



Case report

Case report on a rare cause of small bowel perforation perforated ileal diverticulum

Kishore Rajaguru^{*}, Seow Choon Sheong

Department of General Surgery, Ng Teng Fong General Hospital, National University Health System, Singapore

ARTICLE INFO

Keywords:

Small bowel perforation
Ileal diverticulum
Small intestinal diverticulum

ABSTRACT

Introduction: Complications due to small bowel non-Meckel's diverticulosis is an uncommon clinical scenario encountered in clinical practice. A diverticulum in the ileum is rare among the locations of the diverticulum in the small intestine. We describe an unusual case of ileal diverticular perforation presenting as an acute abdomen. **Case presentation and management:** A 74-year-old male presented with septic shock and localized peritonitis in right lower abdomen. Preoperative imaging and intraoperative findings were consistent with terminal ileal diverticular perforation for which right hemicolectomy was done.

Conclusion: Small bowel diverticulosis was usually asymptomatic, though it can rarely present with acute abdominal emergencies. Computed tomogram of the abdomen, Barium meal follow-through, capsule endoscopy, CT enteroclysis can be used to diagnose small bowel diverticulosis. Although the incidence of small bowel diverticulosis is low, small bowel diverticulitis should be included in the differential diagnosis if an inflammatory mass involving the small bowel is demonstrated on CT. Patients with localized and self-limited inflammation without free perforation in imaging can be treated conservatively with parenteral antibiotics and close monitoring approach. Surgical intervention is usually required for complicated acute presentations and those with refractory symptoms. A high index of suspicion of complicated small bowel diverticulosis should be in the clinician's mind when dealing with acute small bowel emergencies especially in elderly patients.

1. Introduction

The incidence of non-Meckel small bowel diverticulosis is rare which occurs in <1% of the general population and the highest incidence is noted in the elderly patients during the sixth and seventh decade of life. 0.3–1.3% of small bowel diverticula was seen in autopsy cases and small intestine contrast studies pick up diverticulum in 0.5–1.9% of the population [1,2]. Incidence has been seen to be more in men (58%) than women (42%) [3]. Diverticulum in the duodenum is the commonest site followed by jejunum and rarely in ileum. The diagnosis of small bowel diverticular disease is largely made by imaging studies as an incidental finding. Computed tomogram of the abdomen, Barium meal follow-through, capsule endoscopy, CT enteroclysis can be used to diagnose small bowel diverticulosis.

Small bowel diverticulosis was usually asymptomatic, though it can rarely present with nonspecific symptoms like diarrhea, malabsorption, chronic abdominal pain and bloating. In acute scenarios, they can present with hemorrhage, perforation, diverticulitis and rarely as intestinal obstruction. A diverticulum in the ileum is rare among the locations of

the diverticulum in the small intestine. Here we describe the presentation, diagnosis and management of an ileal diverticular perforation in our academic institution.

This case report has been reported in accordance with the SCARE Criteria [4].

2. Case presentation

A 74-year-old gentleman presented to our emergency department with five days' history of fever, chills and progressive abdominal distension with no history of diarrhea or vomiting. His past medical history included hypertension for which he was on medications. On examination he was clinically dehydrated. Initial vitals showed a temperature of 39.7 °C, heart rate of 94/min and blood pressure of 98/70 mmHg. The abdomen was distended and tender in the right iliac fossa and suprapubic regions with localized guarding.

Blood investigation revealed hemoglobin 14 g/dL, leukocytosis (16,500 cells/mm³), neutrophils 14.36 × 10⁹/L, lymphocytes 6.1 × 10⁹/L and C-reactive protein (CRP) 256 mg/dL. A renal panel showed signs

^{*} Corresponding author.

E-mail address: Kishore_Rajaguru@nuhs.edu.sg (K. Rajaguru).

<https://doi.org/10.1016/j.ijscr.2021.106465>

Received 9 September 2021; Received in revised form 28 September 2021; Accepted 28 September 2021

Available online 1 October 2021

2210-2612/© 2021 Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

of mild acute kidney injury: creatinine 120 $\mu\text{mol/L}$ and estimated glomerular filtration rate (eGFR) 75 ml/min/1.73m^2 from his previous baseline value of 90 ml/min/1.73m^2 . No significant pathology was found on the chest X-ray and abdomen X-ray showed dilated small bowel loops.

