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Laparoscopic Ventral Hernia Repair: Comparative Study between Closure of Hernia Defect and Non-Closure (Tension Free Repair)

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ABSTRACT

Background: Any protrusion through the anterior abdominal wall with the exception of hernia through the inguino-femoral region is defined as ventral hernia. Incisional hernia and primary defects in the abdominal fascia, which can cause umbilical hernia, epigastric hernia, para-umbilical hernia and spigelian hernia are grouped under the definition of ventral hernia.

Objective: To evaluate the recurrence rate of laparoscopic ventral hernia repair with closure and non-closure of the hernia defect in non-complicated ventral hernia cases.

Patients and Methods: This prospective randomized study was conducted from March, 2015 till December, 2019 in General Surgery Department, Mansoura University Hospital. It involved 50 patients with ventral hernia, who were classified randomly into 2 groups by computer generated sampling technique after retrieval of the calculated sample size according to inclusion and exclusion criteria.

Results: The mean age of the non-closure group and of the closure group was 39.96 ± 6.52 and 39.84 ± 7.48 years respectively. The males were 36.0% and females were 64.0% in non-closure group, while in the closure group males were 24.0%, and the females were 76.0%. The mean BMI in the non-closure group was 31.44 ± 3.76 kg/m^2, while in the closure group was 30.88 ± 3.70 kg/m^2. In the non-closure group, the most common hernia sites were epigastric (60.0%), followed by umbilical (40.0%) while in the closure group, the most common hernia sites were umbilical (96.0%).

Conclusion: Laparoscopic ventral hernia repair is a safe and feasible technique. The great advance in abdominal laparoscopic surgery and advance in the equipments and instruments as well as individual skills make closure of the hernia defect represents a good alternative to conventional laparoscopic ventral hernia repair (LVHR) with mesh only.

Keywords: Laparoscopic ventral hernia repair, Closure and non-closure of hernia defect, Tension free repair.

INTRODUCTION

Any protrusion through abdominal wall with the exception of hernia through the inguino-femoral region is defined as ventral hernia [(1)]. A ventral hernia arises through fascial defects in the anterior abdominal wall. These defects can be classified as spontaneous (primary) or acquired (secondary) or by their site on the abdominal wall. Spontaneous hernias just as epigastric hernia arises from the xyphoid process to the umbilicus, umbilical hernia arises at the umbilicus, and hypogastric hernias are unusual spontaneous hernias that occur below the umbilicus in the midline. Acquired hernias commonly occur after surgical incisions and are in consequence termed incisional hernias [(2)]. Incisional hernia is a projection, beneath the skin, of intraabdominal viscera through a post-operative defect in the anterior abdominal wall [(3)].

Umbilical hernias in adults are acquired, rather than congenital, and occur usually in females more than males with a 3 to 1 ratio. Umbilical hernias are associated with increased intra-abdominal pressure due to obesity, ascites, pregnancy, and abdominal distension [(4)]. The most frequent complications of ventral hernia are bowel obstruction, incarceration, strangulation, in addition to common complications associated with hernia repair such as seroma formation, wound infection, and recurrent hernia**.** These complications can often be discovered at clinical assessment [(5)]**.**

Presenting symptoms may include abdominal pain, distention, and vomiting. Physical examination may reveal a tender, firm abdominal wall swelling. Imaging studies are mandatory when the clinical manifestations are misleading or uncertain or preoperative assessment of the hernia is needed [(6)]**.**

The main challenges in hernia management lie in deciding the surgical approach and type of repair procedure to do: laparoscopic or open surgery; anatomical or mesh repair and type of mesh to use, and where to place the mesh to guarantee the strongest possible repair with the least probability of recurrence [(7)]**.** The treatment of ventral hernia is operative repair. These techniques include primary closure of the defect by suture, open repair of the hernia using a prosthetic mesh, and laparoscopic hernioplasty [(8)]**.**

Tension-free mesh repair has been approved as the standard surgical technique for the majority of ventral hernias, nevertheless of defect size, and is most frequently used. The main types of mesh with different basic components are used: polypropylene mesh, the polyester mesh and expanded polytetrafluoroethylene (PTFE) mesh. Polypropylene mesh (proline) is most commonly used and consists of an inert, non-absorbable monofilament that exhibits rapid incorporation into the

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tissues. Expanded PTFE mesh is strong inert macrofilament that rapidly becomes fixated within the tissues [8].

