



Laparoscopic Transabdominal Preperitoneal Patch Technique Using Large Butterfly-Wing Mesh Cutouts for One-Piece Bilateral Inguinal Hernia Repairs

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Abstract

Background: Laparoscopic Transabdominal Preperitoneal Patch (TAPP) technique is a clinically accepted method for inguinal hernia repair that is clearly advantageous in repairing Bilateral Inguinal Hernias (BIH). Shorter operative time, less postoperative pain, and earlier return to work are achieved via TAPP, albeit at higher cost. Although guidelines of the International Endohernia Society (IEHS) strongly support TAPP in managing BIH, subsequent reoperation rates exceed those of open hernia repair. Expansive mesh patching is a controversial means of reducing hernia recurrence, prompting us to examine long-term outcomes of this approach using large one-piece mesh cutouts shaped as butterfly wings for repair of BIH.

Materials and Methods: In this single-center retrospective review, we assessed all 12 patients undergoing TAPP repair of BIH by the same surgeon between January 2013 and February 2016. One-piece polypropylene mesh cut by scissors in the shape of out spread butterfly wings served to cover both lesions at once.

Results: Among the 50 consecutive patients undergoing TAPP procedures during the study period, there were 12 BIH repairs involving butterfly-wing mesh. Four of the latter (33.3%) were identified preoperatively, and 8 (66.7%) were intraoperative discoveries. In the other 38 patients, Unilateral Inguinal Hernia (UIH) repairs took place. The follow-up period ranged from 47-67 months (median, 56 months). Members of BIH group were comparatively older (75.2 ± 0.85 vs. 62.1 ± 0.99 ; $p < 0.05$), and operative time was longer (99.2 ± 18.2 vs. 80.2 ± 7.3 min; $p < 0.05$). Mesh patches in UIH and BIH groups averaged $15 \text{ cm} \times 10 \text{ cm}$ and $28 \text{ cm} \times 12 \text{ cm}$, respectively. Only one recurrence was recorded in the UIH group. There were no significant differences in duration of non-steroidal anti-inflammatory drug use, chronic pain, reoperation rate, or postoperative days until discharge.

Conclusion: TAPP repair of BIH is feasible, easy, and safe (even in older patients) using large, one-piece mesh cutouts shaped as butterfly wings.

Introduction

Inguinal hernias are common, surgically correctable defects of the abdominal wall. Most are unilateral, but Bilateral Inguinal Hernias (BIH) may account for 12% to 38% [1,2]. The customary methods of diagnosis have been preoperative groin echo and Computed Tomography (CT) examination. However, 26% of BIH are discovered intraoperatively [3]. Prior to the introduction of tension-free synthetic mesh implants, postsurgical recurrence rates of BIH were high [2,4]. The size of a mesh patch is a very important factor in this regard; and TAPP repairs of BIH are clearly more advantageous than open repairs. Operative time is shorter, there is less postoperative pain, and earlier return to work is anticipated. The purpose of this study was to assess TAPP repairs of BIH, using large one-piece cutouts of mesh shaped as butterfly wings.

Materials and Methods

Surgical technique

Under general anesthesia, three trocars were used: a 10-mm optical trocar placed at umbilicus and two 5-mm operating trocars along midclavicular lines at umbilical level. Figures 1A and 1B are images of Patient [5]. Two peritoneal incisions were made, the wider one bordering the larger hernia sac from above (Figure 2A). Contralateral peritoneal incision can be made smaller. Once the sac was dissected, the peritoneal cavity was exposed to check the symphysis and Cooper's ligament. Doing so

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Table 1: Clinicopathologic parameters of bilateral transabdominal preperitoneal patch.

