Laparoscopic transabdominal preperitoneal repair of bilateral inguinal hernia: Using single mesh versus one mesh for each defect

Original Article

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ABSTRACT

Background: The use of laparoscopic transabdominal preperitoneal (TAPP) repair is increasingly becoming more common as a treatment approach for bilateral inguinal hernias.

Aim: This study aimed to analyze the results of bilateral inguinal hernia laparoscopic TAPP repair utilizing a single mesh against a single mesh for each defect.

Patients and Methods: Six months of follow-up were conducted on the 60 patients who underwent laparoscopic TAPP repair for bilateral inguinal hernias and were admitted to the general surgery outpatient clinic at Benha University Hospital. There were two equal groups of patients: Patients in group A had bilateral inguinal hernias repaired by laparoscopic TAPP utilizing a single mesh. Patients in group B had laparoscopic TAPP repair of bilateral inguinal hernias, with a single mesh used for each abnormality.

Results: Group B's mesh insertion time was much longer (*P=0.019*). Tacking staples utilized for mesh fixing were significantly less in group A (*P<0.001*). Group A exhibited consistently decreased postoperative pain levels on the 1st, 2nd, 3rd, 4th, and 5th days (*P<0.05*). Group A patients consumed much fewer analgesics (*P<0.001*), and they recovered to normal activity more quickly (*P<0.001*). In group A, seroma development was much less common (*P=0.026*).

Conclusion: For bilateral inguinal hernias, utilizing a single big mesh in TAPP will make fixation simpler, need fewer tacking stables, and lessen discomfort. For bilateral inguinal hernia, laparoscopic TAPP with a single big mesh is a secure, efficient, and economical method.

Key Words: Bilateral inguinal hernia, laparoscopic transabdominal preperitoneal repair, single mesh.

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INTRODUCTION

Inguinal hernia repair stands as the most commonly performed operation with a worldwide incidence rate ranging from 5 to 7%[1].

The laparoscopic method, which was first used to treat inguinal hernias in the 1990s, has undergone significant modification and is now a viable treatment option. For the treatment of bilateral hernias and recurring hernias that were previously fixed via the anterior approach, the laparoscopic method offers distinct benefits[2].

Bilateral hernia repairs done simultaneously are safe, requiring similar amounts of discomfort and recovery time as unilateral procedures[3].

Compared with previous approaches, we believe that employing a larger mesh size for laparoscopic bilateral transabdominal preperitoneal (TAPP) inguinal hernia repair is suggested due to its ability to prevent the formation of weak points between two single prostheses and reduce the potential for dislocation and medial overlapping. An additional advantage of the subsequent approach is the capacity to customize the mesh to the specific shape and size needed for each particular patient[4].

The standardization of laparoscopic treatment for bilateral inguinal hernias with a single mesh has not been established, despite the potential benefits it offers. The single mesh repair method is considered safe, as its incidence rates of problems are comparable with those observed in double mesh repair[5].

This research aimed to compare the effects of single against single mesh per defect in laparoscopic TAPP repair of bilateral inguinal hernias.

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PATIENTS AND METHODS:

Patients

Sixty patients diagnosed with bilateral inguinal hernias enrolled in this prospective randomized clinical study. Patients were chosen from Benha University Hospital's general surgery outpatient Clinic between May 2022 and July 2023, including a follow-up period following board of ethics clearance (NS 11/5/2022). Every patient provided written informed consent.

Inclusion criteria were patients with bilateral inguinal hernia, denovo or recurrent, male or female.

Exclusion criteria were: patients unfit for surgery, previous pelvic surgery, those aged less than 18 years, patients with ASA score 3 (e.g., poorly controlled diabetes mellitus (DM), hypertension (HTN), Tuberculosis, and active hepatitis), those refusing to continue in the study, and patients who escaped during the follow-up period.

Randomization

Patients were randomly allocated into two groups. 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 by the Board of Ethics and Benha University Hospital.

Preoperative assessment

Patients in the study underwent a thorough preoperative assessment, including a review of their clinical histories, presenting symptoms, duration of symptoms, prior surgeries, and chronic illnesses. A detailed general clinical examination was conducted to assess their overall health.

The routine preoperative workup encompassed a clinical examination with precise evaluation of the abdomen, complete blood count, liver and kidney function tests, coagulation profile, and, when necessary, ECG and echocardiography. Viral markers for Hepatitis B, C, and HIV were assessed according to the university hospital protocol.