Incisional hernia surgery is still a challenge for general surgeons. Repair of these hernias shows a high rate of recurrence, high morbidity and high costs. Common complications are seroma formation, wound infection, and recurrent hernia [9].

The use of laparoscope in the treatment of abdominal wall hernia repair, first reported in 1993 by **LeBlanc and Booth** [10]. After many years of improvement, laparoscopic ventral hernioplasty is now broadly performed. This may offer benefits for the patients from the use of laparoscopic surgery in which there is less operative time, shorter hospital stays, improvement of patient outcomes and fewer complications in comparison with open hernia repair [11]. The broad acceptance of laparoscopic surgery has afforded an alternative to open incisional hernia repair. The suggested benefits include the avoidance of large incision, less extensive dissection, lower incidence of wound infection, and reduced hospital stay [12]. Although laparoscopic hernioplasty is widely accepted in elective repair, but there is still some controversy regarding longer learning curve, higher cost and risk of bowel injury from trocars or from intra-abdominal manipulation during reduction of the content of the hernia sac [13]. Open ventral hernia repair still preferred by many surgeons, role of laparoscopy in ventral hernia still in progress to reach an ideal technique, and usage of either techniques still needs further studies.

This study was done to evaluate the recurrence rate of laparoscopic ventral hernia repair with closure and non-closure of the hernia defect in non-complicated ventral hernia cases. Also to compare the "non-closure" tension free repair of ventral hernia using mesh alone with the "closure" of hernia defect with mesh reinforcement laparoscopically as regard to operative time, hospital stay, recurrence rate, seroma formation, visible bulge, hematoma, infection, pain and vessel and bowel injury.

PATIENTS AND METHODS

This prospective randomized study was conducted from March, 2015 till December, 2019 in General Surgery Department, Mansoura University Hospital. It involved 50 patients with ventral hernia, who were classified randomly into 2 groups by computer generated sampling technique after retrieval of the calculated sample size according to inclusion and exclusion criteria. **Group I** included patients with ventral hernia who were operated by laparoscopic repair without closure of the defect. **Group II** included patients with ventral hernia who were operated by laparoscopic repair with closure of the defect.

Inclusion criteria: Patients, who were 18 years of age or more with non-complicated ventral hernia, patients who had defect size less than 4 cm in width according to EHS classification and fit patients for general anesthesia and accepting to participate in the study.

Exclusion criteria: Patients who were emergency cases and those with complicated hernia (strangulation, obstruction and paracolostomy hernias), those who had recurrent hernia and/or defect size more than 4 cm, pregnant patients, patients with psychological instability, patients who were unfit for general anesthesia as they had uncontrolled medical diseases and patients who refused to participate in our study.

The selected patients in both groups were subjected to:

1- Preoperative assessment: Full medical history (medical status, smoking and previous operations especially hernia repair using mesh), complete clinical examination, laboratory investigations (complete blood picture, INR, liver and kidney function tests, random blood sugar , radiological investigations (ultrasonography of abdomen and pelvis, chest X-ray and CT abdomen), ECG and ECHO if needed and controlling any general diseases (diabetes mellitus, hypertension, anemia, hypoalbuminemia and chest problems). Also, reduction of body weight in obese patients was done.

2- Operative management: All patients were given third generation cephalosporin (Cefotaxime 1gm) at induction of the anesthesia, prophylactic dose of anticoagulant (fractionated heparin; clexane) was taken 6 hours before operation for at risk group and elastic stocking are applied to the legs. Foley's catheter was used to decompress the urinary bladder if the procedure was in the lower abdomen and Ryle tube was used for gastric decompression if the left hypochondrium was used for creation of pneumoperitoneum or the defect was in the upper abdomen.

3- Operative technique:

1st the positioning: The patient was placed on the table in supine position, after adequate general anesthesia was obtained, the patient must be firmly attached to the table to allow for alterations in position to Trendelenburg, reverse Trendelenburg, or extreme side-to-side ''airplaning'' to allow adhesions to be dissected. Then the abdomen was prepped and draped in usual sterile manner. Creation of Capno pneumoperitoneum was done by using closed techniques including (the use of the Veress needle usually at the umbilicus or the left hypochondrium (Palmer's point) according to the site of the hernia, direct trocar insertion with an optical trocar at lumbar region) or an open Hasson's technique if needed. Carbon dioxide gas was used and intra-abdominal pressure of 15 mm Hg was considered safe.

