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Laparoscopic Trans-Abdominal Retro Muscular Mesh Repair of Ventral Abdominal Wall Hernia

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ABSTRACT

Background: Ventral hernias are defined as a defect of the fascia in the anterior abdominal wall with or without a bulge. Trans-Abdominal Retro-Muscular Mesh Repair (TARM) was introduced as a cost-effective laparoscopic approach utilizing polypropylene mesh placed in the retro-rectus space.**Methods**: This study included 73 ventral hernia patients undergone laparoscopic TARM repair. Postoperative data included length of hospital stay (LOS) and pain assessment by Visual Analogue Scale, postoperative complications (as abdominal wall hematoma, oedema or seroma), time to return to work, sexual practice and regular daily exercise were documented. **Results**: Postoperatively, seroma was the most common complication (16.4%), while recurrence occurred in 5.5% of cases. VAS score for pain was significantly higher in complicated cases. Time to return to work was significantly prolonged in complicated cases. There were statistically significant differences between recurrence and no recurrence as regards sex distribution with higher male predominance in recurrence group, as regards site of hernia as most recurred hernia were epigastric and as regards need for extra- analgesia. Length of hospital stay was significantly longer for females than males. Patients with postoperative ileus had significantly longer duration to work. Patients with postoperative seroma or infection had significantly longer duration to work. **Conclusion**: Laparoscopic Trans-Abdominal Retro-muscular Mesh Repair approach in managing ventral hernia with high efficacy and good outcome. Laparoscopic TARM was demonstrated to be efficient for repairing small hernias.

Introduction

Ventral hernias are defined as a defect of the fascia in the anterior abdominal wall with or without a bulge. The manifestations range from minor cosmetic issues to extensive pain and fatal conditions such as bowel obstruction, incarceration, strangulation and perforation. Though ventral hernia repair is considered as one of the commonest surgical procedures performed daily all over the world, there is still a debate about the ideal

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technique for surgical repair because of high recurrence rate ranging from 10 %- 40 % **[1].**

Ventral hernia can be repaired by open or laparoscopic approach. In open technique, a surgical incision is performed at the hernia site, and the protruding content is gently returned back into the peritoneal cavity. To reinforce the abdominal wall repair and reduce the incidnece of recurrence, a prosthetic mesh is placed over the weak region **[2].**

Due to the major advantages of minimal invasive surgical techniques, different approaches of laparoscopic ventral hernia repair are progressively growing and obtaining popularity, however, Some surgeons still prefer conventional open repair due to the challenging learning curve of laparoscopic approaches and the dangerous complications that may occur after laparoscopic repair **[3]**.

Laparoscopic repair of ventral hernia encompasses various techniques, Leblanc had tried the initial trials by covering the hernia defect from the peritoneal aspect with adequate mesh size to warrant at least 3-5 cm overlap of the boundaries of the hernia defect, named intraperitoneal on lay mesh (IPOM) repair **[4].** Lately, a novel concept of IPOM repair is practiced where the hernia defect is closed before the mesh placement, named the IPOM-Plus repair. In both IPOM plus and IPOM a special composite or double face mesh, which differs from the regular polypropylene mesh is needed and special tacking device is used for mesh fixation. Both techniques have good outcomes, however they have many complications as omental adhesions causing colic, adhesive intestinal obstruction, together with the significant higher economic cost **[5].**

It is evident now that almost all mesh types nevertheless their synthetic material and coverings can induce different degrees of adhesions consequently complications may occur with intraperitoneal mesh placement. So, the mesh placement out of the peritoneal cavity now is trending in laparoscopic hernia repair **[6].** Definitely, the severe postoperative complications of IPOM favour the retro-muscular mesh over the intraperitoneal mesh placement in repair of ventral hernia **[7].**

The main benefit of TARM is using the traditional polypropylene mesh being placed in the retro rectus space outside the peritoneal cavity with minimal fixation thus protecting the bowel from direct contact with the mesh and thus reducing the postsurgical pain and adhesions **[7].** But it is technically challenging and needs long difficult learning curve that is why it is not trendy among surgeons **[3]**

Aim of Work

The current study aimed to evaluate the primary and secondary outcomes of laparoscopic trans-abdominal Retro muscular (TARM) repair as a new minimally invasive technique for ventral abdominal wall hernia.

