

Blunt Abdominal Trauma from a Fall Revealing a Kinked Meckel's Diverticulum and Mesenteric Hemorrhage: A Case Report

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ABSTRACT

Blunt abdominal trauma is common, but mesenteric injuries and Meckel's diverticulum are rarely associated with trauma. We report the case of a 38-year-old male who sustained blunt abdominal trauma from a fall. Initial imaging revealed minimal free fluid and suspected pneumothorax. During surgery, mesenteric contusions and a kinked Meckel's diverticulum were found, which contributed to hemorrhage.

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1. INTRODUCTION

Blunt abdominal trauma is a common presentation in emergency settings, often resulting from motor vehicle accidents or falls from height. While solid organ injuries are frequently encountered, mesenteric injuries and incidental findings such as Meckel's diverticulum are relatively uncommon. We present a rare case of intra-abdominal hemorrhage following a fall from height, in which a kinked Meckel's diverticulum was identified intraoperatively and suspected to be a contributing factor to the mesenteric bleeding.

2. CASE REPORT

A 38-year-old previously healthy male presented to the emergency department after falling from a height of approximately 4 meters at a construction site. On arrival, he was conscious, oriented, and hemodynamically stable. He reported posterior head pain and lower back pain but denied chest or abdominal pain, nausea, or vomiting. There were no signs of external bleeding or evidence of abdominal trauma.

Initial laboratory investigations revealed a white blood cell count of $10.9 \times 10^9/L$, hemoglobin of 130 g/L, a pH of 7.32, elevated pCO₂ and pO₂ levels, and a blood glucose level of 7 mmol/L. An initial extended Focused Assessment with Sonography for Trauma (eFAST) demonstrated a small amount of free fluid in Morrison's pouch.

While undergoing CT imaging, the patient experienced a generalized tonic-clonic seizure lasting approximately one minute. He was treated with intravenous lorazepam, became postictal for 15 minutes, and then returned to his baseline neurological status, allowing imaging to be completed.

CT of the thorax revealed a minimal left pneumothorax, bibasal atelectasis, and small subpleural emphysematous bullae at both apices. Fractures were noted in the right medial upper scapular body, right 12th rib, and left 5th rib. CT of the abdomen and pelvis showed an oval infraumbilical mesenteric lesion with fat stranding in the infrarenal para-aortic region.

Shortly after imaging, the patient became hypotensive, with a systolic blood pressure of 74 mmHg. A repeat eFAST demonstrated increased free fluid in Morrison's pouch, along with new collections in the left upper quadrant and pelvic region. Due to

hemodynamic instability and suspected ongoing intra-abdominal bleeding, the patient was taken emergently to the operating room for exploratory laparotomy.

A midline xiphoid-to-pubic incision was performed, and approximately 1.5 liters of blood were evacuated from the peritoneal cavity. Four-quadrant packing and bowel wrapping were used for temporary hemorrhage control, allowing time for anesthetic stabilization. On exploration, multiple mesenteric contusions were identified at the levels of the jejunum and terminal ileum. A retroperitoneal hematoma was noted at the junction of zones 1 and 3 near the sacral promontory. It was stable, non-expanding, and showed no active bleeding through associated mesenteric tears.

Approximately 70 cm proximal to the ileocecal valve, a Meckel's diverticulum was discovered. Its apex was kinked and tethered to the contused mesentery (figure.1,2), potentially contributing to intra-abdominal bleeding via a traction mechanism. A transverse stapled diverticulectomy was performed using a linear stapler, and the staple line was buried with a running 3-0 Vicryl suture. The diverticulum appeared uncomplicated, with no palpable masses or wall thickening.

The appendix was noted to be contused, likely due to adjacent trauma, and was removed using the same stapler. The appendicular artery was ligated with suture. Mesenteric tears were repaired using a running 3-0 polydioxanone (PDS) suture. No other bowel injuries or solid organ damage were identified.

