

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.e-asianjournalsurgery.com

CASE REPORT

Delayed small bowel perforation following blunt abdominal trauma: A case report and review of the literature



Alireza Hamidian Jahromi ^a, Lester Johnson ^b,
Asser M. Youssef ^{a,*}

^a Department of Surgery, Louisiana State University Health Shreveport, Shreveport, LA, USA

^b Department of Surgery, Louisiana State University Health Sciences Center, E A Conway Medical Center, Monroe, LA, USA

Received 30 July 2012; received in revised form 22 October 2012; accepted 9 January 2013

Available online 6 March 2013

KEYWORDS

blunt abdominal trauma;
bowel perforation;
delayed presentation;
mesenteric hematoma;
small bowel

Summary We report a case of delayed presentation of a small bowel perforation following blunt abdominal trauma (BAT). An initial computed tomography (CT) scan revealed that the patient (a 32-year-old man) had a mesenteric hematoma, which was managed conservatively. Four weeks later, he returned to the hospital complaining of abdominal pain. A CT scan of the abdomen showed a thickened loop of the small bowel adjacent to the mesenteric hematoma at the level of the ileum. He was discharged home, but re-presented with acute abdomen 6 weeks post-trauma. An exploratory laparotomy was performed, which showed a perforated thickened loop of the ileum forming a phlegmon in the lower abdomen. In the English medical literature, only eight other reports of delayed post-traumatic presentation of ileal/jejunal perforation following BAT have been reported. We propose that post-traumatic intestinal perforation be considered in the differential diagnosis even in patients who experience a delayed small bowel perforation following BAT.

Copyright © 2013, Asian Surgical Association. Published by Elsevier Taiwan LLC. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

* Corresponding author. Division of Trauma and Critical Care Surgery, Department of Surgery, Louisiana State University Health Shreveport, 1501 Kings Highway, Shreveport, LA 71103-4228, USA.

E-mail address: ayouss@lsuhsc.edu (A.M. Youssef).

1. Introduction

A small bowel perforation due to blunt abdominal trauma (BAT) is relatively uncommon,^{1–3} and the exact mechanism remains controversial. Delayed presentation of small bowel perforation following BAT is extremely rare. The delayed onset of symptoms following the trauma often makes the diagnosis difficult. In the English-language medical literature, eight other reports (10 cases) of delayed post-traumatic presentation of ileum perforation (3 cases) or jejunum perforation (7 cases) following BAT have been reported.^{4–11} The underlying pathophysiologic mechanism has not been described well. Characteristics of the patients from the previous reports who had a delayed presentation of small bowel perforation following BAT are summarized in Table 1.

This report presents a rare case of delayed bowel perforation in a patient who developed a mesenteric hematoma following BAT. We discuss the possible mechanism underlying this delayed presentation and propose that post-traumatic intestinal perforation be considered in the differential diagnosis of patients who experience a delayed presentation of small bowel perforation following BAT.

2. Case report

A 32-year-old male presented to our trauma center following a motorcycle accident. He was found to have a closed head injury, rib fractures, left shoulder dislocation, humerus fracture, and open fracture of the left tibia and

fibula. A computed tomography (CT) scan of the abdomen with contrast showed a 7×4 cm² mesenteric hematoma (Fig. 1A). A closed reduction of the shoulder dislocation, and an open reduction and internal fixation of his tibia and fibula fractures were performed. He was discharged from the hospital after 1 week of observation. As the patient had open fractures on admission, he received a 10-day course of antibiotics (7 days during the hospital stay and 3 days after his discharge). At the time of discharge, the patient had no fever and was tolerating a regular diet. His abdomen was soft and nontender on examination. His complete blood count showed a normal white blood cell count of 9.03 k/ μ L (k/ μ L = thousands per cubic milliliter) (normal range = 4.0–11.0 k/ μ L). The patient returned to the hospital 4 weeks after discharge (5 weeks post-trauma), complaining of abdominal pain on sitting up and in a standing position. He did not have a fever, was tolerating regular food, and had normal bowel movements. There was no evidence of peritoneal signs on abdominal physical examination. A repeat CT scan of the abdomen with contrast was performed, which showed a thickened narrowed loop of the small bowel adjacent to a mesenteric hematoma at the level of the distal ileum (Fig. 1B). His white blood cell count was 7.59 k/ μ L (normal range = 4.0–11.0 k/ μ L). He was discharged home but re-presented 1 week later (6 weeks post-trauma) with signs of acute abdomen. His white blood cell count was measured at 18.94 k/ μ L (normal range 4.0–11.0 k/ μ L). An exploratory laparotomy was performed. Intraoperative findings included a phlegmon in the mid lower abdomen with a perforated thickened loop of the small bowel and about 300 mL of purulent material in the

