Surg Endosc (2007) 21: 1243–1244
DOI: 10.1007/s00464-007-9230-z

SURGICAL ENDOSCOPY
and Other Interventional Techniques

Technique for the insertion of large mesh during minimally invasive incisional herniorrhaphy

M. A. Carlson, A. Petersen

Department of Surgery, University of Nebraska Medical Center, Omaha, NE, USA

Received: 6 November 2006/Accepted: 20 November 2006/Online publication: 21 February 2007

Abstract
Laparoscopic repair of ventral abdominal wall defects often requires a large sheet of prosthetic mesh. It is a challenge to place this bulky prosthesis into the insufflated abdomen without creating a large incision or potentially seeding the mesh with skin flora. The authors describe a simple technique for inserting a large sheet of prosthetic mesh through a 10- to 12-mm port site without having the mesh come into contact with the skin.

Key words: Laparoscopic ventral hernia repair — Minimally invasive incisional herniorrhaphy — Polytetrafluoroethylene — Prosthetic mesh — Ventral abdominal wall defect

Inserting a large sheet of prosthetic mesh into the abdomen for minimally invasive repair of incisional hernia frequently presents a nuisance to the surgeon because of the discrepancy between the size of the mesh and the hole through which the mesh must be stuffed to get it inside the patient. For example, it is quite difficult to pass a 26 × 34-cm sheet of dual-surface expanded polytetrafluoroethylene (ePTFE) (Gore DualMesh; Gore Medical Products, Arizona, USA) through a 10- to 12-mm trocar. The surgeon has a number of options for circumventing this problem: (1) The trocar can be upsized (to 15 mm or larger). (2) Multiple sections of smaller mesh can be used and sutured together once they are inside the abdomen. (3) A smaller piece of mesh can be used that overlaps the defect less. (4) The trocar can be removed, and the mesh can be forced through the port site. The respective drawbacks to these techniques include (1) a larger hole in the abdominal wall, (2) a longer and more cumbersome procedure, (3) a defect covered inadequately by the mesh, and (4) mesh dragged past the skin, which potentially can seed the mesh with bacteria.

Other solutions to this problem have been described, such as placing the rolled-up mesh partially into a specimen bag, then inserting this assembly through a port site [2]. This technique still allows the mesh to come into contact with the skin. We describe a related technique that allows easy introduction of a large mesh into the abdomen without dermal contact.

Surgical technique

The abdomen is prepared and draped in the customary fashion. In addition, we typically use an iodine-impregnated drape (Ioban; 3M Health Care Professionals, St. Paul, MN) to cover all exposed skin. The trocars (including one 10- to 12-mm trocar) are placed according to the surgeon's preference. All adhesions between the anterior abdominal wall and the viscera are lysed. We then trace the outline of the defects on the iodine-impregnated drape with an indelible marker. An appropriate-sized mesh is chosen, and stay sutures of 2-0 polypropylene (Prolene, Ethicon Inc., Somerville, NJ) spaced 5 to 7 cm apart are placed into the mesh periphery before insertion of the mesh into the abdomen. The sutures are coiled and secured flat onto the mesh with sterile closure strips (Steri-Strip; 3M Health Care Professionals) to prevent entanglement during the insertion process.

If the mesh dimensions are large (e.g., the 26 × 34-cm mesh mentioned in the introduction), then one end of a sterile plastic sleeve used to house an intraoperative ultrasound probe (or similarly shaped device) is inserted into the abdomen through the site of the 10- to 12-mm trocar after the latter has been temporarily removed (Fig. 1). The inserted end of the sleeve is grasped with a 5-mm instrument from the other side of the abdomen, and the 5-mm instrument with the trocar and end of the sleeve is withdrawn from the abdomen at the 5-mm port site.

