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Indications

The indications for laparoscopic ventral hernia repair mirror those of an open repair. The procedure is done electively for symptomatic hernias and those that limit activities of daily living. When there is ambiguity as to the impact of the hernia, the HerQLes survey provides a reliable and valid instrument to evaluate its impact on the patient's health-related quality of life (Krpata et al. 2012). It can accurately define the effect of the hernia and may be used as a tool to document improvement in abdominal wall function postoperatively.

Laparoscopic repair is best undertaken by an experienced laparoscopic team. It is an approach which is particularly useful for smaller defects. It is also applicable to multiple "Swiss cheese defects" that would otherwise necessitate a large incision when approached with an open technique. As minimally invasive skills have improved and techniques evolved, it is increasingly common to address large and recurrent incisional hernias from a laparoscopic approach. While the literature remains equivocal for the general population, a laparoscopic procedure is likely better in an obese individual due to the decreased risk of wound complications. Conversely, the presence of dense adhesions, particularly adhesions to previous mesh placement, renders the minimally invasive approach more difficult, and an open approach may be preferred by those who are less proficient laparoscopically and are not comfortable with complex elective laparoscopic bowel manipulation. Emergency repair of incarcerated ventral hernias is generally performed by an open, rather than laparoscopic, approach.

Preoperative Preparation

- Smoking cessation is critical prior to an elective repair. Exposure to tobacco increases the risk for both respiratory and infectious complications in populations undergoing ventral hernia repairs. It also decreases oxygen tension and impairs collagen formation in healing wounds. Patients should be abstinent from tobacco for 4 weeks to minimize the risk of postoperative complications. References at the end of the chapter give additional information on smoking and hernia repair.
- Weight loss in an obese cohort is also important to improve the durability of a hernia repair. Obese patients are over-represented in a population with abdominal wall defects. They are also more likely to experience postoperative complications when undergoing ventral hernia repairs. Currently, a target body mass index (BMI) less than 40 kg/m² is preferred as this decreases the likelihood of both complications and recurrence (Pernar et al. 2017). It may be appropriate to consider a staged approach starting with bariatric surgery in those with very high BMIs or who are refractory to non-operative attempts at weight loss.
- Diabetes is associated with a decrease in collagen synthesis and deposition in a healing wound. It is also a significant predictor of morbidity in patients undergoing elective ventral hernia repair. Strict blood sugar control should be achieved prior to intervention. A target of an HbA1C less than or equal to 7.3% is a reasonable preoperative goal (Novitsky and Orenstein 2013).
- The stomach will often be distended during the preoxygenation stages of anesthetic induction and can result in gastric injury. Orogastric tubes should be placed prior to establishing access to the abdomen.
- Perioperative antibiotics should be administered according to Surgical Care Improvement Program (SCIP) guidelines. Re-dosing of antibiotics should be completed based on operative time.

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- In particularly complex patients or those reticent to comply with preoperative recommendations, the Carolinas Equation for Determining Associated Risks (CeDAR) app produced by the Carolinas HealthCare system is available for use on all devices running iOS. This program is able to risk stratify patients for wound complications and the associated financial impact following ventral hernia repairs.

Pitfalls and Danger Points

- Accessing the abdomen in a multiply operated abdomen
- Injury to bowel, either unnoticed or identified during surgery
- Inadequate mesh fixation leading to recurrent hernia formation
- Failure to achieve adequate mesh overlap
- Chronic pain associated with mesh fixation

Operative Technique

Patient Positioning and Preparation of the Defect

Position the patient supine on the operative table. Place a footboard on the operating table in any case where reverse Trendelenburg positioning will be utilized. When feasible, tuck both arms in order to facilitate working in all quadrants of the abdomen. An Ioban dressing may be utilized to adequately anchor the drapes to the patient and to isolate the mesh from skin flora. A Foley catheter is used at the surgeon's discretion based on expected difficulty and duration of the case. In the event that mesh placement in the pelvis is anticipated, place a Foley catheter to prevent injury of the bladder during mesh fixation.