PATIENTS AND METHODS

This clinical trial study included 73 ventral hernia patients who were recruited from General Surgery department, Mansoura University hospital, over 1 year in the duration between September-2022 to September- 2023. This study included patients from both genders above 18 years old with primary ventral hernia with a defect less than 5 cm and accepted to participate in the study. But we excluded patients with complicated ventral hernia, with huge ventral hernia or defect >5 cm, with incisional hernia, with severe cardiopulmonary insufficiency or coagulopathy or patients refused to participate in the study.

Methods

All patients underwent history taking including personal history (age, sex, residence, smoking, alcohol intake and occupation), medical history (associated co- morbidities as diabetes, hypertension, chronic liver disease, chronic pulmonary disease, and cardiac diseases), surgical history (previous abdominal surgeries) and history of present illness (presentation as abdominal bulge, pain, or discomfort, and the disease duration).

General examination included assessment of vital signs (systolic, diastolic and mean arterial blood pressure, heart rate, respiratory rate, temperature), height, weight, adjusted body weight and body mass index. Local examination included assessment of type of hernia (Primary or Secondary ventral hernia), site of the defect (epigastric, umbilical or paraumbilical) and auscultation for intestinal sounds.

Preoperative laboratory investigations included complete blood count, liver enzymes (ALT, AST, bilirubin and albumin), renal function test (sr. creatinine), and virus serology (for hepatitis C antibodies, hepatitis B surface antigen and HIV antibodies).

Abdominal ultrasound was conducted to confirm the diagnosis and to exclude the likelihood

of intra-abdominal cause of ventral hernia and to exclude the presence of any condition that requires to be operated upon in the same setting and detect size of defect. Chest x-ray was done to assess the cardio- pulmonary status. ECG was done to assess cardiac status.

Operative Details

Preoperative, an antibiotic, usually a first-generation cephalosporin, was given prophylactically before the incision was made. Trendelenburg or reverse Trendelenburg position, urinary catheter under general anesthesia. Peritoneal access via closed technique using versse needle in palmers point. The operation table was flexed for wider instrument manipulation angles. Three- port technique was used. Three trocars were used: one 10 mm and for telescope (T) and two 5-mm trocars as working ports (w) (labelled T1, W1 and W2) placed in the upper abdomen for infra-umbilical and lateral hernias; and in the lower abdomen (labelled T2, W3 and W4) for epigastric hernias, respectively.

In patients with hernia located at the lower abdomen (paraumbilical or umbilical) the patient was positioned in Trendelenburg position with table break at the hip and the ports were located at 11 mm port for the camera at the epigastrium and two 5 mm working ports at the right and left hypochondrium mid clavicular line.

In patients with hernia located in the upper abdomen (epigastric), the patient was positioned in reversed Trendelenburg position with table break at the hip and knee. Ports were located to be infraumbilical 11 mm for the camera and two 5 mm working ports at rt and left iliac fossa at the mid clavicular line.

A flap was created between the posterior rectus sheath and both recti using diathermy, with cautious preservation of epigastric vessels, neurovascular bundles at the linea semilunaris (LS) and linea alba (LA). The dissection of the flap continued till crossing the defect by at least five cm distally.

The intra-abdominal pressure was then reduced to 8 mm Hg. Defect closure was performed by closure of posterior rectus sheath and anterior rectus sheath with suture of No. 0 proline. A medium-weight microporous polypropylene mesh with wide overlap was parked into the retro muscular space. Finally closure of posterior rectus sheath flap.

We checked vital signs of the patients postoperative to make sure they are vitally stable and check the drains to make sure no blood loss. For pain control, IM sodium diclofenac 75 mg was given every 12 hours. Pain postoperatively was assessed using Visual Analogue Scale (VAS). All patients had an appointment for follow up at outpatient clinic at 1st, 4th week, after 6th month and after one year. All patients were followed up for postoperative complications and time passed to return to normal activities and recurrence.

Data collection

Preoperative data included history taking, sex, type of hernia and site of defect, operative data included uncontrolled bleeding, blood loss, injury to bowel, need for conversion to open repair and operative time which was defined by the time passed from skin incision to skin closure and postoperative data included LOS and pain assessment was done by VAS. The postoperative complications (as abdominal wall hematoma, oedema or seroma), time passed to resume daily activities as return to work, sexual practice, regular daily exercise and recurrence rate were documented.

