

Case report of traumatic abdominal wall hernia caused by seat belt

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Abstract

Rationale: Traumatic abdominal wall hernia (TAWH) is a rare form of hernia that is caused by disruption of the abdominal wall musculature and fascia. The diagnostic criteria and classification of TAWH are still unclear; furthermore, the ideal timing and method of surgical treatment are still unclear. Herein, we report a case of TAWH and describe the surgical approach used.

Patient concerns: A 71-year-old Han Chinese female presented for swelling in the right lower abdominal quadrant. The patient underwent exploratory laparotomy because of a car collision before 1 year ago.

Diagnosis: She was finally diagnosed with TAWH according to the abdominal computed tomography (CT) and surgery.

Interventions: She was performed with an open surgery to repair the TAWH.

Outcomes: The patient was discharged without complications and showed no recurrence or complications during a follow-up period of 6 months.

Lessons: TAWH is a rare form of hernia that presents a diagnostic and therapeutic challenge. The appropriate timing and approach of surgical treatment for TAWH depend on a case-by-case basis. This case highlights that delayed selective surgery may be more suitable for stable patients.

Abbreviations: CT = computed tomography, TAWH = traumatic abdominal wall hernia.

Keywords: abdominal wall hernia, traumatic, treatment

1. Introduction

Traumatic abdominal wall hernia (TAWH) is a rare form of hernia that is caused by disruption of the abdominal wall musculature and fascia (while the skin is still intact) following blunt abdominal trauma, such as traumatic injury from bicycle handlebars or a seat belt. TAWH can occur in all quadrants of the abdomen but occurs more commonly in the lower and lateral quadrants. Since the first report of TAWH in 1906,^[1] multiple case reports and series have been published. However, the reported prevalence of TAWH in patients who have experienced blunt trauma is only approximately 1%.^[2–5] The diagnostic criteria and classification of TAWH are still unclear^[6]; furthermore, due to the low incidence and complex associated injuries, the ideal timing and method of surgical treatment are still unclear. Herein, we report a case of TAWH and describe the surgical approach used.

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Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

The authors have no conflicts of interest to disclose.

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2. Case presentation

A 71-year-old Han Chinese female presented at the emergency department with lower quadrant abdominal pain that had been present for 3 days. The patient had no relevant medical history. She had been in a car collision (as a passenger) 3 days ago, and the seat belt had caused blunt trauma to the lower abdominal quadrant. The patient was hemodynamically stable at presentation. The Glasgow Coma Scale was 15, and the BMI was 28.1. On physical examination, blood pressure was 132/72 mmHg, temperature was 37.7°C, heart rate was 118 beats/min, and respiratory rate was 20 breaths/min. Abdominal assessment revealed mild tenderness in the right lower quadrant, with evidence of peritonitis. Abdominal contrast-enhanced computed tomography (CT) revealed free gas in the abdominal cavity and peritoneal fluid (Fig. 1A). Abdominal CT also revealed a right lateral abdominal wall disruption in the iliac crest area involving the internal oblique muscles and the fascia, with no internal organ herniation through the defect (Fig. 1B). However, the external oblique fascia and the skin were intact.

The patient immediately underwent exploratory laparotomy through a classic midline incision. There were 2 ruptures of the ileum (0.5 cm × 0.5 cm, and 2 cm × 1 cm), with a large amount of turbid liquid in the abdominal cavity. The ruptures were closed with 3–0 absorbable suture. Due to the severe risk of abdominal cavity infection during TAWH repair, the abdominal wall hernia was not treated further. The patient remained intubated and sedated in the intensive care unit for 1 day. She was discharged 20 days after the initial trauma.

The patient was not treated with TAWH because of concerns about the operation. The patient presented at our hospital 1 year later for swelling in the right lower abdominal quadrant. Abdominal CT revealed a TAWH above the right iliac crest,

