Laparoscopic TAPP Repair for Bilateral Inguinal Hernia, Single Large Mesh versus Double Mesh Technique

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Abstract: Background: The aim of this study was to compare the outcome of laparoscopic repair of bilateral inguinal hernia with trans-abdominal pre-peritoneal (TAPP) technique using a single large prosthetic mesh to reinforce the posterior wall versus the use of two separate meshes. **Patients and methods**: We performed a prospective randomized clinical study involving forty patients with bilateral non complicated inguinal hernias ranging from 18-49 years of age. These were operated from January 2013 till January 2015 and followed up for 6-24 months. Twenty patients with bilateral inguinal hernias had TAPP repair with a single large mesh and another twenty patients TAPP repair with double meshes. The main outcome measurements were: hernia type, BMI, operative time, post-operative pain, postoperative complications, hospital stay and recurrence rate. **Results**: We had thirty two males and eight females. Average operating time was 72 minutes in TAPP using single large mesh, and 102 minutes in TAPP with double mesh. There was less postoperative pain in the single large mesh group. We had one patient with transient hematuria and one with lower abdominal hematoma which resolved by medications in the single mesh group. We had one recurrence in double mesh group after 18 months. We had no recurrences in the single mesh group. **Conclusion**: laparoscopic TAPP approach using a single large mesh is a safe, time saving and cost effective approach for non-complicated bilateral inguinal hernias, especially in patients with low BMI. It is suitable for patients with Nyhys III & IV with large defect in the posterior wall. Nyhus II inguinal hernia or small direct hernias in obese patients are best treated with double mesh technique.
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Key words: bilateral inguinal hernia, laparoscopic hernia repair.

1. Introduction

Inguinal hernia is a common medical problem that can significantly interfere with the life quality. Laparoscopic inguinal hernia repair has shown a big role in the management of inguinal hernias (1).

Bilateral hernias represent about 8 - 30% of hernia patients. The optimal surgical approach and technique for inguinal hernia repair is still widely debated (2).

The recent development of laparoscopic hernia repair provides a new alternative to conventional treatment for bilateral hernia. The benefits of laparoscopic inguinal hernia repair include a decrease in postoperative pain, shorter hospital stay, and a small recovery Period (3).

Trans-abdominal preperitoneal (TAPP) laparoscopic inguinal hernia repair is considered as an excellent choice in several studies(4,5). But still a few studies describe bilateral inguinal hernia repair and the results referred to be often described mixed with those of unilateral or recurrent hernias (6).

In the sixties Rives and Stopp a highlighted the importance of strengthening the posterior wall of the inguinal region, as they felt that its weakness to resist the pressure was a major cause in the development of hernias. In the open approach, however, it was a caution to repair both hernias simultaneously due to tension on the suture lines resulting in high recurrences. Alternatively, some authors advised sequential repair of the hernias one at a time.

Laparoscopy can diagnose occult hernia in the contra-lateral side, also able to diagnose and treat recurrent and contra-lateral hernia at the same time. The TAPP approach has the same concept of tension-free hernia repair, as in the Lichtenstein open repair (7).

The recurrences after laparoscopic surgical repair has many causes such as incomplete and improper dissection, missed or undiagnosed hernia, using mesh with small size, mesh migration or bad poisoning of the mesh when the mesh is not fixed (8).

There is no consensus regarding the use of a single large mesh or two separate meshes in bilateral inguinal hernias.

The aim of this study was to evaluate the outcome of laparoscopic repair of bilateral inguinal hernia with trans-abdominal pre-peritoneal (TAPP) technique using a single large prosthetic mesh to reinforce the posterior wall versus the use of two separate meshes.

2. Patients and methods

This prospective study was done from January 2013 till January 2015 at Elite Hospital, Riyadh, and

Mouwasat Hospital Eastern Province, KSA. Forty patients diagnosed as bilateral inguinal hernia (32 males and 8 females) were involved in this study, they were randomly divided into 2 groups, group A included 20 patients who had TAPP repair with a single large mesh and group B included 20 patients who had TAPP repair with double meshes.

Abdominal ultrasonography was performed in some patients to confirm the clinical diagnosis and detect occult hernia.

All patient enrolled in the study were subject to History, physical examination, and laboratory investigations and all patients had preoperative assessment by anesthesiologist. Informed consent was taken from all patients who agreed for surgery.