Ethical Consideration

The whole study design was approved by the institutional review Board, Faculty of Medicine, Mansoura University. Confidentiality and personal privacy were respected

in all levels of the study. Patients feel free to withdraw from the study at any time without any consequences. Collected data was not and will not be used for any other purpose.

Statistical Analysis

All data were tabulated in SPSS sheet version 27. Categorical data were expressed as number and percent. Continuous data were tested for normality using Kolmogorov test. Normally distributed data were expressed as mean and standard deviation. Non- parametric data were expressed as median, minimum and maximum. Chi square test was used to compare data of categorical type. Student t- test was used to compare normally distributed continuous data. Correlation analysis (Pearson correlation) was used to assess the correlation between 2 continuous variables. A p value less than 0.05 was considered of statistical significance.

RESULTS

This was a prospective interventional study which is conducted at MUH from September 2022

to September 2023 following inclusion criteria for 73 patients who underwent TARM with mean age 45.6 ± 7.23 years. Table **(1)** shows that most of the included patients were females (69.9%). The most reported type of hernia was paraumbilical hernia (69.9%) followed by epigastric type (24.7%) then umbilical hernia (5.5%). The mean operative time was 140 ± 22 minutes. No intraoperative complications were reported in 83.6% of patients. The most reported intraoperative complication was 13.7%. Bleeding was reported in 2.7% of patients. The mean postoperative pain score (VAS) was 5.34 ± 1.22. The most reported postoperative complication was seroma (16.4%) followed by postoperative ileus (4.1%). Hematoma and wound infection were reported in 2.7% of patients. Mean length of hospital stay was 1.8 ± 0.4 days. The mean time to work after operation was 5.99 ± 1.8 days. Recurrence was reported in 5.5% of patients.

Table **(2)** shows that the included patients were divided into 2 groups according to incidence of postoperative complication to assess predictors for complications (non- complicated group included 54 patients and complicated group included 19 patients). Age, sex distribution, site of hernia, operative time, intraoperative complications, LOS didn't differ significantly between complicated and non- complicated cases. VAS score for pain was significantly higher in complicated cases (5.89 ± 1.049) than non- complicated cases (5.1 ± 1.2; p= 0.02). Time to return to work was significantly prolonged in complicated cases (7 ± 1.9) than non-complicated cases (5.6 ± 1.5; p= 0.003).

Table **(3)** shows that there were statistically significant differences between recurrence and no recurrence as regards sex distribution with higher male predominance in recurrence group (p= 0.04). There were statistically significant differences between recurrence and no recurrence as regards site of hernia as most recurred hernia were epigastric (p= 0.04). There were statistically significant differences between recurrence and no recurrence as regards need for extra- analgesia. There were no statistically significant differences between patients with and without recurrence as regards intraoperative, postoperative complications, operative time, LOS and time to return to work.

Table **(4)** shows that pain score was significantly higher in patients complicated by seroma (p= 0.004). Otherwise, sex, type of hernia, intraoperative and postoperative complications did not have significant effect on VAS. length of hospital stay was significantly longer for females than males (p= 0.04). There were no statistically significant differences between sites of hernia, intraoperative and postoperative complications, and LOS. Patients with postoperative ileus had significantly longer duration to work (p= 0.042). Patients with postoperative seroma or infection had significantly longer duration to work (p= 0.003; 0.01).

Table **(5)** shows that pain score correlated inversely to patients' age (r: -0.38; p< 0.001). However, pain score did not correlate significantly to operative time or time to return to work. There was a significant inverse correlation between age and length of hospital stay (r: -0.39; p< 0.001). There were insignificant correlations between length of hospital stay and operative time, VAS score or return to work. There were no significant correlations found between age, operative time, VAS, LOS and days to return to work.

Table (1): Demographics, baseline characteristics, operative Time, intraoperative, early and late postoperative complications

	Total cohort (n= 73)
Age (years) Mean ± SD	 45.6 ± 7.23
Sex No. (%) - Male - Female	 22 (30.1%) 51 (69.9%)
Hernia type No. (%) - Paraumbilical hernia - Epigastric - Umbilical	 51 (69.9%) 18 (24.7%) 4 (5.5%)
Operative time (minutes) Mean ± SD	 140 ± 22
Intraoperative complications No complications Flap tears Bleeding Conversion to open	 61 (83.6%) 10 (13.7%) 2 (2.7%) 0 (0%)
Early Postoperative complications	
Pain score (Visual analogue scale) Mean ± SD	 5.34 ± 1.22
Postoperative ileus	3 (4.1%)
Hematoma	2 (2.7%)
Mesh infection	0 (0%)
Seroma	12 (16.4%)
Wound infection	2 (2.7%)
Length of hospital stay (days) Mean ± SD	 1.8 ± 0.4
Late postoperative complications	
Time to return to work (days) Mean ± SD	 5.99 ± 1.8
Recurrence	4 (5.5%)