Histopathological examination of the resected specimen confirmed the diagnosis of Meckel's diverticulum, demonstrating the presence of all layers of the small intestinal wall—consistent with a true congenital diverticulum (figure.3).

3. DISCUSSION

Blunt abdominal trauma (BAT) is a frequent cause of hospital admission, particularly in trauma centers, with falls from height being a well-recognized mechanism. Blunt trauma to the abdomen needs to be carefully evaluated to increase the chances of patient survival [1]. While solid organ injuries—such as those involving the liver and spleen—are most commonly reported, mesenteric injuries are less frequent and can be challenging to diagnose due to their subtle presentation and nonspecific imaging findings.

Mesenteric injuries may present with active bleeding, bowel ischemia, or delayed perforation. The diagnostic criteria for Meckel's diverticulum include the rule of 2, characterized by: 2 in. long, 2 feet away from ileocecal valve, occurring in 2% of population, containing 2 types of heterotopic mucosa (gastric and pancreatic), 2 years of age is the most common age of presentation and 2:1 male to female ratio [2]. In this case, the patient developed hemodynamic instability with increasing free fluid on serial eFAST examinations, prompting an emergent exploratory laparotomy. Intraoperatively, multiple mesenteric contusions were noted without bowel perforation or evidence of active arterial bleeding, suggesting low-pressure or venous hemorrhage.

Meckel diverticulum is a true diverticulum and is the most common congenital anomaly of the gastrointestinal tract, occurring in about 2% of people. It is caused by incomplete obliteration of the vitelline duct and consists of a congenital sacculation of the antimesenteric border of the ileum [3].

Meckel's diverticulum is either discovered incidentally during surgery for other pathology, or in diagnostic imaging or as a complicated Meckel's diverticulum. The most common complications include hemorrhage, obstruction, inflammation of the diverticulum, perforation or the presence of a tumor

within the diverticulum [4]. It arises from the anti-mesenteric border of the ileum, situated between 30 and 150 cm s from ileo-caecal valve [5], and receiving its blood supply from a remnant of the vitelline artery [6]. Most of these are clinically silent and often an incidental finding at laparotomy. Symptoms arises when associated with complications which occurs in 4% of cases [7]. However, its role as a contributing factor in trauma-related mesenteric hemorrhage is exceedingly rare.

In our patient, the Meckel's diverticulum was found to be kinked and tethered to the contused mesentery, likely creating traction that contributed to mesenteric tearing and hemorrhage. Although the diverticulum itself showed no signs of inflammation or perforation, its anatomical position and fixation to the injured mesentery suggest a contributory role. To our knowledge, very few cases have been reported that associate blunt trauma with bleeding related to Meckel's diverticulum [8].

This case highlights the importance of considering mesenteric injuries in the setting of blunt abdominal trauma, even when initial imaging is inconclusive. It also emphasizes the need for a high index of suspicion and prompt surgical intervention in patients who become hemodynamically unstable. The incidental finding of a tethered Meckel's diverticulum underscores how congenital anomalies may complicate trauma cases and potentially serve as indirect sources of bleeding or mechanical stress.

4. CONCLUSION

Blunt abdominal trauma, although commonly associated with solid organ injuries, can also lead to less frequently diagnosed conditions, such as mesenteric injuries and congenital anomalies like Meckel's diverticulum. This case highlights the importance of considering rare contributors to hemorrhage, even in the absence of clear findings on initial imaging. The discovery of a kinked Meckel's diverticulum in conjunction with mesenteric contusions emphasizes the need for a high index of suspicion and careful

surgical exploration in trauma cases. Prompt diagnosis and intervention are crucial in preventing life-threatening complications. Although Meckel's diverticulum is rarely associated with trauma, its potential role as a contributing factor in such cases should be considered, particularly when unexplained intra-abdominal bleeding is present.

