

Single large prolene mesh versus double small meshes in Trans-Abdominal Pre-Peritoneal (TAPP) Laparoscopic Bilateral Inguinal Hernioplasty

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ABSTRACT

Background: Laparoscopic treatment for inguinal hernia gained so much popularity owing to its definite advantages over open surgical treatment regarding the post-operative pain and the convalescence^{1, 2}. These points are outstanding in bilateral cases^{3, 4}. In trans-abdominal pre-peritoneal (TAPP) repair for bilateral inguinal hernias, two options are available; either to use two separate meshes one for each side or one single large mesh for both sides. The technical aspects, and the pros and cons of either option were studied. **Patients and Methods:** Between July 2008 and February 2011, a total of 34 male patients with bilateral inguinal hernias, who were scheduled for laparoscopic TAPP repair, were randomized between two different management groups (17 patients each): Group (A) had single large mesh for both sides and Group (B) had two meshes one for each side. Both groups were compared regarding: the operative time, the number of applied tacking staples, the severity of pain, the length of hospital stay, the convalescence time and the recurrence rate. **Results:** There was a significant difference in the postoperative pain score at rest and on coughing from the day 1 to day 6 postoperatively between both groups. Group A consumed significantly less analgesics compared to group B (P =0.034). Length of hospital stay and time taken to resume normal activities and work were comparable. With a median follow-up of 1 year, no recurrence was elicited in group A and one recurrence on one side in group B. **Conclusion:** by using a single large mesh in TAPP for bilateral inguinal hernia, the fixation will be easier, the number of needed tacking staples will be less and hence the pain will be less severe. The mesh migration and the hernia recurrence will be also less.

Keywords: TAPP, Bilateral inguinal hernia, single/ double mesh.

Introduction

Laparoscopic treatment for inguinal hernia gained so much popularity over the last years. It has its definite advantages over open surgical treatment regarding the post-operative pain and the convalescence^{1, 2}. These points are outstanding in bilateral cases^{3, 4}.

Whether the trans-abdominal pre-peritoneal (TAPP) or the totally extra-peritoneal (TEP) method is used, the gold standard is adequate coverage of the defects by the used mesh⁵. Mesh migration due to inadequate fixation has been reported to be the main cause for hernia recurrence after laparoscopic repair⁶⁻⁹. Mechanical anchorage of the mesh not only reduces the risk of migration but also enhances the repair bursting strength^{10, 11}.

In TAPP for bilateral inguinal hernia, two options are available; either to use two separate meshes one for each side or one single large mesh for both sides. The technical aspects, and the pros and cons of either option warrant a proper analysis which is the aim of this study.

Patients and Methods

Thirty four patients presented with bilateral inguinal hernias (68 hernias) were enrolled into this study over two and half years from July 2008 to February 2011. All were males with a mean age of 42 years and with different hernia types according to Nyhus classification (tables 1&2). Poor surgical risk patients ASA grade 3, 4 & 5 (table 3) and those with previous exploratory laparotomy or concurrent pelvic pathology were excluded from the study. Laparoscopic repair was discussed with every patient and informed written consents were obtained. The patients were randomly allocated between 2 groups: group A; (single mesh group) and group B; (double mesh group). Randomization was done by selection of sealed envelopes containing the name of the group. This was done by the patients in the operating theater. The study was approved from the board of ethics and it was double blinded for the patients and the main investigator.

Table 1: Nyhus hernia classification¹²:

Type	Description
Type 1	Indirect hernia with a normal internal ring;
Type 2	Indirect hernia with an enlarged internal ring;
Type 3a Type 3b Type 3c	<ul style="list-style-type: none">• Direct inguinal hernia;• Indirect hernia with posterior wall weakness;• Femoral hernia;
Type 4	All recurrent hernias.