2nd the Port positions and number: The first trocar should always be placed as far as possible laterally from the defect to provide clear visualization of the defect margin and mesh overlap. The majority of surgeons preferred the left hypochondrium at Palmer's point. This trocar was typically 10–12 mm to accommodate a 10-mm telescope and mesh insertion. In dealing with

midline and right-sided abdominal wall defects, 2-3 inline 5- mm trocars in the left abdomen were ideal while in left-sided abdominal wall defects 2-3 5- mm trocars on the right side were preferred. To facilitate instrument manipulation along with adequate visualization during laparoscopy, trocars usually are placed in triangular fashion around the operative field and optimal distance (16–18cm) from the target termed triangulation.

3rd Adhesiolysis: Omental and bowel adhesions were taken down by use of diathermy or harmonic scalpel and the hernia contents were reduced.

4th Measuring defect size: The defect was identified and careful survey of the whole parietal wall to search for another defect. The size of the defect was measured by the use of scale or the width of opened grasper which measures 2 cm.

5th Closure of the defect: In group II the closure of the defect was a mandatory step, by using extracorporeal interrupted suture technique (Franklin technique) or by using suture passer with cauterization of the inner surface of the sac.

6th Mesh selection and fixation: The dual mesh of a suitable size (with minimum of 3-5 cm overlap beyond the margins of the defect) was introduced and fixed to anterior abdominal wall using transfascial sutures with no. 1 polyamide are placed along the four corners of the mesh leaving both ends long, after reduction of the intra-abdominal pressure to 6-8 mmHg and the center of the mesh is also anchored using interrupted sutures to eliminate the dead space between the mesh and the abdominal wall this step is intended to minimize the incidence of seroma formation. Two rows of tacks are taken, the first row is placed right at the fascial defect and the second row is placed at the edge of mesh approximately 5 cm from the edge. The sutures are placed 2cm apart.

7th Fascial closure of port site if >10 mm by Vicryl 0 then the skin was closed by 3-0 sutures (simple or subcuticular). A ball of gauze was placed over the region of the hernia defect, with a pressure dressing applied and maintained 2 weeks.

Postoperative care: all vital signs were monitored (pulse, blood pressure…etc.), in the absence of bowel adhesions the patients are started orally four hours after surgery. All patients are mobilized within six hours of surgery. Postoperative pain assessment and analgesia was needed (I.M. diclofenac sodium every 24 hours till resuming oral intake). The wound was inspected with respect to hematoma, seroma, wound infection and postoperative skin complications including cellulitis, flap necrosis and infection. Skin infection either superficial, which need no surgical interference and treated by dressing and antibiotic therapy, or deep infections, which may extend to mesh, which is treated by debridement with antibiotic. Resistant infections may necessitate mesh removal. Other complications as bowel injury, vascular injury and hernia recurrence were searched for and diagnosed by physical examinations, which were performed serially in the inpatient and outpatient settings. The patients were instructed to avoid lifting heavy objects and other strenuous activities for at least 6 weeks, and then return to normal activity gradually.

Follow up: After discharge date, patients were followed up. Patient examination was done during a weekly visit in the first month followed by a monthly visit. Follow up of the patients ranged from 6 months to 12 months. Assessment of postoperative complications in the form of wound infection, seroma and recurrence were done. For each patient, demographic, intraoperative, and postoperative data were collected and analyzed. Patient demographics included age, gender, body mass index (BMI), number of prior abdominal surgeries, number of prior hernia repairs, comorbidities, and hernia characteristics. Intra- and post-operative data were also collected and included size of fascial defect, size and type of synthetic mesh used, operative time, complications, length of hospitalization, duration of follow- up, and hernia recurrences.

Ethical consent:

All patients signed an informed written consent to their participation in this study. The study protocol was approved by the Research Ethics Committee of the Faculty of Medicine, Mansoura University with code number MD/16.02.76. This work has been carried out in accordance with the code of ethics of the world medical association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

Data were fed to the computer and analyzed using IBM SPSS Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. Qualitative data were described using number and percent. Quantitative data were described using mean, standard deviation for parametric data after testing normality using Shapiro–Wilk test. Significance of the obtained results was judged at the (0.05) level. Chi-Square test for comparison of 2 or more groups, Student t-test was used to compare 2 independent groups. P value < 0.05 was considered significant.

RESULTS

Table (1) showed the demographic characteristics and body mass index among studied groups. There were no statistically significant differences among both groups in terms of all demographic parameters (age, sex, weight, height, BMI) (P > 0.05).