Choose an entry site remote from incisions and away from the hernia. Initial entry into the abdomen is usually made with a Veress needle placed through a stab incision in the left upper quadrant. Entrance is then established using a 5-mm optical trocar in the left upper quadrant. Additional port placement is dictated by the hernia location and presence and severity of adhesions. In the event of dense adhesions, it is best to place initial trocars on the left lateral abdominal wall to facilitate safe and efficient adhesiolysis without working "against the camera." It is critical to stay lateral with port positioning so that trocars span the perimeter of the defect and are sufficiently far apart and distant from the hernia defect to allow a comfortable working distance. If the hernia is in the upper abdomen, position instruments and laparoscope along an arc in the lower and lateral abdomen

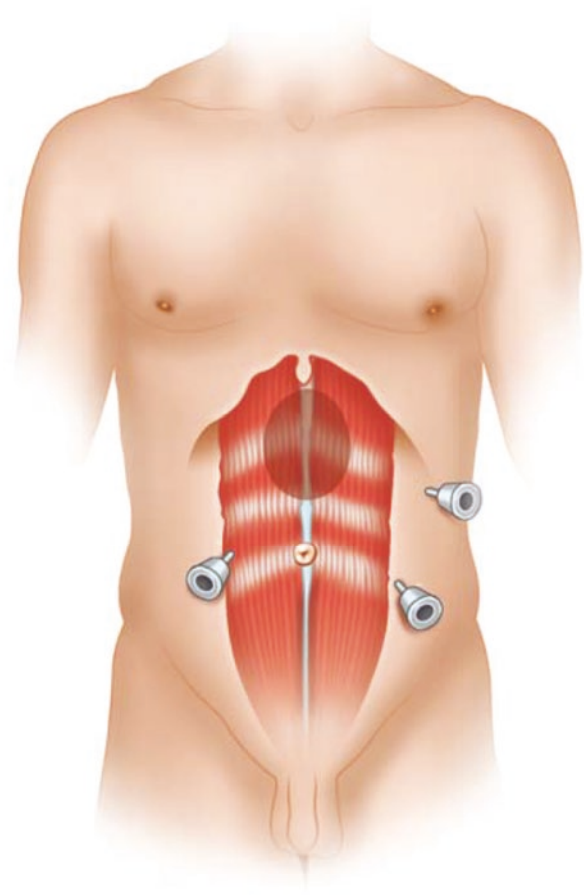


Fig. 113.1

(Fig. 113.1). Conversely, if the hernia is in the lower abdomen, position the trocars as shown in Fig. 113.2.

First, inspect the abdomen. Sometimes the contents of the hernia sac will reduce as the abdominal wall expands with pneumoperitoneum. Often adhesions between omentum or bowel and the hernia defect persist, particularly around the edges of the defect. Gently reduce these adhesions into the abdomen. Use energy modalities sparingly; usually, the adhesions are avascular, and simple blunt or sharp dissection suffices. Bleeding is usually minimal. It is crucial to perform this dissection with care, as inadvertent enterotomy produces a contaminated field not favorable to mesh placement.

If an enterotomy occurs, carefully repair the bowel according to your individual skill set. A conversion to open should not be considered outside the standard of care. In this scenario, consider performing the hernia repair at a later date (staged repair). With that said, there is increasing support in the literature that synthetic mesh is a reasonable option in a clean-contaminated field from both an outcome and cost consideration. There are no good randomized data. It is prudent to address this topic with the patient prior to surgery in order to assess the patient's degree of risk aversion. See ref-

