

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Isolated sigmoid colon disruption after blunt abdominal trauma: Case report[☆]

Luong Thanh Đạt, MD^a, Le Thanh Dung, PhD^{b,c}, Nguyen Thanh Đạt, MD^a,
 Nguyen Khắc Đông, MD^a, Ta Xuan Truong, MD^a, Ninh Viet Khai, PhD^e,
 Duong Trong Hien, PhD^f, Nguyen Ngoc Đức, MD^b, Nguyen Duc Son, MD^d,
 Phan Nhat Anh, MD^{b,d}, Tran Quang Loc, MD^{b,c,*}

^a General Surgery Department, Agriculture General Hospital, Hanoi, Vietnam^b Department of Radiology, Viet Duc University Hospital, Hanoi, Vietnam^c Department of Radiology, University of Medicine and Pharmacy (VNU-UMP), Vietnam National University, Hanoi, Vietnam^d Department of Radiology, Hanoi Medical University, Hanoi, Vietnam^e Organ Transplant Centers, Viet Duc University Hospital, Hanoi, Vietnam^f Laparoscopic Surgical Center, Viet Duc University Hospital, Hanoi, Vietnam

ARTICLE INFO

Article history:

Received 25 June 2024

Revised 16 July 2024

Accepted 17 July 2024

Keywords:

Colon disruption

CT scan

Surgery

ABSTRACT

Isolated colon injuries following blunt abdominal trauma have been reported at a rate of 0.1%–0.5%, with isolated sigmoid colon injuries involved in only 34.8% of single colon injuries. Surgical treatment options include recto-colonic anastomosis, resection with or without recto-colonic anastomosis, and colostomy. We report the case of a 39-year-old male patient diagnosed with isolated sigmoid colon rupture after a traffic accident, identified using contrast-enhanced abdominal computed tomography. The patient underwent emergency surgery, during which the Hartmann procedure was performed. This included excision of the sigmoid colon at both ends of the hiatus, creation of a proximal colostomy, closure of the distal end, and repair of the sigmoid disruption segment. Seven days after surgery, the patient's clinical symptoms were stable, and he was discharged.

© 2024 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license

[\(http://creativecommons.org/licenses/by-nc-nd/4.0/\)](http://creativecommons.org/licenses/by-nc-nd/4.0/)

Introduction

Colon injuries commonly occur in abdominal trauma due to traffic accidents and often accompany injuries to other or-

gans [1,2]. Isolated colonic injuries following closed abdominal trauma are reported at a rate of 0.1%–0.5%, with isolated sigmoid colon injuries involved in only 34.8% of single colon injuries, and distal sigmoid colon involvement is much rarer due to the fixation of the sigmoid colon within the pelvis [3].

[☆] Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

* Corresponding author.

E-mail address: tranquangloc8396@gmail.com (T.Q. Loc).

<https://doi.org/10.1016/j.radcr.2024.07.101>

1930-0433/© 2024 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Challenges in diagnosis and the lack of standardized treatment protocols for colonic injuries contribute to increased complication rates and mortality. Below is a case of isolated discontinuity sigmoid colon injury, unaccompanied by injury to other intra-abdominal organs.

Case report

A 39-year-old male patient presented to the emergency room with symptoms of right lower quadrant pain following a motor vehicle accident. The patient has no significant medical history. Upon admission, vital signs were stable (heart rate 85 beats per minute, blood pressure 128/80 mmHg), with no visual impairment. Physical examination revealed abrasions over the right lower rib and pelvic region, with no signs of pelvic instability or guarding upon palpation. Additionally, there were abrasions over the facial area and soft tissue scalp injuries.

Blood tests revealed an elevated white blood cell count (18.74 G/L), primarily due to an increase in neutrophils (16.36 G/L), and mild liver enzyme elevation (AST = 40.9 U/L; ALT = 76.6 U/L). The red blood cell count and hemoglobin levels were normal. Noncontrast head CT and chest X-ray did not reveal any abnormalities. Abdominal ultrasound detected a small amount of fluid in the hepatorenal recess measuring 4 mm. The patient was scheduled for a contrast-enhanced CT scan of the abdomen.

The abdominal CT scan revealed sigmoid colon discontinuity and mild pericolic fat stranding. A small amount of free intraperitoneal gas was concentrated in the upper abdomen, adjacent to the anterior abdominal wall, with a small amount of free fluid in the subhepatic space and right colonic gutter. No injuries to other organs were observed (Fig. 1).

The patient underwent emergency surgery. Intraoperatively, a 15 cm segmental discontinuity of the sigmoid colon

and a corresponding tear in the suspensory mesocolon were identified. The site of colonic discontinuity was adjacent to the appendiceal orifice, with a 2 cm diameter tear. No injuries were observed in the solid organs, small bowel, or remaining portion of the colon. The surgical team decided to perform a Hartmann's procedure, which involved resection of the sigmoid colon at both ends of the discontinuity, creation of a colostomy at the proximal end, and closure of the distal end, along with repair of the sigmoid tear segment (Fig. 2).