Table (2): Predictors for postoperative complications

	Non- complicated (n= 54)	**Complicated (n= 19)**	**P value**
Age (years) Mean ± SD	 44.9 ± 6.7	 47.5 ± 8.2	0.17
Sex No. (%) - Male - Female	 14 (25.9%) 40 (74.1%)	 8 (42.1%) 11 (57.9%)	0.18
Hernia type No. (%) - Paraumbilical hernia - Epigastric - Umbilical	 36 (66.7%) 15 (27.8%) 3 (5.6%)	 15 (78.9%) 3 (15.8%) 1 (5.3%)	0.57
Operative time (minutes) Mean ± SD	 96.2 ± 20.5	 85.2 ± 24.6	0.06
Intraoperative complications No. (%) - No complication - Flap tears - Bleeding	 44 (81.5%) 9 (16.7%) 1 (1.9%)	 17 (89.5%) 1 (5.3%) 1 (5.3%)	 0.36
Pain (VAS) score Mean ± SD	 5.15 ± 1.2	 5.89 ± 1.1	***0.02***
Length of hospital stay (days) Mean ± SD	 1.87 ± 0.33	 1.74 ± 0.65	0.26
Time to return to work (days) Mean ± SD	 5.6 ± 1.6	 7 ± 1.8	***0.003***

Student t- test; Chi square test; Level of significance < 0.05

Table (3): Risk factors for recurrence

	No recurrence (n= 69)	**Recurrence (n= 4)**	**P value**
Age (years) Mean ± SD	45.3 ± 7.3	50 ± 4.2	0.2
Sex No. (%) - Male - Female	 19 (27.5%) 50 (72.5%)	 3 (75%) 1 (25%)	***0.2***
Hernia type No. (%) - Paraumbilical hernia - Epigastric - Umbilical	 50 (72.5%) 15 (21.7%) 4 (5.8%)	 1 (25%) 3 (75%) 0 (0%)	***0.4***
Operative time (minutes) Mean ± SD	 93.1 ± 22.2	 97.5 ± 20.6	0.7
Extra- analgesia No. (%)	27 (39.1%)	0 (0%)	***0.2***
Intraoperative complications No. (%) - No complication - Flap tears - Bleeding	 58 (84.1%) 9 (13%) 2 (2.9%)	 3 (75%) 1 (25%) 0 (0%)	0.76
Postoperative complications No. (%)	19 (27.5%)	0 (0%)	0.2
Pain score (VAS) Mean ± SD	 5.35 ± 1.2	 5.25 ± 1.3	0.87
Length of hospital stay (days) Mean ± SD	 1.8 ± 0.4	 2 ± 0.1	0.45
Time to return to work (days) Mean ± SD	 5.67 ± 1.8	 6.25 ± 1.26	0.76

