groups. Nevertheless, much longer time was noticed in case of the peritoneal tear in group A. There were no intraoperative complications encountered in both groups, such as bleeding, visceral injuries, and conversion to transabdominal preperitoneal or open technique; however, peritoneal tear occurred in both groups. Regarding the postoperative period, there was no difference in the postoperative parameters between both groups, including pain, hospital stay, and recurrence. Nevertheless, the cost in the double face mesh group is significantly higher than polypropylene mesh group.

Conclusion

TEP approach is an acceptable procedure for inguinal hernia repair with less visceral and vascular injuries. There was no difference in outcome between TEP repair of inguinal hernia either using the polypropylene or double face mesh. Randomized studies on a larger number of patients are needed to confirm the results.

Keywords:

double face mesh, laparoscopic inguinal hernia repair, polypropylene mesh, totally extraperitoneal

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Introduction

Inguinal hernioplasty is the commonest operation done in general surgery, worldwide. In recent decades, laparoscopic inguinal hernioplasty has become more popular [1]. In early 1990, Arregui and Doin declared the transabdominal preperitoneal (TAPP) repair. At the same time, Phillips and McKernan described the totally extraperitoneal (TEP) technique of laparoscopic hernia repair where the peritoneal cavity was not breached [2].

In 2003 the Cochrane review 1 comparing laparoscopic and open-label repairs found that laparoscopic techniques were superior to open-label repairs in postoperative pain, postoperative hematoma and infection rates. It also minimised the time needed to return to normal activities after one week. However,

they were associated with higher costs, increased operating time, higher incidence of seromas and rare but significant visceral injuries (especially urinary and vascular) in 0.2 percent of patients (around 0 percent in open hernioplasty). While there was no significant difference in recurrence (20) [3]. In addition, TEP carries a lower risk of visceral injury than TAPP [4].

The Royal College of Surgeons of England has recently reviewed the current evidence and is now recommending a laparoscopic repair of: bilateral

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inguinal hernias, recurrent hernias (if the primary repair is open), any hernias in females and hernias in young males or those with pain as the main complaint [5].

Tissue-based hernia repair was replaced by tension-free hernia repair with great acceptance of prosthetic materials for the reconstruction of the inguinal floor. Initially, it was described by Lichtenstein. With the appearance of less invasive surgery, inguinal hernioplasty underwent its most recent change. Laparoscopic repair is usually done by TAPP or TEP techniques. Placement of a permanent prosthetic mesh in the preperitoneal space reestablishes the integrity of the posterior wall [6].

Polypropylene mesh is the commonest choice for those surgical procedures owing to its strength and excellent incorporation characteristics. However, these incorporation qualities incite a strong stimulus for chronic inflammatory response responsible for adhesions formation. Therefore, new materials have been developed so as to decrease this inflammatory process with a reduction in connective tissue formation aiming to reduce abdominal adhesions [7].

The new meshes have a lower weight when compared with the traditional heavyweight meshes. Overall, 50% of the new meshes have been made from an absorbable suture (polyglactin) and the rest have been made from a nonabsorbable suture (polypropylene) [8].

Aim

This study aims to compare and provide a concise and updated overview of using polypropylene mesh versus double face in TEP laparoscopic inguinal hernia repair.

Patients and methods

This study was conducted in Theodor Bilharz Research institute and Ain Shams University hospitals in the period from September 2019 to March 2020. This study included 20 patients with inguinal hernia who underwent TEP repair. Patients were divided into two groups; each group included 10 patients. Group A included patients who underwent TEP repair with polypropylene mesh. Group B included patients underwent TEP repair using double face mesh (Fig. 1).

Inclusion criteria

- (1) Patients with a unilateral inguinal hernia undergoing laparoscopic mesh repair (TEP) were included.

Figure 1



Double face mesh – polypropylene mesh.

Exclusion criteria

The following were the exclusion criteria:

- (1) Patients with previous pelvic surgery with distortion of the anatomy of the pelvis.
- (2) Associated cardiac or pulmonary comorbidities that contraindicated general anesthesia.
- (3) Complicated inguinal hernia, for example, obstructed.

Preoperative assessment

All patients were evaluated before the operation using the following:

- (1) History taking (asking about complications).
- (2) Clinical examination (groin and abdominal examination).
- (3) Investigations:
 - (a) Laboratory: full blood count, liver function tests, kidney function tests, coagulation profile, and random blood sugar.
 - (b) Radiological: pelvi-abdominal ultrasound (for assessment of prostatomegaly and any other pelvic abnormalities) and chest radiograph.