	Sex	Hernia Type		Job	Past Medical History	Asymptomatic	Operative Time (min)	Discharge (Days)
1	F	LI	RI	Housewife	Cholecystectomy	N	120	6
2	F	LI	RI RD	Agriculture	Bowel obstruction	Y	70	
3	M	LD	RI	Timber transport	Both groin bulging	N	130	3
4	M	LD	RD	Driver	Recurrence	Y	112	3
5	M	LI	RI	Painting	Asthma	N	93	4
		LD	RD					
		LO	RF					
6	M	LI	RI	Cleaner	Bowel obstruction	Y	85	4
7	M	LD	RI	Designer	Aspirin intake	Y	88	5
8	F	LO	RO	Housewife	Bowel obstruction	Y	88	4
9	F	LF	RD	Agriculture	bowel obstruction	Y	85	8
		LO	RO					
10	M	LI	RI RD	Agriculture	Hypertension	Y	123	3
11	M	LI	RI	Clark	Chronic Obstructive pulmonary disease	N	98	5
12	M	LI	RI	Driver	Constipation	Y	98	4

L: Left; R: Right; D: Direct hernia; I: Indirect hernia; F: Femoral hernia; O: Obdurate hernia

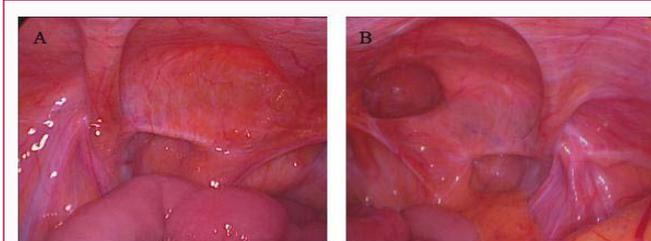


Figure 1: Representative images of: (A) Left direct and indirect hernias and (B) Multiple (direct, indirect, and femoral) hernias.

facilitated and minimized the other preperitoneal dissection (Figure 2B and 2C). A traumatic fenestrated grasper served to confirm the width of each hernia. Polypropylene mesh was then cut, overlapping the outer edge of each external oblique inguinal hernia by >3 cm. Its vertical dimension was determined by the internal inguinal ring and the direct hernia sac. Mesh at the center narrowed, flanked by smoothly contoured, butterfly-like wings (Figure 2D). This one-piece patch was rolled from bottom/front to top/back, leaving the superior edge flat. Two sutures were temporarily fixed (one at each end), creating a mesh tube for intra-abdominal insertion through the 10-mm port. These temporary ligatures were later removed upon fixing the upper mesh border to abdominal wall (Figure 3A). The mesh was unrolled, top to bottom, like a falling curtain. External inguinal regions were covered, including direct and femoral origins and Hesselbach's triangles (Figure 3B). The mesh was then aligned parallel with Cooper's ligaments for 3 cm to cover the obdurate foramen (Figures 3C and 3D). Fixation was primarily by absorbable tack, avoiding injury to triangles of pain and triangles of doom. Both peritoneal incisions were closed using absorbable running suture.

Result

Our study was passed through the hospital ethics committee. We performed a retrospective review of all 50 consecutive patients subjected to TAPP inguinal hernia repairs by a single consultant surgeon. Patients were followed for 47-67 months (median, 56 months). BIH were encountered in 12 patients (24%), 4 (33.3%) of them identified preoperatively. In 8 patients (66.7%), contralateral

