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Blunt trauma-induced abdominal wall hernia with small bowel incarceration: case report and review of the literature

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Abstract

Background Traumatic abdominal wall hernia (TAWH) is a rare sequela of blunt abdominal trauma, characterized by disruption of the abdominal musculature and fascia without skin penetration. Diagnosis may be challenging and delayed, with complications such as bowel incarceration or strangulation requiring urgent intervention. This report describes a TAWH complicated by bowel obstruction, followed by a narrative review of relevant literature.

Case presentation A 69-year-old male presented with acute abdominal pain, vomiting, and a right flank mass, three days after a road traffic accident. Physical examination revealed a tender, irreducible swelling with overlying abrasions and ecchymosis. Laboratory results were unremarkable. Contrast-enhanced computed tomography (CT) demonstrated an anterior abdominal wall defect containing dilated small bowel loops with features of obstruction and possible strangulation. Emergency exploratory laparotomy revealed incarcerated but viable bowel loops within a traumatic defect. The loops were reduced, and a preperitoneal mesh repair was performed. Postoperative recovery was uneventful, and the patient was discharged on postoperative day 3.

Conclusion TAWH, though rare, should be suspected in patients with localized swelling after blunt trauma. Prompt imaging and timely surgical repair are essential to prevent life-threatening complications.

Keywords Traumatic abdominal wall hernia, Blunt trauma, Bowel obstruction, Mesh repair, Case report

Background

Traumatic abdominal wall hernia (TAWH) is defined as a defect in the abdominal wall musculature and fascia that occurs following blunt trauma, permitting the protrusion of intra-abdominal contents without skin penetration [1]. Although TAWH represents less than 1% of all blunt trauma admissions [2], its true prevalence is likely underestimated due to diagnostic challenges and the potential for delayed clinical presentation. Computed tomography (CT) scanning is crucial in the diagnosis of TAWH and aids in the definitive management [3]. TAWH may be complicated by bowel obstruction, particularly if the herniated bowel loops become incarcerated in the abdominal wall defect, which may lead to life-threatening complications such as ischemia, perforation, and sepsis necessitating urgent surgical intervention [4]. Management of post-traumatic abdominal wall hernias typically involves surgical repair, with various techniques available depending on the extent, the complexity of the hernia, and associated injuries [5]. This case report presents a patient with TAWH complicated by bowel

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strangulation, and the narrative literature review aims to identify the presentation and diagnosis of TAWH, the different techniques for surgical repair, and its outcome and complications, with a focus on the complication of bowel obstruction.

Case presentation

A 69-year-old male presented to the emergency department with acute abdominal pain and vomiting, along with a palpable mass in the right flank. The symptoms had begun three days prior, following a road traffic accident. The patient had no history of chronic medical conditions or prior abdominal surgery. Upon initial assessment, the patient appeared to be in distress due to significant abdominal pain. Physical examination revealed a sensitive, non-reducible swelling in the right flank area, in addition to skin abrasions and ecchymosis (Fig. 1). Vital signs were within normal limits, with a blood pressure of 120/80 mmHg, a heart rate of 90 beats per minute, a respiratory rate of 16 breaths per minute, and a temperature of 37 °C. The mechanism of injury was a direct impact of the right flank against the vehicle door during a road-traffic accident, corresponding anatomically to the site of the abdominal wall defect. No seatbelt mark or evidence of additional visceral injury was noted. Laboratory tests were unremarkable, including complete blood count and basic metabolic panel. Abdominal computed tomography (CT) scan with intravenous contrast revealed a post-traumatic right lateral abdominal wall defect through which dilated small bowel loops had herniated, with features of bowel obstruction and a transition level suggestive of strangulation (Fig. 2). The defect involved disruption of the internal oblique and transversus abdominis muscles, with herniation of bowel loops into the subcutaneous tissue. Mild contusion of adjacent musculature was observed without significant hematoma. Given the clinical presentation and imaging findings, it was decided to proceed with immediate surgical intervention. The patient was brought to the operating room for an exploratory laparotomy. Intraoperatively, the small bowel loops were found to be directly herniating through a defect in the abdominal wall musculature and fascia, without the presence of a true hernia sac, consistent with the acute post-traumatic nature of the injury (Fig. 3A, B). The herniated small bowel loops were viable but incarcerated within the traumatic defect and were carefully reduced. There was no evidence of bowel ischemia or perforation (Fig. 3C). The traumatic defect measured approximately 3 × 4 cm and involved disruption of the internal oblique and transversus abdominis muscles with partial tearing of the external oblique aponeurosis. The defect was situated lateral to the rectus muscle, slightly inferior to the arcuate line, an area predisposed to weakness. The herniated bowel loops extended into the subcutaneous plane. Given the absence of contamination and the viability of the incarcerated bowel, a lightweight macroporous polypropylene mesh was positioned in the preperitoneal plane and secured with interrupted non-absorbable sutures. This technique was selected to provide durable reinforcement and minimize recurrence risk. The patient's surgical recovery was uneventful, with abdominal pain resolved and bowel function restored. He was started on a clear liquid diet and gradually advanced to a regular diet as tolerated. Analgesia was provided as needed, and the patient was mobilized promptly to avoid postoperative complications such as deep vein thrombosis and pneumonia. On postoperative day 3, the patient was discharged home with appropriate instructions for wound care, activity restrictions, and follow-up.