Preoperative preparation

All patients were admitted to the appropriate ward via outpatient clinic and underwent surgery according to an elective schedule. All patients consented to undergo conversion to TAPP technique or open technique if necessary. Abdominal and groin hair was shaved from costal margin to midhigh on the operation table. Prophylactic intravenous antibiotic (ceftriaxone) was administered routinely at the induction of general

anesthesia. Foley's indwelling catheter was placed before surgery for emptying the urinary bladder and was removed just at the end of the operation.

Surgical technique

Instruments

Endoscopic blunt dissector, Scissor, graspers, monopolar electrocautery, ligature, 30° or 0° 10 mm camera, and suction instrument.

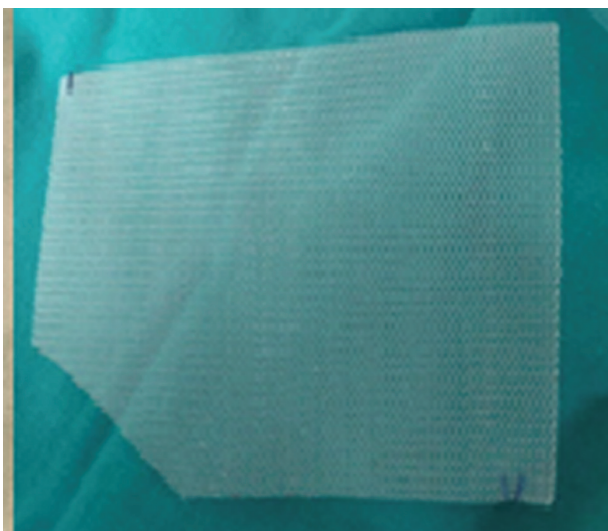
The procedure

Under general anesthesia, the patients are placed in the supine position. The body table belt is applied with the arms tucked and pressure points padded. The surgeon position is on the opposite side of the hernia, whereas the camera operator is behind him. Then extraperitoneal insertion of laparoscopic ports and inflation proceeds, followed by blunt dissection of extraperitoneal space (Fig. 2) and reduction of the hernia sac (using manual reduction first in inguinoscrotal hernia) (Fig. 3), and then insertion of 9×12 cm polypropylene mesh (group A) or double face mesh (group B) without fixation (Fig. 4). Crepe bandage is applied for 24 h for large inguinoscrotal hernias.

Postoperative care and follow-up

During the postoperative hospital stay, pain assessment was done using a visual analog scale, whereas analgesia was used when needed. The patients were discharged to home after 24 h on oral antibiotics, oral antiedematous as well as analgesics (on need). Patients were asked to return for follow-up in the outpatient clinic ~1 week after discharge.

Figure 2



Extraperitoneal space.

Follow-up at 1 week, 1 month, 3 months, and 6 months

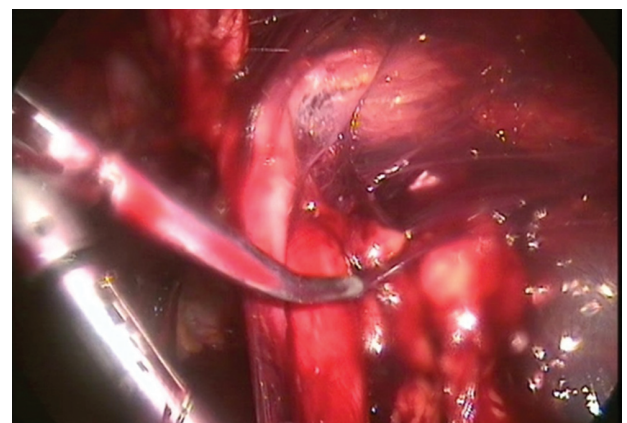
The data were statistically described in terms of mean and SD, median range or frequencies (number of cases) and percentages when appropriate. For comparing categorical data, the χ^2 test was performed. 'P values' less than '0.05' were considered statistically significant. All statistical calculations were done using the program 'IBM SPSS Statistics' (Statistical Package for the Social Science; IBM Corp., Chicago, Illinois, USA) and Graph Pad Prism.

Results

The age of the patients ranged between 16 and 65 years, with mean±SD of 41.80±13.81 years for group A and 45.5±11.84 years for group B (Table 1). All patients of both groups were males (100%) (Tables 2–4).

Regarding postoperative complications, no cases were reported for scrotal edema, urine retention, or

Figure 3



Reduction of hernia sac.

Figure 4



Insertion of mesh.

