Case Report

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Isolated appendix perforation in a blunt traumatic abdominal hernia: A case report

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Abstract

BACKGROUND: Isolated traumatic appendicular perforation is an extremely rare complication of blunt abdominal trauma. The concurrent occurrence with blunt traumatic abdominal hernia represents an exceptionally rare combination, with fewer than 10 cases documented in the literature worldwide.

CASE PRESENTATION: We present a case of an 18-year-old male who sustained isolated traumatic appendicular perforation with concurrent blunt traumatic abdominal wall hernia following a high-speed motor vehicle accident. The patient presented with right lumbar swelling and underwent emergency exploratory laparotomy, which revealed perforation at the base of the appendix with complete disruption of the mesoappendix and active bleeding from the appendicular artery, herniated through a traumatic abdominal wall defect.

CONCLUSION: This case emphasizes the importance of maintaining high clinical suspicion for complex intra-abdominal injuries in blunt trauma patients. Early recognition and surgical intervention are crucial for optimal outcomes in these rare combined injuries.

Keywords:

Appendectomy, blunt abdominal trauma, blunt traumatic abdominal hernia, emergency surgery, isolated appendicular perforation

Introduction

Isolated traumatic appendicular perforation represents one of the rarest complications of blunt abdominal trauma (BAT), with fewer than 50 cases documented in the medical literature. Blunt traumatic abdominal wall hernia (TAWH) is equally rare, occurring in less than 1% of all BAT cases. The concurrent occurrence of these two rare entities is exceptionally uncommon, with only a handful of cases reported worldwide. We present a unique case of isolated traumatic appendicular perforation with concurrent blunt TAWH in an 18-year-old male following a high-energy motor vehicle accident.

Case Presentation

An 18-year-old male, with no significant past medical or surgical history, with a body mass index of 20.6 kg/m^2 presented following a high-speed motor vehicle accident while riding a scooter that collided with a stationary vehicle. The patient denied any history of vomiting, loss of consciousness, abnormal body movements, or external bleeding at the scene of the accident.

Initial assessment at a peripheral hospital demonstrated a Glasgow Coma Scale of 15/15 with bilateral pupils equal in size and reactive to light. Vital signs were stable with a pulse rate of 100 beats per minute,

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blood pressure of 110/76 mm Hg, oxygen saturation of 96% on room air, and respiratory rate of 17 breaths per minute. Chest examination revealed bilateral air entry with normal heart sounds and no evidence of thoracic trauma. Abdominal examination demonstrated swelling in the right lumbar region with bruised but intact overlying skin without penetrating injury, as shown Figure 1. The swelling was soft, tender, and irreducible with associated right iliac fossa tenderness. The remainder of the abdomen was soft and non-tender.

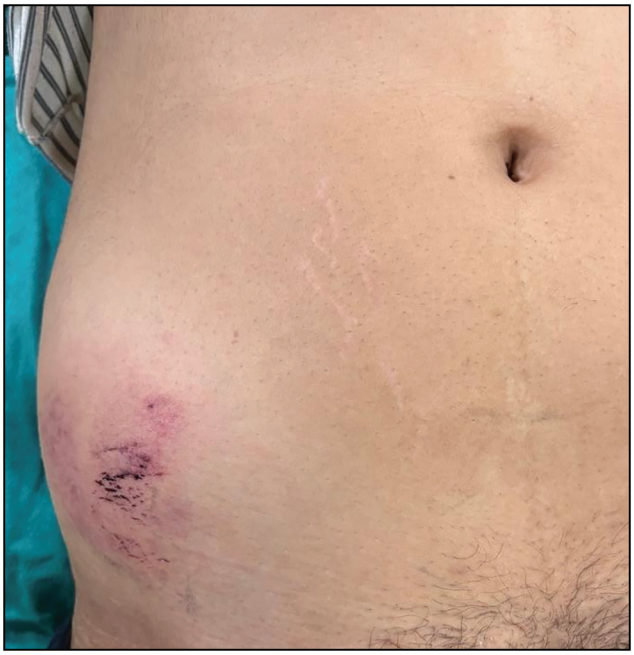

Figure 1: Picture depicting a traumatic right lumbar region swelling with bruised skin