Table (1): Demographic characteristics and body mass index among studied groups

	Non-closure group N=25	Closure group N=25	Test of significance
Age/years Mean ± SD	39.96 ± 6.52	39.84 ± 7.48	t=0.06 p=0.952
Sex N (%) Male Female	9(36.0) 16(64.0)	6(24.0) 19(76.0)	χ^2=0.857 p=0.355
Weight/kg Mean ± SD	90.68 ± 11.37	88.24 ± 12.05	t=0.736 p=0.465
Height/cm Mean ± SD	169.96 ± 8.11	169.0 ± 6.87	t=0.452 p=0.654
BMI (Kg/m^2) Mean ± SD	31.44 ± 3.76	30.88 ± 3.70	t=0.535 p=0.595
t: Student t test χ^2=Chi-Square test			

Table (2) illustrated the procedure and hernia characteristics among studied groups. There were statistically significant differences among both groups as regards the procedure (being increased in non-closure type in alone and increased in closure type in cases with GB and Umbilical & right inguinal) as well as the umbilical type (being increased in non-closure type in epigastric and increased in closure type in cases with umbilical and incisional types) (P < 0.05). In addition, there were no statistically significant differences among both groups as regards hernia size, ASA, mesh size and mesh type (P>0.05).

Table (2): Procedure and hernia characteristics among studied groups

	Non-closure group N=25	Closure group N=25	Test of significance
Procedure N (%) Alone with GB Umbilical & right inguinal	25(100.0) 0(0.0) 0(0.0)	16(64.0) 8(32.0) 1(4.0)	MC P=0.004*
Hernia type N (%) Umbilical Incisional Epigastric	10(40.0) 0(0.0) 15(60.0)	24(96.0) 1(4.0) 0(0.0)	MC P<0.001*
Hernia size/cm Mean ± SD	7.64 ± 3.19	6.48 ± 4.12	t=1.11 p=0.271
ASA Mean ± SD	2.32 ± 1.22	2.08 ± 0.91	t=0.791 p=0.240
Mesh size N (%) 10*20 20*25 Round	11(45.8) 6(25.0) 7(29.2)	6(25.0) 5(20.8) 13(54.2)	χ^2=3.36 p=0.186
Mesh type N (%) Proced Parietex Composite	9(36.0) 16(64.0)	9(36.0) 16(64.0)	χ^2=0.0 p=1.0
t: Student t test χ2=Chi-Square test MC: Monte Carlo test *statistically significant (if p<0.05).			

Table (3) displayed the operative time and hospital stay and follow up period distribution among studied groups. There were statistically significant differences among both groups in terms of operative time (being increased in closure type)**.** In addition, there was no statistically significant difference among both groups as regards hospital stay and follow up (P > 0.05).

Table (3): Operative time, hospital stay and follow up period distribution among studied groups

	Non-closure group n=25 Mean ± SD	Closure group n=25 Mean ± SD	Test of significance
Operative time/min	66.52 ± 17.67	97.12 ± 18.86	t=5.92 p<0.001*
Hospital stay / days	2.76 ± 0.96	2.61 ± 0.88	t=0.575 p=0.57
Follow up / months	14.64 ± 8.08	16.60 ± 7.39	t=0.895 p=0.375
t: Student t test χ^2=Chi-Square test MC: Monte Carlo test *statistically significant (if p<0.05).			

Table (4) demonstrated the Post-operative complications among studied groups. There were no statistically significant differences among both groups in terms of all post-operative complications (vessel injury, bowel injury, seroma, infection, trocar site hematoma, transient pain, DVT PE, prolonged ileus, seroma 8w, mesh infection, residual pain, lipoma formation and recurrence) (P>0.05), except for visible bulge being increased significantly in non-closure group (P<0.001).

