

Colon perforation from an uncommon cause: a case report

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Abstract

Pelvic fractures are frequently associated with concomitant injuries to intra-abdominal and genitourinary structures. We report an unusual case of colonic perforation secondary to entrapment of the sigmoid colon within a complex pelvic fracture. A 59-year-old male sustained a high-energy blunt trauma following a motor vehicle rollover. Upon presentation to the Emergency Department, he was responding with an intact airway and hemodynamically normal and stable. Auscultation revealed normal and symmetrical breath sounds bilaterally (SpO₂ 98%). The patient was alert, oriented, and scored 15/15 on the Glasgow Coma Scale. Physical examination revealed pelvic instability. Whole-body computed tomography (CT)

demonstrated an anteroposterior compression (APC) Type III pelvic ring injury with herniation and perforation of the sigmoid colon into the fracture site, accompanied by free air. The patient underwent emergency exploratory laparotomy, which confirmed the diagnosis. A sigmoidectomy with Hartmann's procedure was performed. Definitive pelvic stabilization was achieved in a subsequent operative session.

Incarceration of bowel loops within pelvic fractures is exceedingly rare but represents a surgical emergency due to the risk of fulminant sepsis and mortality. Early radiologic identification and prompt surgical management are imperative. A high index of suspicion is warranted in patients with complex pelvic fractures, particularly in the presence of free intraperitoneal air or signs of peritonitis.

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Introduction

Pelvic fractures are often associated with concomitant injuries to the genitourinary system as well as intra-abdominal organs.¹ The incarceration of intestinal segments within pelvic fracture lines constitutes a rare but potentially fatal complication following high-energy trauma. Due to its infrequency and the often-subtle or absent abdominal clinical signs at initial presentation, this entity is frequently underdiagnosed in the acute phase and may only become evident during subsequent hospitalizations. To date, only a limited number of such cases have been documented in the international medical literature. We herein describe a rare case of sigmoid colon entrapment and perforation associated with an anteroposterior compression (APC) Type III pelvic fracture, emphasizing the importance of early recognition and timely surgical intervention.

Case Report

A 59-year-old male was transported by ambulance to the Emergency Department of our institution following a high-energy motor vehicle collision involving a vehicle rollover and extrication at the scene. Upon arrival, the patient was immobilized on a spinal board and equipped with a rigid cervical collar in accordance with prehospital spinal precautions.

During the initial evaluation, the patient was responding with an intact airway and hemodynamically normal and stable. Auscultation revealed normal and symmetrical breath sounds bilaterally (SpO₂ 98%). The patient was alert, oriented, and scored 15/15 on the Glasgow Coma Scale. Physical examination demonstrated a stable thoracic cage without palpable crepitus. Abdominal palpation revealed no tenderness, guarding, or signs of peritoneal irritation. In contrast, the pelvis was clinically unstable and tender on palpation. Digital rectal examination was notable for the presence of blood.

Initial resuscitation included the administration of intravenous

crystalloids and supplemental oxygen. Pelvic stabilization was achieved through the application of a pelvic binder. Laboratory investigations revealed no significant abnormalities, apart from a mild elevation in serum creatine kinase (CK) levels. Hematocrit remained within normal and stable limits. The patient had no known past medical history, was not on any chronic medication, and reported no prior surgical interventions.

Following initial assessment and hemodynamic stabilization, the patient underwent a whole-body computed tomography (CT) scan with intravenous contrast (Figure 1). Imaging revealed an APC Type

III pelvic ring injury,¹ characterized by fracture-dislocation of the left sacroiliac joint and widening of the pubic symphysis (Figure 2). Notably, the CT scan also demonstrated entrapment of a segment of the sigmoid colon within the left sacroiliac fracture, accompanied by a small volume of extraluminal free air in the adjacent retroperitoneal and pelvic regions.

The patient was promptly transferred to the operating theatre for an exploratory laparotomy. Intraoperative findings confirmed entrapment of a segment of the sigmoid colon within the left sacroiliac fracture site. Due to perforation of the incarcerated

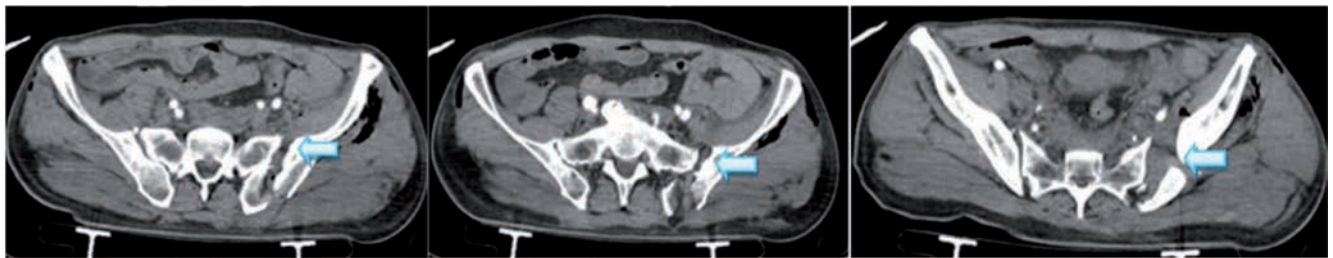


Figure 1. Abdomen computed tomography with IV contrast showing the fracture (blue arrows) and free air.