The patient was transferred to our tertiary care center for further evaluation and management. In emergency, the baseline investigation was done, and blood was sent for blood grouping and cross-matching. Resuscitation was started with warm normal saline, and antibiotics (piperacillin tazobactam and metronidazole) were administered; the patient had a hemoglobin of 10 g/dL and TLC 13,000 cells per microliter. Kidney and liver function tests were normal. The patient had a normal coagulation profile. Ultrasonography revealed an abdominal wall defect in the right lumbar region measuring 58 mm with herniation of bowel loops. Contrast-enhanced computed tomography demonstrated a 5 cm × 2 cm defect in the abdominal wall in the right lumbar region with herniation of the small bowel into subcutaneous space, as depicted in Figure 2. Soft tissue stranding with multiple surrounding tiny air foci suggested possible bowel perforation. Two mesenteric hematomas measuring 40 mm × 30 mm and 42 mm × 35 mm were identified in the right iliac fossa with active contrast extravasation, indicating ongoing vascular bleeding.

Emergency exploratory laparotomy was performed after obtaining informed consent. Operative findings

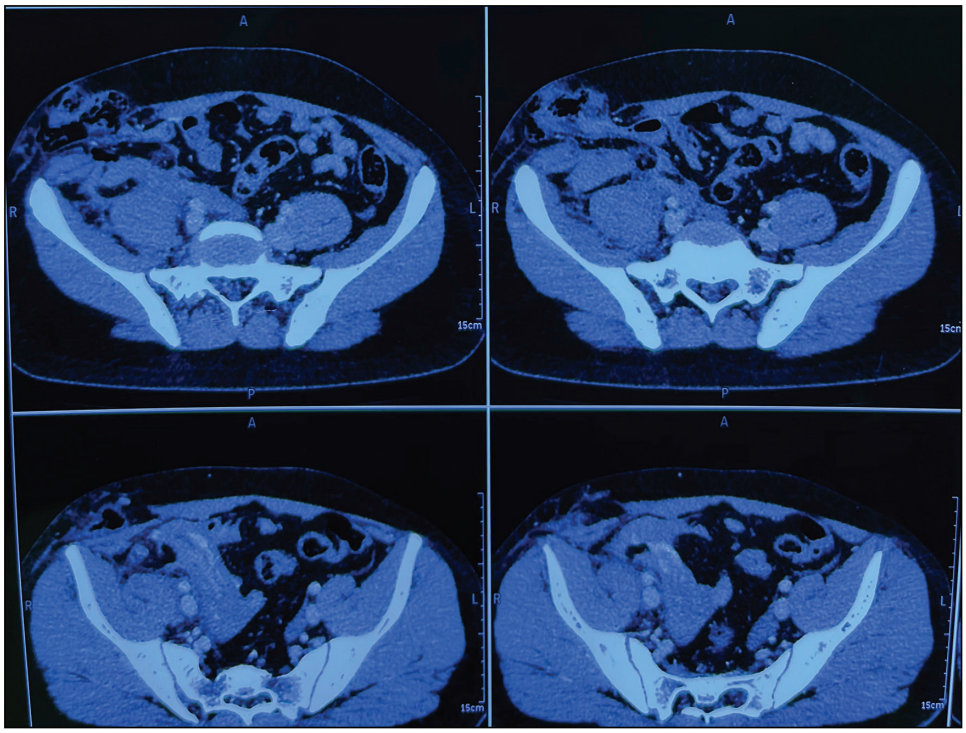

Figure 2: Contrast-enhanced computed tomography picture depicting a defect in the abdominal wall in the right lumbar region with herniation of the bowel

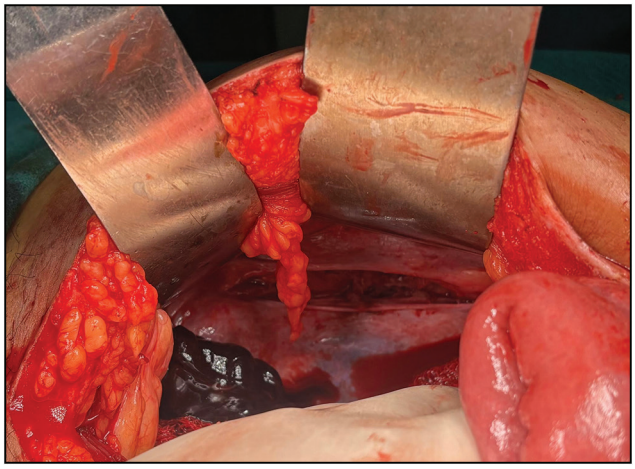

Figure 3: Intraoperative picture showing a defect in the abdominal wall with an associated hematoma in right iliac fossa