Table 2: Types of hernia according to Nyhus classification:

Type	Number	Percentage
Type 2	14	21%
Type 3a	38	56%
Type 3b	12	18%
Type 4	4	5%
Total	68	100%

Table 3: ASA (American Society of Anesthesiologists) grading¹³

ASA Grade	DEFINITION	MORTALITY %
I	Healthy individual with no systemic disease	0.05
II	Mild systemic disease not limiting activity	0.4
III	Severe systemic disease that limits activity but not incapacitating	4.5
IV	Incapacitating systemic disease which is constantly life-threatening	25
V	Moribund, not expected to survive 24 hours with or without surgery	50

Surgical Technique: (figures 1-8)

The patients were operated upon under general anesthesia in 30° Trendelenberg's position after immediate pre operative voiding to empty the bladder. Three ports technique was used; one 12-mm umbilical optic port and two 5-mm working ports placed at the level of the umbilicus in the mid-clavicular lines. Using 30° angle scope the normal and morbid anatomy was defined (figure 1). The peritoneum was then incised transversely from the region of the anterior superior iliac spine for right side hernia, going medially above the neck of the sac towards the medial umbilical ligament. For the left side hernia, peritoneal incision went from the left medial umbilical ligament laterally above the neck of the sac towards the left anterior superior iliac spine (figure 2). Lower peritoneal flaps were created. Direct sacs and small indirect sacs were fully reduced and dissected whereas larger indirect sacs were either dissected and freed from the cord structures or circumcised and the distal part left in-situ. Two spaces on each side were created; the space of Retzius medially and the space of Bogros laterally to house the prolene mesh. In case of group A the space in front of the midline peritoneum was dissected adequately to communicate both sides freely together (figure 3). In group B, two patches were fashioned from a 15 x 15 cm Ethicon standard polypropylene mesh, rolled and inserted through the 12 mm port one towards each side and manipulated to cover the posterior wall of the inguinal canal and the deep inguinal ring. When each mesh was satisfactorily placed, it was stapled in place using tucker. Staples were applied to fix the mesh to the pubic bone and Cooper's ligament. Further staples were placed into the muscle layers anteriorly. In group A, one larger mesh was fashioned from 30 x 30 cm prolene mesh to cover both sides. The fashioned mesh was rolled, introduced through the 12 mm port and manipulated to cover both sides (figures 4-6). The mesh was secured in place using three staples on each side (figure 7). The peritoneum was then reconstituted by suturing it with 3/0 vicryl (figure 8).



