

A Traumatic Abdominal Wall Hernia Repair: A Laparoscopic Approach

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ABSTRACT

Background: Traumatic abdominal wall hernias from blunt trauma usually occur as a consequence of motor vehicle collisions where the force is tangential, sudden, and severe. Although rare, these hernias can go undetected due to preservation of the skin overlying the hernia defect. Open repairs can be challenging and unsuccessful due to avulsion of muscle directly from the iliac crest, with or without bone loss. A laparoscopic approach to traumatic abdominal wall hernia can aid in the delineation of the hernia and allow for a safe and effective repair.

Case Description: A 36-year-old female was admitted to our Level 1 trauma center with a traumatic abdominal wall hernia located in the right flank near the iliac crest after being involved in a high-impact motor vehicle collision. Computed tomography and magnetic resonance imaging of the abdomen revealed the presence of an abdominal wall defect that was unapparent on physical examination. The traumatic abdominal wall hernia in the right flank was successfully repaired laparoscopically. One-year follow-up has shown no sign of recurrence.

Discussion: A traumatic abdominal wall hernia rarely presents following blunt trauma, but should be suspected following a high-impact motor vehicle collision. Frequently, repair is complicated by the need to have fixation of mesh to bony landmarks (eg, iliac crest). In spite of this challenge, the laparoscopic approach with tension-free mesh repair of a traumatic abdominal wall hernia can be accomplished successfully using an approach similar to that taken for laparoscopic inguinal hernia repair.

Key Words: Traumatic abdominal wall hernia (TAWH), Lumbar hernia, Blunt trauma.

INTRODUCTION

The first traumatic hernia was reported in 1906 with only a small number of presentations added to the literature prior to 1974.¹ Following 1974, only 34 documented cases of blunt abdominal wall disruption had been reported with only an additional 6 cases added to the literature 9 years later.¹⁻² A more exceedingly rare presentation of traumatic abdominal wall hernia (TAWH) is that of a flank hernia secondary to trauma that may be difficult to detect without imaging studies. An injury in this location is consistent with a high-impact motor vehicle collision (MVC) with abrupt deceleration in which forces are transmitted by a lap belt.³⁻⁴ As was seen in this case,³ a defect in the abdominal wall musculature from blunt trauma may be disguised by a lack of disruption of the overlying skin and mass effect. Surgery is indicated once the defect is identified. An open approach, with a large flank incision and extensive dissection, may be required for this type of defect.⁵ Insufficient and unstable coverage of a defect along the iliac crest can lead to early operative failure. We are presenting a tension-free laparoscopic approach, which established a bony attachment of the mesh along the iliac crest, to secure a successful repair of hernia defect.

CASE REPORT

The patient is a 36-year-old female involved in a high-speed MVC. She was the restrained driver and was struck on the driver's side door with significant intrusion into the vehicle, and with a reported loss of consciousness at the scene. On arrival to the trauma bay, the patient was alert and complained of right lower quadrant abdominal pain with radiating discomfort into the groin. She was hemodynamically stable on presentation, and the remainder of the primary survey was intact. The secondary survey reproduced the discomfort in the right lower quadrant and flank, without ecchymosis noted at the time of her examination.

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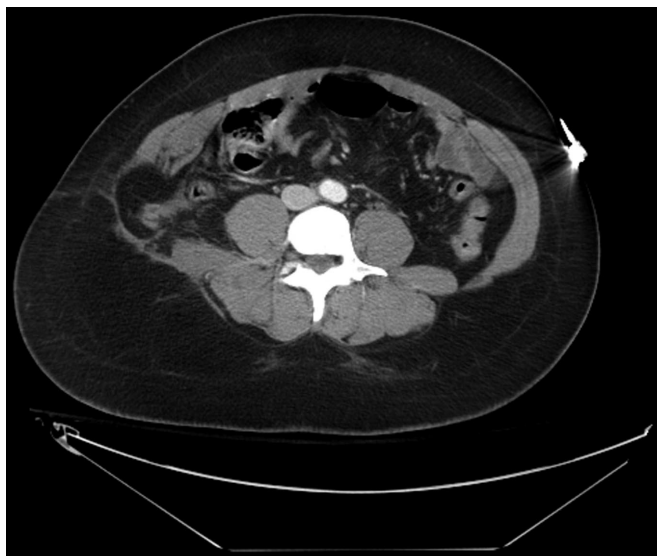


Figure 1. Axial CT scan of the traumatic flank hernia with an avulsion of the external oblique muscles from the attachments to the right iliac crest.