The pathological examination revealed hemorrhagic injury accompanied by minimal degeneration of the sigmoid colon, with no evidence of malignant cells. The postoperative course was stable, and the patient was discharged after 7 days of hospitalization.

Discussion

Colon injuries often occur after penetrating abdominal trauma. However, this type of injury is rarely seen after blunt abdominal trauma, with an incidence of only 0.1%-0.5% [3], and isolated sigmoid colon injuries account for only 34.8% of single colon injuries [4]. Most colon injuries are associated with solid organ injuries [5]. In our case, however, we did not find damage to any other accompanying organs in the abdomen.

The mechanisms of sigmoid colon injury following closed abdominal trauma include (i) bowel impaction against the vertebral bodies; (ii) rapid pressure increase at physiologically narrow segments of the colon; and (iii) torsional forces on the colon/mesentery [1,2,4,6,7]. The resulting injuries may include mucosal tears, bowel perforation, bowel lacerations, mesenteric hematoma, serosal hematoma, ischemic injury, and colonic necrosis [1,2,4,7]. Proposed causes for isolated sigmoid colon perforation in closed abdominal trauma include the sigmoid colon being too long, the mesentery being long



Fig. 1 – Abdominal computed tomography in the contrast-enhanced venous phase: image of sigmoid colon discontinuity accompanied by pericolic fat infiltration (arrow) on coronal (A) and axial (B). Intraperitoneal gas (arrowhead) on axial (C).

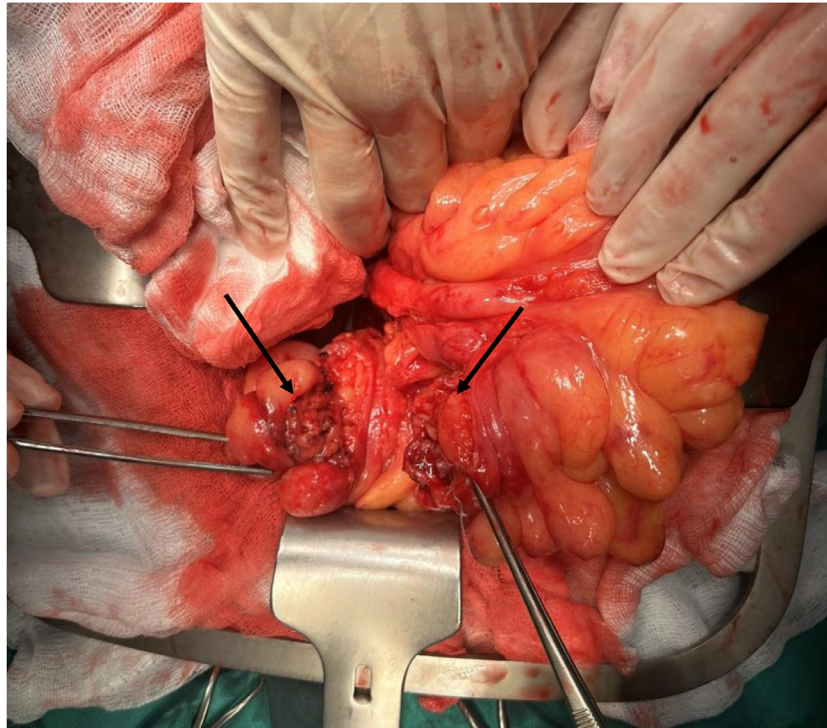


Fig. 2 – Intraoperative image showing the segmental discontinuity of the sigmoid colon, along with a tear in the corresponding suspensory mesocolon (arrow).

and wide, and the distended colon being susceptible to perforation upon sudden impact. Diagnosis of isolated sigmoid colon injury following closed abdominal trauma is often challenging due to associated multiorgan injuries and minimal signs necessitating emergent abdominal surgery [2]. In such cases, the time interval from injury to surgical intervention is crucial in reducing morbidity and mortality in the postoperative period [2,4].

There is no clinically accurate method for diagnosing closed sigmoid colon trauma [6]. Blood-stained gloves during rectal examination, along with abdominal pain, are poor prognostic indicators in colon trauma. An increased white blood cell count may be indicative of pathology [8]. Abdominal X-rays often do not provide definitive conclusions; thickened bowel walls and free fluid on ultrasound may suggest bowel injury. Contrast-enhanced computed tomography (CECT) has a sensitivity of 64% and an accuracy of 82% in predicting bowel injury [7], but its diagnostic accuracy for sigmoid colon trauma is controversial, at approximately 20% [9]. However, CECT is significantly better than clinical examination and other methods (such as Diagnostic Peritoneal Lavage and ultrasound), often leading to negative abdominal explorations in trauma cases [2,4].