Student t- test; Chi square test; Level of significance < 0.05

Table (4): Analysis of VAS score, length of hospital and days to return to work

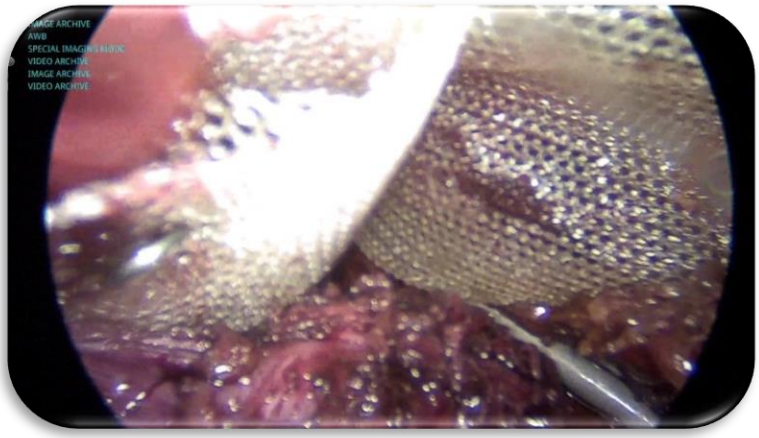
		Pain Mean ± SD	**P value**	**Length of hospital stay (days) Mean ± SD**	**P value**	**Days to return to work Mean ± SD**	**P value**
Sex	Male	5.18 ± 1.3	0.46	1.68 ± 0.47	***0.04***	6.05 ± 1.5	0.46
	Female	5.4 ± 1.2		1.9 ± 0.4		5.96 ± 1.8	
Site of hernia	Paraumbilical	5.3 ± 1.18	0.8	1.86 ± 0.4	0.8	5.9 ± 1.7	0.8
	Umbilical	5.5 ± 1.7		1.75 ± 0.5		6.25 ± 1.5	
	Epigastric	5.4 ± 1.3		1.78 ± 0.5		6.2 ± 1.9	
Intraoperative complications	No	5.25 ± 1.2	0.6	1.84 ± 0.4	0.6	6.13 ± 1.8	0.3
	Flap tears	5.8 ± 1.4		1.8 ± 0.4		5 ± 1.5	
	Bleeding	6 ± 1.4		2 ± 0.1		6.5 ± 0.7	
Postoperative complications	No	5.15 ± 1.2	***0.02***	1.87 ± 0.33	0.26	5.6 ± 1.6	***0.003***
	Yes	5.89 ± 1.05		1.74 ± 0.65		7 ± 1.8	

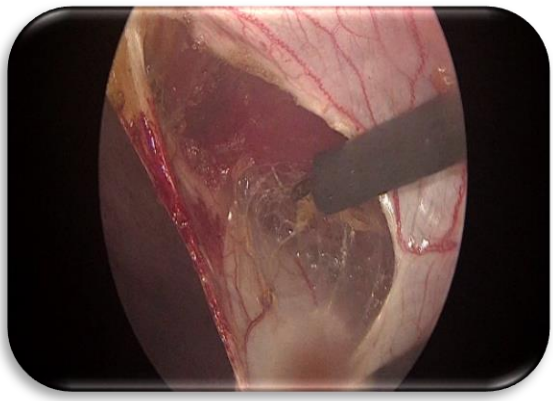
Student t- test; Level of significance < 0.05

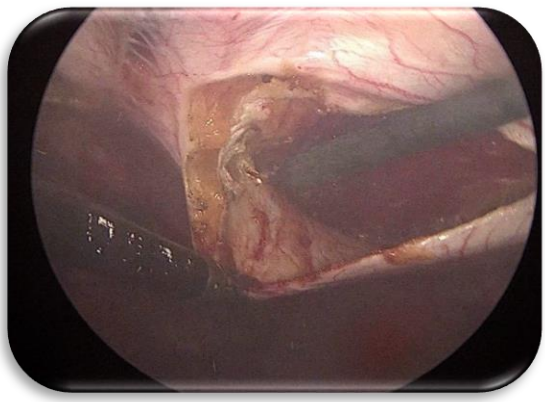
Table (5): Correlation analysis of VAS, length of hospital stay and days to return to work

	VAS		length of hospital stay		days to return to work	
	R	**P value**	**r**	**P value**	**r**	**P value**
Age	-0.38	*<0.001*	-0.38	*<0.001*	0.03	0.8
Operative time	-0.205	0.081	0.086	0.47	-0.2	0.08
Length of hospital stay	-0.023	0.85	-0.023	0.85	-0.1	0.09
Return to work	0.1	0.4	-0.1	0.09	0.1	0.4

r: Pearson correlation; Level of significance< 0.05.







Discussion

Although ventral hernia repair is a common surgical procedure conducted every day globally, the ideal surgical approach is still debatable due to the high recurrence rate that may reach up to 40 %. Laparoscopic ventral hernia repair comprises different methods. Retro muscular mesh repair that was firstly introduced by Revis and Stoppa and become modified and performed laparoscopically through the transabdominal approach and hence termed transabdominal retro muscular mesh repair **[8].**

The aim of the current study was to assess the efficacy and safety of transabdominal retro muscular mesh repair of ventral hernia. The study included 73 ventral hernia patients who underwent TARM with mean age 45.6 ± 7.23 years. In agreement with the present study, **Hassan *et al.*, [9]** in recent study demonstrated that mean age of ventral hernia patients included in his study (24 patients) was 41 ± 9.5 years**,** in another study included 25 patients underwent TARM showed that mean age of the included patients was 48.9 ± 7.17 years **[8]**.