An ultrasound was negative for intraabdominal injuries or hemorrhage. Her survey films included a chest X-ray and a pelvic X-ray, both of which were negative. Computed tomography (CT) scans of the head, chest, abdomen, and pelvis were completed. The abdominal radiographic finding was significant for the presence of a hernia of the lateral abdominal wall with avulsion of all layers of the abdominal musculature from the attachments to the right iliac crest. The traumatic flank hernia allowed protrusion of the cecum without evidence of incarceration or infarction (**Figure 1**). Physical examination was negative for a mass. She was hospitalized for 5 days for observation and pain management.

The patient was discharged home without any operative intervention. An MRI was obtained 9 days after discharge to further delineate the extent of the abdominal wall disruption. The MRI results confirmed an avulsion of the right external oblique, transverse abdominis, and internal oblique muscles from their insertion on the iliac crest, suggestive of TAWH (**Figure 2**). After a discussion with the patient, a delayed repair was scheduled 4 months after discharge at her request.

Laparoscopic Repair: Technical Considerations

Room Setup and Port Placement. The patient was placed in a supine position and appropriately prepped and draped to allow for sterile access to the abdomen. The

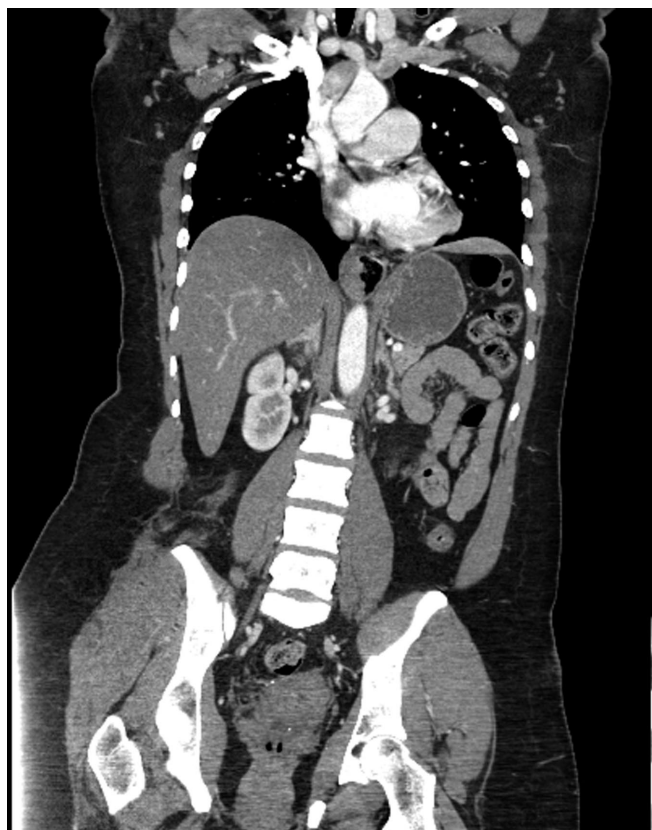


Figure 2. Coronal CT image confirmed an avulsion of the right external oblique, transverse, and internal oblique muscles from their insertion at the iliac crest suggestive of TAWH.

video monitor was placed at the level of the iliac crest on the right side of the patient. The left arm of the patient was tucked to allow the surgeon, assistant, and nurse to be assembled on the left side of the operating table. The surgeon sat at the level of the iliac crest on the nonaffected side (left). The nurse was to the left of the surgeon, and the assistant/camera person was to the right of the surgeon. In addition, the nurse's instrument table was placed 90 degrees in relation to the foot of the operating table.

The pneumoperitoneum was established by the use of a closed Veress needle technique. After the intraabdominal pressure reached 15mm Hg, the abdomen was ready for port placement. A 16-gauge needle was used to infuse local anesthesia (Bupivacaine Hydrochloride Injection, USP) without epinephrine (0.25% Marcaine, Hospira, Lake Forest, Ill), before the skin incisions were made at the trocar insertion sites. A triangular shaped 3-port placement pattern was used. Ten- to 12-mm ports were placed at the umbilicus and in the suprapubic region and a 5-mm trocar was placed in the left lower quadrant

at the lateral edge of the rectus muscle. The use of a Covidien EndoUniversal (Covidien, Mansfield, MA) 65 hernia stapler necessitated the use of a 10-mm to 12-mm trocar in the suprapubic region. The previously described room setup and the aforementioned port placements allowed the surgeon to assume a seated position with arms/shoulders, head/neck in an optimal ergonomic position.