Radiological investigations included pelvi-abdominal ultrasonography to rule out malignancy or any condition that elevates intra-abdominal pressure, in conjunction with a chest radiography to exclude chronic obstructive pulmonary disease.

The categories utilized to classify the hernias were as follows:

Type 1: indirect hernia with a normal internal ring, **Type 2:** indirect hernia with an enlarged internal ring, **Type 3a:** Direct inguinal hernia, **Type 3b:** Indirect hernia with posterior wall weakness, **Type 3c:** Femoral hernia and **Type 4:** All recurrent hernias.

Surgical technique

After immediately voiding to clear the bladder before surgery, the patients were placed in Trendelenberg's position and operated upon under general anesthesia. Three ports were used: two 5-mm working ports were positioned in the mid-clavicular lines at the level of the umbilicus, and one 10 mm optic port was positioned two centimeters above the umbilicus. The normal and sick anatomy was determined with a 30° angle scope. For the right-side hernia, the peritoneum was subsequently incised transversely from the anterior superior iliac spine region, proceeding medially 2 cm above the hernia defect in the direction of the medial umbilical ligament.

The peritoneal incision for the left side hernia extended laterally over the sac's neck and toward the left anterior superior iliac spine from the left medial umbilical ligament. Flaps peritoneally lower were made. Larger indirect sacs were either circumcised and the distal section was left in position, or they were dissected and released from the cord structures. Direct sacs and tiny indirect sacs were entirely reduced and dissected. To hold the prolene mesh, two gaps were made on each side: the medially located Retzieus space and the laterally located Bogros space. For group A, the area in front of the midline peritoneum was sufficiently divided to allow for unrestricted communication between the two sides.

In group B, two patches were fashioned from a 15x13 cm Ethicon standard polypropylene mesh, rolled and inserted through the 10 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 (1–2) tuckers. (8–13) 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 30x30 cm prolene mesh to butterfly mesh has 2 wings 14x12 cm and 2 cm in between to cover both sides (Fig. 1). The fashioned mesh was rolled, introduced through the 10 mm port and manipulated to cover both sides. The mesh was secured in place using three staples on each side and the neck was secured by (6–8) staples. The peritoneum was then reconstituted by suturing it with PDS.

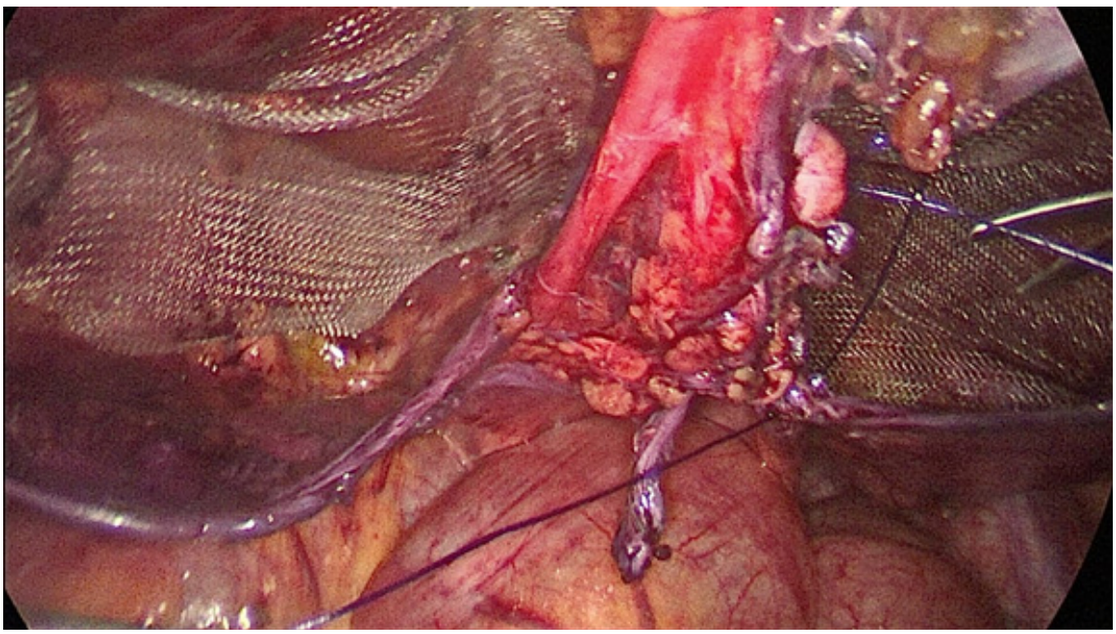

Fig. 1: Two wings mesh fixation in group A.