In the current study most of the included patients were females (69.9%). In concordance with the present study, recent study demonstrated that females represented 75% of patients with ventral hernia **[9].**

In the current study the most reported hernia site was paraumbilical hernia (69.9%) followed by epigastric hernia (24.7%) then umbilical hernia (5.5%). In agreement with the present study, **Aziz *et al.*, [8]** showed that 72% of patients underwent TARM had paraumbilical hernia**.** On contrary, previous recent study showed that the most reported site for ventral hernia was umbilical representing 41.7% **[9].**

In the current study the mean operative time was 140 ± 22 minutes. In agreement with the present study, **Jadhav *et al.*, [10]** reported similar operative time for hernioplasty of ventral hernia in his study (96.65 ± 20 minutes)**.** In addition, **Aziz *et al.*, [8]** in another study found that mean operative time for TARM was shorter than the present study and it was 108.4 ± 9.43 minutes**.**

In the current study intraoperative complications were reported in 16.4% of patients as 13.7% of patients experienced flap tears and 2.7% reported intraoperative bleeding. In the current study conversion to open was not required for any patient. On contrary, **Aziz *et al.*, [8]** reported intraoperative complications especially flab tear in higher percent of patients (32%)**. Hassan *et al.*, [9]** reported intraoperative bleeding in 12.5% of patients. However, in agreement with the present study, he reported conversion to open in only 1 patient**.**

In the present study, mean VAS for pain was 5.34 ± 1.22 postoperative and 37% of patients received extra- analgesia. In agreement with the present study, recent study on Egyptian population reported that mean VAS post- TARM was 5.12 ± 1.01 and extra- analgesia was required for 20% of patients **[8]. Hassan *et al.*, [9]** in previous study explored the outcome of TARM showed that mean postoperative VAS was 4.26 ± 1.5 and none of patients received extra- analgesia**.**

In this study, postoperative complications were reported in 26.3% of patients. The most recorded postoperative complication was seroma which was present in 16.4% of patients. In agreement with the present study, **Hassan *et al.*, [9]** displayed that seroma was the most reported postoperative complication (29.2%). On contrary to the present study, **Jadhav *et al.*, [10]** reported postoperative complications in 16% of patients and he reported that wound infection was the most common postoperative complication (11%) while he reported seroma in 2% of patients only**.**

Postoperative ileus was reported in 4.1% of patients in the present study. In concordance with the present study, recent study reported postoperative ileus in 4.2% of patient **[9].** Also, **Awad *et al.*, [11]** showed that post- TARM ileus was reported in 5.6% of patients**.** On contrary, previous recent study on 25 Egyptian patients did not report post- TARM ileus in any patients **[8].**

In the current study, postoperative hematoma and infection were reported in 2.7% of patients. In hand with the present study, **Hassan *et al.*, [9]** reported low rate of postoperative hematoma (8.3%) and infection (4.2%) **[9]. Masurkar *et al.*, [7]** reported infection in only 1 case after TARM**.** On contrary, recent study reported postoperative hematoma in 8% of patients and infection in 4% of patients **[8].**

According to the present study, the mean LOS postoperatively was 1.8 ± 0.4 days. In agreement with the present study, recent study included 24 patients underwent TARM reported that LOS was 1.3 ± 0.5 days **[9].**

In this study, the patients required 5.99 ± 1.8 days to return to work. In agreement with the present study, **Awad *et al.*, [11]** reported that duration to return to work was 3.4 ± 1.6 days after TARM**.** In addition, **Aziz *et al.*, [8]** showed that mean time required to return to work after TARM was 5.28 ± 1.21 days in previous study**.** In disagreement with

the present study, **Hassan *et al*., [9]** in a previous study included 24 patients reported longer time to return to work which was 10.1 ± 3.75 days**.**

According to the present study, the recurrence rate was 5.5%. Likewise, **Hassan *et al*., [9]** and **Aziz *et al*., [8]** reported incidence of recurrence in only 4% patients**.**

In the current study the patients included were divided into 2 groups according to incidence of postoperative complication to assess predictors for complications. In the current study age and sex distribution didn't differ significantly between complicated and non- complicated cases. In agreement with the present study, **Assakran *et al*., [12]** in recent study included 272 non-complicated cases and 47 complicated cases did not report age and sex differences between complicated and non-complicated cases**.** On contrary to the present study, **Hassan *et al*., [9]** demonstrated that complicated cases had significantly younger age (37.7 ± 9.07 years) than non- complicated cases (43.25 ± 8.9 years; **p= 0.04)**.