Procedure

Initial Abdominal Exploration and Exposure. Upon entering the abdomen with the 10-mm 30-degree laparoscope, a systematic exploration of the abdominal cavity was performed. The exploration proceeded in a quadrant-by-quadrant fashion. The right upper quadrant was examined first, and no injuries or abnormalities were found. The examination then progressed to the left upper quadrant and the left lower quadrant with the same findings. Next, our attention was turned to the right lower quadrant and the right colon. The ascending colon just distal to the cecum was found to occupy the hernia defect (**Figure 3**). In an effort to obtain proper exposure, the patient was rotated to the left, and the table was placed in the Trendelenburg position. Next, a 5-mm grasper was placed through the left lower quadrant port to retract the colon toward the midline. A 5-mm scissor was placed into the abdomen through the suprapubic port. The line of Toldt was incised and the right colon reflected. At that point, the defect was visualized with greater detail. The defect measured approximately 7.5cm by 9.5 cm. This completed the exploration and exposure phase of the procedure.

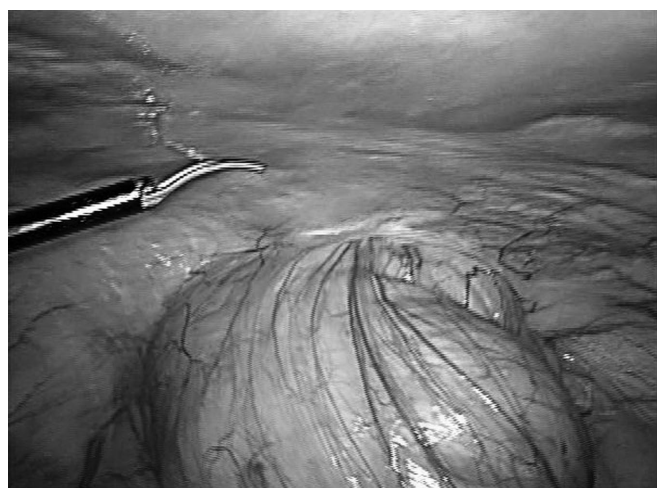


Figure 3. Ascending colon just distal to the cecum occupying the hernia defect.

Identification of Anatomical Repair Landmarks and Securing the Mesh.

The foundation of any effective hernia repair is to identify the anatomical landmarks for fixation of the mesh material. In addition, it is generally accepted that the mesh must extend 3cm to 5cm beyond the defect. Even though this hernia was in an unusual location, the principles of laparoscopic hernia repair (dissection of the hernia defect to allow adequate mesh overlap) had to be respected and followed. The superior, lateral, and medial aspects of the hernia defect were formed by the transversalis fascia, and the iliac crest formed the inferior aspect. The dissection was carried out to accommodate placement of the mesh with proper coverage of the defect. Parietex (Covidien, Mansfield, MA) mesh was used to accomplish this (**Figure 4**). This particular mesh has an advantage of presenting a protective barrier to the abdominal viscera preventing mesh erosion. The protective barrier consists of porcine collagen that shields the viscera until overgrowth of the peritoneum occurs, which takes about 8 days to 12 days, and the barrier lasts 21 days. A Covidien EndoUniversal 65 hernia stapler was used to secure the mesh to the soft tissue landmarks. This is an articulating instrument that provided an advantage by allowing greater ease of fixation. A Covidien Protack (Covidien, Mansfield, MA) 5-mm hernia tacker was used to secure the mesh to the iliac crest. After the mesh was secured, the operative site was irrigated with saline, and the patient was taken out of the Trendelenburg position. The colon was allowed to assume its natural position, which completely covered the mesh. The 10-mm to 12-mm trocar sites were closed with 2-0 Vicryl (Ethicon, Somerville, NJ),