Table 1 Comparison between group A and group B regarding age, sex, BMI, and degree of hernia

	Group A (N=10)	Group B (N=10)	Test value	P value	Significance
Age					
Mean±SD	41.80±13.81	45.50±11.84	-0.643 ^a	0.528	NS
Range	16–63	28–65			
Sex [n (%)]					
Male	10 (100.0)	10 (100.0)	–	–	–
BMI					
Mean±SD	28.10±2.02	28.90±2.69	-0.752 ^a	0.462	NS
Range	26–32	25–34			
Degree of hernia [n (%)]					
Bubonocele	6 (60.0)	5 (50.0)	1.591 ^b	0.451	NS
Funicular	3 (30.0)	5 (50.0)			
Inguinoscrotal	1 (10.0)	0			

^aIndependent *t* test. ^b χ^2 test. *P* value less than 0.05: nonsignificant. *P* value more than 0.05: significant. *P* value less than 0.01: highly significant

Table 2 Comparison between group A and group B regarding hemoglobin, albumin, pelvi-abdominal ultrasound, chest radiography, and comorbidities

	Group A (N=10)	Group B (N=10)	Test value	P value	Significance
Hb					
Mean±SD	13.20±1.64	12.70±1.34	0.748 ^a	0.464	NS
Range	11–16	11–15			
Albumin					
Mean±SD	4.49±0.41	4.39±0.47	0.510 ^a	0.616	NS
Range	3.9–5	3.9–5			
Abdominal ultrasound [n (%)]					
Normal study	9 (90.0)	8 (80.0)	0.392 ^b	0.531	NS
Mild prostatomegaly	1 (10.0)	2 (20.0)			
Chest radiograph [n (%)]					
NAD	10 (100.0)	10 (100.0)	–	–	–
Comorbidities [n (%)]					
No	8 (80.0)	8 (80.0)	0.000 ^b	1.000	NS
DM	1 (10.0)	1 (10.0)			
HTN	1 (10.0)	1 (10.0)			

DM, diabetes mellitus; Hb, hemoglobin; HTN, hypertension. ^aIndependent *t* test. ^b χ^2 test. *P* value less than 0.05: nonsignificant. *P* value more than 0.05: significant. *P* value more than 0.01: highly significant.

Table 3 Comparison between group A and group B regarding bleeding and peritoneal tear

	Group A (N=10)	Group B (N=10)	Test value	P value	Significance
Bleeding [n (%)]					
NIL	10 (100.0)	10 (100.0)	–	–	–
Peritoneal tear [n (%)]					
NIL	8 (80.0)	7 (70.0)	0.267 ^a	0.606	NS
Occurred	2 (20.0)	3 (30.0)			

^a χ^2 test. *P* value less than 0.05: nonsignificant. *P* value more than 0.05: significant. *P* value more than 0.01: highly significant.

recurrence. However, one case in group A had wound infection, which was observed for 1 week with daily dressing and intravenous antibiotics.

Discussion

The introduction of biomaterials for inguinal hernioplasty has become a basic component of surgery. The decision of which type of mesh will be used in hernial repair is left to the choice of the surgeon and the cost. International

studies said that the choice of the mesh type used in hernia repair is much more significant than the technique as a determinant of results [9].

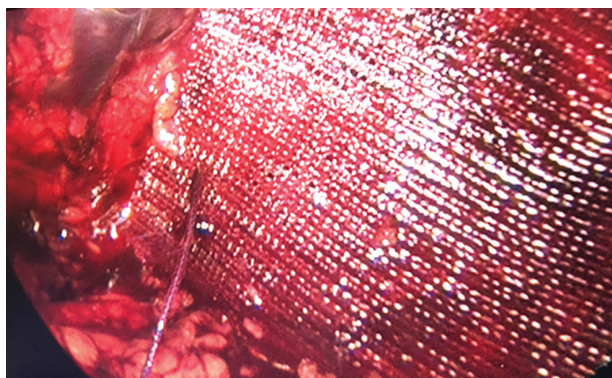
In this study, we have tried to determine if there is a significant difference between using conventional polypropylene mesh and double face mesh in TEP.

Regarding feasibility and handling, it is easier in polypropylene mesh with average 2–3 min for

Table 4 Comparison between group A and group B regarding scrotal edema, urine retention, first and second day pain score, recurrence, wound infection, and surgical emphysema

	Group A (N=10)	Group B (N=10)	Test value	P value	Significance
Scrotal edema [n (%)]					
NIL	10 (100.0)	10 (100.0)	–	–	–
Urine retention [n (%)]					
NIL	10 (100.0)	10 (100.0)	–	–	–
1st day pain score					
Median (IQR)	5 (3–5)	4 (3–7)	0.000 ^a	1.000	NS
Range	3–7	3–9			
2nd day pain score					
Median (IQR)	1.5 (0–3)	1.5 (0–3)	0.000 ^a	1.000	NS
Range	0–5	0–5			
Recurrence [n (%)]					
NIL	10 (100.0)	10 (100.0)	–	–	–
Wound infection [n (%)]					
NIL	9 (90.0)	10 (100.0)	1.053*	0.305	NS
Occur	1 (10.0)	0			
Surgical emphysema [n (%)]					
NIL	10 (100.0)	10 (100.0)	–	–	–

IQR, interquartile range. ^aMann–Whitney test. P value less than 0.05: nonsignificant. P value more than 0.05: significant. P value more than 0.01: highly significant.

