

## Review Article

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# Evaluation of retro muscular mesh repair technique for treatment of ventral hernia

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## ABSTRACT

Ventral hernias commonly encountered in surgical practice account for 15-20% of all abdominal wall hernias. Results of tissue repair have been disappointing. The optimal approach for abdominal incisional hernias is still under discussion. The aim of the study was to evaluate the retro muscular mesh repair technique in the treatment of ventral hernia as one of the standard techniques for treatment of such cases. This prospective study on 50 consecutive patients was performed from July 2016 to July 2017. Patients were prepared to be operated by the retro muscular mesh repair technique. All patients were evaluated with respect to operative time and postoperative complications. Results were documented and statistically analysed. In this study on 50 patients, there were 30 female patients (60%) and 20 male patients (40%). The age of the studied patients ranged between 26 and 65 years with mean age of 49.8 years. The mean operative time was  $88.5 \pm 15.3$  min. The mean period of drainage was  $2.3 \pm 1.3$  days. Seroma was encountered in one case only 2%. No recurrence was reported in the studied patients during the period of follow-up (12months). On the basis of this study, we conclude that retro muscular (sublay) mesh repair is the ideal technique for incisional hernia repair.

**Keywords:** Mesh repair, Preperitoneal, Retromuscular, Sublay, Ventral hernia

## INTRODUCTION

Ventral hernia of the anterior abdominal wall, either primary or secondary, is a common surgical problem and is defined as any fascial defect of the anterolateral parietal abdominal wall, through which intermittent or continuous protrusion of intra-abdominal or preperitoneal contents occurs.<sup>1</sup>

These hernias are of various types and can be categorized into either congenital or acquired. They can also be categorized according to location into primary ventral hernias (true ventral, no incisional hernias) and secondary ventral hernias (acquired, incisional, recurrent hernias);

they occur at the site of a previous surgical scar. Both have two subtypes: lateral ventral hernia and midline ventral hernia. Ventral hernia can also be categorized according to their characteristics into reducible, irreducible or incarcerated, strangulated and recurrent ventral hernia.<sup>2</sup>

The cause of a primary ventral hernia is far from completely understood, but it is undoubtedly multifactorial. Familial predisposition plays a role with increasing evidence of connective tissue disorders. They are considered as a leading cause of abdominal surgery and account for 2-10% of all abdominal wall hernias. Most studies now support the theory that acute fascial

separation occurs early in the postoperative period, leading to the delayed clinical development of abdominal wall incisional hernias. Clinical data show that 52% of incisional hernias occur within 6 months postoperatively as a result of excessive tension and inadequate healing of a previous incision. Obesity, advanced age, malnutrition, ascites, pregnancy, and conditions that increase intra-abdominal pressure are factors that predispose to the development of an incisional hernia.<sup>3</sup>

The history of prosthetic repair in abdominal wall hernias began in 1844 with the use of silver wire coils placed on the floor of the groin to induce an inflammatory fibrosis augmenting the repair. Many prosthetic materials have been tried in hernia repair, but the two most common in current use are polypropylene mesh and expanded polytetrafluoroethylene. The repair of ventral hernias varies from primary closure only, primary closure with relaxing incisions, primary closure with onlay mesh reinforcement, onlay mesh placement only, inlay mesh placement, and intraperitoneal mesh placement. Primary closure techniques are usually performed for small fascial defects less than 5 cm in greatest diameter.<sup>4</sup>

Even for small hernia defects, recurrence rates in excess of 50% have been reported. An onlay, usually of polypropylene mesh, is sutured to the anterior rectus sheath after the fascial defect has been closed primarily. This type of repair has the potential advantage of keeping the mesh separated from the abdominal contents by full abdominal muscle fascial wall thickness. The disadvantages of this repair include repair under tension, large subcutaneous dissection that allows for seroma formation, and mesh infection when the surgical wound becomes infected. The sublay (retrorectus) placement of a mesh, more commonly known as the Stopa technique, became popular in the 1990s. The recurrence rates with this repair have been stated to be less than 10%.<sup>5</sup>

Moreover, the mesh implanted in the preperitoneal space unites and consolidates the anterior abdominal wall. The mesh also adheres to the posterior rectus sheath and renders it inextensible allowing no further herniation. The preperitoneal (sub lay) mesh hernia repair was first described by Renestopa Jean Rives and George Wantz. This technique is considered by many surgeons to be the gold standard for the open repair of ventral hernia.<sup>6</sup>

## METHODS

Fifty patients with ventral hernia were admitted to Menoufia University Hospital from July 2016 to July 2017. All patients were operated upon by the retromuscular mesh repair technique. Patients with inflamed, obstructed, or strangulated hernia were excluded from the study. The included patients were subjected to complete history taking and clinical examination and were prepared for elective surgery for hernia repair.

