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A literature review and case report: Traumatic appendicitis in an elderly patient with spinal cord injury and medical comorbidities

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Abstract:

Acute appendicitis is a leading cause of acute abdomen, yet its onset after blunt trauma remains exceedingly rare and diagnostically challenging – particularly in the elderly and in patients with concurrent neurological injuries. We present the case of a 65-year-old woman who developed acute appendicitis following a motor vehicle collision that also caused thoracic spinal fractures with canal involvement. Initially hemodynamically stable with a normal abdominal examination and a negative focused assessment with sonography for trauma, she developed right lower quadrant pain 22 h posttrauma, which localized and intensified by 56 h. Contrast-enhanced computed tomography (CT) at 59 h revealed an 8-mm inflamed appendix with periappendiceal fat stranding, and open appendectomy at 61 h confirmed acute appendicitis with fibrous obliteration. The patient’s recovery was uneventful. This case underscores how concurrent spinal injury and immobilization can obscure evolving abdominal pathology, emphasizing the importance of repeated clinical assessment and timely CT imaging in elderly polytrauma patients. In addition to the case presentation, we conducted a comprehensive literature review of all reported cases of posttraumatic appendicitis, summarizing demographic, clinical, and diagnostic patterns to contextualize this rare phenomenon. Together, these findings reinforce the need for heightened diagnostic vigilance and multidisciplinary coordination when evaluating delayed abdominal pain in trauma patients with neurological compromise.

Keywords:

Blunt abdominal trauma, case report, elderly, spinal injury, traumatic appendicitis

Introduction

Acute appendicitis is one of the most frequent causes of emergency department (ED) visits for abdominal pain, with a lifetime risk estimated at 7%–8%. Appendicitis is also the leading cause of acute abdomen and the most common

surgical emergency worldwide, occurring predominantly in young individuals and less frequently at the extremes of age.^[1] It results from inflammation and luminal obstruction due to factors such as fecaliths, lymphoid hyperplasia, impaction, neoplasms, parasitosis, or rarely trauma. The etiology of acute appendicitis often remains undefined, and reliable predictors of severity are lacking. While trauma is a recognized but rare precipitant, cases following blunt

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abdominal trauma are reported only sporadically.^[2] In this case report, we describe the diagnostic evaluation and management of an elderly woman who developed acute appendicitis after sustaining blunt trauma to the abdomen, pelvis, and spinal column.

Case Report

A 65-year-old woman was brought to the ED after being involved in a car collision at approximately 8:00 AM. She was a front-seat passenger, not wearing a seatbelt, when the vehicle was struck from the side at moderate speed by another car at an urban intersection. The primary impact was on the left side, but secondary deceleration and cabin deformation transmitted forces to multiple regions of the body, particularly the lumbar spine and abdomen. This mechanism and the involvement of multiple anatomical regions clearly classify the case as multiple trauma.

On arrival at the ED 20 min postaccident (8:20 AM), the patient was fully alert and oriented. Her initial vital signs were stable: blood pressure - 130/80 mmHg, heart rate - 86 beats/min, respiratory rate - 18 breaths/min, and temperature - 37.1°C (98.8°F). She denied loss of consciousness, and there was no evidence of external bleeding or hypotension throughout her ED course.

Focused assessment with sonography for trauma (FAST) was performed immediately and found to be normal. Initial evaluation included a complete blood count, basic biochemistry (blood sugar, urea, and creatinine), noncontrast computed tomography (CT) of the chest and mediastinum, noncontrast CT of the lumbar spine, and magnetic resonance imaging of the thoracic and lumbar spine. Given the absence of abdominal pain, normal abdominal examination, and stable hemodynamics, the patient was evaluated by the general surgery service and subsequently discharged from their care. She was admitted under neurosurgery for the management of spinal injuries.

On hospital day 2 (22 h posttrauma), the patient began to complain of vague, dull abdominal pain without localization or systemic symptoms. Abdominal examination remained normal, with no tenderness, guarding, or peritoneal signs. The pain was initially attributed to postural changes and immobilization related to her spinal injury.