Surgical technique:

Prep and draping of patients under general anesthesia, after a single dose of 3rd generation cephalosporin as prophylactic antibiotic with induction. All patients were in supine position, with a 10º Trendelenburg tilt while both arms in adducted to patient sides. High definition laparoscopic monitor was used and equipments were placed to the foot of the table.

The surgeon operated from the contra-lateral side of the hernia, and the assistant stands opposite to the surgeon (Fig. 1).

After pneumoperitoneum, three trocars were used: first one 10 mm supra-umbilical for the camera and 2nd and 3rd were 5-10mm (for the instruments and mesh) to the right and left of the optic trocar.

A30° scope was used for better visualization in all cases.

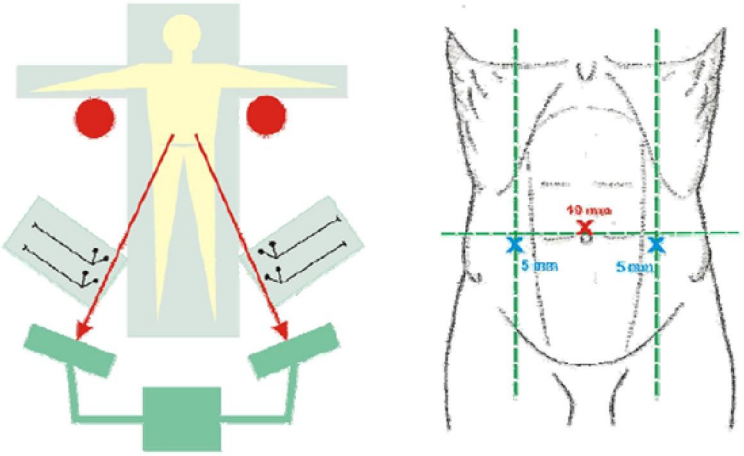


Figure (1) Operating room setup and trocar placement

Laparoscopic exploration was done at 1st in all cases aiming to identify the anatomical landmarks and the site and type of hernia according to Nyhus classification, then identification of the pain triangle and the vascular triangle to avoid them while fixing the mesh.

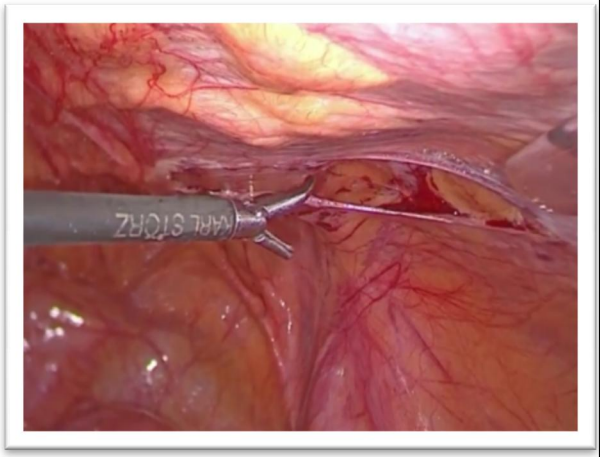
In the double mesh group; preperitoneal dissection started by opening the peritoneum of anterior abdominal wall by two separate incisions (lazy S shaped) at both sides using the scissor and diathermy, starting 2 cm above the iliac spine until the umbilical artery on the same side.

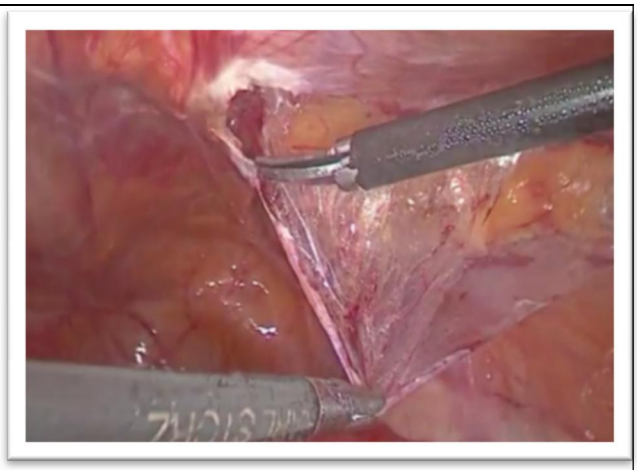
With creation of medial and lateral pockets in the preperitoneal space in both sides separately, the preperitoneal dissection started at the lateral side of the internal inguinal ring and continued medially and caudally at the level of Retzius space until the exposure of the pubis.