Figure 1: Rt direct & Lt oblique inguinal hernia

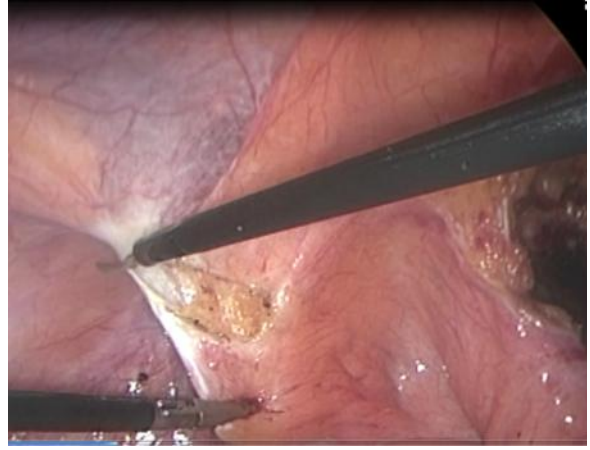


Figure 2: completion of the right and start of the left dissection

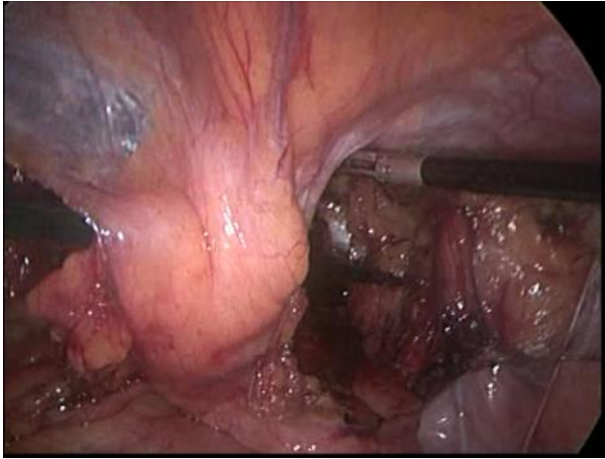


Figure 3: communicating both sides together



Figure 4: mesh insertion

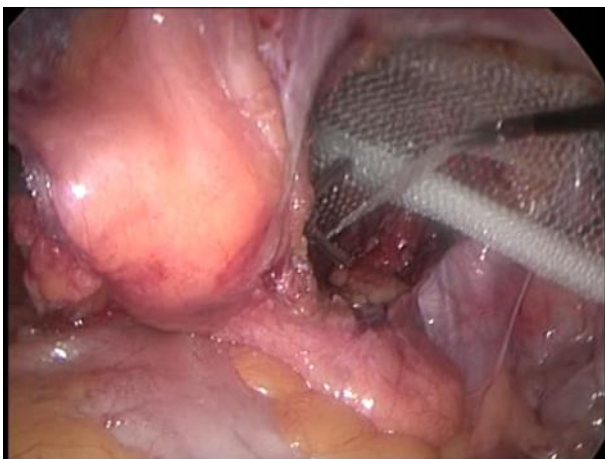


Figure 5: one mesh end was withdrawn from the right towards the left side



Figure 6: the mesh was well placed



Figure 7: tucker used to fix the mesh

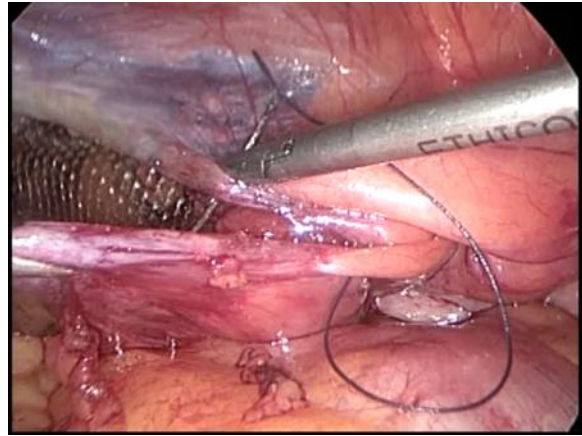


Figure 8: suturing the peritoneum

Post-operative Management

After post-operative assessment, the patients were discharged on the second day on oral diclofenac sodium SR 100 mg once daily and paracetamol 500 mg, 3 times daily upon patients' request. Follow-up at the outpatient clinic was 1 week after discharge and then at 1, 3, 6, and 12 months thereafter.

Outcome Assessment

Both groups were compared regarding the number of staples used to fix the mesh, the operative time, the mesh insertion time, the length of hospital stay, the number of days required to resume normal outdoor activities and work. Severities of postoperative pain and analgesic requirement were also compared in both groups.

Operative time was defined as the time from the skin incision to the placement of the last suture. Mesh insertion time was defined as the time from mesh introduction through the 12 mm port to the last staple used to fix the mesh. Length of hospital stay was referred to the total number of nights spent in hospital after operation. Severity of pain was assessed by a visual analogue pain score on a scale from 0 to 10 daily after operation. All patients were taught to fill in a pain score chart at home, to document their daily pain score at rest and on coughing. Total amount of analgesic consumption was based on the total number of analgesic tablets consumed by the patient during the postoperative period.

Late outcome included comparing the recurrence rate, and the incidence of chronic groin pain which was assessed by a standardized questionnaire at 1 year after operation.

Results

The 34 male patients with bilateral inguinal hernias who underwent bilateral TAPP were randomized between two equal groups: Group (A) had single large mesh and Group (B) had double meshes. The 2 groups were comparable in age, body weight, and type of hernia (Table 4).

TABLE 4. Patients and hernia characteristics

Characteristics	Group A (17 patients =34 hernias)	Group B (17 patients =34 hernias)	<i>P-value</i>
Age (year)*	41±7.8 (32.6 – 48.3)	43 ±9.8 (32.0 – 53.0)	0.627
Body weight (kg)*	60 ±6.5 (53.5 – 66.5)	62 ±8.1 (58.0 – 70.0)	0.153
Types of hernia [no. (%)**]			
Type 2	8 (24%)	6 (18%)	
Type 3a	18 (53%)	20 (59%)	
Type 3b	7 (21%)	5 (15%)	
Type 4	1 (2%)	3 (8%)	

*Mean, standard deviation and range.

**Percentage in each group.

All TAPPs were successfully performed with no conversion to open repair. The mean operative time in group A was 105 ± 29 minutes (range, 75–130 minutes) and in group B 95± 21 minutes (range, 70–120 minutes). The mean mesh insertion time in group A was 12 minutes (range, 8–17 minutes) and in group B was 15 minutes (range, 10–19 minutes). The number of tacking staples used in fixation of the single large mesh in group A ranged from 6 to 8 tacking staples, and those used in the fixation of the two meshes in group B ranged from 8 to 12 tacking staples. There were no significant intra-operative complications in both groups.