By hospital day 3 (approximately 56 h posttrauma, 4:00 PM on day 3), the patient's abdominal pain intensified and became localized to the right lower quadrant. At this point, surgical consultation was re-obtained. Examination by the surgical team revealed localized tenderness at McBurney's point without rebound or rigidity. There was still no vomiting, or fever, but the patient reported nausea.

Given the new focal tenderness and persistent symptoms, an abdominopelvic ultrasound was performed, which was unremarkable. Due to high clinical suspicion for intra-abdominal pathology, a contrast-enhanced CT scan of the abdomen and pelvis was obtained at 7:00 PM (approximately 59 h posttrauma), revealing an appendix measuring 8 mm in diameter with periappendiceal fat stranding and mild inflammatory changes at the tip—findings consistent with acute appendicitis. Mild right lower lobe lung consolidation was also noted [Figures 1 and 2].

Laboratory analysis at this time showed leukocytosis (white blood cell: $12.4 \times 10^9/L$) with neutrophilia (76%), normal platelets ($197 \times 10^9/L$), elevated urea (52 mg/dL), and mildly elevated creatinine (1.35 mg/dL). All other laboratory parameters remained within normal limits.

Open appendectomy was performed approximately 61 h posttrauma (9:00 PM on hospital day 3). Intraoperative findings confirmed an inflamed appendix with a fecalith and periappendiceal edema. Histopathology demonstrated acute appendicitis with fibrous obliteration at the tip. The patient had an uneventful postoperative course and was discharged home in stable condition on postoperative day 5. Written informed consent was obtained from the patient for publication of this case report.

Review of literature

A comprehensive literature search was conducted to identify previously reported cases and case series of acute appendicitis following blunt abdominal trauma. Only studies published in English with full-text access were included. Pediatric cases were excluded to focus on the adult population. Relevant data were extracted. Table 1 summarizes these findings, providing an overview of reported cases and highlighting patterns in presentation, diagnostic evaluation, and management of posttraumatic appendicitis.

Discussion

This case is notable for the rare occurrence of acute appendicitis after blunt abdominal trauma in an elderly patient with concurrent thoracic spinal fractures. While appendicitis is common, its onset in the context of trauma – particularly in older adults – is uncommon and controversial. The clear temporal link between injury and symptom onset, together with imaging and histopathology, supports trauma as a possible trigger rather than coincidence. The uniqueness of this case is further highlighted by the concurrent spinal cord involvement and abnormal renal indices (elevated urea and creatinine), all of which complicated evaluation and management.