Management

Prior to surgery, all patients received a single dose of antimicrobial prophylaxis following a normal preoperative work-up regimen. The procedures were carried out by staff surgeons using the same protocol.

Follow-up

All patients received standard pain management and antibiotic medication (third generation cephalosporins) in accordance with our hospital's clean surgery practice. Four hours later, oral intake began for all patients. Prior to and following patient release, the length of hospital stay was computed, and postoperative problems (such as wound infection) were tracked.

Approval code

Statistical analysis

IBM Inc., Armonk, NY, USA used SPSS v26 for statistical analysis. To determine whether the data distribution was normal, histograms and the Shapiro–Wilks test were employed. For analyzing quantitative parametric data presented as mean and standard deviation (SD), the unpaired student t-test was employed. The Mann–Whitney test was used to evaluate quantitative nonparametric data, which were reported as the median and interquartile range (IQR). The percentage (%) and frequency of the qualitative data were reported, and when applicable, the χ^2 test or Fisher's exact test was employed for analysis. *P value* with two tails less than 0.05 was deemed statistically significant.

RESULTS:

The mean age in group A was 38.1 years with a standard deviation (SD) of 11.26, while in group B, it was 41.6 years with an SD of 11.48. The distribution of sex showed 63.33% males and 36.67% females in group A, compared with 70% males and 30% females in group B.

Age, sex, weight, height, BMI, and types of hernia were insignificantly different between the studied groups. HTN, DM, and COPD were insignificantly different between the studied groups. (Table 1)

White blood cells, platelets, and Hb were insignificantly different between the studied groups. (Table 2)

Operative time was significantly longer in group A compared with group B. Mesh insertion time was significantly delayed in group B than in group A (*P value 0.019*). Tacking staples used in fixation of the mesh were significantly decreased in group A than in group B (*P value <0.001*). (Table 3)

Postoperative pain score was significantly decreased in group A than in group B on the 1st, 2nd, 3rd, 4th, and 5th day (*P value <0.05*) with no significant difference on the 6th and 7th day. (Figure 5)

Analgesic consumption was significantly decreased in group A than in group B (*P value <0.001*). Return to normal activity was significantly better in group A than in group B (*P value <0.001*). Hospital stay did not differ significantly among the groups investigated. (Table 4)

Bleeding and recurrence were insignificantly different between the investigated groups. Port site infection, wound hematoma did not occur to any patients of the studied groups. Pelvic hematoma occurred in a case from group A and was treated conservatively. Mesh infection occurred also in a case from group A. Mesh removal and drain insertion were done after one month. (Table 5)

Table 1: Patient characteristics and risk factors of the studied groups

	Group A (n=30)	Group B (n=30)	*P value*
Age (y)			
Mean±SD	38.1±11.26	41.6±11.48	0.242
Range	22–58	21–58	
Sex			
Male	19 (63.33%)	21 (70%)	0.584
Female	11 (36.67%)	9 (30%)	
Weight (Kg)			
Mean±SD	66.6±7.14	65.5±5.32	0.501
Range	55–80	55–75	
Height (m)			
Mean±SD	1.6±0.07	1.6±0.06	0.589
Range	1.5–1.7	1.5–1.7	
BMI (Kg/m^2)			
Mean±SD	25.7±3.38	25.5±2.56	0.833
Range	19.72–33.75	20.07–29.94	
Types of hernia			
Type 2	6 (20%)	5 (16.67%)	0.753
Type 3a	16 (53.33%)	13 (43.33%)	
Type 3b	4 (13.33%)	6 (20%)	
Type 4	4 (13.33%)	6 (20%)	
Risk factors			
HTN	10 (33.33%)	12 (40%)	0.592
DM	6 (20%)	7 (23.33%)	0.754
COPD	3 (10%)	5 (16.67%)	0.707

COPD, chronic obstructive pulmonary disease; DM, diabetes mellitus; HTN, hypertension.

Table 2: Laboratory investigations of the studied groups

	Group A (n=30)	Group B (n=30)	*P value*
WBCs ($x10^9/L$)			
Mean±SD	11.8±1.11	11.7±1.07	0.714
Range	10–13.5	10–13.5	
Platelets ($x10^3/\mu L$)			
Mean±SD	256±49.44	250.1±63.38	0.687
Range	163–349	156–348	
Hb (g/dL)			
Mean±SD	11.8±1.11	11.7±1.07	0.714
Range	10–13.5	10–13.5	

Hb, hemoglobin; WBCs, white blood cells.