Correspondence to: M. A. Carlson

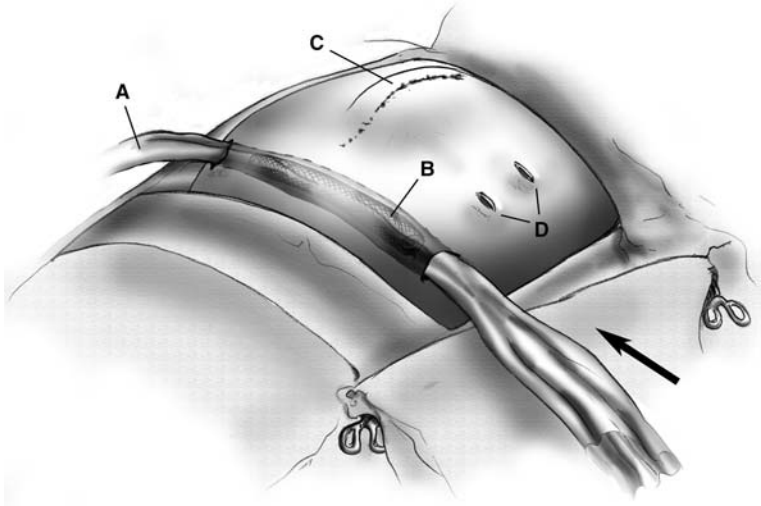

Fig. 1. Intraabdominal insertion of a large prosthetic mesh during minimally invasive incisional herniorrhaphy. The schematic shows a prepped and draped abdomen with the plastic sleeve (**A**) placed transabdominally through two port sites (10–12 mm on the near side and 5 mm on the far side). The mesh (**B**) has been delivered through the sleeve into the abdomen in the direction of the arrow. The incisional hernia (**C**) and two other port sites (**D**) are shown unoccupied for simplicity.

At this point, the surgeon has a sterile plastic conduit running from one side of the abdomen to the other (Fig. 1). The large mesh with stay sutures is coiled tightly along its long axis and slid into the plastic sleeve through the 10- to 12-mm port site until the mesh is completely within the abdomen (Fig. 1). The plastic sleeve then is pulled from the 5-mm port site until the opposite end of the sleeve comes through the abdomen and all the way out of the 5-mm port site. The mesh is grasped within the abdomen using another 5-mm instrument to prevent the mesh from being dragged into the 5-mm port site where the sleeve is exiting. At this point, the mesh is completely within the abdomen without ever having touched the skin. The surgeon then replaces the trocars, and completes the minimally invasive incisional herniorrhaphy.

Discussion

We typically have used dual-surface ePTFE for minimally invasive incisional herniorrhaphy. This prosthetic is available to us in two sizes: 15×19 cm and 26×34 cm. The vast majority of hernia defects we see are covered well (≥4 cm overlap) with the smaller mesh, which fits easily through a 10- to 12-mm port. The larger mesh does not fit through a 10- to 12-mm port, however, so insertion with the plastic sleeve has been reserved for the 26×34-cm sheet. Plastic sleeve insertion of the large mesh has been used four times, and no difficulties with the technique have arisen.

Mesh infection is a rare complication of minimally invasive incisional herniorrhaphy, but disastrous when it occurs [1, 3]. Mesh explantation commonly is required to resolve the infection, particularly if ePTFE was used at the index operation. Surgeons typically use a variety of measures (some based on science, some based on anecdotal experience) to minimize the infection risk during foreign body implantation. One concern of ePTFE implantation is seeding of the mesh with skin flora if the mesh should contact the skin. The risk of such seeding with subsequent infection necessitating mesh explantation after minimally invasive incisional herniorrhaphy is not known.

For abdominal wall defects requiring coverage with a large sheet of mesh, we have described a simple, cheap, and expeditious method for inserting the mesh through a relatively small hole and into the abdomen without having the mesh contact the skin. Presumably, this will reduce the risk for bacterial seeding of the mesh.

References

1. Heniford BT, Park A, Ramshaw BJ, Voeller G (2003) Laparoscopic repair of ventral hernias: nine years' experience with 850 consecutive hernias. Ann Surg 238: 391–399, discussion 399–400
2. Himpens JM, Leman GM, Deloose KR (2002) Technique for introducing large composite mesh while performing laparoscopic incisional hernioplasty. Surg Endosc 16: 1244–1246
3. LeBlanc KA (2004) Laparoscopic incisional and ventral hernia repair: complications—how to avoid and handle. Hernia 8: 323–331