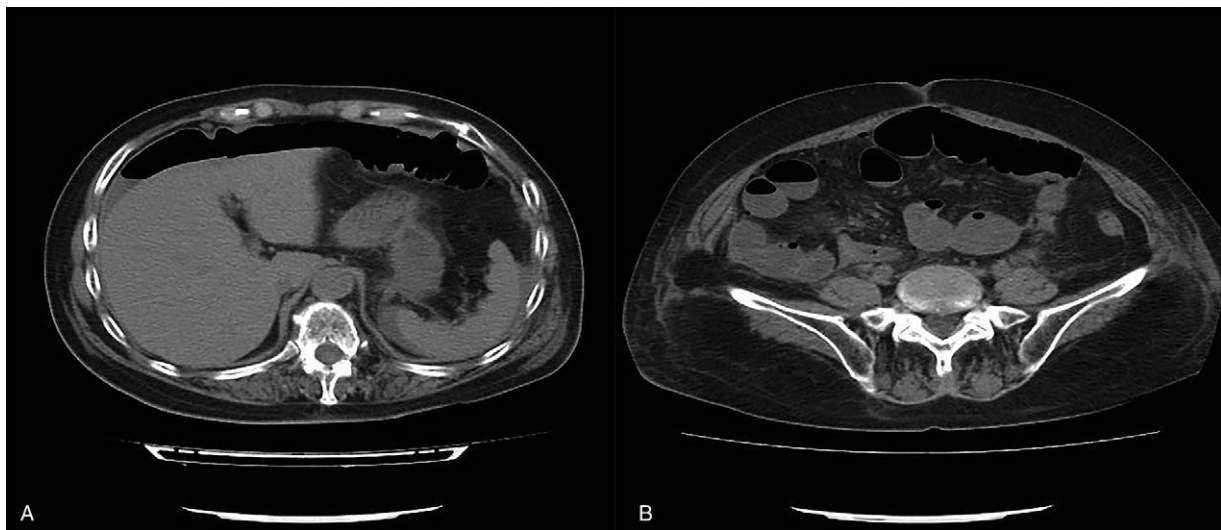


Figure 1. Abdominal contrast-enhanced computed tomography revealed free gas in the abdominal cavity and peritoneal fluid (Fig. 1a). Abdominal CT also revealed a right lateral abdominal wall disruption in the iliac crest area involving the internal oblique muscles and the fascia, with no internal organ herniation through the defect (Fig. 1b). CT = computed tomography.

with internal organ herniation through the 3 cm × 4 cm defect (Fig. 2 Fig. 2). Open surgery was performed through an oblique incision above the right iliac crest. Intraoperatively, the external oblique fascia was intact, and the internal oblique fascia was separated from the anterior superior iliac crest to form a 4 cm × 4 cm defect. An UltraPro Hernia System (UHS; Ethicon, Norderstedt, Germany) was used to repair the defect, with the underlay patch placed below the internal oblique muscle, and the onlay patch placed below the external oblique muscle. The patient was discharged without complications and showed no recurrence or complications during a follow-up period of 6 months.

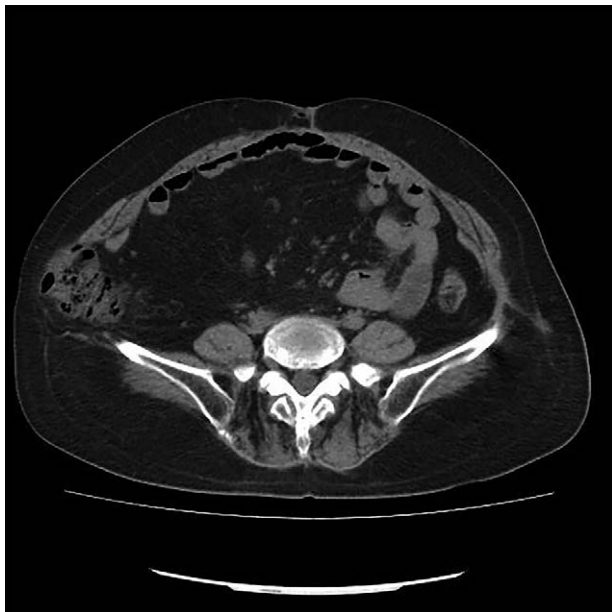


Figure 2. Abdominal computed tomography 1 year after the initial trauma showing a traumatic abdominal wall hernia above the right iliac crest, with internal organ herniation through the defect.

3. Discussion

TAWH is a rare type of hernia that occurs after a blunt impact. Although TAWH has been recognized for more than 100 years, the diagnostic criteria and standard treatment remain controversial.

Various diagnostic criteria for TAWH have been proposed.^[7-10] The diagnosis of TAWH includes 3 aspects: absence of hernia before trauma, history of trauma that could potentially have caused the hernia, and absence of skin penetration. One of the controversies regarding diagnosis of TAWH is that documentation of the absence of TAWH before trauma is not always possible.

The most common location of TAWH is the lower abdominal quadrant, due to the presence of natural orifices and the general weakness of the abdominal wall around this area. Pardhan et al reported that TAWH is most frequently located in the right lower quadrant (41%).^[11] TAWH that occurs in the lateral abdominal wall is known as traumatic flank hernia,^[12] and the superior and inferior lumbar triangles are also prone to herniation.