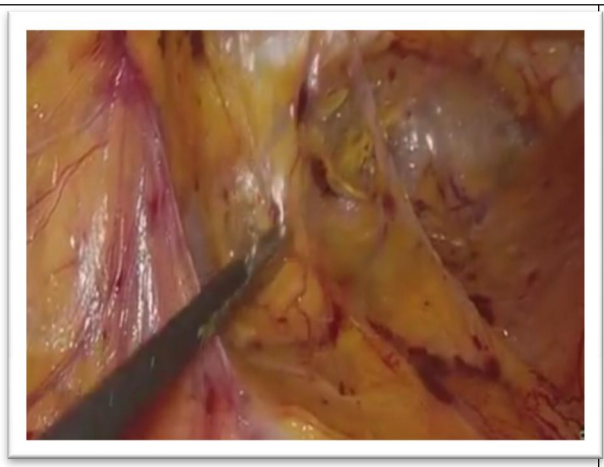
Then, dissection of the hernia sac was done through traction and counter-traction technique by using scissor with monopolar diathermy and peanut dissector. Dissection of the sac always starts anteriorly aiming to protect the vasdeferens and spermatic vessels from injury.

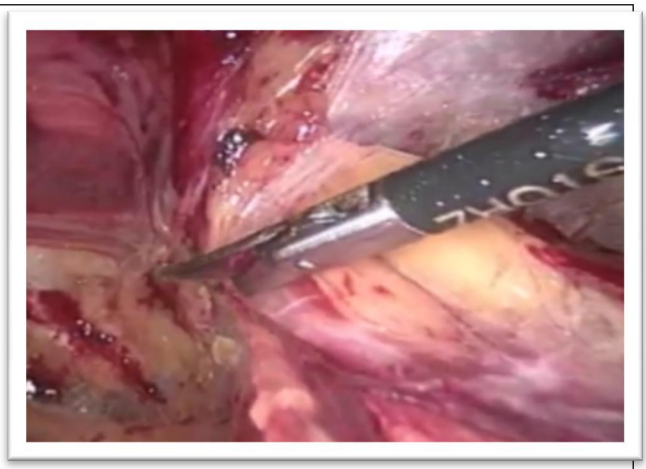
After completing the dissection, two separate polypropylene meshes 12x15 cm were inserted through the 10mm port, placed in the appropriate position and fixed by using tacks. The first staple was at the level of the pubis and pectineal ligament and then 2 cm above the level of iliac spine then on the upper and internal edge on both sides of the inferior epigastric vessels. Closure of the peritoneum was done by using a 2/0 absorbable monofilament suture or by tacks.

In the single mesh group: a transverse peritoneal flap was made from a point joining both anterior superior iliac spines. The space of Bogros was opened anterior to the bladder and both inguinal fossae joined. The anatomic landmarks were identified on both sides, taking care of epigastric vessels, urinary bladder, external iliac vessels, corona mortis vein, vas deferens and spermatic vessels.









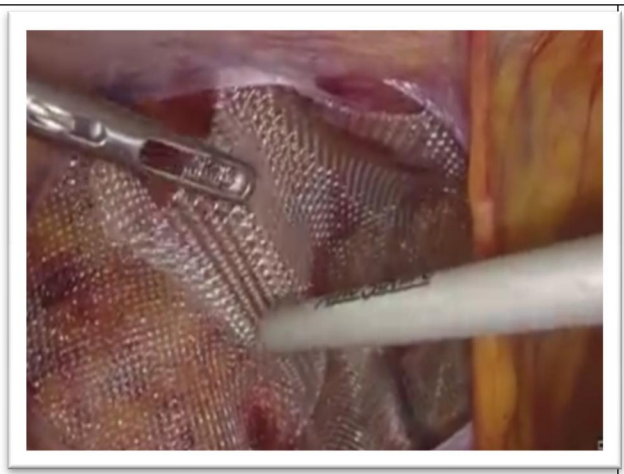


Fig. 6 **Fig. 7**

Figures (6 & 7): mesh fixation and closure of the peritoneum.