Table (4): Post-operative complications among studied groups

	Non-closure group N=25 (%)	Closure group N=25 (%)	test of significance
Vessel injury	0(0.0)	0(0.0)	……
Bowel injury	0(0.0)	0(0.0)	…….
Seroma	1(4.0)	3(12.0)	FET P=0.61
Infection	3(12.0)	2(6.0)	FET P=1.0
Trocar site hematoma	0(0.0)	0(0.0)	……
Transient pain	2(8.0)	3(12.0)	FET P=1.0
DVT PE	0(0.0)	0(0.0)	……..
Prolonged ileus	0(0.0)	0(0.0)	……
Visible bulge	17(68.0)	2(8.0)	χ^2=19.1 P<0.001*
Seroma 8w	9(36.0)	4(16.0)	χ^2=2.59 P=0.11
Mesh infection	0(0.0)	0(0.0)	……..
Residual pain	1(4.0)	3(12.0)	FET P=0.609
Lipoma formation	0(0.0)	0(0.0)	……..
Recurrence	0(0.0)	0(0.0)	…….
χ^2=Chi-Square test FET: Fischer exact test *statistically significant (if p<0.05)			

DISCUSSION

Franklin *et al.* [14] reported their 11 years' experience with laparoscopic ventral hernia repair. Their technique included primary closure of the defect before mesh placement. Benefits included lower recurrence rate (2.9 %) and fewer complications (10.1 %) at a mean follow-up of 47.1 months. Since then, different defect closure techniques have been described, and all have advantages and disadvantages. **Jorge *et al.*** [15] described their intra-corporeal technique of hernia defect closure using the Endo Stitch™ suturing device. Authors have reported good results using conventional needle and suture, laparoscopic needle driver, and knot pusher; others have reported a percutaneous technique using a suture passer to close the hernia defect [16].

The results of the present work showed that the mean age of the non-closure group was 39.96 ± 6.52 years, compared to the closure group, which was 39.84 ± 7.48 years. Within the non-closure group, the percentage of males was 36.0%, while the percentage of females was 64.0%, compared to the closure group in which the percentage of males was 24.0%, while that of females was 76.0%. The mean weight of patients in the

non-closure group was 90.68 ± 11.37 kg, compared to the closure group, where it was 88.24 ± 12.05 kg. The mean height of patients in the non-closure group was 169.96 ± 8.11 cm, while in the closure group was 169.0 ± 6.87 cm. The mean BMI in the non-closure group was 31.44 ± 3.76 kg/m^2, while in the closure group was 30.88 ± 3.70 kg/m^2.

Concerning the procedure and hernia characteristics in the studied groups, the current study showed that in the non-closure group, all patients had hernia alone, while in the closure group, about 64.0% of patients had hernia alone and about 32.0% had combined hernia and GB, while only one patient had combined umbilical and right inguinal hernias. There was a statistically significant difference regarding the carried-out procedure among the studied groups. In the non-closure group, the most common hernia sites were epigastric (60.0%), followed by umbilical (40.0%). The average size of the hernia was 7.64 ± 3.19 cm^2. The average size of the prosthetic meshes were 10*20 cm^2 in 45.8% of patients, 20*25 cm^2 in 25.0% of patients and round mesh in 29.2% of patients. The most commonly used mesh type was parietex composite (64.0%), while in 36.0% of patients a proced mesh type was used. The average ASA was 2.32 ± 1.22 (range: 1-4). In the closure group, the most common hernia sites were epigastric (60.0%), followed by umbilical (40.0%). The present work found no statistically significant difference between the studied groups as regards the size of the hernia, the type and size of the mesh used in the procedure, or the average ASA.

In the non-closure group, the mean operative time was 66.52 ± 17.67 min (range: 30-90 min), the mean post-operative hospital stay was 2.76 ± 0.96 days (range: 2-5 days), while the mean follow-up time was 14.64 ± 8.08 months (range: 6-33 months). In the closure group, the mean operative time was 97.12 ± 18.86 min (range: 50-120 min), the mean post-operative hospital stay was 1.96 ± 0.78 days (range: 1-3 days), while the mean follow-up time was 16.60 ± 7.39 months (range: 6-33 months). Operative times have been reported as "prolonged" when using trans-fascial or intra-corporeal suturing. However, authors rarely report their operative times or compare them to a control group. In the study conducted by **Franklin *et al.*** [14], the authors achieved an average operative time of 68 min (range: 14-405). The operative times in the current study are similar with a mean of 66.52 min in the non-closure group and 97.12 min in the closure group. There was a statistically highly significant difference regarding the operative time between the two groups in the current study.

Mesh fixation can be achieved using suture, tacks or a combination. The number, types and techniques vary significantly in the literature. In a meta-analysis, tackers when used alone were associated with shorter operative time and less post-operative pain, but similar peri-operative complications, length of hospital stay and hernia recurrence when compared with suturing fixation alone [17]**.** Also, there was a statistically significant difference between both groups regarding the post-operative hospital stay, while there was no statistically significant difference between the studied groups as regards the follow up time.