A prophylactic dose of antibiotic was given at induction of anesthesia. After incising the skin and subcutaneous tissue, the sac was dissected and delineated. Thereafter, the sac was opened, contents were reduced.

A plane was created between the posterior rectus sheath and rectus muscle to place polypropylene mesh. The peritoneum and posterior rectus sheath was closed by 2/0 vicryl. Thereafter, the mesh was secured with interrupted 2/0 polypropylene sutures and then a suction drain was placed over the mesh.

The anterior rectus sheath and muscular aponeurosis were approximated or closed if possible in front of the mesh. Thereafter, the subcutaneous space was closed with interrupted absorbable sutures and the skin with polypropylene sutures. Intravenous antibiotics were given to all patients on the first day. More duration of antibiotic therapy was given only if infection had been encountered according to culture and sensitivity.

## RESULTS

In present study, we evaluated 50 patients with follow-up 12 month who were treated by retromuscular prosthetic repair: 24 patients had para umbilical hernia (48%), 10 patients had epigastric hernia (20%) and 16 patients had incisional hernia (32%). The size of hernia defect mean  $(8.9 \pm 2.0)$  ranged from 5-15cm.

Studied patients were 20 males (40%), 30 females (60%) with mean age  $49.8 \pm 9.2$ ; range 26-65 years and mean BMI  $29.8 \pm 4.4$ ; range 22-40.

The predisposing risk factors which resulted in hernia formation were Diabetes mellitus 20 patient (40%) of cases, Benign prostatic hyperplasia 3 patients (6%) of cases, Chronic constipation 12 patients (24%) of cases, Obesity 9 patients (18%) of cases, smoking 13 patients (26%) of cases and Wound infection of previous operation 9 patients (18%) (Table 1).

**Table 1. Demographic data of the studied patients.**

Item	Frequency	Percentage
Gender		
Males	20	40%
Females	30	60%
	Mean $\pm$ SD	$49.8 \pm 9.2$
Age	Min- max	26-65
	Median	51.5

Duration of surgery (in minutes-from incision to skin closure) ranged from 70-130 minutes  $(88.5 \pm 15.3)$ .

Drain removal in studied groups (in days - till drainage reached less than 50 cc/Day). Table 2 shows drain was removed after a period of time ranged from 1-5 days

( $2.3 \pm 1.3$ ) which is significantly lower than any other type of repair.

**Table 2. Operative time and post-OP complications.**

Item	Studied cases (N = 50)	[N (%)]
Operative time (min)	70-130 minutes	( $88.5 \pm 15.3$ )
Drain removal (days)	1-5 days	( $2.3 \pm 1.3$ )
Seroma formation	1	(2%)
Wound infection	3	(6%)
Hospital stay	1-4 days	( $1.8 \pm 0.77$ )
Recurrence rate	0	0

Postoperative hospital stays (In days): This table shows that, the length of hospital stays ranged from 1-4 days ( $1.8 \pm 0.77$ ) (Table 2).

#### *Post-operative complications*

Hematoma formation occurred after drain removal in 2 patients (4%) which was very small collection in 1 patient treated conservatively resolved in 3 weeks followed up by abdominal ultrasound and the other patients was treated by U/S guided pig tail insertion for 3 days then removed after draining about 250cc.

Seroma formation was noticed in one patient (2%) after drain removal treated by repeated aspiration under complete aseptic condition

Wound infection occurred in 3 patients (6%) all were minor infection that was treated conservatively by broad spectrum antibiotics.

There is no recurrence occurred among the cases of studied group (0%) during the period of follow up 12 months.