Broad-spectrum antibiotics (ceftriaxone and metronidazole) were started along with intravenous paracetamol and metoclopramide. The patient was adequately resuscitated and because of the clinical suspicion of septic shock, he was subjected to a computed tomogram of his abdomen and pelvis which revealed inflammatory changes in the right iliac fossa with the presence of extra-luminal gas locules [Fig. 1]. The inflammatory changes were mostly centered along the mesenteric border of the terminal ileum with a focal outpouching seen in close relationship to the gas locules with an intraluminal hyperdensity (fecolith) at the base [Figs. 2,3].

Given presenting symptoms of septic shock, the patient was counseled and consented for emergency surgery. On diagnostic laparoscopy, inflammatory soft adhesions of the small bowel and omentum were seen in the right iliac fossa region. Adhesions were released. Compatible with the CT findings, a perforated terminal ileum diverticulum was seen around 5 cm from ileocecal junction with an exposed fecolith along the mesenteric border with a localized abscess cavity [Fig. 4]. The rest of the gastrointestinal tract was normal.

The abscess was drained and because of the anatomical location of the perforated diverticulum, Laparoscopic assisted right hemicolectomy was performed. Medial to lateral approach was done to secure the ileocolic vessels. This was followed by lateral mobilization of terminal

ileum, right colon and hepatic flexure. After completion of right hemicolectomy and resection, anastomosis (terminal ileum to transverse colon) was done. The resected specimen is shown in Fig. 5.

Post-operatively he was started on early feeds and mobilized with active physiotherapy. He was discharged home well on fourth post-operative day. Histology of the resected specimen showed acute terminal ileum diverticulitis with perforation and abscess.

3. Discussion

Non-Meckel Diverticular disease of the small bowel is rare and has a prevalence of approximately 1% of the general population [5]. 0.3–1.3% of small bowel diverticula was seen in autopsy cases and small intestine contrast studies pick up diverticulum in 0.5–1.9% of the population [1,2]. Incidence has been seen to be more in men (58%) than women (42%) [3]. The highest incidence is in the elderly occurring during the sixth and seventh decade of life.

Diverticulosis of duodenum region is the common site among small bowel diverticulum with variable prevalence (range from 11 to 31%) in different studies. The incidence in upper barium studies is 0.16 to 6% and in ERCP studies is 9–23% [6]. Majority of duodenal diverticulum are diagnosed incidentally during endoscopic or imaging studies. Complications due to duodenal diverticula were rare (1–5%) which includes hemorrhage, diverticulitis, cholangitis and in rare cases perforation.

Jejunal and ileum diverticula are less common with the incidence of jejuno-ileal diverticulum in imaging studies is 0.07–1.0% and in autopsies is 0.07–0.8% [7,8]. Among the jejuno-ileal site, proximal