In the first week, the total number of analgesic tablets consumed by each of the group A patients had a mean of 5.5 tablets; (range, 4–10 tablets). This was significantly less than that of the group B (mean 7.5 tablets; range, 5–14 tablets) ($P = 0.034$). Comparison of daily pain scores at rest and on coughing from the day of operation to postoperative day 6 between the 2 groups, showed that the mean values of the pain score is lower in group A than in group B, especially on coughing (Figures 9 and 10).

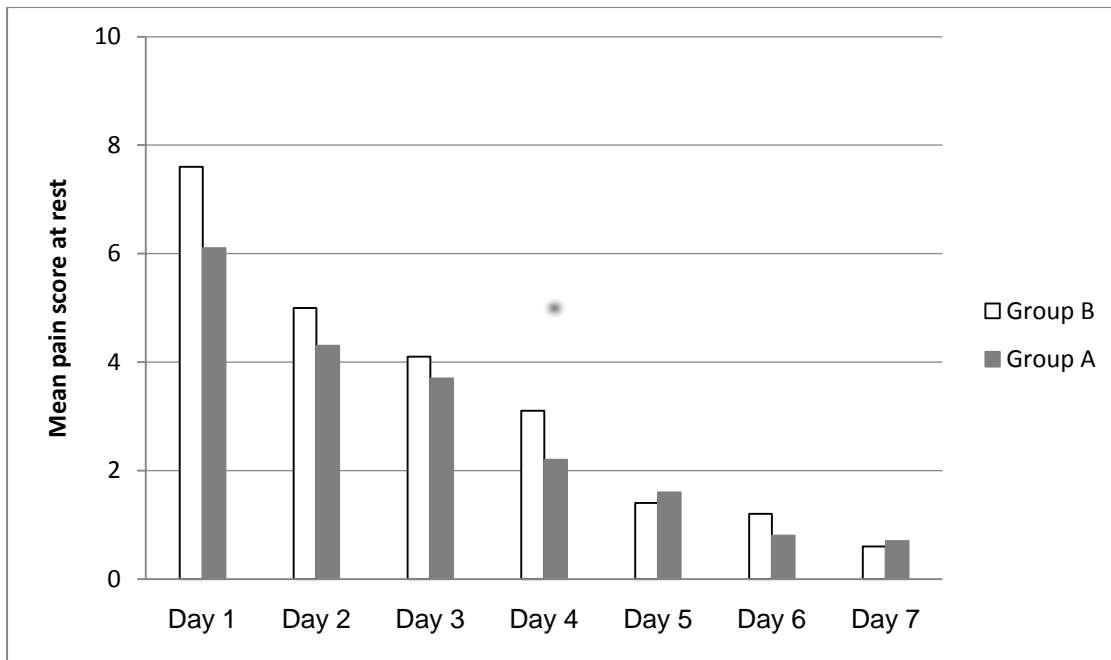


FIGURE 9. The mean values of daily postoperative pain score at rest in both groups.

