

Isolated Complete Jejunal Transection After Blunt Abdominal Trauma: CT Imaging

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ABSTRACT

Abdominal injury following road traffic accident is less common, compared to the extremities, head and chest. Bowel may get injured following blunt abdominal trauma, but perforation and complete transection is rare. Initial clinical examination may be unreliable, as signs of bowel injury may take some time to develop. Imaging plays a crucial role in the early and accurate diagnosis of bowel injuries. We report a case of 21-year-old male, who presented with severe abdominal pain, following a road traffic accident. Chest X-Ray was normal and abdominal ultrasound revealed intra-peritoneal free fluid with internal echoes. Contrast enhanced CT scan showed pneumoperitoneum and intraperitoneal free fluid with disruption in continuity of proximal jejunum along with signs of shock bowel and bowel ischemia. This report highlights the role of CT imaging in the prompt diagnosis of bowel transection following blunt abdominal trauma.

Keywords: Bowel perforation, Pneumoperitoneum, Shock bowel

CASE REPORT

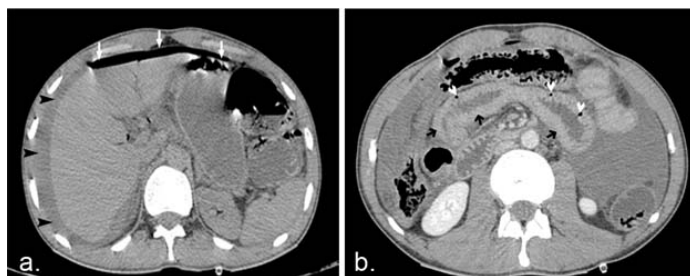
A 21-year-old male presented to Emergency Medicine department with severe abdominal pain after a car accident. Patient reported blunt trauma to abdomen with the steering wheel of car, after head to head collision with another car. His vitals were within normal limit (blood pressure 110/80mmHg, pulse 96/minute) and GCS was 15/15. On further examination there was moderate tenderness in peri-umbilical region. There was no evidence of abdominal contusion. CVS and RS examination was within normal limits.

The chest X-ray was normal. Abdominal ultrasound revealed mild intraperitoneal free fluid with internal echoes within. However solid organs were normal on ultrasound. An urgent Computed Tomography (CT) scan was performed with positive IV contrast.

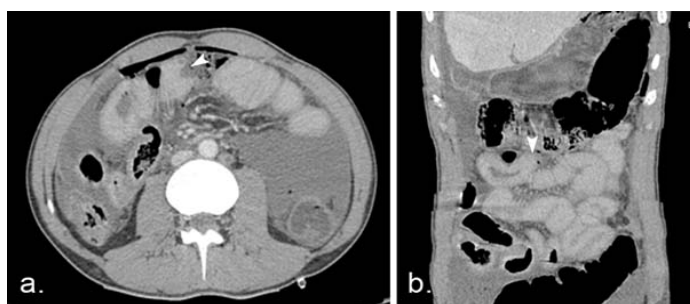
CT scan revealed moderate amount of intraperitoneal free air and free fluid. The density of free fluid ranged from 15 to 20 HU (Hounsfield

Units), suggesting it to be non-hematologic in origin [Table/Fig-1a]. There was no evidence of solid organ injury. On examination of the bowel, proximal jejunal wall was circumferentially thickened and edematous, measuring 10 mm in thickness and showed intense post-contrast enhancement. The jejunal mucosal enhancement was greater than the density of psoas muscle, which along with bowel-wall thickening greater than 3 mm is a CT criteria for shock bowel. There were intramural air foci within proximal jejunum, which is a feature of bowel ischemia [Table/Fig-1b]. On further tracing jejunum, there was disruption in its continuity from the rest of jejunum, which is known as Complete cut-off sign [Table/Fig-2a&b]. At the site of disruption, proximal jejunal segment showed abnormal dual bowel wall enhancement (i.e. both increased and decreased enhancement), which is known as Janus sign [Table/Fig-3]. Ileal and jejunal loops distal to disruption were collapsed. Rest of the bowel loops were normal. Inferior vena cava, abdominal aorta and mesenteric vessels were unremarkable. Based on this CT findings diagnosis of complete jejunal transection was made.