Previous studies have reported the association between seat belts and TAWH.^[13,14] Incorrect placement of the lap belt across the abdomen rather than the bony pelvis may shear the abdominal muscles off their attachments along the pelvic brim;^[15] this incorrect placement of the seat belt often occurs in obese people. The seat belt may cause a sudden increase in intra-abdominal pressure, leading to rupture of the abdominal wall. The present patient had a high BMI and experienced blunt trauma from a seat belt. However, the association between seat belts and TAWH remains unclear.

TAWH is most commonly diagnosed immediately after the inciting trauma. However, delayed presentation of TAWH has been reported; the longest reported period between trauma and TAWH diagnosis was 14 years.^[16] TAWH is often concomitant with damage to other abdominal organs. A retrospective analysis of 80 cases of TAWH revealed that the associated injuries included lumbar spine fractures, pelvic fractures, splenic injuries, and bowel injuries.^[17] The concomitant injuries impact the choice of TAWH treatment.

Careful history taking followed by thorough physical examination usually results in the selection of the appropriate imaging modality. Most cases of TAWH are diagnosed by abdominal CT, as it is widely used in the initial assessment of trauma. CT has the advantage of enabling the localization of concomitant injuries. In this case, the patient underwent abdominal CT which confirmed the TAWH. Ultrasonography is most commonly used to assess injury after abdominal trauma. Previous studies have reported the usefulness of ultrasonography for confirming the presence of TAWH.^[18–20] Given the difficulty in diagnosing TAWH, and the serious potential consequences of a missed diagnosis, Bjork et al proposed the use of point-of-care ultrasonography.^[21] However, the use of ultrasonography instead of CT may cause the clinician to miss other abdominal injuries. In some cases of TAWH, magnetic resonance imaging has a high degree of accuracy in the evaluation of the abdominal wall. In an unstable patient with multiple intra-abdominal injuries in whom surgical intervention is mandatory, TAWH is usually diagnosed during laparotomy.^[22,23]

The timing and type of TAWH repair are affected by several factors. The best timing of the surgical repair of TAWH is still under debate.^[14] In accordance with the complexity of the associated injuries, the surgical treatment of TAWH is classified as emergency or delayed. Unstable patients require laparotomy. Simultaneous hernia repair depends on the abdominal wall defect, trauma score, strangulation risk, overall patient condition, and available surgical expertise. Tension-free mesh repair of hernias minimizes the recurrence rate;^[24] however, the associated injuries increase the risk of mesh-related infection. In particular, hollow viscus injury with abdominal contamination is considered a contraindication to mesh repair.^[24] Delayed surgical repair of TAWH can lead to problems such as bowel strangulation.^[4] The appropriate timing and approach of surgical treatment for TAWH depend on the associated injuries, the size of the abdominal wall defect, the clinical status of the patient, and the surgical expertise of the attending surgeon. In this case, the patient underwent hernia repair 1 year after the trauma. Our study of the literature suggests that delayed surgery of a TAWH may be feasible for stable patients.

The 2 main techniques used to repair the defect in delayed cases are open and laparoscopic. Just like this case, delayed open TAWH repair is usually performed through a local incision. Most previous studies recommend the use of mesh in cases of delayed hernia repair to minimize the hernia recurrence rate.^[25] Therefore, mesh is recommended for all delayed TAWH repairs. The size of the TAWH defect influences the mesh selection. Another management method for TAWH is laparoscopic repair. Reports of laparoscopic TAWH repair have been published recently.^[12,26–28] Laparoscopic TAWH repair can be successfully performed via a similar approach to that used for laparoscopic inguinal hernia repair. One of the difficulties encountered in laparoscopic TAWH repair is the mesh fixation. Previous reports have described many mesh fixation methods.^[29,30] Patient selection for laparoscopic repair remains debatable. In recent years, emergency laparoscopic TAWH repair has been described.^[31,32] The laparoscopic approach is a viable option for TAWH repair.

4. Conclusions

TAWH is a rare form of hernia that presents a diagnostic and therapeutic challenge. The appropriate timing and approach of surgical treatment for TAWH depend on a case-by-case basis.

This case highlights that delayed selective surgery may be more suitable for stable patients.

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Author contributions

YXL and HYM searched the literature. YXL conceived of the study, participated in its design and drafted the manuscript, and final revision of the manuscript. HYM participated in the collection of the clinical data and design of the study. All authors read and approved the final manuscript.

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