Transversus Abdominis Release for Abdominal Wall Reconstruction: Early Experience with a Novel Technique

Joshua S Winder, MD, Brittany J Behar, MD, Ryan M Juza, MD, John Potochny, MD, FACS, Eric M Pauli, MD, FACS

BACKGROUND: Ventral hernias are common sequelae of abdominal surgery. Recently, transversus abdominis release has emerged as a viable option for large or recurrent ventral hernias. Our objective was to determine the outcomes of posterior component separation via transversus abdominis release for the treatment of abdominal wall hernias in the first series of patients at one institution.

METHODS: We performed a retrospective review of a prospectively maintained database of open ventral hernia repair patients to identify patients who underwent posterior component separation via transversus abdominis release at one institution from 2012 to 2015. Patients who were at least 1 year out from surgery were included. Patient demographic characteristics, operative details, perioperative and postoperative complications, and recurrences were analyzed. Postoperative imaging was reviewed for evidence of morbidity or recurrence.

RESULTS: Thirty-seven patients met inclusion criteria; 23 (62.2%) of these patients were female, with a mean age of 57.5 ± 11 years and median BMI of 32.1 kg/m^2 (range 23.6 to 44.0 kg/m^2). All patients underwent repair with mesh (81.1% polypropylene, 5.4% porcine dermal matrix, and 13.5% biologic/permanent synthetic hybrid). Median defect size was 392 cm^2 (range 250 to 2,700 cm^2) and median mesh area was 930 cm^2 (range 600 to 3,600 cm^2). Approximately 24% (9 of 37) of patients experienced a postoperative complication; ileus was the most common (4 patients). Surgical site events requiring intervention (ie drainage and antibiotics) developed in 2 patients. Median follow-up period was 21 months (range 12 to 42 months), during which one recurrence was identified (2.7%).

CONCLUSIONS: Posterior component separation via transversus abdominis release is a safe and effective method of ventral herniorrhaphy with favorable rates of wound morbidity and recurrence. (J Am Coll Surg 2016;223:271−278. © 2016 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)

Ventral hernias pose a formidable problem for the modern surgeon. Incisional hernias develop in as many as 30% of patients who undergo laparotomy, and most occur within the first 5 years after their initial procedure.[1] Patients often present with persistent abdominal pain, intermittent obstruction, hernia enlargement, or cosmetic dissatisfaction.[2] Surgeons have also recognized not only the importance of the initial attempt at hernia repair for prevention of recurrent hernia development, but also the prevention of seroma, hematoma, and wound infections, which also contribute to recurrence.[3] Multiple solutions to these problems have been developed, including open, laparoscopic, endoscopic, and robotic repairs.

Ventral hernias also place a large financial burden on the health care system. Poulose and colleagues[4] reported that up to $3.2 billion are spent each year to repair ventral hernias. They concluded that a 1% reduction in hernia recurrence could save at least $32 million each year. Despite the widespread implementation of external

Disclosure Information: Nothing to disclose.

Disclosures outside the scope of this work: Dr Pauli receives payment for lectures from Cook and Gore.

Received March 7, 2016; Revised April 9, 2016; Accepted April 11, 2016.
From the Divisions of Minimally Invasive and Bariatric Surgery (Winder, Juza, Pauli) and Plastic and Reconstructive Surgery (Behar, Potochny), Department of Surgery, Penn State Hershey Medical Center, Hershey, PA. Correspondence address: Eric M Pauli, MD, FACS, Division of Minimally Invasive and Bariatric Surgery, Department of Surgery, Penn State Hershey Medical Center, 500 University Dr, H149, Hershey, PA 17033. email: epauli@hmc.psu.edu

http://dx.doi.org/10.1016/j.jamcollsurg.2016.04.012
ISSN 1072-7515/16

Abbreviations and Acronyms
PCS = posterior component separation
SSE = surgical site event
SSO = surgical site occurrence
TAR = transversus abdominis muscle release

oblique component separation methods, recurrence rates as high as 22% to 32% are still reported.[5] With high recurrence rates and a heavy burden on the health care system, improved techniques are needed.