A large 30×25 cm Polypropylene mesh was deployed and fixed with tacks in Copper's ligaments and on the conjoint arc avoiding the inferior epigastric vessels and the dangerous triangles. Closure of the peritoneum was done by using a 2/0 absorbable monofilament suture or by tacks.

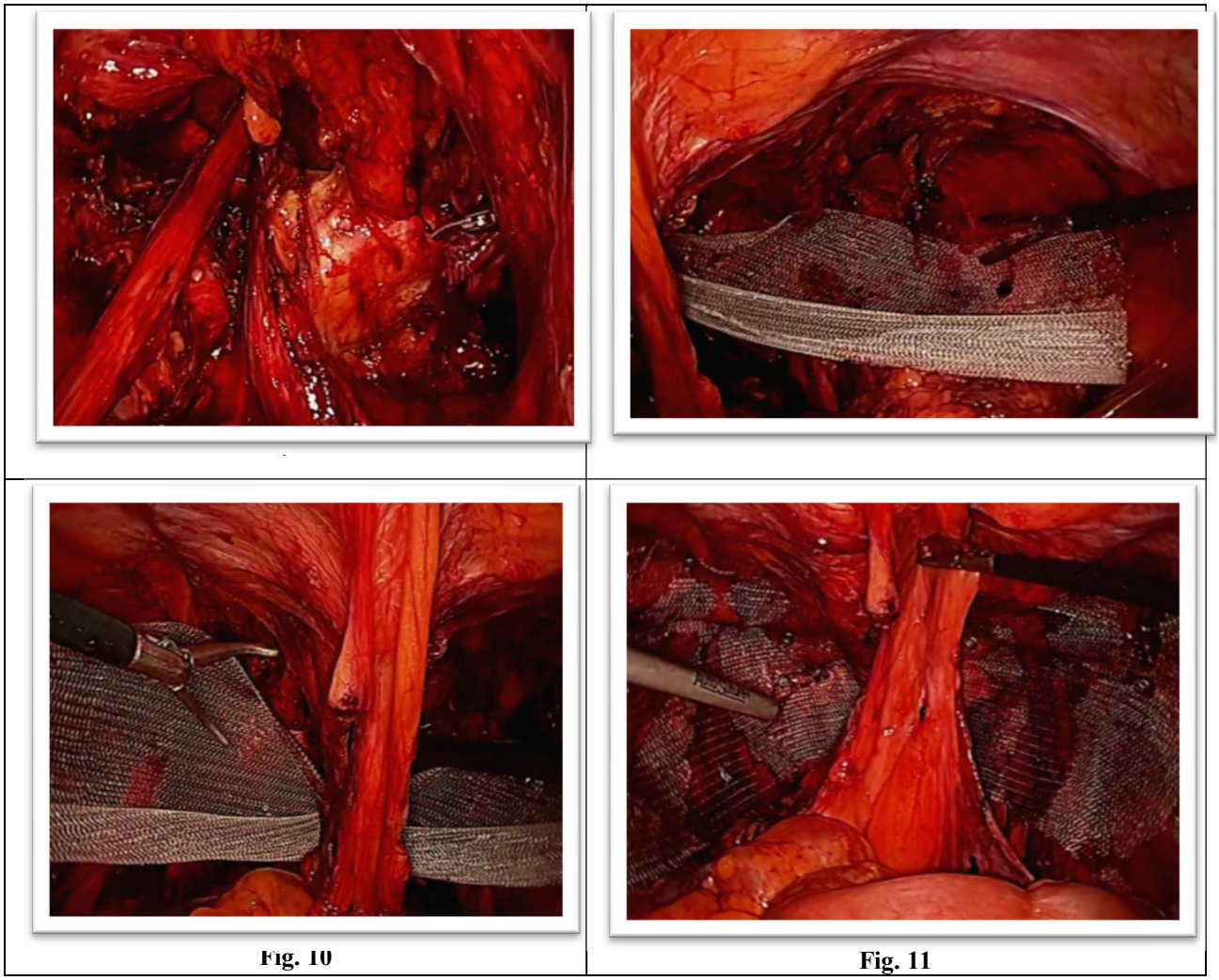


Fig. 10 Fig. 11

Figures (8-11): Dissection of The space of Bogros, and mesh insersion and fixations by tacks.