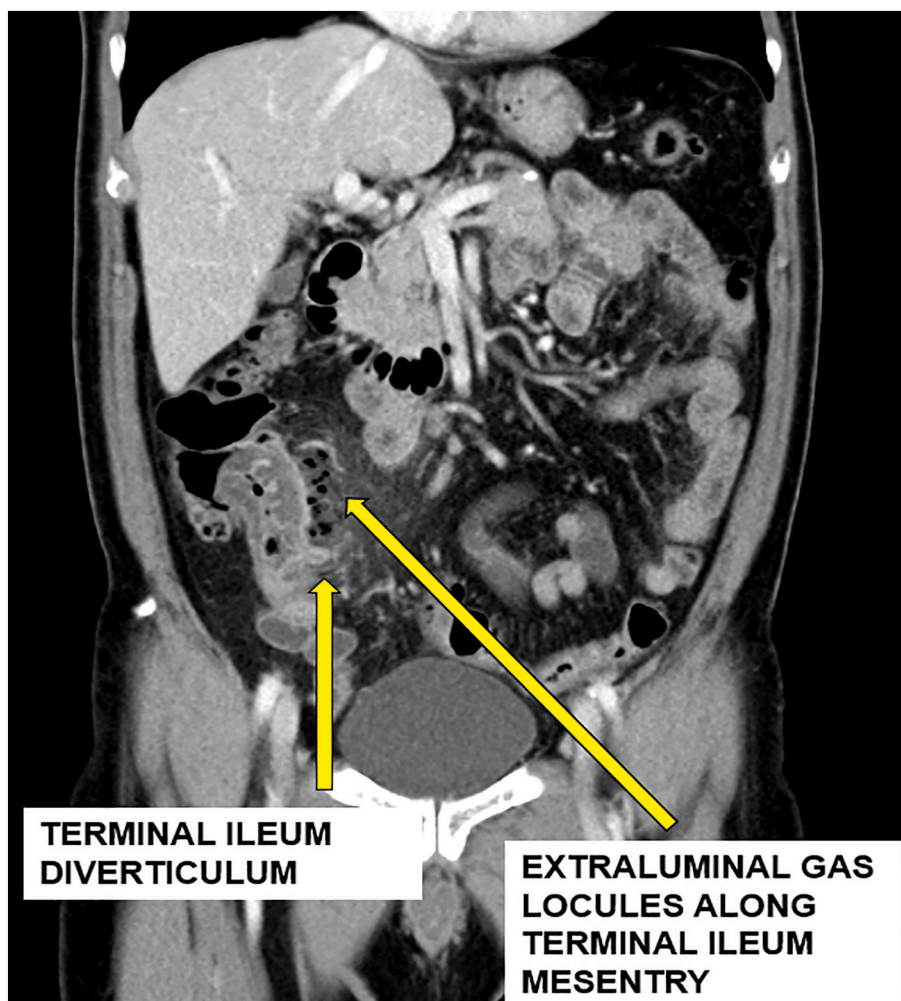


Fig. 1. Extra luminal gas locules along mesenteric border with perforated ileal diverticulum.



Fig. 2. Ileal diverticulum with fecolith occupying the lumen.

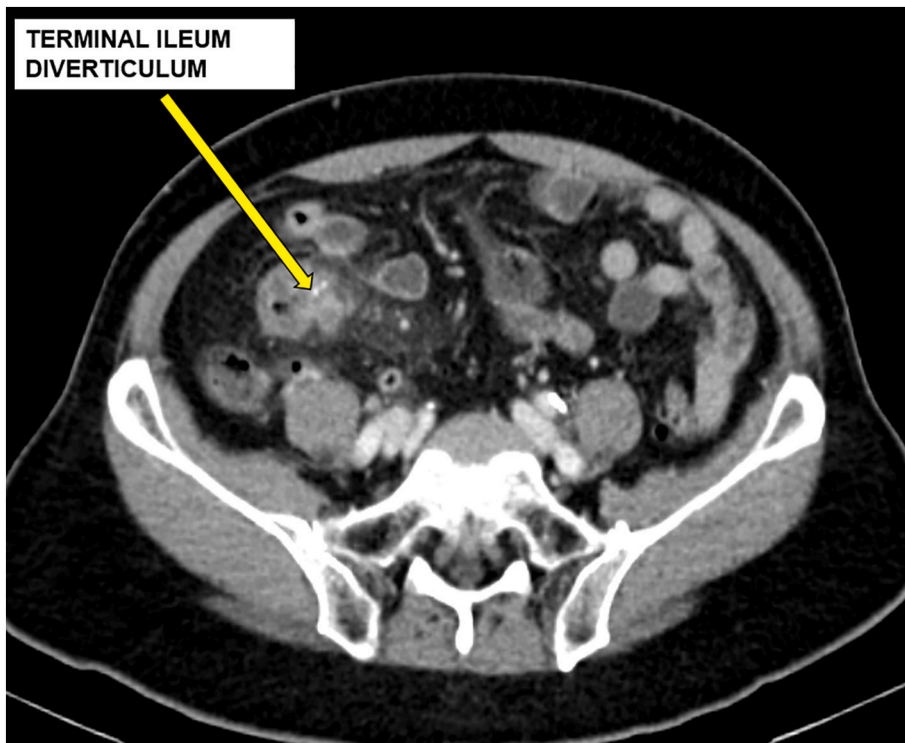


Fig. 3. Focal outpouching along the terminal ileum.