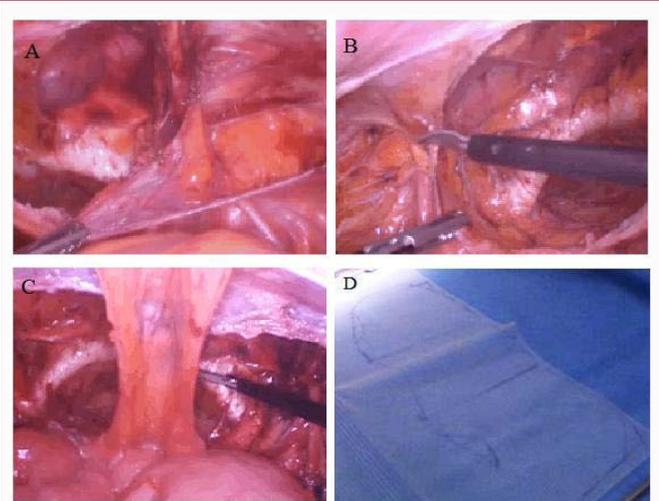
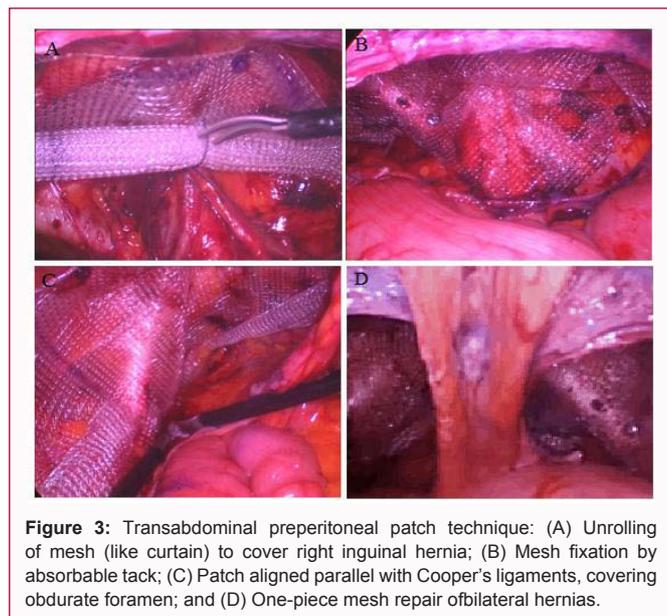


Figure 2: Transabdominal preperitoneal patch procedure: (A-C) Views of bilateral hernias, two peritoneal incisions performed and (D) Large butterfly-wing mesh cutout.

hernias were discovered intraoperatively. Of the 12 patients, 8 men, and 4 were women. Four patients required emergency intervention for incarceration. Although one patient was taking aspirin, no significant postoperative bleeding occurred. The initial subject was an elderly patient with confirmed cholelithiasis. Simultaneous precautionary cholecystectomy was performed without consequence (Table 1). UIH repairs were undertaken in the remaining 38 patients. By comparison, members of the BIH group were relatively older (75.2 ± 0.85 vs. 62.1 ± 0.99 ; $p < 0.05$), and operative time was longer (99.2 ± 18.2 vs. 80.2 ± 7.3 ; $p < 0.05$). Mesh patches in the UIH and BIH groups averaged $15 \text{ cm} \times 10 \text{ cm}$ and $28 \text{ cm} \times 12 \text{ cm}$, respectively. A single recurrence was recorded after UIH repair. There were no significant group-wise differences in duration of non-steroidal anti-inflammatory drug use, chronic pain, reoperation rate, or postoperative days to discharge (Table 2).

