

Original Article

Combined Fascia and Mesh Closure of Large Incisional Hernias

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Background: Incisional hernias are common and recurrence after repair has been reported in up to 44% of patients. Large incisional hernias of the abdominal wall represent substantial defect of supportive tissues.

Methods: Twenty-nine patients with large incisional hernias underwent surgery from January 2003 through December 2005. Herein, we presented our experience in closure of large incisional hernias using a technique in which we combine a fascia with a prosthetic repair. The variables recorded were classified as patient-related (gender, age, obesity, cough, constipation, diabetes mellitus, glucocorticosteroid therapy, smoking habit, and abdominal surgical history) and operation-related factors (size of defect, recurrence, wound infection, hematoma, and duration of hospital stay).

Results: The repair was performed for 25 midline hernias and four large incisional hernias in the right subcostal region. Four patients were females and 25 were males with a mean age of 52 (range: 30 – 77) years. The mean size of fascial defect was 12.7x4.5 cm. The mean time of operation was three hours and 18 minutes. The mean hospital stay was six (range: four to ten) days. Two patients had recurrence during the follow-up period. The mean follow-up period was 16 (range: eight to 26) months.

Conclusion: The combined three-layer fascia and mesh repair can be successfully used for large incisional hernias.

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Keywords: Abdominal hernia • incisional hernia • recurrence

Introduction

Incisional hernias are common and develop in 11 – 20% of surgical abdominal wounds.^{1,2} Recurrence after repair has been reported in up to 44% of patients.³

The signs and symptoms of an incisional hernia attribute to intermittent bowel obstruction, ischemia of the skin overlaying the hernia, and eventual loss of contents of the hernial sac. These signs and symptoms are due to congestion and stretching of the viscera in hernial sac. During repair of a large

hernia, when attempts are made to return the contents of hernial sac back to the abdominal cavity, there is insufficient space to accommodate all the viscera without stretching or increasing tension in the anterior abdominal wall.

Tension in a hernia repair or in any wound, is the principal reason for failure of wound healing. If the deficit is small, simple closure without tension is all that is required. The maximum force that should be applied to close a wound is three pounds.⁴

However, if the defect is too large to be closed by simple closure method, closure repair using prosthetic material might become necessary.

Open mesh repair of incisional hernias generally requires overlapping the prosthesis on the anterior or posterior surfaces of intact abdominal wall fascia for a distance of at least three to four centimeters from the defect edge. Polypropylene or polyester (Mersilen) meshes are commonly used for repair of incisional hernias.

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When these meshes are exposed to the underlying bowel, dense adhesions to mesh can lead to chronic abdominal pain, bowel obstruction, or fistulization.⁵

Recently, commercially-available prosthetic mesh materials consist of both polypropylene and polytetrafluoroethylene (PTFE) on superficial and deep surfaces (dual mesh).

PTFE does not incorporate into surrounding tissues in this way and does not induce dense adhesions to peritoneal structures such as intestines. But in Iran, dual meshes are very expensive for most patients.

Herein, we presented our experience in closure of large incisional hernias using a technique in which we combine a fascia with a prosthetic repair.

Materials and Methods

From January 2003 through December 2005, 29 patients with large incisional hernias underwent surgery using our new technique at Sina Hospital, affiliated to Tehran University of Medical Sciences.

Institutional Review Board approval was granted by the Research Ethics Committee of Tehran University of Medical Sciences and informed consent was taken from all participants.

All patients were followed until April 2006 for postoperative complications such as wound infection and recurrence. All operations were performed by one surgeon.

Surgical technique

After preparation, skin and subcutaneous tissue were incised and edges of the defect were delineated (Figure 1). The hernia was reduced either with or without opening the peritoneal cavity and a circumferential incision was made down to muscle two to five centimeters from the edge of the neck of sac (Figure 2). The larger the hernial neck was, the farther the incision was from the edge. The medial edges of the fascia were sutured with either 1 nylon or 0 polypropylene over the hernia which provided a tension-free fascial layer (Figure 3). Then, we created a plane between the rectus muscle and posterior fascia. Thereafter, a piece of expanded polypropylene sheet prosthesis, approximately six centimeters wider in all dimensions than the hernial aperture, was spread in the created plane. In this method of repair, mattress sutures of nylon were placed five to six centimeters

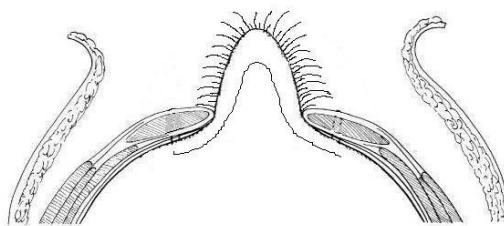


Figure 1. Anatomy of the incisional hernia. The shaded area is muscle with the fascial layer anteriorly made of rectus sheath and aponeurosis of the external oblique muscle. The hernial sac is seen protruding through the defect in the muscle and fascia. (Note: all figures are prepared by the authors).

away from the margins of hernial defects in which suturing began from the subcutaneous space, including the full thickness of muscle and anterior fascia and mesh into the created plane (Figure 4). The anterior fascial defect which was formed by this maneuver was then reconstructed using a tension-free polypropylene mesh that was sutured to the free edge of the anterior fascia around its circumference (Figure 5).⁴ After the insertion of a vacuum drain, the subcutaneous layers were closed and the skin was sutured. The procedure was cared by prophylactic antibiotic coverage.

Results

This method was performed for 25 midline hernias and four large incisional hernias in the right subcostal region.