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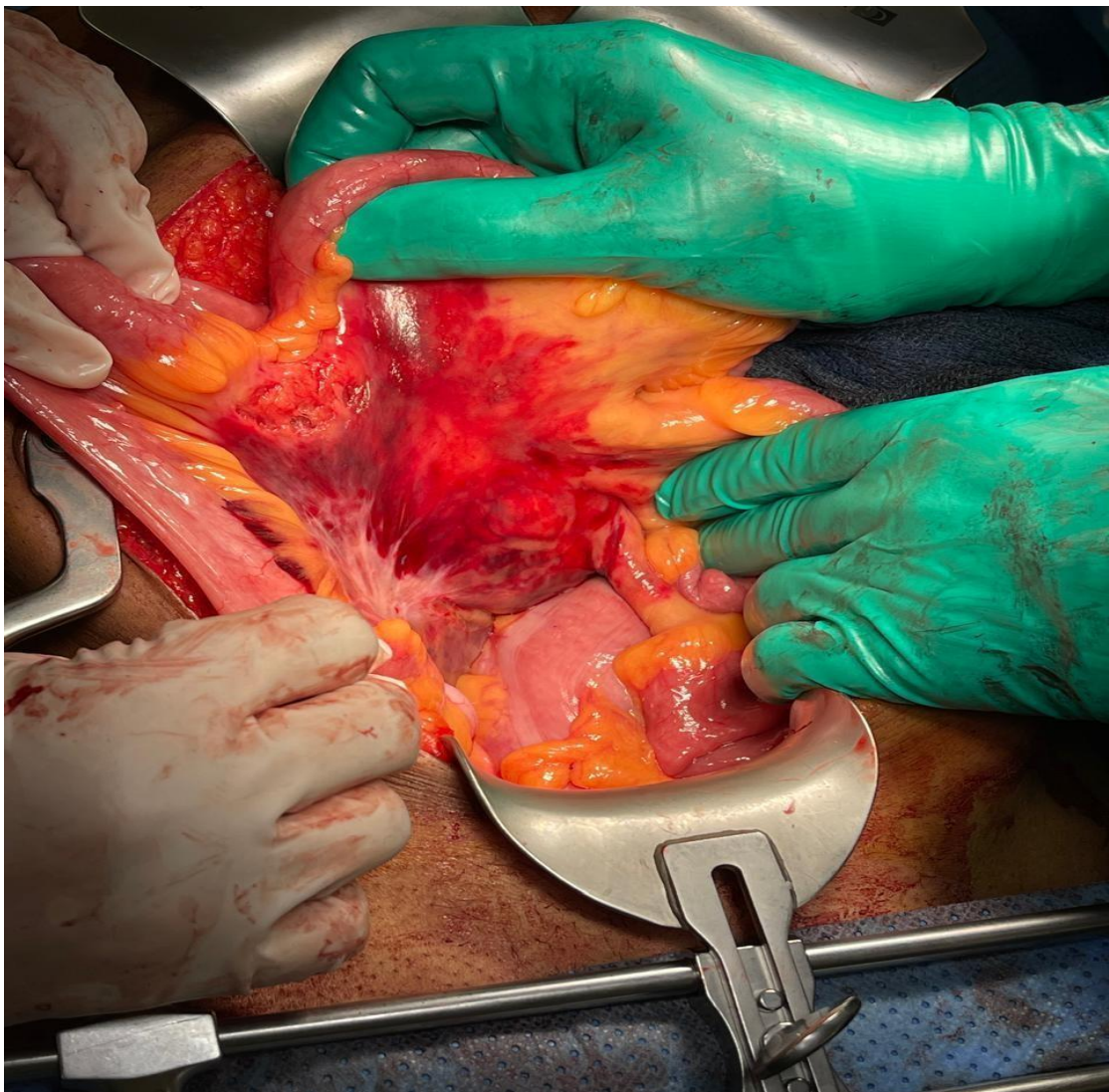