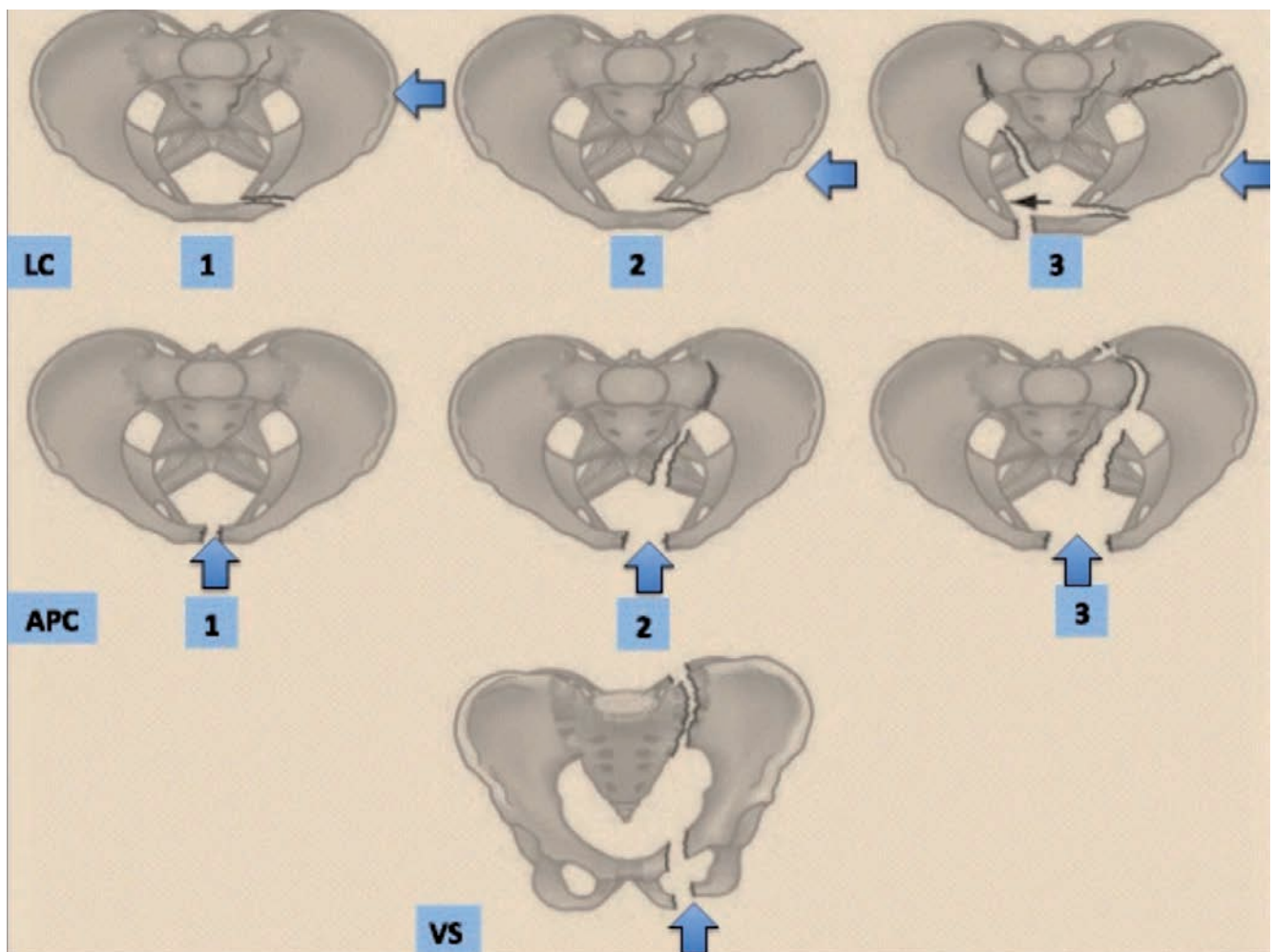


Figure 2. Young and Burgees' classification for skeletal pelvic lesions. LC, lateral compression; APC, anteroposterior compression.

bowel segment, a sigmoidectomy was performed, followed by the creation of an end colostomy in accordance with Hartmann's procedure.

Postoperatively, the patient was admitted to the Intensive Care Unit (ICU), where he remained hemodynamically stable. On postoperative day four, orthopedic surgeons performed definitive surgical fixation of the pelvic fracture (Figure 3). The patient remained in the ICU for one week, after which he was successfully extubated and transferred to the general surgery ward for continued rehabilitation. He was ultimately discharged ten days later. The patient's postoperative course was uneventful, with no clinical or radiological evidence of septic arthritis or osteomyelitis involving the sacroiliac joint. Restoration of bowel continuity *via* reversal of the Hartmann's procedure was successfully performed six months following the initial surgery.