Table 3: Surgery characteristics of the studied groups

	Group A (n=30)	Group B (n=30)	*P value*
Operative time (Min)			
Mean±SD	101.4±9.52	97.5±12.91	<0.001*
Range	85–120	75–116	
Mesh insertion time (Min)			
Mean±SD	7.86±1.38	9.36±0.99	<0.001*
Range	6–10	8–11	
Tacking staples			
Mean±SD	6.9±0.87	10.2±1.67	<0.001*
Range	6–8	8–13	

*: significant as *P value* less than or equal to 0.05.

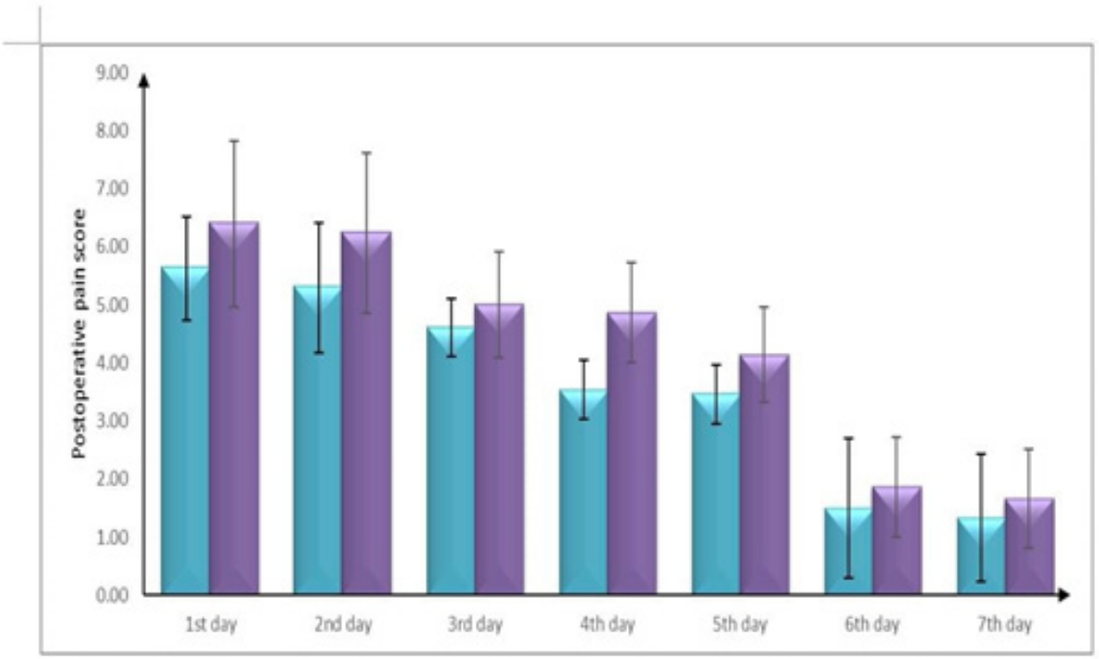

Figure 5: Postoperative pain score of the studied groups

Table 4: Surgery outcomes of the studied groups

	Group A (n=30)	Group B (n=30)	*P value*
Analgesic consumption (Tablets)			
Mean±SD	7.5±1.81	10.7±2.63	<0.001*
Range	5–10	7–15	
Hospital stay (Days)			
Mean±SD	1.6±0.5	1.5±0.51	0.799
Range	1–2	1–2	
Return to normal activity (Days)			
Mean±SD	13.1±1.75	15.8±3.11	<0.001*
Range	10–15	10–20	

*: significant as *P value* less than or equal to 0.05.

Table 5: Complications of the studied groups

	Group A (n=30)	Group B (n=30)	*P value*
Port site infection	0	0	–
Wound hematoma	0	0	–
Pelvic hematoma	1 (3.33%)	0	1.00
Bleeding	0	1 (3.33%)	1.000
Recurrence	0	1 (3.33%)	1.000
Mesh infection	1 (3.33%)	0	1.000

*: significant as *P value* less than or equal to 0.05.

DISCUSSION

Total 20 to 30% of individuals who have elective surgery for inguinal hernia repair come with bilateral hernias[6]. Although there is ongoing disagreement over the significance of laparoscopic therapy, it is generally acknowledged that this approach which is regarded as the gold standard is most beneficial for bilateral or recurring instances[7]. Benefits of laparoscopic repair include shorter hospital stays, quicker recovery times, and less discomfort following surgery[8]. Even though recurrences might happen for a variety of reasons, it allows for the simultaneous detection and treatment of contralateral and occult hernias. The process of mesh fixing, which has historically involved the use of staples or tacks, is essential for limiting the likelihood of mesh displacement and recurrence[9]. The results of laparoscopic TAPP repair for bilateral inguinal hernias utilizing single versus single mesh for each defect were compared in this study.

