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# Polyester-based mesh for ventral hernia repair: is it safe?

**Michael J. Rosen, M.D.***

*Case Medical Center, University Hospitals of Cleveland, Department of General Surgery, 11100 Euclid Ave., Cleveland, OH 44106, USA*

**KEYWORDS:**
Ventral hernia repair;
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Polyester mesh;
Laparoscopic ventral hernia repair;
Open ventral hernia repair

**Abstract**

**INTRODUCTION:** The ideal prosthetic material for ventral hernia repair has yet to be described. Each prosthetic material has unique advantages and disadvantages in terms of tissue ingrowth, adhesion formation, and shrinkage profiles. Polyester-based mesh has shown minimal shrinkage and excellent tissue ingrowth in animal models. However, the macroporous, braided nature of this material has raised several concerns regarding the incidence of infections, fistulas, and bowel obstructions. We have reviewed our experience with polyester-based mesh for the repair of ventral hernias.

**METHODS:** All patients undergoing ventral hernia repair at the Case Comprehensive Hernia Center at University Hospitals of Cleveland from December 2005 to April 2008 were included. Laparoscopic cases underwent intraperitoneal placement of a polyester-based mesh with a collagen hydrogel anti-adhesive barrier. The mesh was sized for at least 4 cm of fascial overlap, and transfascial fixation sutures and titanium spiral tacks were used routinely to secure the mesh to the abdominal wall. Those cases deemed inappropriate for laparoscopic ventral hernia repair underwent open repair. Open ventral hernia repairs were performed using a retrorectus repair, placing the mesh in an extraperitoneal position. Unprotected polyester mesh was used in these cases. Pertinent data included patient demographics, surgical details, postoperative outcomes, and long-term follow-up evaluation.

**RESULTS:** During the study period 109 patients underwent ventral hernia repair with polyester mesh. Seventy-nine patients had a laparoscopic repair, and 30 patients had an open repair. The mean age was 57 years, with a mean body mass index of 33 kg/m$^2$, and American Society of Anesthesia score of 2.6. The patients had undergone 2.1 prior abdominal surgical procedures, and 42 patients had recurrent hernias. Surgical details for the laparoscopic repair and open repair were as follows: mean defect size, 116 versus 403 cm$^2$; mesh size, 367 versus 1,055 cm$^2$; and surgical times, 132 versus 170 minutes, respectively. The average hospital stay was 4.2 days for the laparoscopic repair and 5.8 days for the open repair groups. With a mean follow-up period of 14 months (range, 2–28 mo) in the laparoscopic repair group, 1 patient (1.4%) developed a mesh infection (with a history of a prior methicillin-resistant *Staphylococcus aureus* mesh infection), 1 patient (1.4%) developed a small-bowel obstruction remote to the mesh on re-exploration, and there were no fistulas. With a mean follow-up period of 11 months (range, 2–21 mo) in the open repair group, 3 wound infections (13%) occurred, 2 involved the mesh, which was salvaged with local wound care in 1, and required partial mesh resection in the other, and there were no bowel obstructions or fistulas during the follow-up evaluation.

**CONCLUSIONS:** This study shows that in this complex group of patients, polyester mesh placed during ventral hernia repair results in acceptable infection rates, and no direct bowel complications or fistulas. Given the macroporous nature of the mesh, each case of infection was treated successfully with local wound measures or partial mesh resection. Polyester-based meshes with an anti-adhesive barrier appear safe for intraperitoneal placement.


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The use of synthetic mesh for ventral and incisional hernia repair has resulted in a significant reduction in long-term hernia recurrence rates.[1] Most surgeons now agree that a prosthetic material should be used in all but the smallest ventral hernia repairs. However, there is little agreement as to the most appropriate prosthetic selection.