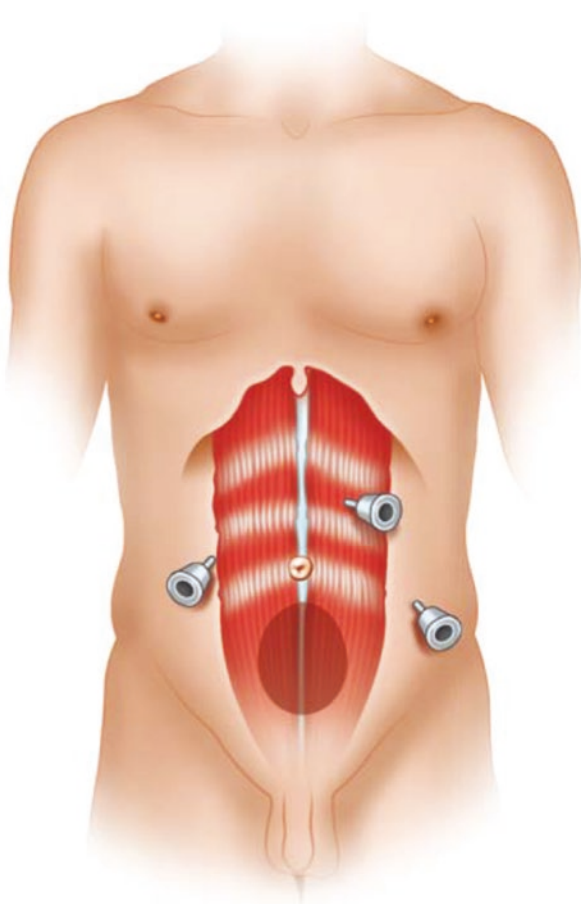


Fig. 113.2

erences at the end of chapter for further information on this topic.

Once all adhesions are lysed, identify all defects. A missed defect is a common cause of recurrence, and it is only when the entire abdominal wall can be visualized laparoscopically that you can be certain no defects remain. Figure 113.3 shows the kind of Swiss cheese defects that laparoscopic incisional ventral hernia repair is well-suited for.

If the hernia is in the lower abdomen (as is seen with a Pfannenstiel incision), it may be necessary to create a preperitoneal plane. This allows the bladder to be gently displaced posteriorly to avoid inadvertent injury during tack placement. Furthermore, dissection can be carried posterior to Cooper's ligament to allow for sufficient caudal overlap to decrease the risk for recurrence. This is typically accomplished with a hot scissors to create a preperitoneal flap similar to that used for a transabdominal preperitoneal inguinal hernia. The majority of the dissection can be accomplished bluntly after entering this space. Having successfully completed mesh fixation, the peritoneum can then be handsewn



Fig. 113.3

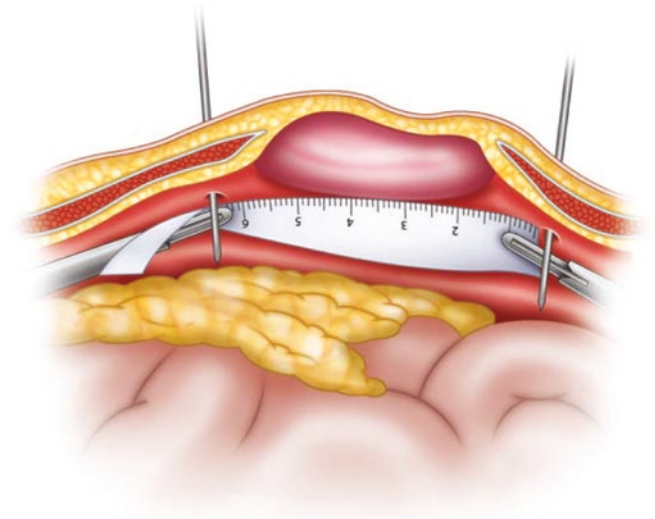


Fig. 113.4

or tacked back up to the mesh to prevent bowel herniating into this pocket.

Sizing the Mesh

Map the extent of the area that must be covered with a 22-gauge spinal needle. Pass the needle directly into the abdomen under laparoscopic visualization at the upper aspect of the most cephalad defect. Pass a second needle directly into the abdomen at the lower aspect of the most caudal defect. Pass a measuring tape into the abdomen and measure the distance between the two spinal needles (Fig. 113.4). Add 10 cm to this distance, to allow a 5 cm

overlap at each end. This measurement tells you the long axis of the patch. Mark the skin at the entry site of these needles. Repeat this maneuver with the farthest lateral aspects of the defect or defects on each side. This distance (with an additional 10 cm for overlap) gives you the width of the patch. Remove the measuring tape from the abdomen.