In the current study, site of hernia did not affect incidence of postoperative complications significantly. In agreement with the present study, recent study didn't report significant effect of hernia type on incidence of postoperative complications **[12]. Hassan *et al*., [9]** did not find significant difference between complicated and non-complicated cases as regards type of hernia **[9].** In addition, previous study did not report site of hernia as a significant predictor for postsurgical complications **[13].** On contrary, **Al-Mansour *et al*., [14]** reported significant effect of hernia type on incidence of postoperative complications with higher rate among incisional hernia**.**

In this study, there were no significant differences between complicated and non-complicated cases as regards operative time or LOS. In agreement with the present study, **Lindmark *et al*., [13]** did not report operative time as a significant predictor for postoperative complications **[13].** On contrary, **Al- Mansour *et al*.,** demonstrated that prolonged operative time was a significant predictor for postoperative complications **[14].**

In the current study, incidence of postoperative complications had 2 main side effects as it significantly increased postoperative VAS score (p= 0.02) and prolonged time to return to work (p= 0.003). In the current study the included patients were further divided into 2 groups to stratify risk for recurrence.

Age was not considered as significant predictor for recurrence in the present study. In agreement with the present study, **Bhardwaj *et al*., [15]** did not report age as a significant predictor for recurrence after hernia repair in his large study included 29834 patients**. Also, other studies** did not report age as a significant predictor for recurrence after repair of ventral hernia **[16, 17].** **Romain *et al*., [18]** also in another study did not report significant differences between recurrence and non-recurrence groups as regards patients' age**.**

In the present study, male patients had higher risk for recurrence with statistically significant difference **(p= 0.04).** On contrary to the present study, **Bhardwaj *et al*., [15]** did not consider sex as a significant predictor for recurrence in ventral hernia repaired patients**.** Meanwhile, **Parker *et al*., [17]** in a meta- analysis men had significantly lower odds of recurrence (OR 0.77)**.**

Operative time, incidence of intraoperative or postoperative complications were not considered risk factors for recurrence in the current study. In agreement with the present study, **Romain *et al*., [18]** in another study didn't find significant differences between recurrence and no- recurrence groups as regards operative time and postoperative complications**.** In addition, **Piccoli *et al*., [16]** did not report postoperative complications as a significant predictor for recurrence.

On contrary to the present study, **Piccoli *et al*.,** reported operative time as a significant predictor for recurrence **[16]. Parker *et al*.,** demonstrated that postoperative wound infection, seroma, hematoma are all significant predictors for recurrence and all increased odds for recurrence **[17].**

In this study, the LOS didn't differ significantly between recurrent and non- recurrent groups. On contrary, **Piccoli *et al*., [16]** reported that the LOS was significantly prolonged in recurrent group than non- recurrent group
(p= 0.003).

The study had some advantages as it was conducted on relatively large sample size on Egyptian population. Also, the study explored the factors affected postoperative VAS among ventral hernia patients underwent TARM. In the current study visual analogue scale (VAS) was used to evaluate postoperative pain, and it seems to be correlated significantly to age **(r: -0.38; p< 0.001)** but not to sex. Pain score was significantly higher among patients with postoperative complications **(p= 0.02)**.

In accordance with the present study, **Langbach *et al*., [19]** reported that age and sex were significant predictors for post hernia repair VAS score**.** Another advantage of the present study that the study analyzed the factors affected length of

hospital stay postoperatively which was age **(r: -0.39; p< 0.001)** and female sex.

The study also explored the factors affecting the duration required to return to work. The study stated that postoperative complications incidence was the main determinant of time to return to the work. To the best of our knowledge, limited studies explored these associations. Our study has some limitations. We included a relatively small sample size the enrolled cases from a single surgical center. Additionally, absence of control group and randomization could affect generalizability of the results and expose the study to some types of bias.

CONCLUSION

Based on our findings the laparoscopic trans-abdominal retro-muscular mesh repair (TARM) which is a minimal invasive technique is safe and effective in the management of ventral hernia also this approach is accompanied by less complications and helps in rapid recovery and return to normal activity so we recommend:

Conflict of interest

None.

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None.

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