Discussion

Ger and colleagues first described laparoscopic inguinal hernia



repair in 1990 [5]. TAPP and Total Extra-Peritoneal (TEP) repair have been widely accepted by surgeons since then. A TAPP (*vs.* TEP) approach enables identification of contralateral asymptomatic hernias, which are found in ~22% of patients with inguinal hernias [6]. In one report, 26% of patients harbored secondary hernias that were undetected during clinical examinations and were unapparent on CT scans or echo. In our cohort, bilaterality was confirmed during surgery in 8 of the 50 patients (16%). Curiously, two women in this study demonstrated coexisting femoral, obdurate, and inguinal hernias. With advanced age, weakening of the abdominal wall may predispose to BIH, as well as hernias of femoral obdurate type, Hesselbach's triangle, and external inguinal region [7]. There is also evidence that femoral hernias may be missed in 40% of women with inguinal hernias, making the TAPP approach preferential in older women [8]. Both treatment and diagnostic screening are thereby achieved. Inguinal hernia is the most common abdominal disorder, stemming from increased abdominal pressure in the course of aging, pregnancy, hard labor, active lifestyles, constipation, coughing, or obesity [9]. Dysfunction of collagen synthesis is also integral in both primary and recurrent inguinal hernias [10,11]. Half of our patients were heavy manual workers, and a sportsman showed recurrence 2 months after surgery. One patient with six hernias suffered from asthma, marked by episodic surges in abdominal pressure. Abdominal pressure is thus a fundamental influence in both initial and recurrent hernias. Repair of asymptomatic hernias is a controversial issue. Thumbe et al. [12] have indicated that 28% of patients with contralateral asymptomatic inguinal hernias will develop symptoms within 12 months. Increasingly, the data suggest that early identification and simultaneous repair serves to reduce reoperation rates and costs. Although local anesthesia may be used for open and TEP repair of BIH, based on preoperative documentation, TAPP procedures have been recommended as the standard surgical treatment for BIH [2]. For unilateral repairs, IEHS also recommends a minimum grid size of 15 cm × 10 cm. However, considering that the middle part of two independent patches may lead to overlapping of patches, in this study, we used a patch with a left and right transverse diameter of 28 cm respectively, slightly smaller than the double size of unilateral patch. In addition, to cover the obdurate foramen, a slightly larger mesh was needed between the top and bottom, so we used 28 cm × 12 cm mesh.

Table 2: Clinicopathologic parameters of transabdominal preperitoneal patch (Unilateral *vs.* Bilateral).

	Unilateral	Bilateral	P Value
Patient total, n	38	12	
Male	33	8	NS
Female	5	4	
Age, Year	62.1 ± 0.99	75.2 ± 0.85	<0.05
Operative time	80.2 ± 7.3	99.2 ± 18.2	<0.05
Average mesh size cm	15 × 10	28 × 12	<0.05
Non-steroidal anti-inflammatory drug use times	22.5 ± 2.2	21.2 ± 3.2	NS
Trocar site bleeding	1 (2.6%)	0	NS
Trocar site infection	1 (2.6%)	0	NS
Seroma	2 (5.2%)	0	NS
Chronic pain >6 months	1 (2.6%)	0	NS
Reoperation rate	1 (2.6%)	0	NS
Discharge, postoperative days	2.5 ± 1.2	4.5 ± 1.44	NS

As opposed to unilateral repairs, TAPP repairs of BIH have proven safe, comfortable, and cost effective, carrying no increased risk of morbidity or recurrence [4] despite use of separate mesh patches. Nevertheless, a small-sized patch may heighten the chance of recurrence. The larger, one-piece mesh cutouts we used conformed to pelvic contours, conferring a three-dimensional design to two-dimensional material. By aligning the butterfly wings with Cooper's ligaments, obdurate foramen is covered, which is not easily done in TEP repairs. Large butterfly-wing mesh cutouts for one-piece bilateral inguinal hernia repairs rather than two separate "standard size" pieces may have the following advantages: 1: The length of the contralateral peritoneal incision may be shortened because many operations are performed from the contralateral side, postoperative peritoneal adhesions may be reduced. 2: Reduce the cost of the contralateral new patch. 3: When the two patches are fixed separately, the medial pubic bone needs to be fixed twice, but large mesh just need fixed once, it can reduce the number of tacks. However, we currently do not have enough data to compare the long-term recurrence, future clinical trials are needed. BIH due to muscular atrophy is more common in the elderly, and our BIH group was older, exceeding the UIH group by 13 years. Even so, the two groups proved similar in postoperative complications. Surgical procedures have learning curves, and it is essential that the needed TAPP skills be acquired quickly and safely. The one-piece mesh skills may be used for various hernia repairs for younger surgeons. Given the small number of patients involved, a larger controlled trial is warranted to corroborate the findings herein.

Conclusion

TAPP procedures for repair of BIH are feasible, easy, and safe (even in older patients) using a large one-piece mesh cutout shaped as butterfly wings.

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