Postoperatively, patients were followed up after 7 days and after one, 6, 12, and 18 months, where symptoms and signs of postoperative complications detected and recorded. The preoperative data collected for both group included age, sex, BMI, hernia type and operative time. Post-operative data included hospital stay, score of post-operative pain, postoperative wound complications and recurrence rate, and then we compared the data of both groups.

Results were tabulated and *statistically studied using* SPSS® v.16 software: Chi square test, Mann-Whitney test, or student-t test as appropriate. Numerical variables were presented as mean and SD or median and range as appropriate, while categorical variables were presented as frequency and percentage. Any difference with p value < 0.05 was considered statistically significant. Bonferroni's correction of significance level was applied if multiple comparisons were performed.

3. Results

This study included 40 patients diagnosed as bilateral inguinal hernia (32 males and 8 females), the mean age of group A was 38.68 ± 17.56 and was 40.13 ± 15.37 years for group B. The mean BMI was 31.27±43.61 for group A and 30.74±61.72 for group B

with no significant statistical difference between the two groups. The mean operative time (minutes) for Group A was 64.37±12.52 minutes while it was 72.56±8.42minutes for group B with a significant statistical difference. The mean hospital stay for group A was1.8 ±0.52 and it was 1.7 ±0.83 days for group B with no significant statistical difference. (Table 1)

All cases at both groups were done laparoscopically without conversion to open. All patients in this study had a follow up for at least1year after surgery.

In the present study, intraoperative bleeding was happened in one patient (5%) in group A without the need for blood transfusion, while 2(10%) patients in group B had bleeding, also without the need for blood transfusion. The cause of bleeding in group A was injury of inferior epigastric artery in one patient (5%). In group B, the source of bleeding was the peri-vesical fat. Scrotal hematoma reported in one case (5%) in group A and in 2 cases (10%) in group B.

There was no post-operative port site infection, bladder or bowel injury or wound hematoma. The median pain score at the 1st 6 hours was 2.17 for group A and 3.62 for group B with a significant statistical difference. No cases of recurrence were reported in the present study for both groups. (Table 2).

Table (1): showing Preoperative data in the study groups (sex, age and BMI), operative time and hospital stay

	Group A (single mesh)	Group B (two meshes)	*p*- value
Age	38.68 ± 17.56	40.13 ± 15.37	NS
Sex M/F	17/3	15/5	NS
BMI	31.27±43.61	30.74±61.72	NS
Operative time (minutes)	64.37±12.52	72.56±8.42	<0.01
Hospital stay (days)	1.8 ±0.52	1.7 ±0.83	NS

Table (2): showing the operative and post-operative complication for both groups.

	Group A (single mesh)	Group B (two meshes)	*p*- value
Intraoperative Bleeding	1(5%)	2 (10%)	NS
Injury to inferior epigastric vessels	1(5%)	0(0%)	NS
Scrotal hematoma	1 (5%)	2 (10%)	
Port site infection	0 (0%)	0(0%)	NS
Bladder injury	0(0%)	0(0%)	NS
Wound hematoma	0(0%)	0(0%)	NS
Median pain score 6 h post op	2.17	3.62	<0.05
Recurrence within the 1st year	0(0%)	0(0%)	NS

There was a significant statistical difference as regarding to the cost between the 2 groups as the cost of a single large mesh was 35% to 42% lower than that of 2 separate meshes.

4. Discussion

Even after many studies done in recent years, no consensus has been achieved on the surgical technique of inguinal hernia repair (9).

Compared with open repairs, laparoscopic inguinal hernia repair has some advantages, such as, lower score of postoperative pain, a shorter recovery time, earlier return back to the daily activities and work, better cosmetic results and lower recurrence rate.

Some authors reported a high morbidity rate after bilateral hernia repair in comparison with unilateral hernia repair. Others reported that the morbidity rate for bilateral hernia repair when a tension –free repair is performed, was lower than unilateral hernia repair for each side. From the morbidity point of view, endoscopic technique for bilateral hernia repair is more effective with less morbidity rate than conventional repair, less post-operative pain, rapid recovery, lower recurrence rate (10).