A total of 60 patients undergoing laparoscopic TAPP repair of bilateral inguinal hernias were incorporated into this prospective research. Two equal groups of patients existed: Patients in group A had bilateral inguinal hernias repaired by laparoscopic TAPP utilizing a single mesh. Patients in group B had laparoscopic TAPP repair of bilateral inguinal hernias, with a single mesh used for each abnormality.

In the current study, there were no discernible differences between the analyzed groups in terms of age, sex, weight, height, BMI, hernia varieties, HTN, DM, COPD, white blood cells, platelets, and Hb. Our results are consistent with the research[10] comparing two independent meshes with stapler fixation versus a single big mesh without fixation for laparoscopic repair of bilateral inguinal hernias. Comparable results were also found by research[11] that compared laparoscopic and open mesh repair of bilateral primary inguinal hernias in a randomized clinical trial. There were no discernible differences between the groups in terms of the age range, patient comorbidities, characteristics, hernias' size or anatomical categorization. Our findings are in line with research[12] that compared the use of two versus one mesh in laparoscopic TAPP repair for bilateral inguinal hernias. The overall alignment of our analysis with the body of literature was supported by their finding that there were no notable variations between the two management groups' laboratory tests and patient characteristics.

Our findings indicate that there was little variation in the operating time across the groups under investigation. Group B's mesh insertion time was much slower than group A's (*P-value=0.019*). Group A had a considerable drop in the amount of tacking staples needed to secure the mesh, compared with group B (*P value <0.001*).

Our findings are consistent with research[11] that found that, in comparison to open PP repair and bilateral Lichtenstein repair, the incidence of mesh feeling was considerably reduced in the Lap TAPP group (13% vs. 28.3% and 37.3%, *P 0.038*).

Comparable to the duration of the primary operating time for group B in our investigation, bilateral laparoscopic hernia repair TAPP utilizing two distinct meshes required 73.99 min. Our results were close to those reported by another study[13].

Research[12] found that the mean mesh insertion time in the single big mesh group was 12 min (range, 8–17 min) and in the double mesh group was 15 min (range, 10–19 min), which is in line with our results. Additionally, between 6 and 8 tacking staples were used to secure the one big mesh in group A, while between 8 and 12 tacking staples were used to fix the two meshes in group B.

However, research[10] found that there was a considerable difference in the operating times between the groups under investigation, with the double mesh group's average operating time being 102 min and the single mesh group's average operating time being 72 min.

Comparably, research[14] that used two meshes for laparoscopic bilateral repair reported an operating duration of 48.8±10.8 min, which is less than our findings. Different research[15] found that the operating duration for a group of two mesh groups was 43.5±13.2 min; this is less than our results and similar to the findings of a study[14].

In research by certain authors[16], 23 (76.67%) cases of bilateral TAPP surgery with two meshes were completed in less than 2 h, whereas 6 (20%) instances required 3 h to complete. Compared with our outcomes, these results were lengthier.

Additionally, research[17] that used two meshes for bilateral TAPP repair showed a mean operational duration of 48.5 min, which was less than our findings.

Our findings only showed that at the 1st, 2nd, 3rd, 4th, and 5th days (*P value <0.05*), group A's postoperative pain score was considerably lower than group B's, with no discernible difference at the 6th and 7th days.

Research[10] found that the single mesh group experienced considerably less discomfort than the double mesh group, with a *P-value* of less than 0.05, which is consistent with our findings.

According to a study[12], which compared the daily pain scores between the two groups from the day of the operation to postoperative day 6, both at rest and when coughing, the single large mesh group had lower mean pain scores than the double mesh group, particularly when coughing.

Nevertheless, research[11] found that after undergoing a lap TAPP surgery, patients reported substantial reduction in the mean pain score compared with those who had bilateral Lichtenstein repair and open PP repair (3.37±0.71 vs. 5.12±1.69 and 4.81±0.74, respectively, *P<0.001*). After 7 days, a similar result was observed: the mean pain score in the Lap TAPP group was 1.81±1.21, but the bilateral Lichtenstein and the open PP groups had mean scores of 3.18±0.71 and 4.13±0.88, respectively, *P* less than 0.001.

Our results showed that group A's analgesic consumption was much lower than group B's (*P value <0.001*). Group A's return to regular activities was noticeably better than Group B's (*P value <0.001*). The length of hospital stay varied hardly across the groups under study.

