

Laparoscopic Ventral Hernia Repair

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Abstract

The preliminary clinical experiences in laparoscopic ventral hernia repair described that the procedure can be approached by a totally extraperitoneal (TEP) repair, a transabdominal preperitoneal repair (TAPP) and an intraperitoneal onlay mesh repair (IPOM). The disadvantages of the TEP and TAPP approaches are the extensive dissection in the preperitoneal space required to perform and the operation took longer for the processes of mesh fixation and peritoneal approximation. Those approaches are not suitable for repairing the large defects. The advantages of the IPOM approach are a large working space and familiar anatomic landmarks. A large piece of absorbable barrier composite mesh was introduced into the peritoneal cavity and secured in place using a combination of spiral tacks and sutures. The extracorporeal hanging sutures at the corners of the mesh by separated skin incisions are recommended.

Key words : *Laparoscopic Ventral Hernia Repair, Laparoscopic Umbilical Hernia Repair, Laparoscopic Incisional Hernia Repair.*

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Introduction

Ventral hernias represent the defects in the fascial and muscular layers of the abdominal wall which intra-abdominal contents can protrude. Ventral hernias may be congenital or acquired. Acquired hernias may develop through deterioration of the abdominal muscular layers or they may develop from failed healing of an anterior abdominal wall surgical incision. The most common finding is a protrusion on the anterior abdominal wall, which may increase in size in upright position when the abdominal pressure is increased. Ventral hernias may be asymptomatic or cause a considerable degree of discomfort.

Physical examination reveals a bulge on the anterior abdominal wall that may reduce spontaneously or with manual pressure. Hernias are said to be irreducible if they cannot be pushed back into the right place. This does not mean that they are either necessarily obstructed or strangulated. Gastrointestinal hernias are obstructed if protruded

bowel contents cannot pass through them. The classical features of intestinal obstruction soon appear. They are strangulated if ischemia occurs. The patient becomes toxic and requires urgent surgery.

Epigastric hernias occur from the xyphoid process to the umbilicus, umbilical hernias occur at the umbilicus, and hypogastric hernias are rare spontaneous hernias that occur below the umbilicus in the midline. Acquired hernias typically occur after surgical incisions and are therefore termed incisional hernias. Although not a true hernia, diastasis recti can present as a midline bulge. In this condition, the linea alba is stretched, resulting in bulging at the medial margins of the rectus muscles. Abdominal wall diastasis can occur at other sites besides the midline. There is no fascial ring or hernia sac, and unless significantly symptomatic, surgical correction is avoided. Umbilical hernias occur at the umbilical ring and may either be present at birth or develop gradually

during the life of the individual. Umbilical hernias are present in approximately 10 percent of all newborns and are more common in premature infants. Most congenital umbilical hernias close spontaneously by age 5 years. If closure does not occur by this time, elective surgical repair usually is advised. Adults with small, asymptomatic umbilical hernias may be followed clinically.

Surgical treatment is offered if a hernia is observed to enlarge, if it is associated with symptoms, or if incarceration occurs. Surgical treatment can consist of primary sutured repair or placement of prosthetic mesh for larger defects (more than 2 centimeters) using open or laparoscopic methods. Based on national operative statistics, incisional hernias account for 15 % to 20 % of all abdominal wall hernias; umbilical and epigastric hernias constitute 10 % of hernias. Incisional hernias are twice as common in women as in men. As a result of the almost 4 million laparotomies performed annually in the United States and the 2 % to 30 % incidence of incisional hernia, almost 150,000 ventral hernia repairs are performed each year¹. Several technical and patient-related factors have been linked to the occurrence of incisional hernias. There is no conclusive evidence demonstrates that the type of suture or technique of incisional closure at the primary operation affects hernia formation². Patient-related factors linked to ventral hernia formation include obesity, older age, male gender, sleep apnea, emphysema, and prostatism. It has been proposed that the same factors associated with destruction of the collagen in the lung result in poor wound healing with increased hernia formation. Wound infection has been linked to hernia formation.

Only two prospective randomized trials have compared laparoscopic and open ventral hernia repairs. Although both of these studies are small, with fewer than 100 patients in both studies combined, the results tend to favor a laparoscopic

approach. The incidences of postoperative complications and recurrence were less in hernias repaired laparoscopically. Several retrospective reports demonstrate similar advantages for a laparoscopic approach. Based on the comparative trials, laparoscopic incisional hernia repair results in fewer postoperative complications, a lower infection rate, and decreased hernia recurrence. Until an appropriately powered prospective randomized trial is performed, the ideal approach will largely be based on surgeon expertise and preference³.

