Abdominal Wall Reconstruction: A Comparison of Totally Extraperitoneal and Transabdominal Preperitoneal Approaches

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BACKGROUND: Abdominal wall reconstruction for complex ventral and incisional hernias is associated with significant complications. Commonly, the peritoneal cavity is opened and adhesiolysis is performed with the potential for enterotomy. A totally extraperitoneal (TE) approach to abdominal wall reconstruction is feasible in many ventral hernia repairs and can reduce visceral injuries without impacting other outcomes. This study compares outcomes after retrorectus ventral hernia repairs with TE and transabdominal (TA) preperitoneal approaches.

STUDY DESIGN: An IRB-approved review of a prospective hernia database was performed for all ventral hernia repairs between 2009 and 2013. Preoperative patient characteristics, including demographics and comorbidities; operative variables, including surgical technique, operative duration, type/size/location of mesh, concomitant procedures, and incidence of inadvertent injury; and patient outcomes in terms of length of stay, wound and nonwound complications, and readmissions or returns to the operating room were obtained. Groups were compared using *t*-tests, Mann-Whitney U tests, chi-square tests, and Fisher's exact tests as appropriate. Significance was set at $p < .05$.

RESULTS: One hundred and seventy-five complex abdominal wall reconstructions were performed between 2009 and 2013. Of those, 85 patients underwent hernia repair for CDC grade 1 hernias with retro-rectus mesh placement performed (n = 45 TA, n = 40 TE). Groups did not differ in age, BMI, sex, smoking status, hernia defect size, history of COPD, asthma, hypertension, cancer, or renal failure. More TA patients had diabetes (36% vs 13%; $p = 0.02$) and previous hernia repair (73% vs 45%; $p = 0.01$) than TE patients. Mesh size was larger in the TE group (625 ± 234 cm^2 vs 424 ± 214 cm^2; $p < .001$). There was no difference in enterotomy between TA and TE groups (0% vs 2%; $p = 1.0$). However, there was a reduced operative time with TE (170 ± 49 minutes vs 212 ± 49 minutes; $p < .001$).

CONCLUSIONS: Abdominal wall reconstruction can be performed safely in a TE fashion. The extraperitoneal approach results in shorter operative duration, but had similar complications when compared with TA preperitoneal approach. (J Am Coll Surg 2016;222:159−165. © 2016 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)

Ventral and incisional hernias are a frequent complication after abdominal surgery, with surgical intervention remaining as the only definitive treatment.[1] Surgical procedures for ventral hernia repair include traditional open techniques as well as laparoscopic methods, both of which are commonly performed through a transabdominal (TA) approach in which the peritoneum is transgressed.[2-6] Use of a prosthetic mesh is commonplace for ventral and incisional hernia repairs to reduce the incidence of hernia recurrence.[7] Placement of the mesh in the retro-rectus or preperitoneal space minimizes the risk of the prosthetic contacting the abdominal viscera.[8]

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The modified Rives-Stoppa technique for ventral hernia repair is performed through a midline laparotomy and subsequent dissection of the posterior rectus sheath from the rectus abdominis muscles.[9-11] This approach facilitates placement of a prosthetic mesh in the extraperitoneal space after closure of the posterior rectus sheath. Alternatively, many ventral hernia repairs can be performed without entering the peritoneum by using a totally extraperitoneal (TE) approach.[12] Although formal evaluation of the peritoneal cavity and adhesiolysis might be required occasionally, many ventral hernia repairs do not necessitate entry into the peritoneal cavity. Similar to laparoscopic inguinal hernia repair, both TA and extraperitoneal approaches have been described.[13-15] The TE approach for inguinal hernia has been reported to decrease operative time, improve patient satisfaction, and reduce pain, although seroma formation is more common. The benefits and drawbacks of an extraperitoneal approach for ventral and incisional hernias have not been reported previously. Ventral hernia complications are not uncommon and include intraoperative complications, wound complications, and postoperative medical complications, with an overall incidence of nearly 40%.[16] An unplanned enterotomy occurring during ventral hernia repair increases the risk for additional postoperative complications considerable.[17] We hypothesized that the incidence of intestinal injuries would be reduced in patients undergoing TE ventral hernia repair through avoidance of intestinal adhesiolysis. This study compares the outcomes of incisional hernia repairs using TA and extraperitoneal approaches.

METHODS

An IRB-approved review of a prospectively maintained database of ventral hernia repairs from a single surgeon was performed between 2009 and 2013. The database was reviewed for patient information, including sex, age, BMI, smoking history, and comorbid conditions, including diabetes, cardiac disease, COPD, asthma, cancer, hypertension, renal failure, cirrhosis, and history of immunosuppression. Surgical history was evaluated for history of hernia repairs, mesh infection, wound infections, and American Society of Anesthesiologists class.

Perioperative variables that were studied include operative time; CDC wound class; hernia defect size; mesh size; mesh type; mesh location; procedural details, including technique, closure type and drains; and intraoperative complications, including enterotomy, unplanned bowel resections, and serosal injuries.

Postoperative outcomes, including hospital length of stay, wound complications (superficial, deep, and organ space), 90-day hospital readmission, 90-day return to the operating room, hernia recurrence, and major medical complications were evaluated. Cases were classified using the Ventral Hernia Staging System.[18]

Groups were compared using *t* tests, Mann-Whitney U tests, chi-square, and Fisher's exact tests as appropriate. SPSS software, version 22 (IBM Corp) was used for all calculations. Significance was set at $p < 0.05$.

RESULTS

One hundred and seventy-five complex abdominal wall reconstructions were performed between 2009 and 2013, of which 121 were performed through a TA approach and 54 were performed in a TE approach. Eighty-five of these patients underwent hernia repair for a CDC class I wound with a retro-rectus mesh placement ($n = 45$ TA, $n = 40$ TE). The TA and TE groups were similar in age, BMI, sex, history of COPD, asthma, hypertension, history of cancer or renal failure, hernia defect size, or smoking status (Table 1). More TA patients (36%) had diabetes than TE patients (13%) ($p = 0.02$), and a higher percentage of TA patients (73%) had had previous hernia repair than TE patients (45%) ($p = 0.01$). All patients were amenable to primary fascial closure over the mesh.

Selection criteria for our study included focusing solely on CDC class I patients for the purpose of comparison, as TA patients tend to have higher CDC wound class rankings in general. Using the Ventral Hernia Staging System classification scheme, and considering defect width (cm) given the exclusion of wound class >1, the TA and TE groups had similar numbers of stage I (33% vs 50%, respectively) and stage II hernias (64% vs 50%), and 1 class III hernia found in the TA group ($p = 0.13$). Mean (SD) hernia defect width was 10.5 cm (3.2 cm) in TA cases and was 9.5 cm (4.0 cm) for the TE group (Table 2).

One patient in the TE group was converted to a TA approach to remove previously placed mesh. Although defect size was similar between groups, mesh size was larger in the TE group (625 ± 234 cm^2 vs 424 ± 214 cm^2; $p < 0.001$). Operative duration was shorter for TE than TA repairs (170 ± 49 minutes vs 212 ± 49 minutes; $p < 0.001$), respectively. The incidences of enterotomy and unplanned bowel resection were similar between TE and TA groups (0% vs 2%; $p = 1.00$). Length of stay, wound complications, return to the operating room within 90 days, 90-day readmissions, and hernia recurrences were similar between groups, with a follow-up mean of 142 days in the TE group and 246 days in the TA group (Table 3). In the TE group,