Fig. 1 Clinical photograph showing a right flank abdominal wall swelling (arrow) consistent with a traumatic abdominal wall hernia, associated with overlying skin abrasions and ecchymosis

Discussion

Traumatic abdominal wall hernias represent a rare and diagnostically challenging consequence of blunt abdominal trauma. The first reported case was described by Selby in 1906 [6], and current knowledge regarding epidemiology, pathophysiology, and management is largely derived from case reports and small series. Traumatic abdominal wall hernias may present immediately after injury or be diagnosed in a delayed manner due to progressive weakening of the abdominal wall.

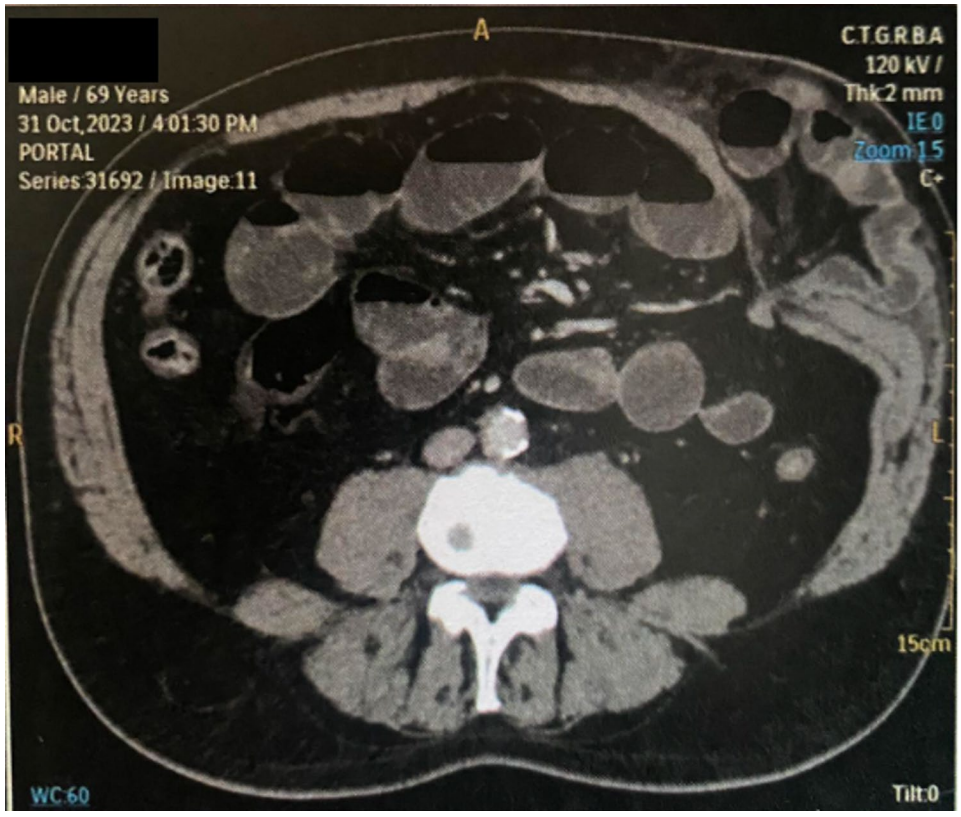

Fig. 2 Axial CT image showing a right lateral abdominal wall defect measuring approximately 3×4 cm, involving disruption of the internal oblique and transversus abdominis muscles, with herniation of small bowel loops into the subcutaneous tissue