According to research[10] that supported ours, the single mesh group's mean hospital stay was 1.7±0.83 days, whereas the double mesh group was 1.8±0.52 days, with no statistically significant difference.

It's interesting to note that research (2011) found that laparoscopic TAPP repair had better immediate postoperative results, such as lower postoperative pain levels, shorter hospital stays, and quicker recovery times before returning to work and regular activities. In comparison to the open PP group and Bilateral Lichtenstein, the Lap TAPP group's hospital stay was considerably shorter (1.11±0.32 days against 1.77±0.452 and 1.41±0.50 days, *P<0.001*). In comparison to bilateral Lichtenstein and the open PP group, the lap TAPP group returned to daily activities considerably sooner (5.87±0.97 days against 12.10±1.02 days and 10.64±0.96, respectively, *P<0.001*). Furthermore, the Lap TAPP group had a considerably reduced period for returning to work in contrast to the Bilateral Lichtenstein group and the open PP group (12.30±1.47 vs. 20.20±1.79 and 19.85±1.06 days, respectively, *P<0.001*).

Our findings are supported by research[12], which found that during the first week, group A patients used an average of 5.5 analgesic pills overall (with a range of 4–10). The difference between this and group B's mean (7.5 tablets; range, 5–14 tablets) was statistically significant (*P=0.034*).

Research[13] found that the average duration of hospitalization subsequent to the bilateral TAPP technique utilizing two meshes was 2.08 days. In contrast, a study[16] found that 22 patients accounting for 73.33%, received hospital discharge within 36 h subsequent to the operation. Furthermore, all 30 patients, representing 100%, were discharged within a span of three days.

In research[18], a bilateral hernia repair procedure, which included the use of two meshes, required a hospitalization period of two days.

Seroma was considerably lower in group A than in group B in the current investigation (*P value=0.026*). Between the groups under study, there was no discernible difference in bleeding or recurrence. None of the patients in the study groups experienced a port site infection, a wound hematoma, or a pelvic hematoma.

Research[10] that supported our findings showed that intraoperative hemorrhage was observed in two (10%) patients of group B, but no blood transfusion was required, whereas one (5%) patient in group A experienced intraoperative hemorrhage. One patient (5%), in group A, had an inferior epigastric artery damage, which resulted in hemorrhage. In group B, bleeding was attributed to the presence of peri-vesical fat. In group B, there was a single case (5%) of scrotal hematomas, whereas in group A, there were two (10%)

cases. Furthermore, there was no wound hematoma, bladder or bowel damage, or post-operative port site infection.

Furthermore, according to research[11], three patients two from the bilateral Lichtenstein group and one from the open PP group needed seroma aspiration in order to be evacuated, whereas the other instances improved with anti-inflammatory drugs and compression. Three (5.9%) patients in the bilateral Lichtenstein group in addition to four (7.5%) patients in the open PP group encountered postoperative wound dehiscence or infection, whereas none of the patients in the lap TAPP group presented with any indications of port site infection (*P 0.137*). Additionally, according to research[12], on the second day following the operation, every patient was released without any significant complications, and none of them developed wound infections.

Furthermore, research[18] found that seroma was a postoperative complication in six (4.62%) patients; of these, 1 required aspiration, and the remaining 5 received conservative treatment. Two (1.54%) patients had wound infections, and one (0.77%) patient had a recurrence. There are no known cases of scrotal hematoma or neuralgia.

According to research (2013), he experienced the following postoperative complications: wound infection at 3 (0.07%), seroma at 155 (3.61%), intestinal damage at 4 (0.04%), intra-operative hemorrhage at 52 (1.21%), and reoperation at 84 (1.96%).

Although the research[14] noted that no instances of wound infections, intestinal injuries, or urinary bladder injuries were reported, there were three (4%) cases of hematoma, three (4%) cases of seroma, and one (1.3%) case of bleeding.

CONCLUSION

For bilateral inguinal hernias, utilizing a single big mesh in TAPP will make fixation simpler, need fewer tacking stables, and lessen discomfort. There will also be reduced mesh migration and hernia recurrence. Laparoscopic TAPP with a single big mesh is an efficient safe, and economical method in bilateral inguinal hernias treatment. (Figures 2–4).