Emergency laparotomy was performed, which confirmed complete jejunal transection approximately 25 cm distal to duodenojejunal flexure [Table/Fig-4]. Approximately 1 litre of bilious intraperitoneal free fluid was drained and end to end anastomosis was performed. Patient was managed postoperatively in intensive care unit with total parenteral nutrition and was discharged 2 weeks later after unremarkable postoperative recovery.



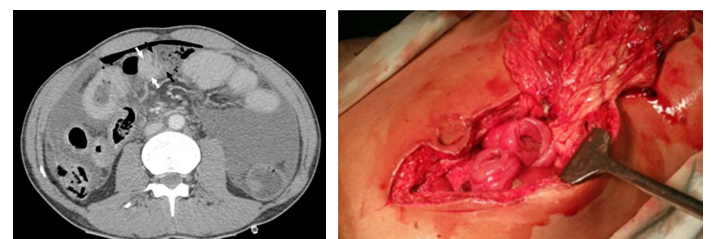
[Table/Fig-1]: (a) Non-contrast CT scan shows pneumoperitoneum i.e. extraluminal free gas (white arrows) and intraperitoneal free fluid (black arrowheads); (b) Contrast enhanced CT scan shows circumferentially thickened wall with intense enhancement, suggesting shock bowel (black arrows) and intramural air foci (white arrowheads) in proximal jejunum.



[Table/Fig-2a & b]: Axial and coronal contrast enhanced CT scan shows complete disruption in the continuity of jejunum (arrowheads), which is known as complete cut-off sign.

DISCUSSION

Bowel injury following blunt abdominal trauma is rare compared to solid organ injury. In a study by Dauterive A et al., bowel perforation or mesenteric injury leading to bowel ischemia, accounted for 6.9%



[Table/Fig-3]: Axial contrast enhanced CT scan shows abnormal dual bowel wall enhancement, i.e. both increased (white arrows) and decreased enhancement (black arrows) in proximal jejunum. This is known as Janus sign.

[Table/Fig-4]: Intraoperative image showing completely transected jejunum.

of the 870 patients who had laparotomy for blunt trauma during the period of study [1]. According to another study by Watts D et al., perforating small bowel injury accounted for less than 0.3% of total admissions for blunt abdominal trauma [2]. Complete bowel transection following blunt abdominal trauma is rarer. In a study by Pikoulis E et al., bowel transection occurred in 2.56% of 64 patients with blunt intestinal or mesenteric injury [3]. Very few reports of isolated jejunal transection following blunt abdominal trauma have been published in literature [4].

Bowel injury necessitates urgent laparotomy, delay in which may result in significant morbidity and mortality due to haemorrhage, peritonitis, or abdominal sepsis. Transection, that is complete loss of bowel continuity, is the most severe form of bowel injury. It usually results due to direct compression of the bowel against thoraco-lumbar spine, due to application of significant blunt force to a localised area on central abdomen [4].

A multidetector CT (MDCT) scan is the primary imaging modality for early detection of bowel injury by the radiologist. Various signs of bowel injury following blunt abdominal trauma are described in the literature [5]. Pneumoperitoneum, i.e. intraperitoneal extraluminal free gas, is a highly sensitive but not a pathognomonic sign of bowel perforation.

Bowel perforation is usually associated with significant intraperitoneal haemorrhage, resulting in circulatory shock. Shock bowel can be diagnosed on CT by various signs like increased mucosal enhancement, transmural oedema, intramural gas and fluid-filled dilated bowel loops. But these signs only suggest significant bowel wall trauma and are not specific for bowel transection [5].

The specific CT signs of bowel transection includes, "complete cutoff sign", which is almost 100% specific [5]. It indicates discontinuity in the bowel wall, which appears as completely cutoff from distal bowel. However, recognition of this sign requires high degree of suspicion, as haematoma and mesenteric infiltration surrounding the site of transection makes it difficult to detect. Another sign with high specificity is "Janus sign", which is named after a roman god of beginnings and transitions and who is usually depicted as having two faces. It is characterized by adjoining areas of focally increased and decreased wall enhancement in single bowel loop [5].

CONCLUSION

Complete small bowel transection is a rare injury to follow blunt abdominal trauma. The MDCT scan plays a crucial role in early and accurate detection of severe bowel injuries like transection, thereby significantly reducing patient morbidity and mortality. Certain CT findings like complete cut off sign and Janus sign, are highly specific for bowel transection, thus aiding in accurate CT diagnosis.

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