Table 1: Summary of reported cases of acute appendicitis following blunt trauma

Author (year)	Age Sex	Clinical presentation	Timing of appendicitis onset after trauma	Physical examination	Laboratory results	Imaging findings	Associated injuries	Pathology
Derr and Goldner (2009) ^[11]	41 Male	RLQ pain, vomiting	Several hours after trauma	Not detailed	Not reported	US/CT: Appendicitis	None	Acute, nonperforated
Alabdulaaly <i>et al.</i> (2024) ^[12]	21 Male	Sudden RLQ pain, nausea, vomiting, and anorexia	5 days after trauma	RLQ tenderness, rebound, soft, no fever	Normal	CT: Appendicitis, fat stranding, phlegmon	Grade 1 splenic injury	Perforated appendicitis
Takagi <i>et al.</i> (2000) ^[13]	45 Male	Mild mid-abdominal pain, RLQ pain 2 days later	2 days after trauma	Mild tenderness, soft abdomen, bruising (day 2)	Normal WBC, mild↑CPK	Not reported	None reported	Phlegmonous appendicitis with periappendicitis
Lee and Jung. (2021) ^[14]	68 Female	Transferred after motor vehicle accident; hypotension, abdominal pain/distension	Not specified	Distended, diffusely tender abdomen	Leukocytosis	eFAST: Peritoneal fluid; CT: Hemoperitoneum, dilated appendix	Small bowel perforation, multiple mesenteric tears, splenic injury	Acute appendicitis was confirmed pathologically after appendectomy
Hennington <i>et al.</i> (1991) - Case 1 ^[9]	46 Male	Generalized lower abdominal pain, radiating to the back/groin; anorexia; mild nausea; no prior symptoms	Case 1: 2 days after trauma Case 2: 8 h after trauma	Mild abdominal distension; bilateral lower quadrant tenderness (worse on right); no guarding or rigidity	Leukocytosis; urine cells; CPK ↑	CT: Small fluid in cecal/mesenteric area; no retroperitoneal injury	None reported	Gangrenous appendicitis
O'Kelly <i>et al.</i> (2012) ^[15]	29 Male	24-h history of progressive RLQ pain following trauma	24 h after trauma	RLQ guarding and rebound tenderness; no rigidity; scrotal and rectal exams unremarkable	WBC and lactate ↑; others normal	CT: Inflammatory mass in RIF; haemoperitoneum; enlarged lymph nodes; stranding; free air; thickening of caecum, small bowel, appendix	None reported	Perforated appendicitis with necrotic fragments, dense inflammatory infiltrate
Khilji and Zia Ullah (2017) ^[16]	43 Male	Abdominal pain; no prior symptoms	Two hours after trauma	RIF tenderness with visible seat belt mark; no peritoneal signs; vitals stable	Neutrophilia; others normal	CT: Appendix 8 mm thickened with minimal adjacent fat stranding; subcutaneous fat stranding of the anterior lower abdominal wall (seat belt bruise)	None reported	Acute appendicitis confirmed on histopathology
Jaramillo <i>et al.</i> (2024) ^[17]	18 Female	Initial RUQ/flank pain → migrated to RIF over 6 h; dull, constant pain with nausea, vomiting, and anorexia	6 h after trauma	RIF tenderness; positive psoas sign; no initial rebound, positive later; vitals stable	Mild leukocytosis; others normal	CT: Thickened retrocecal appendix (4.6 mm); subtle fat stranding; intraluminal gas; no other abnormalities	None reported	Congested retrocecal appendix with mucosal erosions

Contd...

Table 1: Contd...

Author (year)	Age Sex	Clinical presentation	Timing of appendicitis onset after trauma	Physical examination	Laboratory results	Imaging findings	Associated injuries	Pathology
Karapolat and Küçük (2018) ^[18]	36 Male	RLQ abdominal pain, vomiting, absence of bowel movement; began ~13–14 h postinjury	13–14 h after trauma	RLQ tenderness, guarding, rebound tenderness	WBC ↑; CRP ↑; Hb mildly ↓	US: Appendix 10 mm, mesenteric edema; CT: Appendix 11 mm, periappendiceal mesenteric density increase; no other intra-abdominal injuries	None reported	Acute gangrenous appendicitis with congested periappendiceal adipose tissue and hematoma
Yu et al. (2023) - Case 2 ^[19]	25 Male	Abdominal pain, fever, signs of abdominal infection 3 days after assault	Three days after trauma	Tenderness and guarding; no bruises	WBC normal; others unremarkable	FAST: Morrison's pouch fluid; CT: Thickened appendiceal wall, dilated lumen, hemopneumoperitoneum	None reported	Perforated appendix with pus in the right paracolic gutter
Shawasha et al. (2024) ^[20]	28 Male	Vague abdominal and bilateral flank pain, progressing to RIF pain; urinary symptoms; decreased appetite	Three days after trauma	Ill-appearing, pale, dehydrated, tachycardic, hypotensive; rigid abdomen with guarding, maximal at RIF	WBC and CRP ↑; fluid: <i>E. coli</i>	CT (noncontrast): Free fluid, perforated appendix, thickening of jejunum, rectum, sigmoid; inflammatory mass near bladder; X-ray: Pneumoperitoneum	Inflammatory mass attached to the urinary bladder and sigmoid	Acute perforated appendicitis with inflammatory mass formation adherent to the bladder; <i>E. coli</i> infection confirmed from peritoneal culture
Our case	65 Female	Generalized dull abdominal pain → localized to the RLQ; no nausea, vomiting, fever, or peritoneal signs	22 h after trauma	Mild RLQ tenderness; abdomen soft, no guarding/rebound; lungs: Wheezing; vitals stable	All labs normal	US: No findings; CT: Appendix 8 mm, mild periappendiceal fat stranding (suggestive of appendicitis)	Spinal trauma	Lumen with fecaloid content; acute appendicitis with fibrous obliteration at the tip