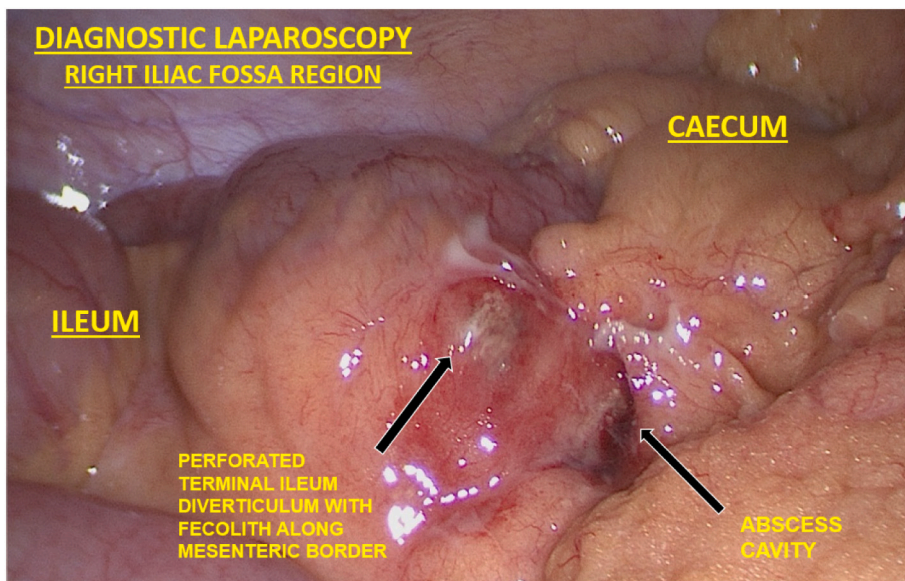


Fig. 4. Laparoscopic view showing perforated ileal diverticulum along mesenteric border.