There are numerous mesh options available to the hernia surgeon. Laparoscopic-specific products typically feature a collagen barrier on one side to limit visceral attachments prior to mesh incorporation. Choice of mesh is often dictated by hospital contracts. To date, no synthetic mesh has been absolutely proven to be superior to others. Cut the patch to size. Mark the side that is to face the viscera. The mesh will be anchored with four to six transfascial sutures depending on the size of the mesh being used. Place these sutures in predetermined spots such that the long tails are on the “uncovered” side of the mesh and leave the tails long. If the skin is covered by an adhesive drape, simply place it on the abdominal wall and outline the desired shape, and identify the transfascial suture sites directly. Roll the mesh up into a tight cylinder and pass it into the abdomen. Unfurl it so that the marked side is made to face the viscera and separate the sutures so that they can be easily manipulated into the suture passer.

It is crucial that the mesh be centered over the defect with adequate overlap and proper orientation. The mesh must also be placed with sufficient tautness to encourage tissue ingrowth and mesh incorporation. It is easiest to use the mesh tracing on the anterior abdominal wall to dictate transfascial suture placement. Pass each suture 1–2 cm lateral to the mesh edges to accommodate for the thickness of the abdominal wall and avoid gathering of the mesh. For each suture, make a small incision in the skin. Pass a suture passer into the abdomen, grasp one end of the preplaced suture, and pull it out through the fascia. Take care not to pull the other end out of the mesh, anchoring it as needed with a grasper. Then replace the suture passer through a slightly different point in the fascia and grasp and retrieve the other end. Place a hemostat on this suture (Fig. 113.5). Pull all of the sutures tight before tying in order to ascertain that the mesh becomes taut and accurately spans the defect. Some surgeons will partially desufflate the abdomen at this point to more nearly approximate normal anatomy and verify that the mesh does not gape. If the mesh spans the defect nicely, tie these deep to the subcutaneous tissues (Fig. 113.6). Take care not to catch any subcutaneous tissue in the tie, as this may cause unsightly dimpling.

It is now relatively simple to secure the perimeter of the mesh circumferentially with a hernia tacker (Fig. 113.7). Depending on the size of the mesh, it may be advisable to place additional transfascial sutures to anchor the mesh to the abdominal wall. Again, check by partially desufflating the abdomen to ensure that the mesh does not gape any-

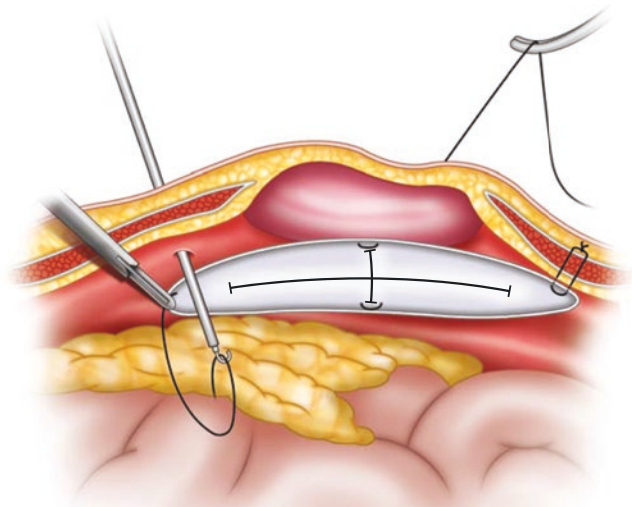


Fig. 113.5

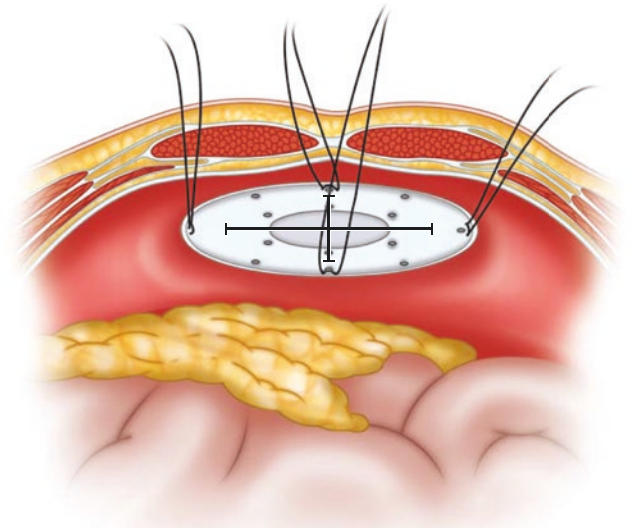


Fig. 113.6

where. Figure 113.8 shows completed intraperitoneal only mesh placement with a caudal bladder flap to allow for low mesh placement.