When the laparoscopic technique is used to repair a clinically diagnosed unilateral inguinal hernia, it is possible to also explore the contra-lateral side. In 10–25 % of cases, an asymptomatic, preoperatively in apparent, occult inguinal hernia is identified on the other side. Accordingly, contra-lateral occult inguinal hernia found at the time of laparoscopic trans-abdominal preperitoneal patchplasty (TAPP) repair should also be repaired (11).

In laparoscopic inguinal hernial repair, both hernial orifices can be observed clearly and tension-free mesh repair carried out effectively (12).

In bilateral inguinal hernia cases, laparoscopic surgery has many advantageous as it can be done through the same incisions as in unilateral laparoscopic inguinal hernia repair without the need for additional incision (13). For bilateral inguinal hernia, it could be used a single large meshes (like in Stoppa procedure or two meshes (1).

In the present study, 40 patients diagnosed as bilateral inguinal hernia (32 males and 8 females), were divided into 2 groups A& B, where TAPP hernial repair was done with single large mesh in group A and with 2 separate meshes for group B. The mean age of group A & B were 38.68 ± 17.56 and 40.13 ± 15.37 respectively. The mean BMI was 31.27±43.61 and 30.74±61.72 for group A & B respectively.

In this study, we reported 64.37±12.52 minutes as mean operative time for bilateral hernial repair with single large mesh (group A), and 72.56±8.42 minutes for 2 separate meshes group (group B), with a significant statistical difference.

In a study done by **Jacob D. A. *et al.,*** (14) the main operative time for bilateral laparoscopic hernial repair (TAPP) with 2separate meshes was 73.99 minutes which was similar to the operative time for group B in this study.

Feliu X. *et al.,* (6) reported 48.8 ± 10.8 minutes operative time for laparoscopic bilateral repair with 2 meshes which is shorter than our results for group B. **Ferdinando Agresta *et al.,***(15) reported operative time of 43.5±13.2 minutes for 2 mesh group, this results near the results of **Feliu X. *et al.,*** (6)and shorter than our results. In a study done by **Kalpesh *et al.,*** (12) while bilateral TAPP surgery with 2 meshes was performed, 23 cases (76.67%) were finished within 2 hours and in 6 cases (20%) surgery taken 3 hours to be finished, this results was longer than our results. **Mushtaq Chalkoo *et al.,*** (16) reported mean operative time of 48.5 minutesfor bilateral TAPP repair with 2 meshes, which was shorter than our results.

The mean hospital stay in the present study was1.8 ±0.52 days for group A, and 1.7 ±0.83 days for group B, with no significant statistical difference.

Jacob *et al.,* (14) reported 2.08 days as a mean hospital stay for bilateral TAPP surgery with 2 meshes, while **Kalpesh *et al.,*** (12) reported hospital stay as, 22 patients (73.33%) were discharged within 36 hours of surgery and all 30 (100%) patients were discharged within 3 days of surgery. hospital stay was 2 days in a study done by **Zdravko *et al.,*** (17)for bilateral hernial repair with 2 meshes.

In the present study, bleeding was reported in 1 patient (5%) in group A due to injury of inferior epigastric artery, and in 2(10%) patients in group B the source of bleeding was the peri-vesical fat, without the need for blood transfusion. There was no post-operative port site infection, bladder or bowel injury or wound hematoma.

Zdravko *et al.,* (17) reported post-operative complication as, seroma occurred in6 patients (4.62%), one of them needed aspiration while the others 5 patients treated conservatively. wound infection was happened in 2 patients (1.54%) and recurrence was reported in 1 patient (0.77%). No recorded cases of neuralgia or scrotal hematoma.

Jacob D.A. *et al.,* (14) reported his postoperative complications as, intraoperative bleeding was 52 (1.21 %), urinary bladder injury was 4 (0.09 %), seroma at 155 (3.61 %), wound infection at 3 (0.07 %), intestinal injury at 4 (0.04 %) and reoperation was done at 84 (1.96 %). While the study of **Feliu X. *et al.,* (6),** reported, Hematoma in 3 patients (4%), seroma in 3 patients (4%), Bleeding in 1 patient (1.3%), no reported cases of wound infection or urinary bladder or intestinal injuries.

Pain score in this study at the 1st 6 hours was higher in group B than group A, and reported as 2.17 and 3.62 for group A and B respectively with a significant statistical difference.

The present study reported that the cost of a single large mesh was 35% to 42% lower than that of 2 separate meshes, with a significant statistical difference.

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