Methods

The preliminary clinical experiences in laparoscopic ventral hernia repair, the procedure was selected by a totally extraperitoneal (TEP) repair or a transabdominal preperitoneal repair (TAPP) or an intraperitoneal onlay mesh repair (IPOM). With the TEP repair, the preperitoneal space is developed with a balloon inserted between the posterior abdominal wall fascia and the peritoneum. The balloon is then inflated to dissect the peritoneal flap away from the posterior abdominal wall, and the other ports are inserted into this extraperitoneal space without entering the peritoneal cavity. A piece of polypropylene mesh is introduced into the extraperitoneal space. It is positioned over the hernial ring and secured in place with the spiral tacks. The peritoneum is frequently thin and tears easily once dissected, it is sometime necessary to suture the recognized peritoneal lacerations⁴. With the TAPP repair, the peritoneal space is entered by conventional laparoscopy, and the peritoneum overlying the hernia is dissected away as a flap. The peritoneum and hernial sac are dissected free from the abdominal wall so that the fascial ring is circumferentially exposed. A piece of polypropylene mesh is introduced into the abdominal cavity through the cannula and proceeds in an identical fashion to the TEP procedure. The peritoneum is then closed with running suture on straight needle by intracorporeal

hand suturing technique⁵. The basis of the IPOM repair is to place the prosthesis directly onto the peritoneum. Thus, no preperitoneal dissection is required and the hernia sac is undisturbed. A large piece of absorbable barrier composite mesh is introduced into the peritoneal cavity and secured in place using a combination of spiral tacks and sutures. The extracorporeal hanging sutures at the corners of the mesh by separated skin incisions are routinely performed to prevent the mesh separation. (Figure 1)

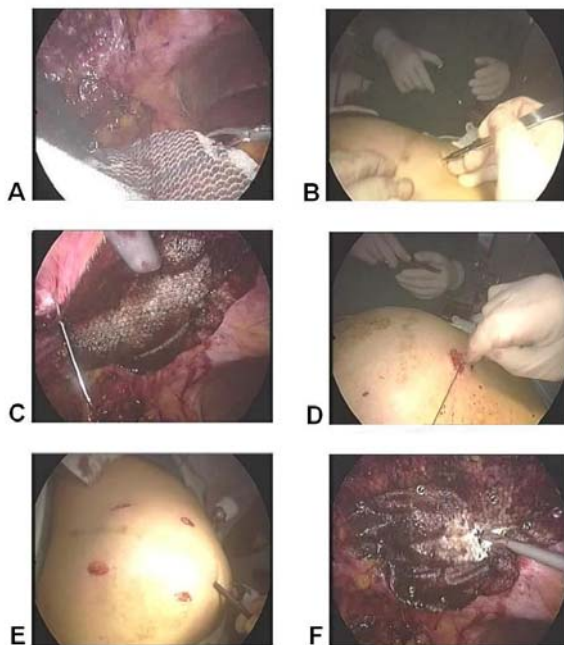


Figure 1 Laparoscopic Incisional Hernia Repair (IPOM).⁶ A. A large piece of absorbable barrier composite mesh is introduced into the peritoneal cavity. B. The skin incision is made. C. The suture is placed at the corner of the mesh by a straight needle of nonabsorbable material. D. The knot ties over the abdominal wall in the subcutaneous tissue. E. The extracorporeal hanging sutures were completely placed at the four corners of the mesh by separated skin incisions. F. The spiral tacks are placed circumferentially around the mesh.

Discussion

The use of laparoscopic ventral hernia repair has been increasing, particularly for large defects. The laparoscopic technique requires general anesthesia and probably is reserved for large defects or recurrent umbilical hernias⁷. There is no universal consensus on the most appropriate method of umbilical hernia repair. Laparoscopic incisional hernia repair was first described by LeBlanc and Booth in 1993. Since that time, many would argue, these procedures have become a new gold standard for abdominal wall reconstruction for ventral hernia. In 2000, data from 407 patients undergoing laparoscopic incisional hernia as part of a multicenter trial revealed a recurrence rate of only 3.4 %, after a mean follow-up of more than 2 years. Of the recurrences noted, the overwhelming majority were felt to be secondary to technical errors committed early in the surgeons' experience that were avoided during the later cases. Recently, investigators at Washington University examined pooled data from 45 different series of laparoscopic and open ventral hernia repair. Use of the laparoscopic technique was associated with fewer wound complications, fewer overall complications, and a lower recurrence rate than use of the open technique. These benefits of the minimally invasive technique are achieved by eliminating the requisite large abdominal incision at a location where the abdominal wall blood supply has previously been compromised. In addition, with the laparoscopic technique, the entire undersurface of the abdominal wall can be examined, which often reveals multiple secondary defects that might not otherwise be appreciated⁸.