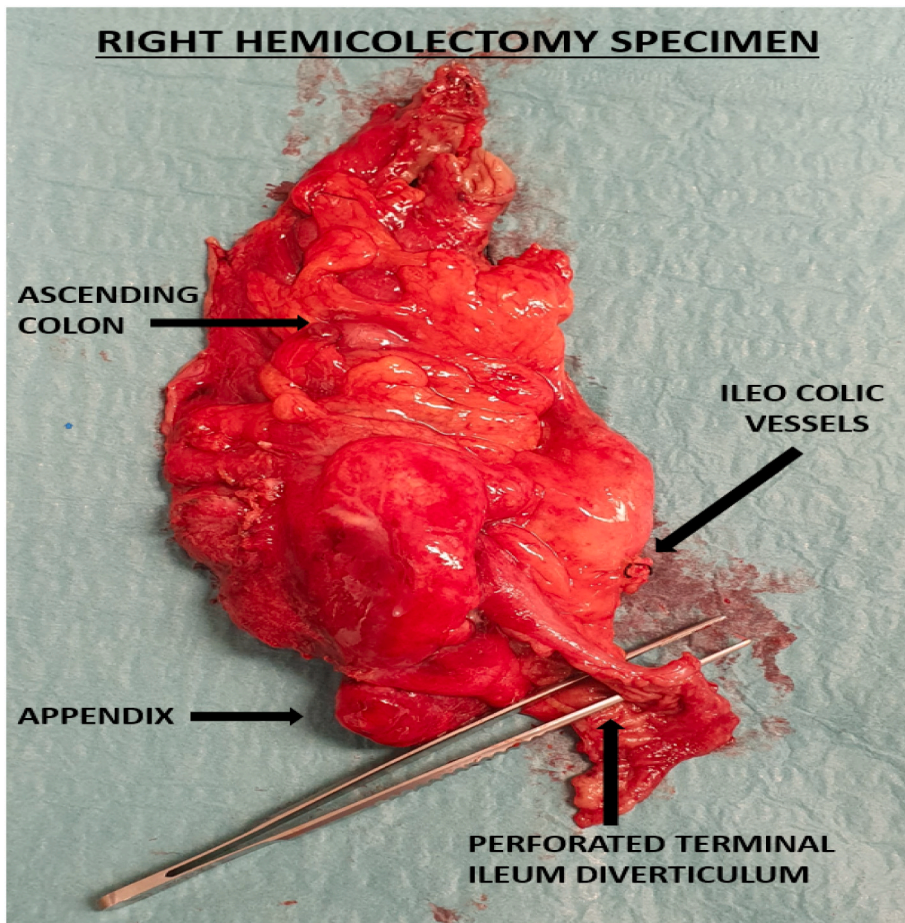


Fig. 5. Right Hemicolectomy specimen showing perforated terminal ileal diverticulum.

jejunum (75%) is the most common site followed by distal jejunum (20%) and then ileum (5%).

In our case, we encountered ileal diverticular perforation which is an uncommon presentation. Its medial perforation into the mesentery has probably accounted for his relative delayed presentation with favorable

clinical outcome.

Most of the cases were asymptomatic. The remaining patients had symptoms of diarrhea, malabsorption, chronic abdominal pain and bloating. In acute scenarios (10–15% of cases), they can present with hemorrhage, perforations, diverticulitis and rarely as intestinal

obstruction [9]. A possible association of jejunal diverticula with collagen vascular disorders such as Raynaud's phenomenon and systemic sclerosis was documented in case studies [6].

Non-Meckel Small bowel diverticulum in the majority are false diverticulum as they lack muscular wall present in true diverticulum such as Meckel's diverticulum. The cause for small bowel diverticulosis is likely a motor dysfunction of myenteric plexus or smooth muscle fibers which results in disordered contraction [10] and increased intraluminal pressure and causes herniation along the area where the vasa recta blood vessels and nerves penetrate the mesentery area [11]. The predominance of jejunal diverticulum is attributed to the greater diameter of the penetrating jejunal arteries. The base of diverticula may contain ectopic gastric or pancreatic tissue which may be the cause for ulceration. Patients with ileal diverticulosis are more likely to develop complications such as perforation and diverticulitis than jejunal and duodenal diverticulosis.

The diagnosis of small bowel diverticular disease is largely made by imaging. Computed tomogram (CT) of the abdomen, Barium meal follow-through, capsule endoscopy, CT enteroclysis can be used to diagnose small bowel diverticulosis. In an acute presentation, CT finding includes of bowel wall thickening with smooth margins, mesenteric edema and inflammation, extraluminal free air and fluid collection around diverticula [12]. Pre-operative diagnosis by enteroclysis was possible in majority of patients with chronic symptoms. Lesions that presents as hemorrhage can be diagnosed by either Technetium-99 m bleeding scan or by arteriography when the bleeding rate is in the range of 0.1-0.5 ml/min and 0.5-1 ml/min respectively [13]. Capsule endoscopy has a role in the diagnosis of small bowel diverticulosis but it has limited value in acute abdominal presentations including obstruction and patients with motility disorders.

Complications of small bowel diverticulosis occur in 10-15% of cases. Acute complications include diverticulitis, hemorrhage, perforation, mechanical obstruction and fistula formation. Chronic complications include low-grade gastrointestinal hemorrhage, blind loop syndrome, megaloblastic anemia, functional pseudo-obstruction and steatorrhea [14]. Differential diagnosis in acute presentations includes perforated small bowel neoplasm, foreign body perforation, small bowel ulcerations due to NSAID use, Crohn's small bowel disease [15].

For asymptomatic presentation of cases, conservative management and follow-up are adequate. However, surgical treatment is recommended for incidental large diverticulum with dilated hypertrophied bowel loops that represent a progressive form of the disease. When presented with acute complications, surgical intervention is usually needed. Segmental resection and end to end anastomosis is the preferred treatment of choice [16], whereas simple closure of perforation site and other conservative measures causes greater mortality and morbidity [25-50%]. However, patients with localized and self-limited inflammation without free perforation in imaging can be treated conservatively with parenteral antibiotics and close monitoring approach.