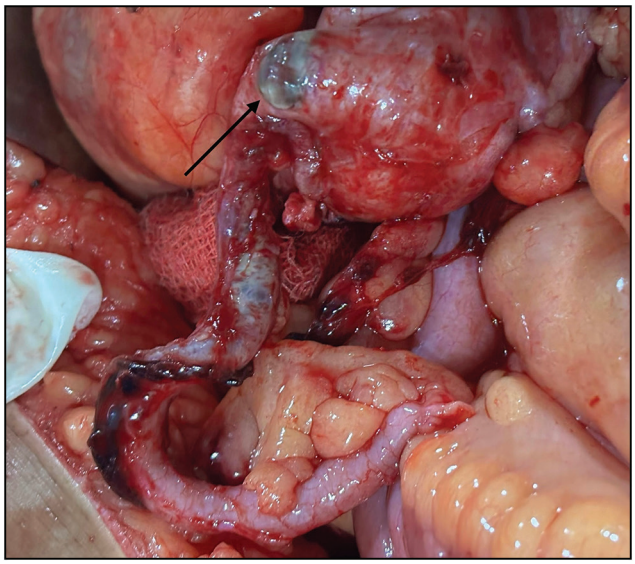

Figure 4: Intraoperative picture depicting a perforation at the base of the vermiform appendix

revealed a traumatic abdominal wall defect in the right lumbar region measuring approximately 10 cm × 3 cm, as is evident from Figure 3. There was herniation of approximately 5 cm of terminal ileum, appendix, and base of cecum through the defect. The herniated contents were reduced, revealing perforation at the base of the appendix with a serosal tear in the body of the appendix, as shown in Figure 4. Complete disruption of the mesoappendix from the appendix was noted, with active bleeding from the appendicular artery. Two hematomas measuring 5 cm × 5 cm each were present in the right iliac fossa. An additional 7 cm × 2 cm defect in the parietal peritoneum overlying the psoas muscle with exposed muscle fibers was identified. Notably, the cecum and terminal ileum appeared entirely normal with no evidence of injury, confirming the isolated nature of the appendicular perforation.

The surgical procedure involved ligation of the actively bleeding appendicular artery followed by appendectomy. The traumatic hernia defect was repaired with primary closure using prolene sutures, and the parietal peritoneum defects were closed with vicryl sutures. The operative time was 70 min. The patient experienced an uneventful postoperative course and was discharged on the fifth postoperative day with complete recovery. On histopathological examination, the appendix was edematous and distended with perforation at the base. On microscopic examination, features of acute appendicitis were present.

Discussion

Isolated traumatic appendicular perforation remains a seldom encountered but clinically significant manifestation of BAT. Many cases have been reported on traumatic appendicitis, but less data are available on traumatic appendicular perforation. Given the appendix's mobility and retrocecal positioning in most individuals, it is typically shielded from direct injury. In contrast, common sites for injury following BAT are the liver, spleen, and hollow viscera such as the small bowel or colon. The co-occurrence of TAWH and isolated appendicular perforation, as demonstrated in this case, is not only exceedingly rare but diagnostically elusive. A detailed literature search reveals that only a handful of such cases have been reported. Toumi *et al*.[1] in a systematic review of 28 cases between 1991 and 2009, emphasized that trauma can serve not merely as a coincidental event but as a precipitating factor in acute appendicitis and perforation. They proposed that mechanisms such as mucosal edema, lymphoid hyperplasia, or ischemic injury following BAT can initiate an inflammatory cascade, leading to perforation, even in previously normal appendices. Wangensteen *et al*.[2] in one of the earliest pathophysiological studies, proposed that increased intraluminal pressure and impaired vascular perfusion are key events in appendiceal inflammation and necrosis. Their findings, although from animal studies, remain relevant to understanding trauma-induced ischemia as a contributory factor in appendicular perforation.[2] Our case supports both ischemic and mechanical theories. The complete avulsion of the mesoappendix, active bleeding from the appendicular artery, and perforation at the base of the appendix indicate direct shearing forces and vascular disruption—hallmarks of high-velocity trauma. Moreover, the concomitant TAWH and