Table 1 Characteristics of the patients from the previous reports who had a delayed presentation of small bowel perforation following blunt abdominal trauma.

Age (y)	Sex	Reference	Mechanism of injury	Presentation delay (d)	Perforation site	Mesenteric injury ^a	Postoperative findings
28	M	How et al ⁴	MVC	56	Ileum	NM	Mucosal necrosis, transmural edema in keeping with ischemic changes in the involved segment
37	M	Subramanian et al ⁵	MVC	77	Jejunum	MH (+)	Mucosal necrosis, transmural congestion, hemorrhage, and serositis in the involved segment
32	M	Subramanian et al ⁵	MVC	49	Jejunum	NM	Ulceration, transmural congestion, submucosal infiltration, and granulation tissue in the involved SB
36	M	Coats ⁶	MVC	26	Ileum	MT (+)	Histological evidence of bowel ischemia in the involved segment
36	F	Mauil and Rozycki ⁷	MVC	4	Jejunum	NM	Antimesenteric SB perforation
7	M	Winton et al ⁸	MVC	6	Jejunum	MH (+)	Seromuscular tears proximal and distal to the SB perforation
29	M	Winton et al ⁸	MVC	6	Jejunum	MH (+)	SB perforation and ischemic sigmoid colon
13	M	Ross and Bickerstaff ⁹	Fall from bicycle	6	Jejunum	NM	SB perforation with necrotic area at the edge of perforation
32	M	Fleishman et al ¹⁰	MVC	35	Ileum	NM	Total disruption of the terminal ileum associated with tissue loss
30	M	Burrell et al ¹¹	MVC	11	Jejunum	NM	SB perforation secondary to bowel infarction

F = female; M = male; MH = mesenteric hematoma; MT = mesenteric tear; MVC = motor vehicle crash; NM = not mentioned; SB = small bowel.

^a Presence and type of the reported mesenteric injuries are in bold.