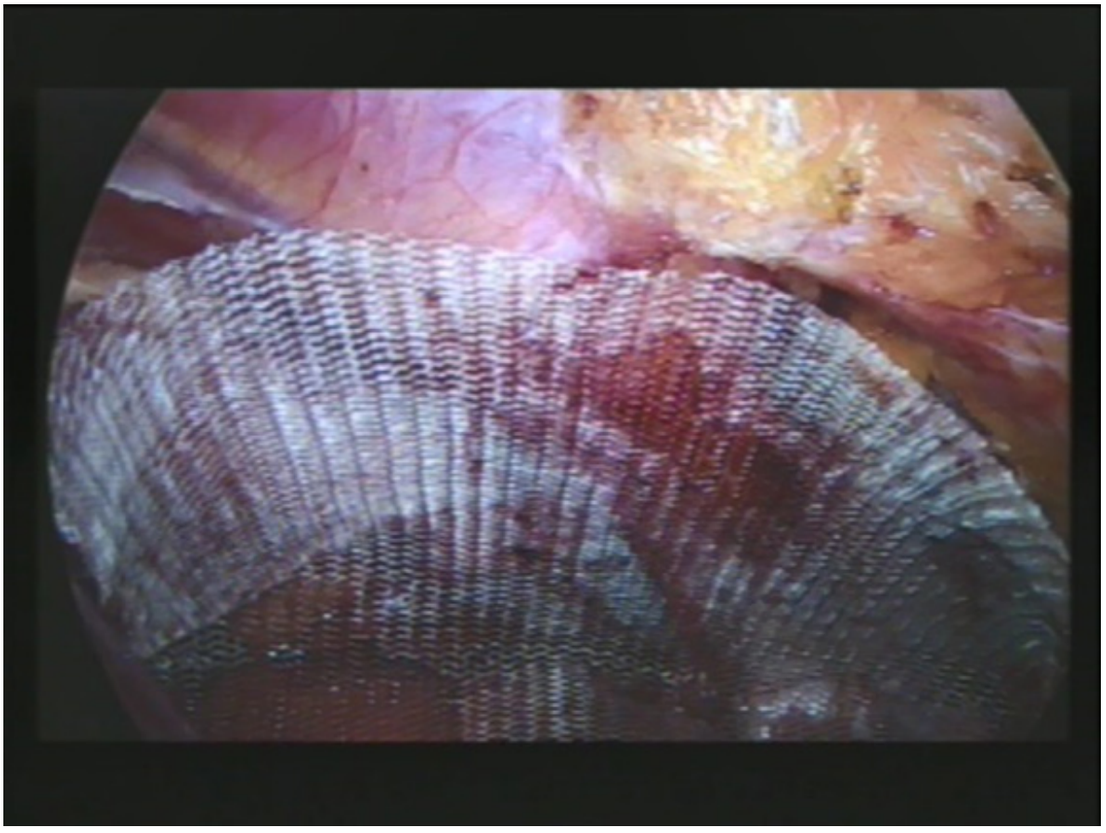

Fig. 2: Separate mesh fixation in group B.