mesenteric hematomas suggest substantial localized force transmission to the right lower quadrant (RLQ), reinforcing that even a mobile structure like the appendix is not immune to blunt force impact when surrounded by localized hemorrhage or bowel displacement. The diagnostic challenge is compounded by the fact that preoperative imaging may not reveal appendicular injury, especially in the absence of free intraperitoneal air or localized peritonitis. Computed tomography (CT) imaging is highly sensitive in identifying solid organ injuries and bowel wall defects but often underperforms in diagnosing subtle perforations of a mobile, small-caliber organ like the appendix. In our case, CT showed herniation and hematomas, which indirectly raised suspicion of a hollow viscous injury but failed to identify the exact site of perforation. This is consistent with findings by Yu *et al*.[3] who reported a case of delayed traumatic appendicular perforation in an adult where CT imaging was nonspecific, and the final diagnosis was made intraoperatively. Additionally, Etensel *et al*.[4] documented similar diagnostic delays in pediatric cases of trauma-induced appendicitis, with imaging showing only nonspecific RLQ findings. Their retrospective review highlighted the necessity of a high clinical index of suspicion, especially in pediatric or young adult trauma patients presenting with atypical RLQ pain.[4] In our scenario, prompt exploratory laparotomy led to the diagnosis and definitive management before peritonitis could ensue. All available reports in the literature, including those by Zvizdic *et al*.[5] and Habachi *et al*.[6] emphasize that surgical intervention via appendectomy, and in some cases, abdominal wall reconstruction, leads to favorable outcomes when done early. The presence of TAWH, an entity first formally described in 1906, should independently raise red flags for possible underlying bowel injury. TAWH occurs due to a sudden increase in intra-abdominal pressure with concurrent shearing of the muscle layers, while the skin remains intact. Though commonly associated with seatbelt injuries, handlebar impacts, or falls, its association with bowel or appendiceal herniation—as in our case—should trigger immediate surgical evaluation. Failure to recognize TAWH can lead to strangulated hernias, delayed bowel ischemia, or missed hollow viscous perforation. From a surgical standpoint, standard appendectomy remains the cornerstone of treatment for traumatic appendicular perforation. The decision to perform primary repair of the hernial and peritoneal defects must be tailored to the defect size, contamination level, and patient condition. In our case, the primary closure with non-absorbable sutures yielded excellent results without hernia recurrence or infection. Lastly, this case reiterates the importance of multidisciplinary trauma assessment. Surgeons, emergency physicians, and radiologists must collaborate closely in evaluating BAT cases, especially when unusual abdominal wall findings coexist with signs of intra-abdominal hemorrhage. Delayed or missed diagnosis in such scenarios can have grave consequences, including sepsis, abscess formation, or multi-organ failure.

Conclusion

Isolated traumatic appendicular perforation with concurrent blunt TAWH represents an exceptionally rare combination of injuries that requires high clinical suspicion for diagnosis. The concurrent occurrence of these two rare entities creates unique diagnostic and therapeutic challenges that demand comprehensive evaluation and prompt surgical intervention. This case contributes valuable information to the extremely limited literature on this rare combination of injuries and reinforces the importance of thorough evaluation in trauma patients with evidence of abdominal wall disruption.

Author contributions

SB and GAB: conceptualization. SB: methodology. SB and BAW: formal analysis and investigation. SB: writing – original draft preparation. Funding acquisition: Not applicable. Resources: Not applicable. SB: supervision.

Ethical policy and Institutional Review board statement

The institution doesn't seek approval for publication of case reports. The study complies with the ethical principles outlined in the Declaration of Helsinki.

Declaration of patient consent

Informed consent was taken from patient for publication of this case report, including operative images.

Data availability statement

Data is present with corresponding author and will be made available on request of editor in chief.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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