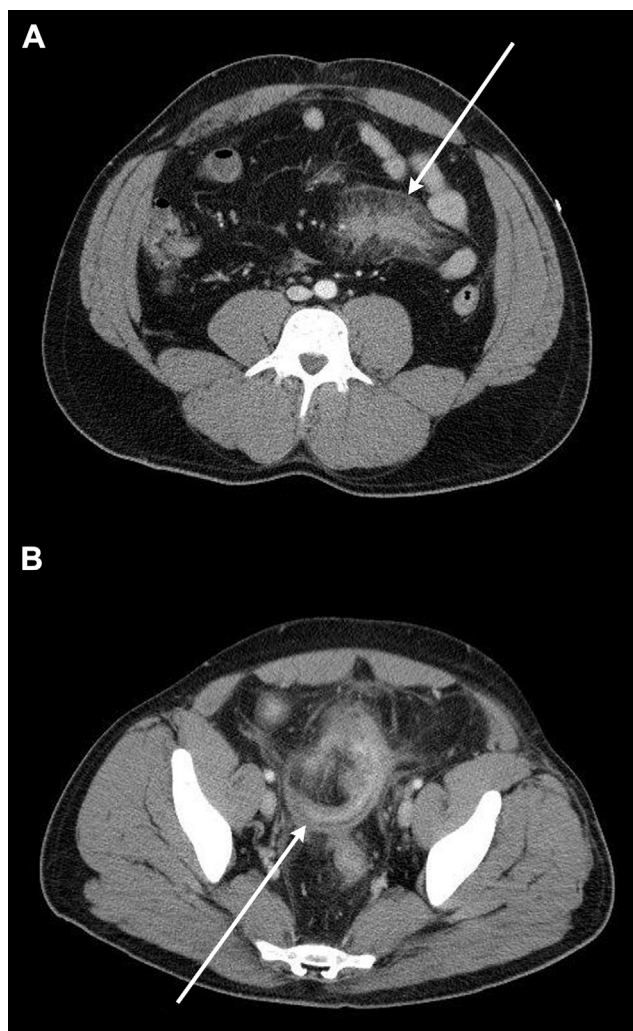


Figure 1 (A) Abdominal computed tomography immediately after trauma and (B) 5 weeks post-trauma, showing the mesenteric hematoma (white arrow in Fig. 1A) and the stenotic loop of the small bowel adjacent to the hematoma (white arrow in Fig. 1B).

abdomen (Fig. 2). He underwent resection and anastomosis of the small bowel.

3. Discussion

Various pathophysiological mechanisms (deceleration, crushing, and rupture phenomena) are responsible for small bowel perforations following BAT.¹ These mechanisms are generally responsible for small bowel injury in cases where perforations of the small bowel from BAT present soon after the initial trauma. Direct injury mechanisms described by Vertruyen et al¹ do not explain the situations where the small bowel perforation develops a few weeks after the blunt abdominal trauma.

Post-traumatic mesenteric injury is a potentially life-threatening complication of BAT and can cause severe hemorrhage and/or bowel ischemia. Many cases with minor and isolated mesenteric injuries may remain subclinical

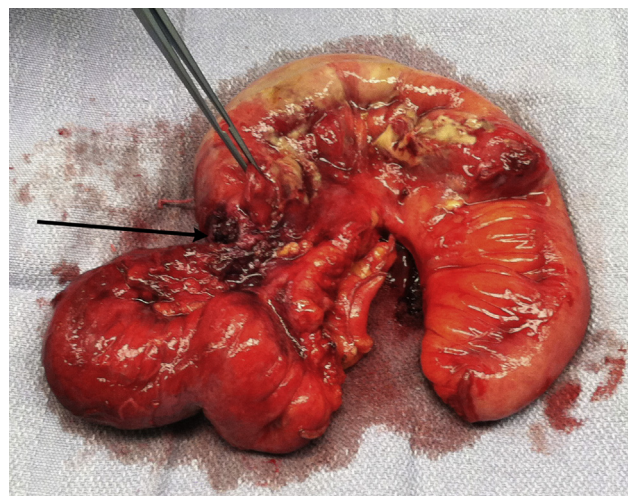


Figure 2 Postoperative specimen of the resected segment of the small bowel showing its thickened, inflamed, and perforated loop. The site of perforation is indicated with a black arrow.

and go undiagnosed for a period of time.¹² Delayed intestinal stenosis resulting in small bowel obstruction after BAT has been reported by our group and other authors.^{13,14} We reviewed the literature and discussed the possible mechanism for this feared complication in our previous report.¹³

In situations where the post-traumatic mesenteric injury is not severe and consists of only minor tears and contusions, the clinical presentation would follow a period of normal bowel function and may be delayed by a time period ranging from 2 weeks to 3 months.¹³

Patients with such injuries need to be followed closely with repeated physical examinations to detect any signs of peritonitis, and if necessary with serial X-ray investigations (abdominal X-rays and/or abdominal CT scans).

The clinical presentation is normally a consequence of a mesenteric tear or hematoma formation, which can affect progressively blood supply to the small bowel and cause partial ischemia of the adjacent bowel segment, partial- or full-thickness intestinal wall ischemia, mucosal ulceration, and submucosal inflammation.¹³ Severe steatorrhea and profound weight loss are other presentations of ischemic small bowel stricture and blind loop syndrome, which have also been reported in association with a partial mesenteric tear.¹⁵

The subsequent occurrences depend to a great extent on the dominance of progressive ischemia or takeover by a healing process. It is possible to have a dominant healing process with continuous fibrosis formation, ultimately leading to stricture and bowel obstruction, as well as a progressive ischemia and ulceration resulting in bowel perforation (the current case). These two pathophysiological scenarios can occur simultaneously with synergistic effects. The presence of stricture and bowel obstruction would lead to an increase in intraluminal pressure in the affected small bowel segment, which affects the intestinal wall circulation even further.⁵ The increase in intraluminal pressure would expedite the process of ulcer formation, resulting in bowel perforation.