#### **DISCUSSION**

Historically, ventral hernias have been repaired with either primary suture techniques or placement of a variety of prosthetic materials. Before the 1960s, most ventral hernias were repaired primarily with suture and a few with metallic meshes. Even with some modifications, the recurrence rates with the primary suture repair ranged from 24 to 54%. The introduction of polypropylene mesh repair opened a new era of tension-free herniorrhaphy. The recurrence rates with prosthetic mesh decreased to 10-20%. Subsequently, it was realized that the placement and fixation of the mesh was more crucial in determining the outcome of the repair. Analysis of various techniques of ventral hernia repair along multiple outcome variables reveals that mesh-based repair offers the best alternative when compared with the suture-based technique.<sup>4-8</sup> The main issue is increased risk for infection with the placement of a foreign body and the cost factor.

Postoperative complications such as seroma formation, hematoma, cellulitis, and wound infection have been attributed largely to the extensive dissection and tissue handling during hernia repair. Repair with mesh requires longer operating time and has greater intraoperative blood loss. Both these factors have been reported to be associated with increased wound infection.

The placement of the mesh in the preperitoneal, retromuscular position with a wide overlap of at least 5 cm over the hernia defect in all directions was introduced in the late 1980s. The refinement of this method decreased the recurrence rates to as low as 3.5%, making it to be declared the standard of care of ventral hernias.<sup>10</sup>

The fundamental principles of the open retromuscular (preperitoneal) repair described by Stopa and Rives that entail placing the mesh in this plane have many advantages.<sup>11,12</sup> This plane is highly vascular; hence, it prevents infection, and, moreover, any infection occurring in the subcutaneous plane does not affect the mesh, as the mesh is retromuscular in a deeper plane. This coincides with our results where infection in the studied patients was 6% with 1 case seroma formation. The preperitoneal approach allows for an even distribution of forces along the surface area of the mesh. This accounts for the strength of the repair and the decreased recurrence associated with it. The repair capitalizes on the physics of Pascal's principle of hydrostatics using the forces that create the hernia defect to hold the mesh in place.<sup>13-16</sup> The prosthesis adheres to the posterior rectus sheath and renders it inextensible, permitting no further herniation, no dislodgement or rupture by intra-abdominal pressure but instead is held in place by the force that caused the hernia. Finally, it is a virgin plane for recurrent incisional hernia repairs.

Seroma formation is one of the most commonly reported complications after ventral hernia repair.<sup>14,17,18</sup> It occurs immediately after operation in virtually all patients. Most seromas develop above the mesh and within the retained hernia sac.<sup>14</sup> The mean incidence of seroma in reported series at a range of 4-8 weeks is 11.4%. In the largest multi-institutional trial, seromas that were clinically apparent more than 8 weeks were considered a complication and occurred in 2.6%.<sup>13</sup> Regardless of whether they are aspirated under sterile conditions or allowed to resolve, they rarely cause long-term morbidity. Aspiration may increase the risk for mesh infection but is recommended if they enlarge or persist before they reach their extremes. In present study, seroma was encountered in only one case of the studied patients.

In a multicenter series of 850 patients, the recurrence rate after a mean follow-up period of 20 months was 4.7%.<sup>13</sup> The average recurrent rates using the onlay approach are 4.2%, although rates as high as 17% have been reported.<sup>19</sup> Critical technical points related with recurrence are inadequate mesh fixation particularly with sutures and prostheses that overlap the defect by less than

2-3cm. Other factors associated with high recurrent rates include postoperative complications, previous repairs, missed hernias as in the 'Swiss cheese' defects, longer operating time, and obesity. In present study, we found no recurrences at a median follow-up of almost 12 months. Previous studies have shown that 70-75% of recurrences develop within 2 years and 80-90% develop within 3 years.<sup>4,7,9</sup> Our follow-up, therefore, is probably not long enough and should be extended for at least another year.

## CONCLUSION

Retromuscular mesh repair is a good and an ideal technique for the treatment of ventral incisional hernias; we advocate this method of incisional hernia repair as it is applicable to all sites of incisional hernia, the mesh is mostly hidden and anchored behind the rectus sheath, the complication rate is low, and there is a low recurrence rate.

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