My experiences in laparoscopic ventral hernia repair, the procedure had been selected as a totally extraperitoneal (TEP) repair or a transabdominal preperitoneal repair (TAPP) or an intraperitoneal

onlay mesh repair (IPOM). The advantages of the TEP repair are that the abdominal cavity is not violated, the peritoneum is not opened, and much of the dissection is done by balloon. However, it is impossible to dissect the peritoneal flap away from the posterior abdominal wall in the midline without lacerations. The disadvantages of the TEP and TAPP approaches are the extensive dissection in the preperitoneal space required to perform, the operation took longer for the processes of mesh fixation and peritoneal approximation. Those approaches are not suitable for repairing of the large defects. Most of laparoscopic surgeons familiarize with the IPOM for laparoscopic ventral hernia repair.

The advantages of the IPOM approach are that there is a large working space and familiar anatomic landmarks are visible. A troublesome pattern with regards to non-absorbable mesh (polypropylene mesh), it was determined that the intestinal exposure to the mesh could lead to an increased risk of adhesion and intestinal fistulization. Various formulations of absorbable and non-absorbable biomaterials have been introduced for repair of ventral hernias. Each product has its own characteristics, making it useful in various circumstances. There is little outcomes data to support the use of one product over another. The absorbable barrier composite mesh, a type of biomaterials, composed a resorbable material barrier on one side to limit visceral attachments and a non-absorbable material on the other to promote tissue ingrowth.

The IPOM approach is a procedure that placing a large piece of biomaterial mesh without undermining large subcutaneous tissue flaps. Wound complications are accomplished rarely. In a series of almost 1,000 patients who had laparoscopic ventral hernia repair, mesh infections occurred in less than 1 % of cases⁹. The disadvantages of the

IPOM approach are that the procedure requires expensive biomaterial mesh that increase the total hospital costs and the mesh separation due to inadequate fixation is a frequent complication. Efforts to deal with the mesh separation have engendered surgical solutions intended to reduce this complication. Once the area encompassing all fascial defects is defined, a mesh is fashioned to allow for sufficient overlap (minimum of 3 to 4 centimeters) under the healthy abdominal wall. After insertion into the abdomen, the mesh is fixed into position with transfascial sutures placed circumferentially around the mesh and spiral tacks placed according to surgeon preference. Some surgeons recommended a minimum 5 centimeters overlap of mesh from defect edge if transfascial sutures are not used. In my opinion, the extracorporeal hanging sutures at the corners of the mesh by separated skin incisions combined with spiral tracks fixations are applied. The extracorporeal hanging sutures are simplified and the requirement of the spiral tracks are minimized thus, these suggested procedures are more economical and easier to perform.

Conclusion

The laparoscopic approach is an increasingly used alternative method for repair of ventral hernias. The repair generally is performed intra-abdominally and involves placement of intraperitoneal mesh prosthesis to cover the hernia defect. Early results show that the technique is safe, simple, and effective, with results that are better than or equivalent to the results of open repair. Length of hospital stays and pain medication requirements are less than with open repair. Use of the laparoscopic technique was associated with statistically fewer wound complications, fewer overall complications and a lower recurrence rate than use of the open

technique. The laparoscopic approach may be selected by a totally extraperitoneal (TEP) repair, a transabdominal preperitoneal repair (TAPP) and an intraperitoneal onlay mesh repair (IPOM). The disadvantages of the TEP and TAPP approach are the extensive dissection in the preperitoneal space required to perform and the operation took longer for the processes of mesh fixation and peritoneal approximation. The advantages of the IPOM approach are that there is a large working space and familiar anatomic landmarks are visible. A problem is mesh separation due to inadequate fixation. The extracorporeal hanging sutures at the corners of the mesh by separated skin incisions combined with spiral tracks fixations are recommended.

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