Four patients (14%) were females and 25 (86%) were males. The mean age was 52 (range: 30 – 77) years. One patient had a body mass index (BMI) of $>35 \text{ kg/cm}^2$ and others had $\text{BMI} < 35$.

Five (17%) patients had diabetes mellitus; two (6.8%) had end-stage renal disease; and seven (24%) were smoker. The mean size of fascial

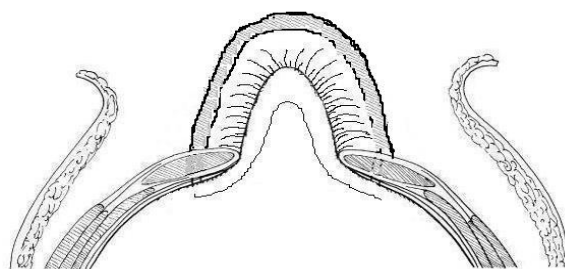


Figure 2. Incision in the anterior fascial layer down to muscle, 2 – 5 cm from the hernial neck.

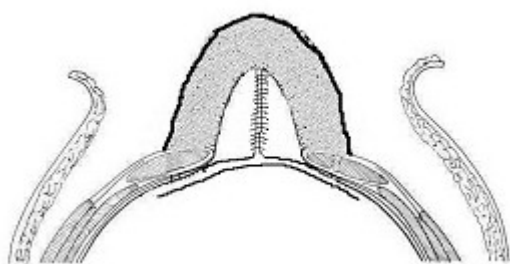


Figure 3. Anterior fascia flapped medially to meet the fascial flap from the other side. 1 nylon or 0 polypropylene closure of fascia, reducing the hernia and giving a tension-free fascial closure of the defect. However, muscle of the anterior abdominal wall (the shaded area) is now exposed to superficial structures and is without fascial support.

defect was 12.7×4.5 cm.

The mean time of operation was 180 (range: 90 – 240) min. The mean hospital stay was six (range: four to ten) days. The mean follow-up period was 16 (range: eight to 26) months. Two (7%) patients developed recurrence during the follow-up period. In two female patients, recurrence was occurred. They were nonsmoker and had no history of diabetes mellitus or end-stage renal disease. Both had BMI < 35 kg/cm².

The postoperative complications during the recovery course in hospital were wound infection in one (3%) patient, myocardial infarction in one (3%) patient, cerebrovascular accident in one (3%), and gastrointestinal bleeding in another one (3%). There were no cases of intraoperative death.

Discussion

Using the prosthetic repair technique is recommended when the incisional hernia recurs after an operation or when the tissue tensile strength at the incisional hernia margin is low or the incisional hernia is large.⁶

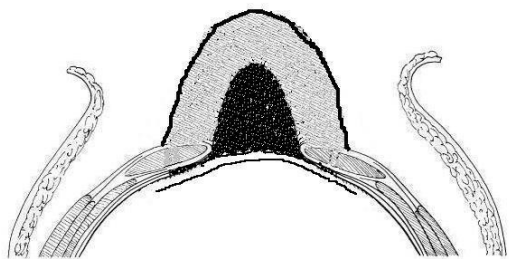


Figure 4. Polypropylene or Marlex mesh repair (the dark shading) of the fascial defect using 1 nylon or 0 polypropylene.

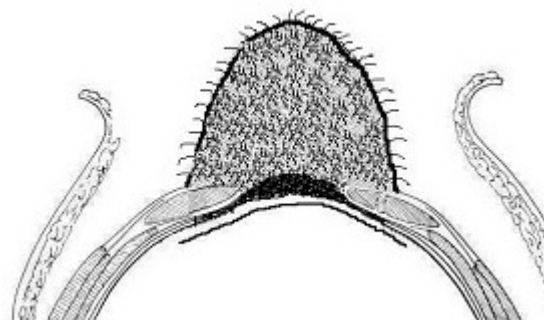


Figure 5. The anterior defect in fascia is repaired using a tension-free polypropylene mesh that is sutured to the free edge of the anterior fascia around its circumference.

The usual way of using mesh is to open the sac, separate the bowel from the neck of the sac, and suture the mesh to the edges of hernia, as described elsewhere.⁴

Molloy et al., described a technique for closure of huge incisional hernias with Marlex mesh which involves opening the sac and applying the mesh directly on the defect, albeit with a 10-cm overlap and two rows of sutures.⁷ In such techniques, it may not be always possible to separate the bowel from the mesh by using the omentum or peritoneum; thus, the mesh may adhere to or damage the gut.² Similarly, the gut may be damaged during dissection of the sac.

A technique similar to ours presented in this article, has been first described by Browse and Hurst in 1979 for the repair of long midline incisional hernias.⁸ It was then used by Whiteley in 1998.²

This technique prevents the potential complications described earlier. This procedure is easy to perform and produces an adhesion-free layer.

The authors believe that formation of a deeper fascial layer is an advantage over the one-layer mesh repair technique in which the mesh lies directly on the peritoneum or abdominal contents. We encountered no serious wound or mesh-associated problems.

Recurrence was found in two (7%) patients; wound infection was observed in one (3%). The wound infection was managed simply by drainage and the mesh was not removed.

The limitations of our study were small sample size and short follow-up period. We think that this is a useful technique for the repair of large midline and subcostal incisional hernias and we recommend further studies and investigations related to this procedure.

Although, in the presence of dual mesh, there is

no worry about mesh adhesion to the intestine, this kind of mesh is very expensive. Therefore, application of our proposed method can be a proper method for repairing the large incisional hernias.

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