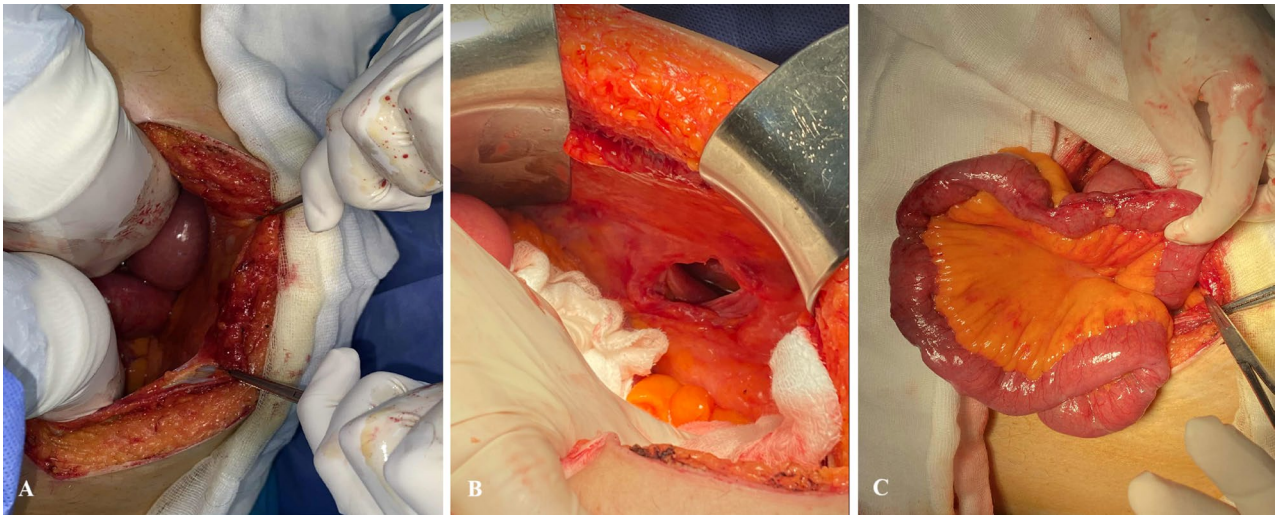

Fig. 3 Intraoperative findings. (**A**) Incarcerated small bowel loops within the abdominal wall defect. (**B**) Musculofascial defect of the abdominal wall. (**C**) Reduced small bowel loops showing no macroscopic signs of ischemia

TAWH is more commonly observed in younger males, typically under the age of 50, and commonly presents as either hematoma, abrasion, ecchymosis (in 49% of cases) or a palpable local hernia (in 31% of cases) [7]. In our case, the hernia was identified within three days following a road traffic accident, illustrating an acute onset. Clinical presentation varies from asymptomatic abdominal wall defects to acute complications such as bowel obstruction or strangulation. This variability underscores the importance of early recognition and timely surgical management [8]. As Killeen and colleagues demonstrated through a decade-long review of 63 cases, high clinical

Table 1 Published cases of traumatic abdominal wall hernia complicated with bowel obstruction