Figure 5

Suturing of peritoneal tear.

applying, whereas it takes four to five minutes in double face mesh.

Regarding postoperative pain, there were no significant difference in postoperative pain in both groups ($P=1$) in the current study. Kalra *et al.* [10] found that there is no significance as well.

No cases of chronic groin pain were also reported in this study after 6 months of postoperative follow-up. This result is consistent with Collaboration EH [11], as the risk of chronic pain following laparoscopic repair is low. The possible difference between these two meshes can therefore be extremely difficult to demonstrate. The pain result of this study is in contrast to Langenbach *et al.* [12], which shows a significant difference in acute and chronic postoperative pain (more severe in the polypropylene

group). No cases of recurrence have been reported in any group during the study period. This is quite similar to Bangash *et al.* [13], which shows recurrence in the long-term follow-up (60 months) but with no significant difference (2). And as T has shown. Heikkinen *et al.* [8] was the short-term result of extraperitoneal laparoscopic repair of recurrent hernias. It was the same with either polypropylene or VyproII, with a slight advantage in the VyproII group. However, long-term results are needed to determine whether the lightweight mesh has similar low recurrence rates to the standard mesh and whether or not it lowers the risk of chronic groin pain [8].

Peritoneal tear in each group shows no significant difference, ranging from 20% in group A and 30% in group B. A study by Khajanchee *et al.* [14] on 129 patients found that the peritoneal tear happened in 16 (12.4%) patients. Three (2.3%) were converted to a TAPP technique, and seven (5.4%) continued by TEP approach after using a Veress needle for decompressing the peritoneal cavity.

However, the incidence was not related to the type of mesh used but the matter is the time needed for closure of the tear, which was 12 ± 2 min using suturing technique (Fig. 5) as shown by Lau *et al.* [15] in contrast to group B, where it was safe to use double face mesh with no need for closure of the tear or increase the intraoperative time as it has a low risk for adhesion formation as identified by Maria de Lourdes [16], Pereira-Lucena *et al.* [7], and Garcia-Moreno *et al.* [17].

Regarding cost, there is a highly significant difference between the two groups, and this prevented their worldwide acceptance. However, Baylón *et al.* [18] mentioned that these meshes do not trigger an inflammatory reaction, in addition to the safety of the mesh when used in an infected environment, which is the main benefit and makes them of good value for their cost [13].

Despite the cases of a peritoneal tear, there were no cases converted to open hernia repair or TAPP procedure, and there were no bowel and visceral injuries in this study. This was similar to the results of the study by Krishna *et al.* [19] on 53 patients operated with laparoscopic TEP. There was one conversion to TAPP technique in the study of Bansal *et al.* [20], where 160 patients underwent laparoscopic TEP repair. Fitigi *et al.* [21] in their study on 60 patients reported four (6.6%) patients converted to open surgery because of the technical defect. In a large number of cases (3868) Tamme *et al.* [22] found that 12 (0.23 percent) of patients converted to open or TAPP had no visceral injury but 8 (0.15 percent) had a bladder injury, In their study of 2356 patients undergoing laparoscopic repair, Meyer *et al.* [23] and colleagues found that 12 (0.04 percent) hernias had been converted to open surgery and 24 (0.08 percent) to TAPP. Most of these occurred early in their experience with complicated inguinal hernias.

In this study, there were no recorded cases of intraoperative bleeding. However, Bringman *et al.* [24] showed minor bleeding occurred in one case in each group. Moreover, Heikkinen *et al.* [8] reported two cases of diffuse bleeding and one case of inferior epigastric vessel injury.

Mesh infection is feared, as it is hard to eliminate without removing the mesh and can appear clinically many years after the surgery. Avtan *et al.* [25] showed mesh infection rate remains at ~0.1–3%.

In this study, only one case of mesh infection was reported in group A and was treated conservatively by using intravenous third-generation antibiotics, hot fomentation, and anti-inflammatory for 5 days with good result (but increase postoperative spend money) versus no reported cases in group B, as also reported by Bangash *et al.* [13].

Conclusion

- (1) TEP approach is an acceptable procedure for inguinal hernia repair with less visceral and vascular injuries.

- (2) No difference in outcome between in TEP repair of inguinal hernia either using polypropylene or double face mesh.
- (3) Randomized studies on a larger number of patients and a longer postoperative follow up are needed to confirm the results.

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Nil.

Conflicts of interest

The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this research.

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