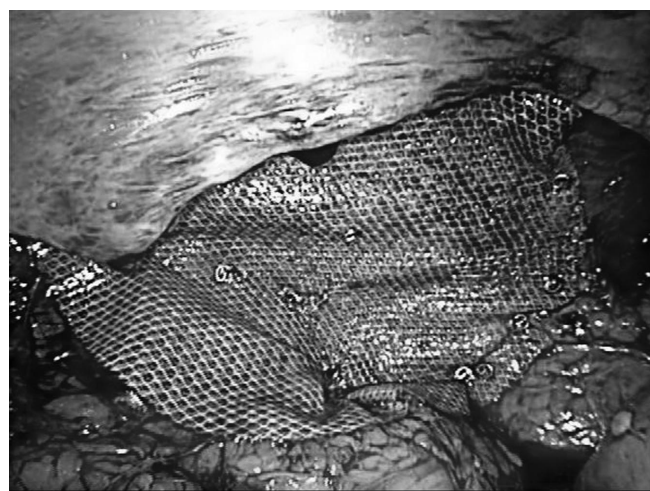


Figure 4. Parietex was used to accomplish 3-cm to 5-cm extension beyond the defect.

and the skin was closed with a simple interrupted 5-0 Monocryl (Ethicon, Somerville, NJ) suture in subcuticular fashion. The patient was taken to recovery and had an uneventful stay and was released to the floor.

Postoperative Course and Follow-up

During an overnight stay, the patient was allowed to have clear liquids and progressed rapidly to a regular diet. Pain control was achieved initially with injectable medications and later by oral analgesics. She was discharged the following morning. The patient was seen in the clinic 2 weeks later. Her trocar incisions were healing well with no signs of infection. Also no signs of recurrence were evident. The patient was cleared for light-duty work with a 15-pound lifting restriction. At the 6-month follow-up visit, magnetic resonance imaging was done that showed the mesh remained in an excellent position, and on physical examination, there was no recurrence of the hernia detected. A 1-year follow-up phone call was conducted, and the patient was asymptomatic with no complaints suggestive of a recurrence.

DISCUSSION

The prevalence of TAWHs in published series is approximately 1%. In 1 series, 34 patients were identified as having TAWHs, and most were found in the lumbar triangle above the iliac crest.³ For an abdominal wall disruption to occur, the traumatic force must be sudden, tangential, and strong enough to cause an acute rise in the intraabdominal pressure that does not penetrate the skin, but strong enough to disrupt the muscle and fascia.^{1,6-8} TAWHs can present with a continuum of complaints frequently represented by nonspecific signs, such as localized tenderness, ecchymosis, or even normal-appearing overlying skin.^{1,3} The occurrence of a hernia in the flank can lead to entrapment of fat and bowel with possible strangulation of the contents.^{8,9} Associated intraabdominal injuries are frequent and depend on the location of the hernia.⁹

Surgical repair of these hernias is challenging and typically has a high failure rate. The strategies invoked to repair TAWHs have included primary tissue repairs, such as tensor fascia lata, rectus femoris muscle, rectus abdominis fascia, and latissimus dorsi muscle.⁷ Failure rate is highest when repairs with primary closure are attempted. Prosthetic mesh, in the absence of bowel compromise, can be used at the time of initial repair or in a delayed fashion when the patient's clinical status is optimized.¹⁰ Laparoscopic placement of a mesh prosthesis allows for a ten-

sion-free repair, with secure bony fixation, without the morbidity associated with an open approach.

Gagner et al¹¹ reported approaching hernias in this region similarly to the approach for ventral hernias. However, *their* case was nontraumatic and located more cephalad. It was the result of 3 closely placed port-site incisional hernias secondary to a previous laparoscopic nephrectomy. The defects were some distance from the iliac crest, and therefore it is understandable that Gagner would use a ventral incisional hernia repair technique.

Unlike the case discussed by Gagner et al,¹¹ the location and mechanism of action of the case being *reported* herein dictated that the approach be more like a transabdominal preperitoneal (TAPP) or transextraperitoneal (TEP) inguinal hernia repair. Instead of Cooper's ligament being a strategic fixation point, the soft tissue covered bony prominence of the right iliac wing was used.

CONCLUSIONS

TAWHs are exceedingly rare, and the reporting of repairs in the literature is infrequent. Those reported show that open repairs are often complex, require large incisions that produce significant morbidity and have a high recurrence rate. The laparoscopic approach using a tension-free repair, with prosthetic mesh in a delayed setting, was a safe and effective option for our patient. Of course, it is important to stress that the timing and method of surgical intervention for TAWHs should be evaluated on a case-by-case basis. Ultimately, clinical decisions should be based on the patient's presentation and radiologic findings that confirm the presence or absence of bowel compromise or concomitant injuries.

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