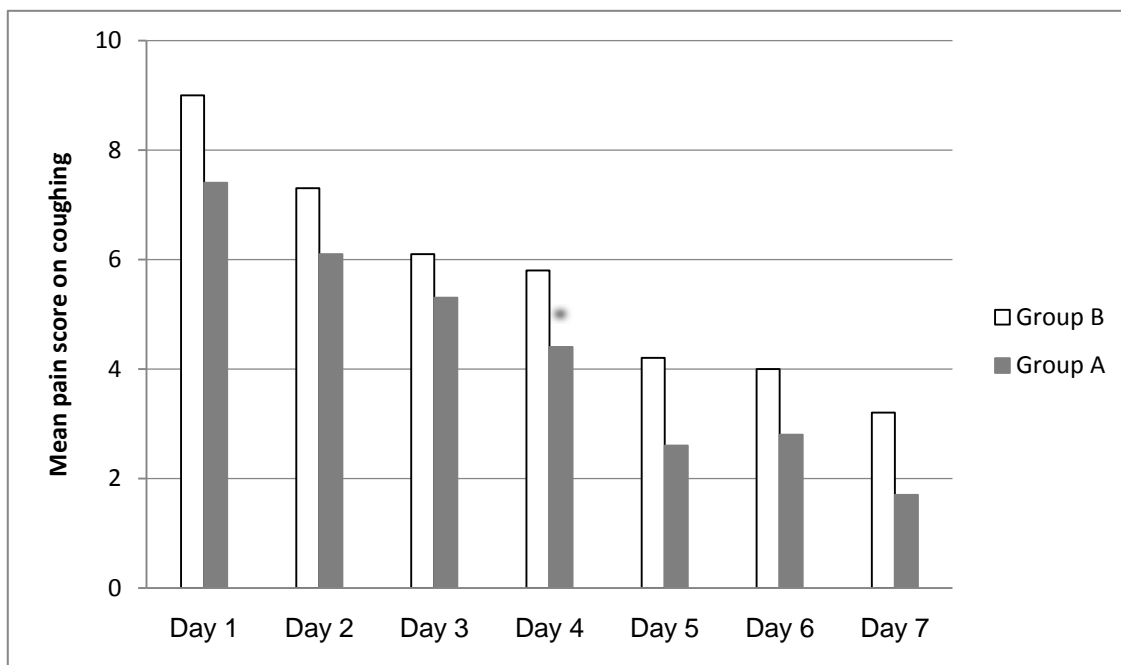


FIGURE 10. The mean values of daily postoperative pain score on coughing in both groups.

All patients were discharged on the 2nd postoperative day with no major complication and none developed wound infection. The time taken to resume near normal outdoor activities was comparable in both groups (mean=5 days; range= 3–7 days).

Follow-up ranged from 8 to 27 months, with a median follow-up of 12 months. During the follow up no recurrence was elicited in group A, and one recurrence was elicited on one side in group B. A total of 24 patients had follow-up exceeding 1 year. Of these, the incidence of chronic pain was (23%) (n = 3 of 13) in group B, which was higher than that of group A (9%) (n = 1 of 11).

Discussion

In TAPP repair for unilateral inguinal hernia in adults, the use of large prolene mesh to cover the defect adequately is recommended to reduce the recurrence rate¹⁴. Whereas for bilateral hernia, the choice is between using two meshes¹⁵, or a single large mesh to cover both sides like in Stoppa procedure¹⁶. Previous reports documented that the actual tendency in bilateral hernia is towards using two separate meshes which is technically easier and associated with good short term results¹⁷.

Whatever the tendency is, some concern has arisen regarding the potential complications of prosthetic mesh stapling. This is because the acute and chronic pain resulting from sensory nerve entrapment. So, the issue of performance of laparoscopic hernia repair without fixation of the mesh has been advocated. Although some suggested that secure stapling of the mesh is mandatory to reduce recurrence rate following laparoscopic hernioplasty¹⁸⁻²⁰, yet recent reports²¹⁻²³ demonstrated comparable early recurrence rates with and without prosthetic mesh stapling for certain types of meshes but the long-term results remain to be unproven.

Chronic pain after inguinal hernia repair has been classified broadly as either somatic or neuropathic in origin. Somatic pain may arise from tissue injury, tissue ischemia, or the placement of staples or non-absorbable sutures on the pubic bone. Meralgia paresthetica is a rare but serious potential complication of prosthetic mesh stapling and a multicenter study recruiting 1514 laparoscopic repairs of inguinal hernia reported 2 neurologic complications that required repeated laparoscopy and staple removal.²⁴⁻²⁶

In this current trial we nullify the adverse effects which may occur due to using more staples by using single large mesh that required less number of staples especially at the midline. At the same time we did not adopt the principle of no mesh fixation at all which may carry in our belief a potential for hernia recurrence. In 1997, Lowham et al⁶ conducted a multicenter study to evaluate the mechanisms leading to hernia recurrence after laparoscopic and traditional pre-peritoneal hernioplasty. Mesh lifting by hematoma and inadequate inferior mesh fixation represented the most common causes of recurrence for surgeons experienced in traditional or laparoscopic pre-peritoneal hernia repair. In addition to pain reduction from using less staples in group A, the cost was less.

Conclusion

By using a single large mesh in TAPP for bilateral inguinal hernia, the fixation will be easier, the migration will be less, and the recurrence will be reduced. Also the number of needed tacking staples will be less and hence the pain will be less.

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