In practice, prosthetic materials can be placed as an onlay (above the fascia, in the subcutaneous position), inlay (bridging a fascial defect, secured to the fascial edges), or as an underlay (beneath the fascial edges). In the underlay position the prosthetic can be placed either in the retrorectus, preperitoneal, or intraperitoneal position. Although there is extensive debate as to the best technique for mesh placement, it should be understood that each of these approaches requires unique qualities of the prosthetic material. For example, a prosthetic material placed as an onlay likely will not interact with the viscera, but certainly is at a higher risk for infection given its subcutaneous position. Likewise, a mesh placed in an intraperitoneal position must provide substantial abdominal wall tissue integration, while avoiding the formation of extensive adhesions and eventual bowel fistula formation or small-bowel obstructions. There are many commercially available products to accomplish these goals. Each product has its own merits and limitations, and, although none is ideal, certain characteristics can affect long-term outcomes. The ideal mesh would be one that was technically easy to place, did not incite a chronic inflammatory response, did not degrade over time, resulted in minimal shrinkage, was resistant to infection, resulted in excellent tissue integration, and no adhesion formation, small-bowel obstructions, or fistulas, and resulted in a durable repair. To date that mesh does not exist.

The use of a multifilament, hydrophilic, polyester-based mesh has certain unique advantages. In animal models polyester mesh resulted in minimal shrinkage, minimal adhesion formation, minimal stiffness, excellent tissue incorporation, and excellent integration profiles.[2–6] However, the multifilament braided nature of the mesh has resulted in some investigators questioning the incidence of long-term mesh infection and bowel complications. For instance, Leber et al[7] noted unprotected polyester mesh to be associated with a higher incidence of postoperative infections, fistulas, and small-bowel obstructions when compared with polypropylene and expanded polytetrafluoroethylene (PTFE). Other European groups have reported more favorable results with polyester-based mesh.[8–13] Based on these conflicting results we sought to review our experience with a polyester-based mesh with particular attention to postoperative infections, fistulas, small-bowel obstructions, and recurrence rates.

* Corresponding author: Tel.: +1-216-844-2763; fax: +1-216-844-2888.
E-mail address: Michael.rosen@uhhospitals.org

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## Methods

After obtaining Institutional Review Board approval, all patients undergoing ventral hernia repair from December 2005 to April 2008 at the University Hospitals Case Medical Center, by a single surgeon, were reviewed retrospectively. Medical records were analyzed for patient demographics including age, sex, comorbidities, body mass index (BMI), number of prior abdominal procedures, number of prior failed hernia repairs, and prior intraperitoneal mesh placement (Table 1). Perioperative data included surgical technique, open versus laparoscopic, size of the defect, size of the mesh, number of transfascial fixation sutures, surgical times, postoperative length of stay, and complications (Table 2). Outcomes were evaluated for postoperative complications, wound complications requiring any intervention including antibiotics or debridement, length of follow-up period, and hernia recurrence.

The surgical technique for the laparoscopic repair has been detailed in other reports.[14] In brief, an open cutdown technique is preferred by the author. Typically, a 4-port approach is used. Adhesiolysis is performed sharply. The defect is measured internally using spinal needles, and a 15-cm ruler, under standard insufflation pressures. The mesh is sized for at least 4 cm of fascial overlap. For intra-abdominal placement, a Parietex composite (Covidien, Norwalk, CT) mesh is chosen. Permanent transfascial fixation sutures are used at 5-cm intervals. Helical tacks are placed at 5-mm intervals around the periphery of the mesh. The patients are placed in an abdominal binder for 6 weeks.

Those patients who were deemed inappropriate for laparoscopic repair based on the following criteria underwent an open ventral hernia repair. Patients with massive defects and loss of abdominal wall domain, thin attenuated anterior abdominal wall skin, defects in close proximity to the iliac crest laterally, recurrences after a prior adequate laparoscopic ventral hernia repair, or those converted from laparoscopic to open procedure owing to extensive adhesions. Patients with active contamination or infections were excluded from synthetic mesh placement. It is important to point out that this is not meant to be a comparison between the outcomes of laparoscopic and open ventral hernia repairs because the open repairs are obviously a highly selected, more complex group of patients. The open technique also has been described previously.[15] In brief, the midline wound is re-entered and the abdominal wall is freed of

**Table 1** Patient demographics based on surgical approach

| | Laparoscopic | Open |
|---|---|---|
| Patients | 79 | 30 |
| Male:female | 34:45 | 12:18 |
| Mean age, y | 57 (28–80) | 59 (40–88) |
| BMI, kg/m$^2$ | 34 (20–50) | 31 (18–51) |
| Recurrent hernias | 41% | 47% |

Ranges are shown in parentheses.