Figure.1: Meckel's diverticulum

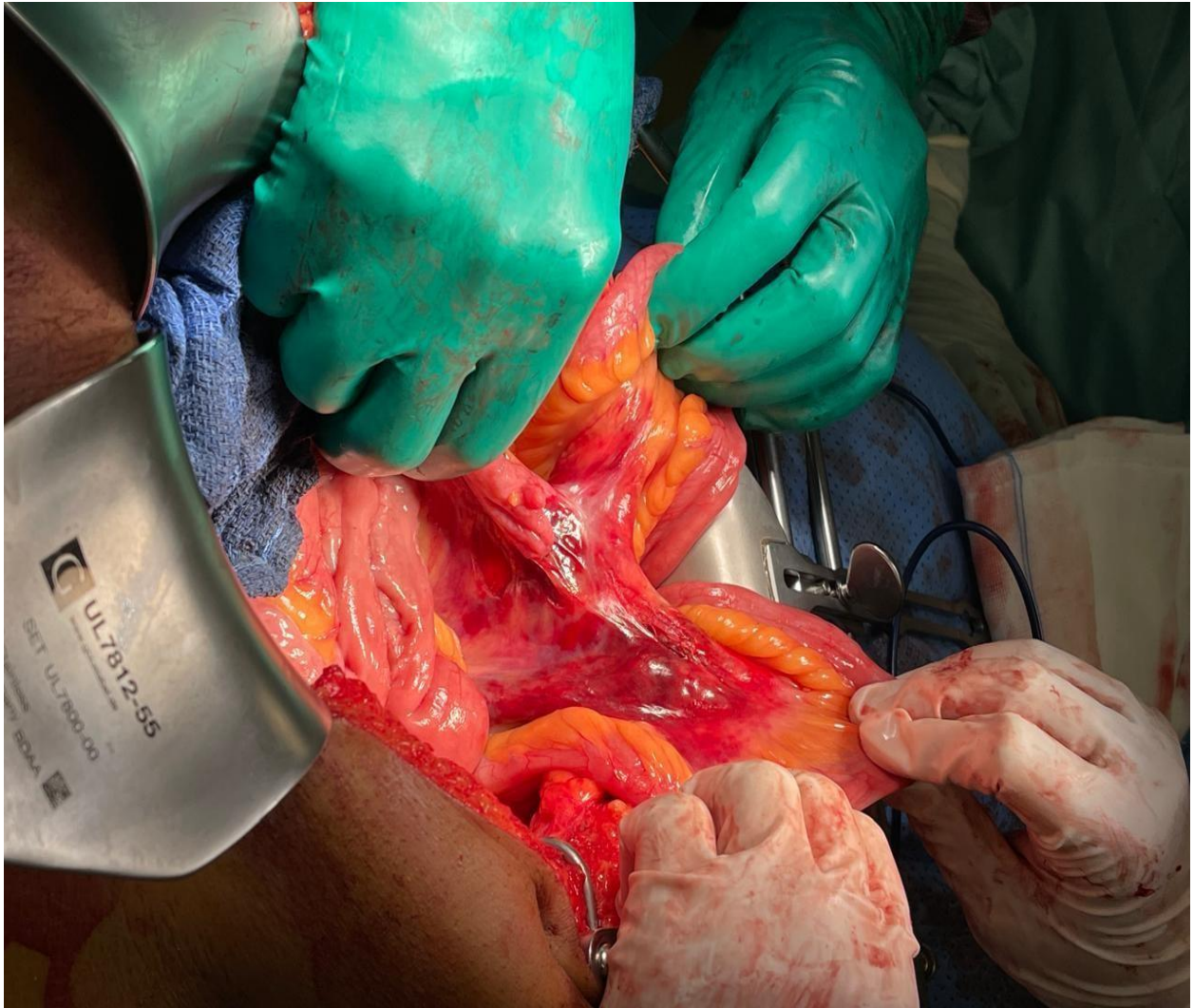


Figure.2: A kinked Meckel's diverticulum

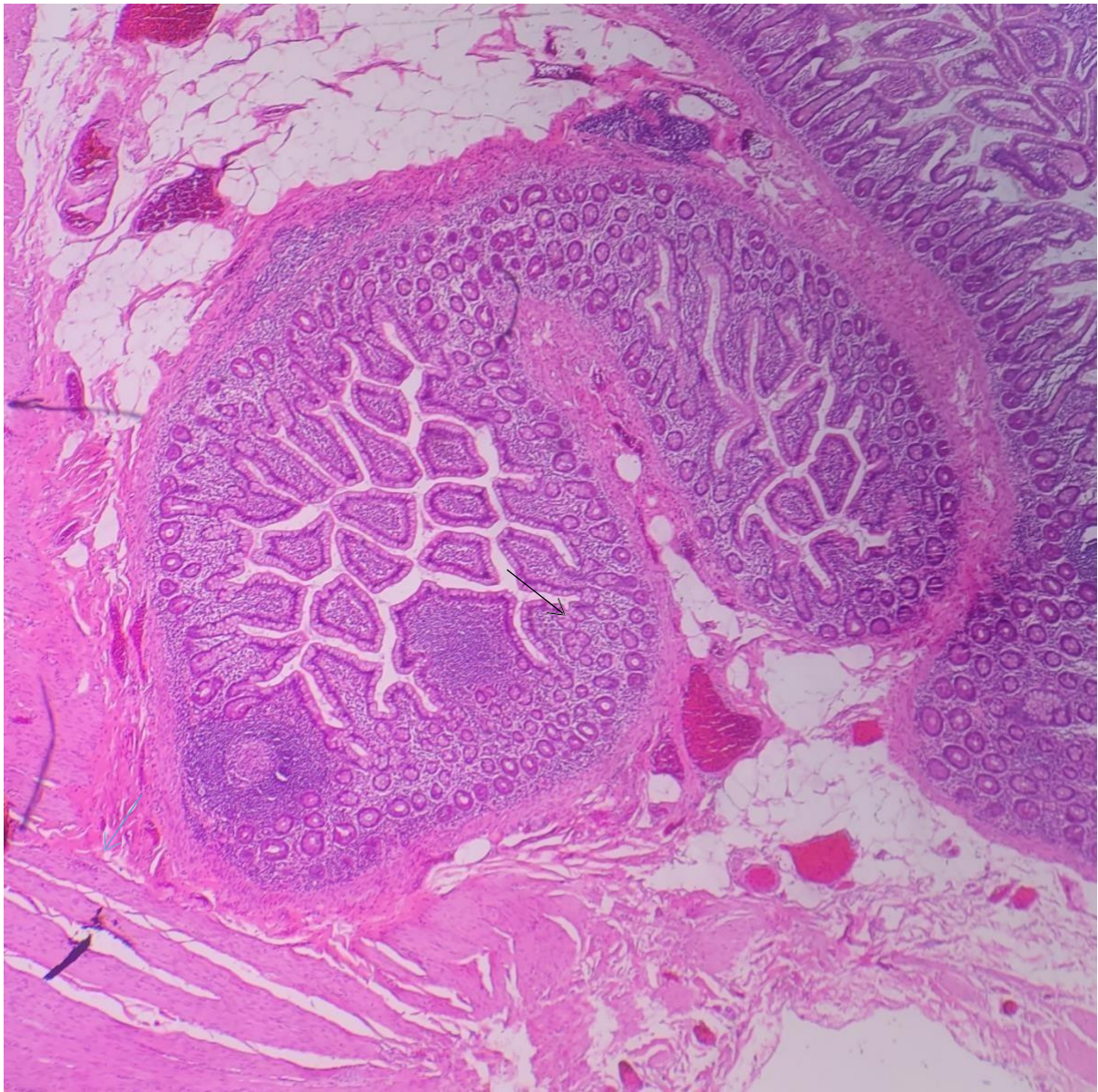


Figure 3 x 20 magnification. Meckel's diverticulum showing all layers of small bowel wall i.e. mucosa-black arrow, muscularis propria- blue arrow.