In the absence of a direct bowel injury, a patient may initially tolerate a diet and display normal bowel function. In the current patient, we believe that the perforation was a complication of the mesenteric hematoma, which compromised blood flow to this bowel segment. This mechanism may explain the situation in the cases reported by other authors as well.^{5,6,8}

4. Conclusion

Based on our experience and following a review of the reported cases in the literature, we propose that post-traumatic intestinal perforation be considered in the differential diagnosis of patients who experience a delayed presentation of small bowel perforation following BAT. While we agree that hemodynamically stable and asymptomatic post-trauma patients with a mesenteric tear and/or hematoma following BAT can be managed conservatively, the surgical team should be aware of possible delayed complications of such injuries. These concerns should be shared with the patient when planning the management, and the patient should be followed closely so that such complications can be detected very early during the course of follow-up.

Consent

Written informed consent was obtained from the patient whose case is discussed in this paper regarding the publication of this case report and accompanying images.

Acknowledgments

The authors would like to thank Mr John Cyrus for his editorial assistance and Ms Lory Tubbs, Graphic Designer at the Louisiana State University Health Sciences Center, for her help with the preparation of the images.

References

1. Vertruyen M, Nardini J, Bruyns J. Isolated perforations of the small bowel from blunt abdominal trauma. Report of two cases and review of the literature. *Acta Chir Belg.* 1995;95:76–80.
2. Ceelen W, Hesse U, De Hemptinne B. Small bowel perforation following blunt abdominal trauma. *Acta Chir Belg.* 1995;95(4 suppl.):187–189.
3. Faria GR, Almeida AB, Moreira H, Barbosa E, Correia-da-Silva P, Costa-Maia J. Prognostic factors for traumatic bowel injuries: killing time. *World J Surg.* 2012;36:807–812.
4. How PD, Feddo H, Woo E, Huang A. Delayed ileal perforation secondary to traumatic stricture presenting as pyrexia of unknown origin. *Ulus Travma Acil Cerrahi Derg.* 2009;15:185–187.
5. Subramanian V, Raju RS, Vyas FL, Joseph P, Sitaram V. Delayed jejunal perforation following blunt abdominal trauma. *Ann R Coll Surg Engl.* 2010;92:W23–W24.
6. Coats TJ. Delayed presentation of perforation of the ileum following seat belt trauma. *Arch Emerg Med.* 1991;8:144–146.
7. Maull KI, Rozycki GS. Delayed presentation of traumatic blunt small bowel perforation. *J Tenn Med Assoc.* 1986;79:287–288.
8. Winton TL, Girotti MJ, Manley PN, Sterns EE. Delayed intestinal perforation after nonpenetrating abdominal trauma. *Can J Surg.* 1985;28:437–439.
9. Ross WB, Bickerstaff DR. Late jejunal perforation following blunt injury. *Injury.* 1985;16:481.
10. Fleishman HA, Griffith GL, Bivins BA. Delayed perforation of small bowel following blunt abdominal trauma. *J Ky Med Assoc.* 1979;77:294–295.
11. Burrell M, Toffler R, Lowman R. Blunt trauma to the abdomen and gastrointestinal tract. Plain film and contrast study. *Radiol Clin North Am.* 1973;11:561–578.
12. Nolan BW, Gabram SG, Schwartz RJ, Jacobs LM. Mesenteric injury from blunt abdominal trauma. *Am Surg.* 1995;61:501–506.
13. Northcutt A, Hamidian Jahromi A, Johnson L, Youssef AM. Unusual late occurrence of bowel obstruction following blunt abdominal trauma. *J La State Med Soc.* 2011;163:305–307.
14. Kaban G, Somani RA, Carter J. Delayed presentation of small bowel injury after blunt abdominal trauma: case report. *J Trauma.* 2004;56:1144–1145.
15. Isaacs P, Rendall M, Hoskins EO, Missen GA, Sladen GE. Ischemic jejunal stenosis and blind loop syndrome after blunt abdominal trauma. *J Clin Gastroenterol.* 1987;9:96–98.