Novitsky and colleagues[6] published a landmark paper on their novel technique, the transversus abdominis muscle release (TAR) in 2012.[6] A retrospective review of 42 patients showed that their typical patient was morbidly obese, with a mean BMI of 39 kg/m^2, and most had chronically and recurrent incarcerated hernias. Despite the large mean defect size of 366 cm^2, they reported a recurrence rate of only 4.7% at 26-month follow-up. Although 24% of patients had a surgical site occurrence (SSO), the majority of these were self-limited, with only 7% requiring surgical intervention.

We hypothesized that by using the same technique, namely a posterior component separation (PCS) via TAR and retromuscular mesh placement, we could achieve similar rates of recurrence and SSO, despite the technique being new to our medical center.

METHODS

After receiving IRB approval, we performed a retrospective review of a prospectively maintained database of patients undergoing ventral hernia repair at a single institution (Penn State Milton S Hershey Medical Center) by a single fellowship-trained abdominal wall reconstructive surgeon (EMP). We included all patients who underwent PCS/TAR from 2012 to 2015 who were at least 1 year out from surgery. We began performing PCS/TAR in 2012. Before this, anterior component separation with external oblique release was the preferred approach for large ventral hernia repair.

Patient demographics including age, sex, BMI, comorbidities, smoking status, number of previous abdominal operations, number of previous hernia operations, and previous wound complications were noted. Active smoking was defined as occurring within a 3-month period before surgery. Preoperative CT images were analyzed to characterize the location of the hernia. Patients undergoing TAR parastomal hernia repair and those undergoing retro-rectus (Rives-Stoppa) repairs without TAR were excluded. Perioperative data included defect area, mesh type, and mesh area. Intraoperative wound assessments were recorded using CDC guidelines, and hernia grades were determined according to the modified Ventral Hernia Working Group guidelines.[7]

Standard follow-up protocol consisted of physical examination at 2 to 3 weeks, 1 month, and 1 year. Standard telephone surveys were conducted at yearly intervals to assess for signs of recurrence.[8] Patients with a phone survey concerning for recurrent hernia were seen back in clinic for evaluation. Abdominal CT scans were routinely obtained at 1 month and 1 year or sooner to further investigate any abdominal discomfort or signs of potential recurrence (Fig. 1). Surgical site events (SSEs) were defined as SSOs requiring additional clinical intervention. Surgical site infection was characterized based on CDC criteria as superficial, deep, or organ space.[9] Hernia recurrence was diagnosed by the surgeon via physical examination and/or CT imaging. Data were analyzed using Microsoft Excel. All continuous variables are expressed as median and range.

Surgical technique

The surgical technique for PCS/TAR for retromuscular placement of mesh has been described previously.[6,10] Briefly, the abdomen was entered through a midline laparotomy. Complete adhesiolysis was then performed, including adhesions from the bowel to the abdominal wall. A towel was placed to protect the viscera during the component separation. The posterior rectus sheath was then incised approximately 2 to 5 mm lateral to the medial border of the rectus muscle. This incision was extended along the length of the rectus muscle to include the retroxiphoid space superiorly and the space of Retzius inferiorly. The posterior rectus space was then developed laterally using blunt and electrocautery dissection toward the linea semilunaris until the junction of the anterior and posterior sheaths was visualized. Traversing intercostal nerves supplying the rectus are preserved. To permit access to the retromuscular plane lateral to the linea semilunaris, the posterior rectus sheath was then incised approximately 5 mm medial to the junction to expose the transversus abdominis muscle (Fig. 2). The muscle was then divided along its medial length, which allows access to the space between the transversus muscle (anteriorly) and the pretransversalis/pre-peritoneal plane posteriorly (Fig. 3). This space was further developed laterally (to the psoas muscle), superiorly (behind the costal margin), and inferiorly (to the myopectineal orifice) with blunt dissection (Fig. 4). After contralateral dissection, the posterior sheath was then reapproximated at the midline with running absorbable sutures. In cases where a defect remained, a portion of the hernia sac, mobilized omentum, or a piece