Author(s)	Age	Gender	Mechanism of Blunt Trauma	Clinical Manifestation	Radiological Findings	Management
Gill et al. (1993) [10]	23	Male	Road traffic accident	Non-reducible 8×10×2 cm midline soft tissue swelling with shallow skin lacerations over the epigastrium	ventral abdominal hernia containing small bowel and a portion of the transverse colon	Resection of nonviable ileum and primary repair with interrupted 1 – 0 Vicryl sutures
Mahajna et al. (2004) [11]	55	Male	high-velocity motor vehicle accident.	Abdominal pain Right upper quadrant ecchymosis	CT: Abdominal wall rupture in the right upper quadrant with intestinal herniation through the defect	-Right hemicolectomy - The abdominal wall defect was repaired using prosthetic mesh.
Pazouki (2014) [12]	24	Male	falling from the third floor	tender reducible mass of 8×10 cm2 in the left side of the umbilicus	a defect in the abdominal wall with herniation of small bowel loops	Resection of 100 cm of the ischemic small bowel. Abdominal fascia closed with nylon
Nishimura el al. (2015) [13]	60	Female	She had fallen on a bicycle handlebar	Bowel obstruction, delayed presentation	CT: herniated bowel with signs of strangulation	Surgical exploration and hernia repair by elective suture of the fascia and peritoneum
Chandrasekhar et al. (2015) [14]	29	Male	Blunt injury to the anterior abdominal wall with the handlebars of an autorickshaw	A 3 cm irreducible mass in the left iliac fossa	strangulated Spigelian hernia with dilated bowel loops	Resection of 20 cm of bowel with primary ileoileal anastomosis. The tear in the peritoneum and muscle layers was repaired by layered suturing
Andrabi et al. (2021) [15]	29	Male	Road traffic accident	Distended abdomen distended with seat-belt signs	herniation of bowel and hernial defect	Herniated jejunum was reduced. The defect was repaired with on-lay polypropylene mesh
Ali et al. (2024) [16]	66	Male	animal struck him with its horns on his lower abdomen	Abdominal tenderness, shock signs, and irreducible swelling in the left iliac region	US: herniation of gut loops in the left iliac fossa. The gut loops appear thickened with no peristalsis and no significant vascularity	Emergency laparotomy with bowel resection and primary abdominal wall repair

suspicion and prompt imaging with a CT scan facilitate accurate diagnosis and guide appropriate management decisions [9].

The literature on TAWH complicated by bowel obstruction, while limited, offers insights into the optimal management of this injury [10–16] (Table 1).

In terms of classification, traumatic abdominal wall hernias can be categorized into primary or secondary types based on the absence or presence of pre-existing fascial defects, respectively. Primary hernias emerge where trauma directly disrupts the abdominal musculature, while secondary hernias stem from indirect forces breaching weakened fascial planes. Dennis et al. [17] introduced a novel CT-based grading system to assess abdominal wall injuries. Each scan underwent meticulous examination to identify and classify injuries based on the following criteria:

- grade I denoted subcutaneous tissue contusion
- grade II indicated hematoma within the abdominal wall muscles
- grade III represented partial disruption of a single abdominal wall muscle
- grade IV signified complete disruption of abdominal wall muscles
- grade V described complete muscle disruption with herniation of abdominal contents
- grade VI referred to an open herniation.

This nuanced grading helps surgeons plan the most effective repair strategy.

Imaging remains the cornerstone for assessing these injuries, with CT scan being the preferred modality due to its high sensitivity and specificity for detecting breaks in the muscle layers, protruding bowel loops, signs of bowel ischemia or obstruction and associated visceral injuries [18]. Such findings guide not only diagnosis but the urgency and type of treatment required.

Management of TAWH is dictated by the clinical presentation, severity of associated injuries, and patient's overall condition. In cases of acute hernia incarceration or strangulation, emergent surgical intervention is indicated to relieve bowel obstruction, restore blood flow to ischemic bowel segments, and repair the hernia defect. Surgical repair options range from primary closure of the fascial defect to placement of synthetic mesh for

reinforcement, to achieve durable hernia repair and minimize the risk of recurrence [19]. The use of mesh in hernia repair has become standard practice, as it provides durable reinforcement of the abdominal wall and reduces the risk of hernia recurrence. In our case, a preperitoneal mesh repair was favored due to its ability to cover the defect and distribute tension evenly across the abdominal wall.

Although postoperative recovery is often favorable, potential complications include wound infection, seroma formation, mesh-related morbidity, and hernia recurrence. Vigilance in postoperative care and diligent follow-up remain essential.

Conclusion

Traumatic abdominal wall hernias, although rare, must be viewed through a lens of urgency and precision. Advances in radiological imaging and surgical techniques have indeed improved outcomes, but gaps remain particularly around long-term follow-up studies, the prognostic impact of additional intra-abdominal injuries, and the true efficacy of mesh repairs. Standardized diagnostic and treatment protocols could dramatically enhance clinical decision-making and patient care. This case underscores the potential for early bowel incarceration following blunt trauma and reinforces the need for high clinical suspicion and timely surgical management, even in apparently stable patients.

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Data availability
Not applicable.

Declarations

Ethics approval and consent to participate
Ethical review and approval were not required for the study on human participants in accordance with the local legislation and institutional requirements.

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

Competing interests
The authors declare no competing interests.

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