4. Conclusion

The incidence of non-Meckel small bowel diverticulosis is rare which occurs in <1% of the patients. Duodenum is the commonest site followed by jejunum and rarely in ileum. Ileal perforation due to diverticulum is rare in clinical practice and hence demands reporting. Most of those diverticulosis was asymptomatic. Some patients can present with nonspecific symptoms like diarrhea, malabsorption, chronic abdominal pain and bloating. Acute complications related to small bowel diverticulosis were rare. Computed tomogram (CT) of abdomen, Barium meal follow-through, capsule endoscopy, CT enteroclysis can be used to diagnose small bowel diverticulosis. Patients with localized and self-limited inflammation without free perforation in imaging can be treated conservatively with parenteral antibiotics and close monitoring approach. Surgical intervention is usually required for complicated acute presentations and those with refractory symptoms. Although the

incidence of small bowel diverticulosis is low, it needs to be considered in the clinician's mind to avoid misdiagnosis.

Funding

Nil.

Ethical approval

Not applicable, patient consent obtained.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Registration of research studies

Not applicable.

Guarantor

- 1] Dr. Kishore Rajaguru.
- 2] Dr. Seow Choon Sheong.

Provenance and peer review

Not commissioned, externally peer-reviewed.

CRediT authorship contribution statement

- 1] Dr. Kishore Rajaguru: Writing: Original manuscript draft.
- 2] Dr. Seow Choon Sheong: Writing: Review and editing.

Declaration of competing interest

Nil.

References

- [1] J.K. Fisher, D. Fortin, Partial small bowel obstruction secondary to ileal diverticulitis, *Radiology* 122 (1977) 321-322.
- [2] R.B. Cattell, T.J. Mudge, The surgical significance of duodenal diverticula, *N.Engl. J. Med.* 246 (1952) 317-324.
- [3] G.G. Tsiotos, M.B. Farnell, D.M. Ilstup, Non-meckelian jejunal or ileal diverticulosis: an analysis of 112 cases, *Surgery* 116 (1994) 726-732.
- [4] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus Surgical Case REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226-230.
- [5] M. Fang, S. Agha, R. Lee, et al., Perforation of jejunal diverticulum: case report and review of literature, *Conn. Med.* 64 (2000) 7-10.
- [6] W.-Y. Yin, H.-T. Chen, S.-M. Huang, H.-H. Lin, T.-M. Chang, Clinical analysis and literature review of massive duodenal diverticular bleeding, *World J.Surg.* 25 (7) (2001) 848-855.
- [7] R.E. Miller, R.E. McCabe, P.F. Salomon, W.G. Knox, Surgical complications of small bowel diverticula exclusive of Meckel's, *Ann.Surg.* 171 (1970) 202-210.
- [8] S.C. Cunningham, C.J. Gannon, L.M. Napolitano, Small-bowel diverticulosis, *Am.J. Surg.* 190 (2005) 37-38.
- [9] D.R. Wilcox, H.C. Shatney, Surgical implications of jejunal diverticula, *South.Med. J.* 81 (1988) 1386-1391.
- [10] D. Jones, R. McMillin, F. Greene, Complications of acquired diverticula of the ileum, *Am.Surg.* 49 (1983) 218-220.
- [11] A. Gotianand, S. Katz, Jejunal diverticulitis with localized perforation and intramesenteric abscess, *Am.J.Gastroenterol.* 93 (7) (1998) 1173-1175.
- [12] J.M. Lieberman, J.R. Haaga, Computed tomography of diverticulitis, *J.Comput. Assist.Tomogr.* 7 (1983) 431-433.
- [13] Small bowel diverticula, *World J. Gastrointest. Surg.* 3 (4) (2011 April 27) 49-53.

- [14] C.B. Ross, W.O. Richards, K.W. Sharp, P.D. Bertram, P.W. Schaper, Diverticular disease of the jejunum and its complications, *Am.Surg.* 56 (5) (1990) 319–324.
- [15] M. Macari, M. Faust, H. Liang, H.L. Pachter, CT of jejunal diverticulitis: Imaging findings, differential diagnosis, and clinical management, *Clin. Radiol.* 62 (1) (2007) 73–77.
- [16] J.A. Ferguson, Ramin, H.E. Slusher, Diverticulosis of the terminal ileum: case report, *Mil. Med.* 148 (1983) 551–552.