Check hemostasis. If omentum is available, bring it down to lie under the mesh. Inject trocar sites with local anesthesia. Remove the trocars and close sites as usual.

Management of the Fascial Defect

There is increasing emphasis placed on the compromised quality of life associated with an incisional hernia as well as

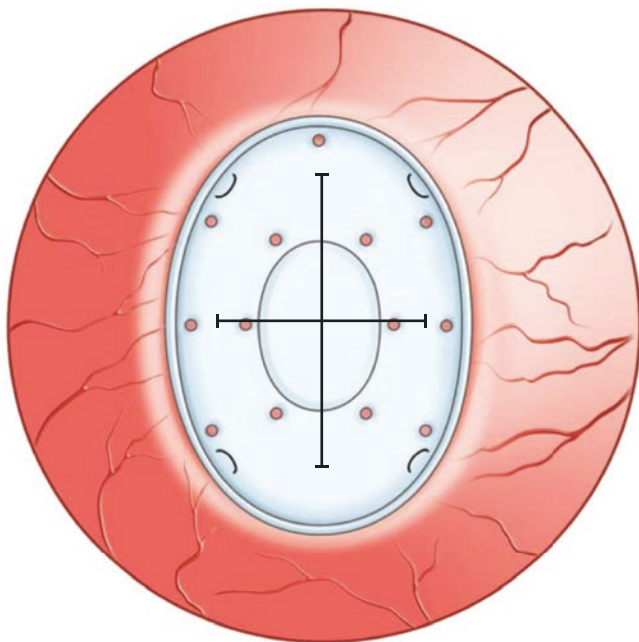


Fig. 113.7

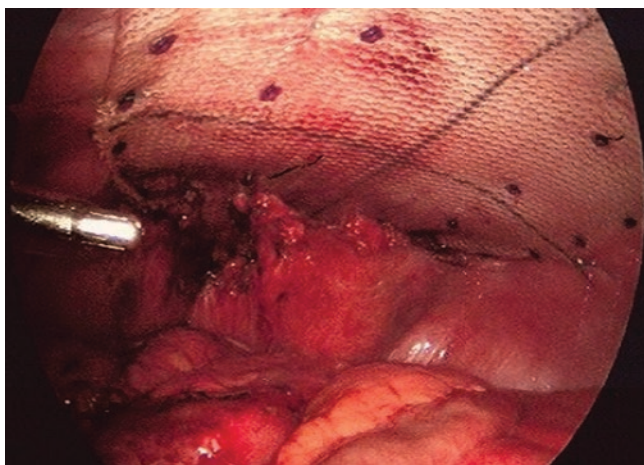


Fig. 113.8

the resultant improvement accompanying a surgical repair. Fundamental to this equation is the patient's abdominal wall function. While current research is not definitive, it has been suggested that reapproximation of the midline may yield improved abdominal wall strength (Den Hartog et al. 2010). Additionally, seroma formation has historically been the Achilles heel of the laparoscopic repair. A hernia sac is ubiquitous. Collapsing this potential space postoperatively can be problematic laparoscopically. There is increasing evidence that closure of the fascial defect may yield decreased seroma rates and overall adverse hernia-site events postoperatively (Tandon et al. 2016).