Several benefits have been proposed with hernia defect closure. For example, authors have suggested that by closing the defect, especially large ones, the repair is stronger and more reliable. It has also been suggested that by approximating the fascial edges, a more physiologic restoration of abdominal wall function is achieved. Greater mesh overlaps and better cosmetic appearance has also been suggested [18]**.**

A disadvantage cited with the laparoscopic "tension-free" technique without defect closure is a bulging phenomenon. The mesh bulges through the defect. Aside from cosmetic disadvantage, the mesh can also come in contact with the skin, especially in larger defects. Conversely, when the defect is closed, the mesh is never in contact with the skin because the abdominal wall muscle and fascia provide a physical barrier. This may also help prevent mesh erosion of the skin and subsequent infections. Finally, a lower wound and mesh infection rate has been reported with defect closure [19]**.**

As regards the post-operative complications, the current results demonstrated that in the non-closure group, the most common post-operative complication was visible bulge at the hernial site, observed after the operation in 17 patients (68.0%). The second most common complication was seroma formation that occurred in 10 cases (40.0 %), mostly persisted for 8 weeks after surgery. No long-term complications related to seroma formation were observed, whether they were aspirated or not. Other complications included infection in three cases, mesh infection in two cases. Two patients had transient pain relieved after some time, while only one patient had residual pain that persisted after the operation. Regarding the post-operative complications in the closure group, only two patients had visible bulge, seven patients had seroma formation, two cases suffered infection, while only one patient showed mesh infection. Three patients had transient pain and a similar number had residual pain that persisted after the operation.

In the literature, rates of seroma formation ranged from 2 to 20%. This could be due to the inability of the fluid collecting in the sac to drain back into the peritoneal cavity. However, the present work did not find any clinical importance to the seroma formation. Similar to **Franklin *et al.*** [14] who reported rates of 15-20 % for seroma formation. Seroma in the current work resolved without intervention in less than 8 weeks.

Authors have also considered disadvantages of closing the defect. Percutaneous sutures were associated with abdominal discomfort (up to 6 months after surgery), pain and neuralgia. Recently, there is more liberal use of local anesthetics, intravenous acetaminophen and intravenous ketorolac. Finally, fixation techniques, whether tacks, sutures or a

combination, and how many each probably plays a role [20].

The current results found a statistically highly significant difference between the non-closure and closure groups regarding the post-operative visible bulge development, while no statistically significant differences were found between the two groups as regards any of the other reported complications. In addition, some of the complications reported in other studies did not develop in any patient of the studied groups, including vessel injury, bowel injury, DVT, prolonged ileus or lipoma formation. Moreover, no hernial recurrence was developed in any patient in the two studied groups. However, it has been believed that by approximating the fascial edges prior to fixation of the mesh, a more physiologic and anatomic repair is achieved. It is likely that with longer follow-up and more patients, a difference will be demonstrated in the future. Larger comparative, long-term studies are needed to address this question. Furthermore, there is still need to investigate the maximum defect size that can be closed and still retain purported benefits. It is possible that by combining defect closure with endoscopic component separation, this technique will be applicable to larger defects [21].

Closure of the hernia defect represents a major difference to conventional LVHR with mesh as reported in most studies and meta-analyses. No randomized controlled trial has addressed the advantages or disadvantages of defect closure. LVHR with mesh has only been evaluated when performed with a "tension-free" or sublay, conventional method. Despite recommendations to close the hernia defect in laparoscopic repair with mesh by some surgeons, it is not widely being performed in LVHR and there are only a few published reports. Reasons for this may be the added time and difficulty presumed to be associated with closing the defect. Another reason may be that there is presumed to be no benefit and/or a lack of evidence to suggest an advantage.

CONCLUSION

Laparoscopic ventral hernia repair is a safe and feasible technique. The great advance in abdominal laparoscopic surgery and advance in the equipments and instruments as well as individual skills makes closure of the hernia defect represents a good alternative to conventional laparoscopic ventral hernia repair (LVHR) with mesh only. The current results are encouraging and demonstrated the safety and feasibility of hernia defect closure, in which the closure group was associated with prolonged operative time but the results were in favor of closure of the defect. We look forward to reporting a longer follow-up in this group of patients in 3-5 years. The absence of recurrence rate (0.0%) emphasized the need for a randomized clinical trial addressing laparoscopic closure with standardized clinical protocol and better control of variables.

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