



Inguinal Hernia Repair in the Setting of Bowel Injury/ Resection

Garth R. Jacobsen and Jessica L. Reynolds

The use of permanent synthetic mesh in the repair of inguinal hernias is considered standard of care regardless of whether a laparoscopic or open approach is used. The use of mesh has been shown to reduce the recurrence rate tenfold to less than 1% compared to primary repair with no significant mesh-related complications [1, 2]. However, when repair of the inguinal hernia involves resection of the bowel or injury to the bowel, the use of mesh becomes more controversial due to concerns with seeding the mesh with enteric bacteria. This can be a devastating complication resulting in chronic mesh infection requiring mesh explantation. This question also arises when considering repair of an inguinal hernia during an unrelated abdominal procedure such as cholecystectomy or small bowel obstructions from adhesive disease or malignancy.

Inguinal hernia repair can involve a spectrum of contaminated wound classifications ranging from a clean-contaminated case that involves resection of a dusky loop of the bowel with minor spillage to contaminated cases involving injury to the bowel with gross spillage and dirty cases with perforation and necrosis. Our repair options depend on the level of contamination of the wound. It is important to keep in mind that there is no permanent synthetic mesh that is approved

for use in contaminated fields, though it is becoming increasingly popular to use macroporous meshes in these situations. There is however abundant data related to the safe use of biologic or some absorbable synthetic meshes. Of course, the option is open to do a primary tissue repair in the acute setting a good one, with the option to perform a definitive laparoscopic or open repair should the patient develop a recurrence.

Clean Contaminated

The CDC defines a clean-contaminated wound in this case as one in which the alimentary tract was entered under controlled conditions and without unusual contamination. Current evidence would suggest that using appropriate synthetic mesh in clean-contaminated settings is safe with wound morbidity rates not significantly different from non-mesh repairs [3–8]. It is our practice to use lightweight, macroporous polypropylene mesh in these cases. It is also acceptable to use an absorbable mesh or biologic mesh.

Typically, a clean-contaminated case involves a strangulated hernia that requires resection of the reduced small bowel due to questionable viability, but there is no perforation. We prefer to approach incarcerated and strangulated hernias laparoscopically using a transabdominal

G. R. Jacobsen (✉) · J. L. Reynolds
University of California San Diego,
San Diego, CA, USA
e-mail: [gjacobson@ucsd.edu](mailto:gjacobsen@ucsd.edu)

approach. After induction of anesthesia, the bowel usually can be reduced with a combination of gentle traction and external pressure and sometimes relaxing incisions. Once the bowel is reduced, it can be determined if it is not viable and will need resection. We proceed with repair of the hernia and mesh placement prior to resecting the bowel to allow the mesh to be placed in the preperitoneal space prior to contaminating the peritoneal space. We prefer the transabdominal approach as this offers the best access to the peritoneal cavity to further assess for bowel viability. After raising the peritoneal flap, reducing the hernia sack completely, and ensuring there is an adequate pocket for the mesh with good inferior and medial coverage of the myopectineal orifice, the mesh is tacked in place at Cooper's ligament and then superior on either side of the epigastric vessels. The peritoneal flap is then sutured closed with a running stitch. In a clean-contaminated case, we recommend using a lightweight macroporous synthetic meshes as these have been shown to be more resistant to infection than other types of synthetic mesh while still being very durable. The bowel resection can then be completed either intracorporeally or extracorporeally by extending the umbilical incision.

If the bowel cannot be reduced laparoscopically as described above, it may be necessary to perform a relaxing incision. This is most typically utilized during incarcerated femoral hernias. The inguinal ligament can be incised using hook electrocautery anteriorly and medially. If reduction still cannot be achieved, a groin incision can be performed. The bowel resection can be done at this point if necessary allowing for reduction and subsequent anastomosis. The anastomosis can be done through the groin. If this is unsuccessful, then we would complete the bowel resection through the inguinal incision and repair the hernia using a Lichtenstein approach with lightweight macroporous polypropylene mesh.

Contaminated

The CDC defines a contaminated wound in this case as hernia-related bowel pathology in which gross spillage occurred. If the bowel injury and

contamination occur during a laparoscopic procedure and the soilage is limited to the peritoneal cavity, then the best option is to convert to an open repair of the inguinal hernia, after repairing or resecting the injured bowel as described above. This avoids placing permanent mesh in the contaminated field and reduces the risk of mesh infection. If, however, there is gross spillage within the inguinal canal that would mandate exposure of the repair to the gross contamination, more care should be exercised. This is often the case in the late presenting patient with evidence of sepsis and some degree of ischemia in a large inguinal hernia but has not yet perforated. Though laparoscopy may be useful, anterior approach is often needed. Should resection be needed and spillage occur consideration for primary tissue-based repair should be had. One may also consider utilizing a biologic or absorbable synthetic mesh such as Gore Bio-A in the manner of Lichtenstein. Current data does not support the use of permanent synthetic mesh in this setting.

Dirty

Dirty wounds are those in which there is retained devitalized tissue and those that involve existing clinical infection or perforated viscera. The patient presentation is similar to the above but more extreme as the patient has now perforated the viscus. Patients who have a strangulated hernia with perforation and gross contamination in our practice are no longer considered a "hernia" case. The primary concern is to resect the bowel, wash out the contaminated space, and prevent intra-abdominal sepsis. This can be done through either an inguinal or abdominal incision. If the patient does not have peritonitis, we prefer an inguinal approach to limit the intra-abdominal contamination. The bowel usually can be pulled into the wound to perform the resection and anastomosis and then returned to the abdomen. If adequate length to do the resection cannot be achieved, the operation can be hybridized utilizing either a laparoscopic approach or a midline laparotomy. Again, the primary consideration in this case is a gastrointestinal one, and control of the bowel injury is the most important. Depending

on the size of the hernia defect, it can then either be repaired primarily or repair can be staged. We do not routinely place any mesh, including absorbable or biologic, in a dirty wound, and prefer to stage the repair. If the patient is unstable, then the wound should just be washed out and closed over the drain with plans to return for repair of the hernia when the patient is stable and the wound is clean.

Patients who have peritonitis require a laparotomy with exploration and washout of the abdominal cavity in addition to bowel resection. We prefer a staged approach to hernia repair in these patients, first treating the bowel perforation and sepsis and returning to the OR for hernia repair when the infection has resolved.

Conclusion

The repair of hernias in the face of concomitant bowel injury and resection should be addressed in a systematic fashion which is most easily approached by addressing the degree of wound contamination. We struggle as hernia surgeons to define the best repair for a clean groin hernia. Should we do open or laparoscopic? TEPP or TAPP? Mesh or no mesh? These questions are just as relevant in the approach to the inguinal hernia in the face of various degrees of contamination. However, we believe the systematic approach laid out above helps to prioritize the nature of the problem. Is the problem mostly hernia (clean contaminated) or mostly visceral (contaminated)? Once that determination has been made, the treatment options become clearer. The utilization of prosthetic meshes (particularly macroporous and certain absorbable synthetics) in these situations is becoming

increasingly prevalent and in fact is likely safe for clean-contaminated wounds but more controversial in higher wound classification. Finally, as evidenced by the discussion above, the surgeon approaching inguinal hernia repair in this complex setting is best served by having knowledge and skill in a variety of laparoscopic and open techniques so as to best serve their patient.

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