Discussion

Pelvic fractures occur in approximately 12% of patients admitted to Level 1 Trauma Centers and are frequently associated with injuries to other organ systems due to their typical etiology involving high-energy trauma. The most common concomitant injuries, affecting approximately 16% of cases,^{2,3} involve the urinary and genital systems, extraperitoneal and intraperitoneal hemorrhages, as well as intra-abdominal organ damage.⁴ Bowel injury represents a well-documented complication of pelvic fractures,² characterized by a distinct clinical presentation with severe abdominal pain, peritoneal irritation, and signs of sepsis, which generally facilitate diagnosis. However, entrapment of a bowel segment, either small or large intestine, within the fracture site, resulting in perforation, constitutes a rare and serious complication.² To date, only 26 cases have been reported in the international literature,⁵ predominantly involving small bowel loops,^{6,7} likely due to the increased mobility of these intestinal segments. In contrast, the present case involves entrapment of the sigmoid colon, a less commonly affected segment.

The earliest documented case of bowel entrapment within a pelvic fracture was reported by Arnold in 1907, describing incarceration of a small intestine segment in a pubic ramus fracture in a 76-year-old female patient, who succumbed shortly after exploratory laparotomy.^{2,5}

Diagnosing bowel entrapment in the context of pelvic fractures remains a considerable clinical challenge. Delayed or missed diag-

nosis carries a poor prognosis. Historically, diagnosis was often delayed until the typical paralytic ileus,² commonly seen in pelvic fractures,^{4,8} was recognized as obstructive in nature or until overt signs of sepsis developed. Paralytic ileus affects approximately 20% of pelvic fracture patients⁸ and is often secondary to retroperitoneal hematoma, which may persist for several days, thereby further delaying recognition of true intestinal obstruction.

A review of international literature suggests that early cases carried high mortality rates, as noted by Tanaka *et al.*,⁸ but improvements in imaging modalities have led to better outcomes in recent years. Modern trauma protocols commonly include immediate abdominal and pelvic CT scanning upon emergency department presentation, primarily to assess for active hemorrhage or intra-abdominal injuries. This approach has significantly enhanced the detection of rare complications such as bowel entrapment. The first CT-documented case of bowel entrapment was reported by Catsikis *et al.*⁹ in 1989. The case involved a 36-year-old female patient who sustained a widely displaced fracture of the left ilium along with a wide separation of the left sacroiliac joint following a motor vehicle accident. Loops of both small and large bowel were found to be entrapped between the fracture fragments. Subsequent studies, including that by Zong *et al.*,¹⁰ highlight the high sensitivity of CT scans with oral and intravenous contrast in diagnosing bowel entrapment within pelvic fractures. Nonetheless, accurate diagnosis demands a high index of clinical suspicion, especially in patients presenting with prolonged ileus or signs of sepsis. Prompt CT imaging should be pursued under these circumstances.⁹

Once diagnosed, early exploratory laparotomy is essential to assess bowel viability and determine whether resection is required. The choice between primary anastomosis and creation of a diverting stoma depends on the patient's hemodynamic stability and intraoperative contamination. For instance, the cases reported by Poilly *et al.*⁷ and Farooq *et al.*⁵ describe successful primary repair of bowel perforations, whereas Tanaka *et al.*⁸ and our case necessitated diverting stoma formation. Pelvic fracture fixation is generally deferred to a secondary surgical stage to optimize patient stability.

This case underscores the critical importance of maintaining vigilance for bowel entrapment in patients with pelvic fractures, particularly when initial clinical signs are subtle. Early imaging and timely surgical intervention were pivotal in achieving a favorable outcome. A key strength of this report is the availability of long-term follow-up data, which confirms sustained recovery without complications such as osteomyelitis or bowel dysfunction. Conversely, inherent limitations of single-case reports apply, including restricted generalizability and the inability to establish causative relationships or standardized treatment protocols for similar cases.

Conclusions

Bowel perforation secondary to entrapment within a pelvic fracture represents a rare but potentially fatal complication. Despite its low incidence, clinicians should maintain a high index of suspicion irrespective of the fracture classification, given the significant morbidity and mortality associated with delayed diagnosis. Early multidisciplinary collaboration between trauma surgeons, orthopedic surgeons, and radiologists is imperative to ensure prompt recognition and accurate diagnosis. Furthermore, persistent or prolonged paralytic ileus in patients with pelvic fractures should prompt thorough investigation for possible bowel entrapment. Timely surgical intervention remains the cornerstone of management, contributing substantially to improved clinical outcomes.



Figure 3. Postoperative anteroposterior plain radiograph of the pelvis demonstrating definitive surgical fixation of the pelvic fracture (yellow arrows).

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