↑: Increased (or Elevated), ↓: Decreased (or Reduced), RLQ: Right lower quadrant, eFAST: Extended focused assessment with sonography for trauma, CT: Computed tomography, US: Ultrasound, WBC: White blood cell count, CPK: Creatine phosphokinase, RUQ: Right upper quadrant, RIF: Right iliac fossa, CRP: C-reactive protein, Hb: Hemoglobin, *E. coli*: *Escherichia coli*

Acute appendicitis after blunt abdominal trauma has been occasionally reported. However, the occurrence of acute appendicitis following trauma remains relatively rare. Whether trauma bears a causal relationship to acute appendicitis or the association is merely coincidental remains a subject of debate.^[3] Several traumatic events have been documented, such as injuries caused by seat belts, falls, assaults, and blunt trauma sustained during motor vehicle collisions, which have ended in acute appendicitis.^[4] Many theories have been developed to explain this phenomenon, such as increased intra-abdominal pressure in direct injury, obstructive appendicitis secondary to increased intra-colonic pressure, simultaneous presence of appendiceal fecalith and cecal trauma, a direct effect on the appendix with

subsequent appendiceal edema, inflammation, and/or hyperplasia of intrinsic lymphoid tissues.^[4-7]

Appendiceal obstruction may arise from various conditions, such as fecaliths, hypertrophied lymphoid tissue, foreign bodies, intestinal parasites, or, less commonly, neoplastic lesions. When the appendiceal lumen becomes blocked – whether by benign or malignant pathology – luminal pressure rises, leading to mucosal edema, inflammation, and compromised venous and lymphatic drainage. This cascade promotes tissue ischemia, which may progress to necrosis and bacterial translocation.^[8] Others suggest another view that early appendicitis often begins with vague abdominal discomfort, which may predispose patients to accidents. In this scenario, trauma does not cause appendicitis but



Figure 1: Contrast-enhanced axial computed tomography image of the abdomen demonstrating an enlarged, thick-walled appendix with periappendiceal fat stranding, consistent with acute appendicitis. The inset highlights the inflamed appendix, with surrounding inflammatory changes clearly visible in the right lower quadrant. These radiologic findings are characteristic of early acute appendicitis and support the clinical diagnosis in the posttrauma setting

rather leads to medical evaluation of an already evolving condition. This overlap creates a diagnostic pitfall, as abdominal pain may be mistakenly attributed to injury instead of early appendicitis.^[9]

In another proposed theory, direct trauma induces localized edema, intramural hematoma, or reactive lymphoid hyperplasia of the appendix. These posttraumatic changes may compromise the appendiceal lumen, leading to secondary obstruction and subsequent inflammation.^[9] In our opinion, in elderly patients, the possibility of an underlying appendiceal neoplasm requires specific attention. Neoplastic lesions can cause partial obstruction of the lumen and remain asymptomatic until an additional trigger, such as trauma, induces inflammation. In this setting, trauma may act as the precipitating factor that unmasks a preexisting oncologic process. Therefore, in older patients presenting with posttraumatic appendicitis, oncologic causes should be carefully considered, and thorough histopathological evaluation of the specimen is essential.