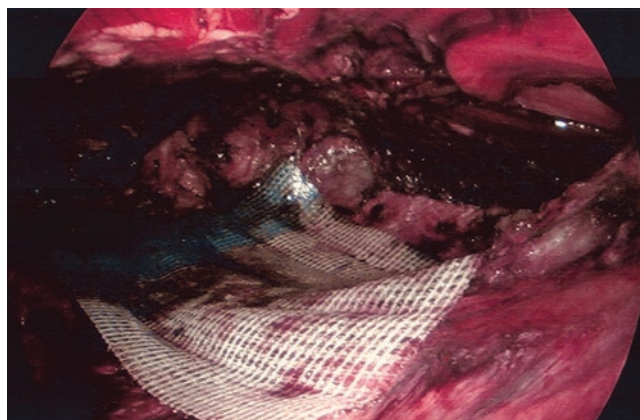


Fig. 113.9

Increasingly, laparoscopic surgeons are attempting to reapproximate the fascial edges prior to mesh placement, effectively obliterating the hernia defect. This can be done with stab incisions made in the midline every 1–2 cm along the length of the hernia prior to mesh fixation. Using a suture passer, a nonabsorbable suture is passed through the fascial edges on either side of the defect to bring together the midline. Using this technique, the abdominal pressure should be decreased prior to tying all of the sutures so as to avoid undesirable tension. Alternatively, there are numerous knotless sutures with “barbs” that prevent suture from backing out of the tissue. This suture is an ideal adjunct to close the fascia using intracorporeal skills. Similar to the transfascial approach, decreasing the abdominal pressure will facilitate reapproximation. In either case, given the fact that is not a true tension-free repair, a piece of mesh tailored closer to the original hernia size is indicated to achieve adequate overlap in the event that the primary repair fails.

More recently, advanced laparoscopic techniques have been described which reproduce the classic Rives Stoppa operation utilizing a laparoscopic approach. This is begun by entering the retrorectus space similar to the approach used for a totally extraperitoneal inguinal hernia repair. The surgeon then creates bilateral myofascial flaps using a combination of blunt and cautery dissection. Figure 113.9 shows re-approximated posterior sheath at the bottom of the picture with an appropriate-sized piece of mesh lying on top. Following closure of the posterior sheath, the mesh can be placed in the retrorectus space. Finally, the anterior fascia is closed most often with a running, barbed suture. Figure 113.10 shows the completed repair after reapproximation of fascial edges using fascial suture. This technique has the benefits of allowing for a tension-free reapproximation of the rectus muscles while also isolating the mesh from the intra-abdominal contents and the associated risk of unwanted postoperative adhesions.

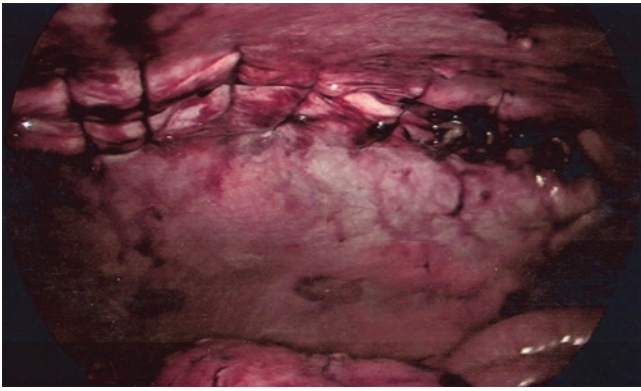


Fig. 113.10

Postoperative Care

Postoperative care is routine. These procedures are typically done on an outpatient basis. Seroma formation is virtually universal, and the patient must understand that this is a normal finding and not a recurrence of the hernia. Many surgeons advise wearing an abdominal binder to minimize seroma formation during the first few weeks.

Complications

Missed enterotomy is the most feared complication of this procedure. Take extreme care during adhesiolysis, and carefully inspect the bowel several times. If an enterotomy occurs, repair it either laparoscopically or through an open incision. In this case, safety is of primary importance and should override any concerns of improved cosmesis or discharge timing. As stated earlier, mesh placement in this situation is a controversial subject. The use of a synthetic mesh in an intraperitoneal onlay position in this setting may be inadvisable at this point in time.

Recurrent hernia can occur. Minimize the risk of this by carefully identifying all defects and by sizing the mesh appropriately (sufficient overlap). It has been advocated that the entire incision should be covered by mesh notwithstanding the extent of the fascial defect as there is a risk for further disruption of the incision uninvolved in the hernia. Finally, the obese patient has consistently been shown to have increased risk of recurrences. Maximizing preoperative weight loss is critical to success of the repair.

Pain due to sutures traversing the richly innervated parietal peritoneum can also occur. Management can be prob-

lematic postoperatively. Referral to a pain management clinic for chronic analgesics such as gabapentin and/or interventional procedures to ablate the offending nerve are reasonable adjuncts to reliance on opiates alone.

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