Surgical treatment includes closing the initial perforation or resecting the affected segment, with or without restoring continuity and/or creating an artificial anus [1,2,4]. Most reported literature supports restoring continuity whenever possible, due to better wound closure, prevention of complications at the anastomotic site, and the need for a second surgery. However, artificial anus creation may be necessary in cases of injuries involving more than 50% of the intestinal

circumference, compromised blood supply, full-thickness perforation, unstable hemodynamics, or associated comorbidities, as artificial anus creation has been associated with reduced mortality rates in that subgroup [10]. In our case, the surgical decision was based on the inflammatory/infectious status during surgery and the condition of the intestinal segment.

Surgical treatment includes closing the initial perforation or resecting the affected segment, with or without restoring continuity and/or creating an artificial anus [1,2,4]. Most literature supports restoring continuity whenever possible due to better wound closure, prevention of complications at the anastomosis site, and the reduced need for a second surgery. However, creating an artificial anus may be necessary in cases involving more than 50% of the intestinal circumference, compromised blood supply, full-thickness perforation, unstable hemodynamics, or associated comorbidities, as artificial anus creation has been associated with reduced mortality rates in that subgroup [10]. In our case, the surgical decision was based on the inflammatory/infectious status during surgery and the condition of the colon segment.

Conclusion

Isolated sigmoid colon trauma following blunt abdominal trauma is relatively rare. Its rarity and the lack of accurate diagnostic methods lead to delayed diagnosis and treatment, increasing the incidence of morbidity and mortality. Current literature tends to focus on penetrating colon injuries, with

few studies concentrating on blunt colon trauma. Due to the challenges of clinical examination in diagnosing blunt colon trauma, contrast-enhanced computed tomography of the abdomen has become an effective method for accurate and rapid diagnosis, facilitating timely intervention for patients. Further research is needed to identify patient populations that may benefit from surgical interventions and to explore the application of various surgical treatment methods.

Patient consent

Informed consent for patient information to be published in this article was obtained.

REFERENCES

- [3] Srivastava A, Yadav H kesh, Katiyar V. Isolated sigmoid colon perforation in the setting of blunt abdominal trauma: a case series. *Cureus*. 14(11):e31591. doi:10.7759/cureus.31591
- [4] Cheng V, Schellenberg M, Inaba K, et al. Contemporary trends and outcomes of blunt traumatic colon injuries requiring resection. *J Surg Res* 2020;247:251–7. doi:10.1016/j.jss.2019.10.017.
- [5] ALShareef B, ALJurushi R, ALSaleh N. Delayed presentation of an isolated sigmoid colon injury following blunt abdominal trauma: a case report with review of literature. *Int J Surg Case Rep* 2021;83:105989. doi:10.1016/j.ijscr.2021.105989.
- [6] Sharpe JP, Magnotti LJ, Weinberg JA, et al. Applicability of an established management algorithm for colon injuries following blunt trauma. *J Trauma Acute Care Surg* 2013;74(2):419–25. doi:10.1097/TA.0b013e31827a36e9.
- [7] Ertugrul G, Coskun M, Sevinc M, Ertugrul F, Toydemir T. Delayed presentation of a sigmoid colon injury following blunt abdominal trauma: a case report. *J Med Case Rep* 2012;6:247. doi:10.1186/1752-1947-6-247.
- [8] Harris HW, Morabito DJ, Mackersie RC, Halvorsen RA, Schechter WP. Leukocytosis and free fluid are important indicators of isolated intestinal injury after blunt trauma. *J Trauma* 1999;46(4):656–9. doi:10.1097/00005373-199904000-00016.
- [9] Kim HC, Shin HC, Park SJ, et al. Traumatic bowel perforation. *Clin Imaging* 2004;28(5):334–9. doi:10.1016/S0899-7071(03)00244-4.
- [10] Yamamoto R, Logue AJ, Muir MT. Colon trauma: evidence-based practices. *Clin Colon Rectal Surg* 2018;31(1):11–16. doi:10.1055/s-0037-1602175.

- [1] Maurya AP. Delayed presentation of colonic injury following blunt abdominal trauma. *Indian J Surg* 2021;83(S1):207–9. doi:10.1007/s12262-020-02277-w.
- [2] Singh M, Dalal S, A A, Sattibabu V. Delayed presentation of an isolated sigmoid colon injury following blunt abdominal trauma: a case report & review of literature. *Oncology, Gastroenterol Hepatol Rep* 2017;6:75–6. doi:10.5530/ogh.2017.6.2.21.