The presence of concurrent spinal injury adds a layer of complexity in the diagnosis and management of posttraumatic appendicitis. Spinal fractures and associated neurological concerns often dominate the initial clinical assessment, potentially delaying recognition of evolving abdominal pathology. Moreover, overlapping symptoms – such as abdominal pain referred from spinal injury or limited mobility masking peritoneal signs – can obscure the clinical picture. In this patient,

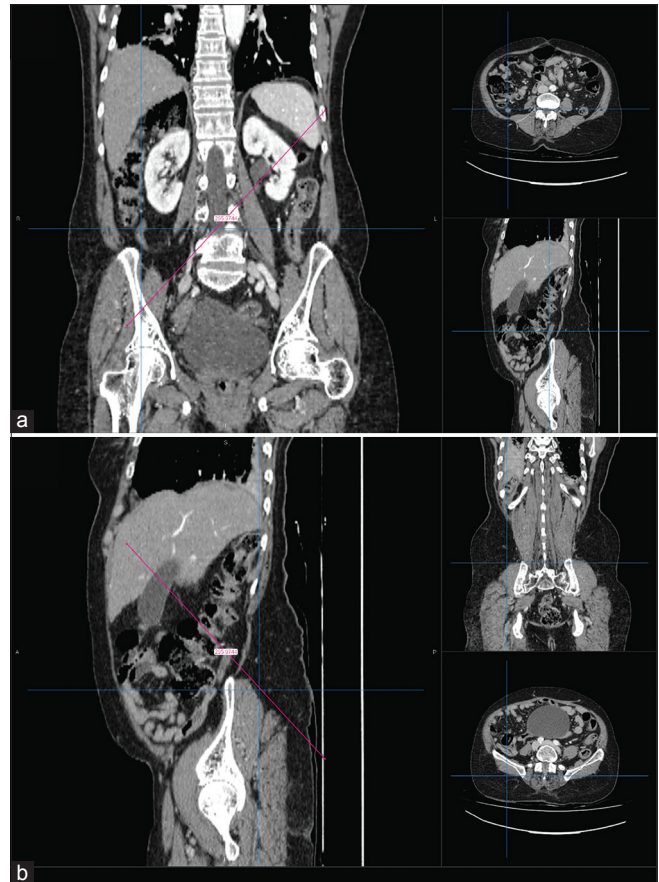


Figure 2: (a) Coronal computed tomography scan view illustrating the anatomical position and structure of the appendix in the pelvis. (b) Sagittal computed tomography scan view depicting the appendix in longitudinal profile

thoracic vertebral fractures with spinal canal involvement posed significant diagnostic challenges and required a high index of suspicion for intra-abdominal pathology. Routine hematological and biochemical investigations are of limited diagnostic value; while inflammatory markers may be elevated, they lack specificity and cannot confirm the diagnosis. Accordingly, imaging plays a pivotal role. Ultrasonography, when performed by skilled operators, has been reported as a valuable diagnostic tool in the posttrauma setting, and some authors recommend incorporating an extended FAST examination to include the appendix. Nevertheless, CT remains the imaging modality of choice in most reported cases.^[3-10]

This case is particularly notable for the exceptionally rare occurrence of posttraumatic appendicitis in an elderly patient, combined with a longer-than-usual interval between trauma and symptom onset. The additional complexity of thoracic spinal fracture and renal dysfunction further sets this case apart, emphasizing the need for heightened vigilance and advanced imaging when evaluating elderly trauma patients with evolving abdominal symptoms.

Conclusion

This case highlights the importance of careful imaging and clinical suspicion for the timely diagnosis and management of abdominal pathology in elderly patients with major trauma. Moreover, written informed consent was obtained from the patient, and data were kept confidential.

Author contribution statement

- Sarah Khosropanah: Writing – original draft, data collection (patient information)
- Mohsen Rahmanian: Writing – original draft, data collection (patient information)
- Amir Rahmanian Sharif Abad: Project administration, supervision, data acquisition (facilitated data gathering, saw the patient), writing – review and editing, preparation for publication
- Mohammad Ashrafazimi: Data acquisition (facilitated data gathering, saw the patient), Surgery (treated the patient as a surgeon), Supervision, Writing – review and editing.

Conflicts of interest

None declared.

Ethical approval

Ethical approval for this case report was obtained in accordance with our institutional guidelines. Written informed consent was secured directly from the patient for the publication of this clinical case and any accompanying radiological images. All patient data have been thoroughly anonymized to ensure complete confidentiality and adherence to standard ethical protocols.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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