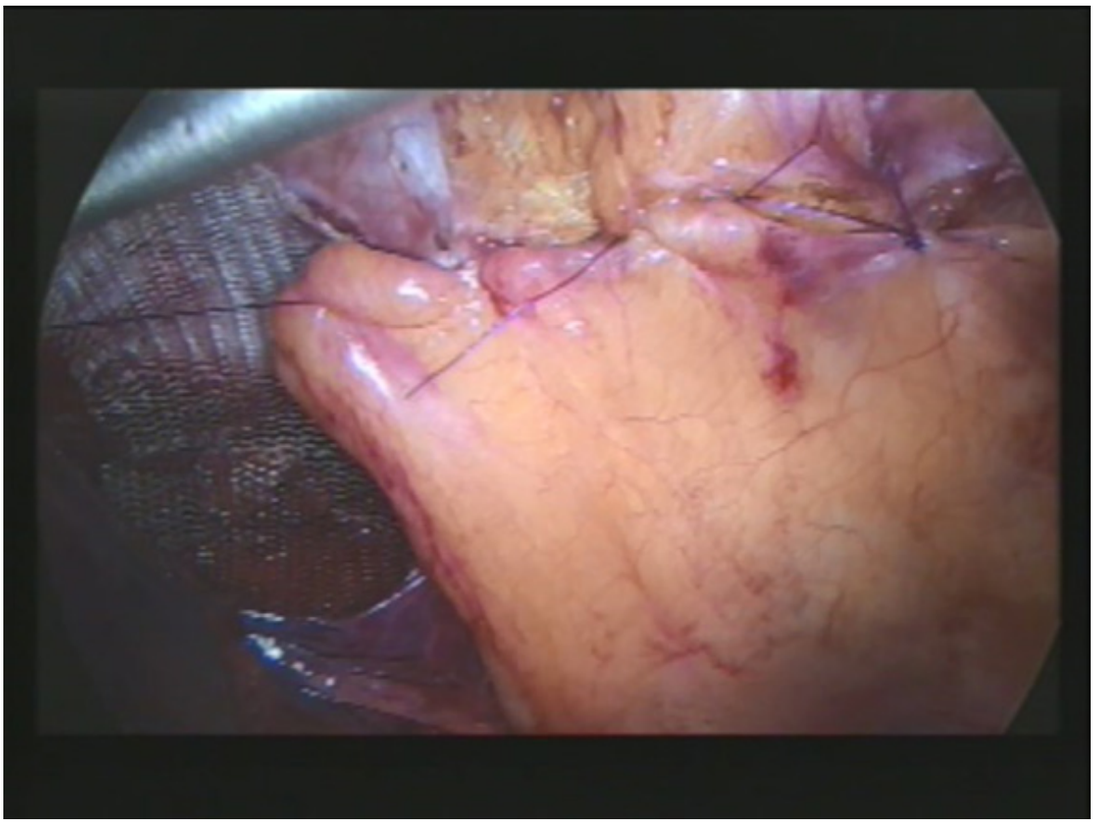

Fig. 3: Closure of peritoneal flap by PDS.

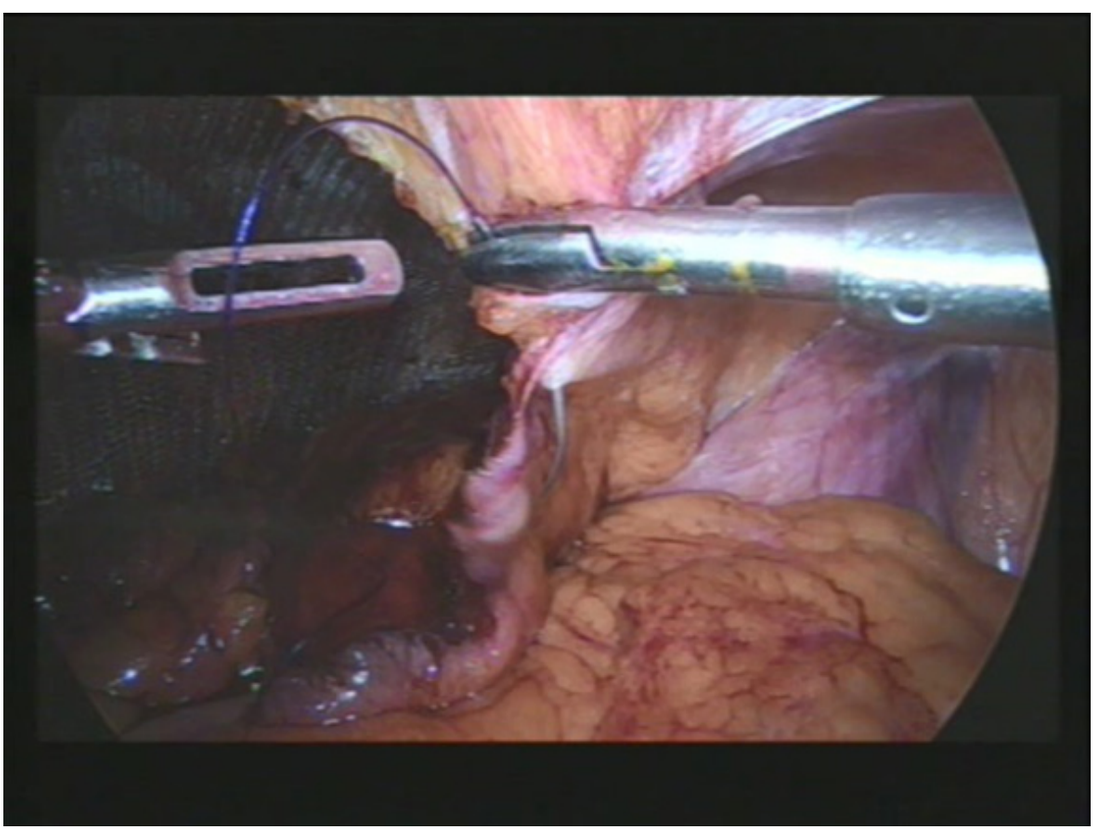

Fig. 4: After peritoneal reconstitution.

CONFLICT OF INTEREST

There are no conflicts of interest.

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