

Case report

Case report: Challenges in diagnosis and treatment of Small bowel diverticulitis presenting with acute abdomen

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Small bowel diverticulitis is a rare condition that is often excluded in the differential diagnosis of acute abdomen. We herein present two cases of patients with small bowel diverticulitis who presented with acute abdomen. First case was a 72-year-old lady who presented to emergency with 2 days of sudden-onset worsening generalized abdominal pain. The computed tomography (CT) revealed a segment of abnormally thickened jejunum with marked adjacent inflammatory mesenteric fat stranding and adjacent extraluminal gas locules, in keeping with complicating perforation. The patient was subsequently taken to the operating theater for an emergency laparotomy which revealed a contained perforation of the proximal jejunum secondary to a ruptured diverticulum. 20 cm of proximal jejunum containing the perforation was resected. The patient recovered uneventfully and was discharged day 7 following the operation. Second case was a 78-year-old lady who presented with 12 h of sudden-onset right-sided abdominal pain. The CT revealed the presence of multiple diverticula in the jejunum associated with diffuse wall thickening and marked peridiverticular inflammatory changes. This was most in keeping with small bowel diverticulitis, however, there was no definite extraluminal gas to suggest any evidence of perforation. The patient was managed conservatively with intravenous antibiotics and bowel rest. The patient's pain improved with improving inflammatory markers during the hospital stay. The patient was discharged day 4 following the admission. We believe that there is a need to devise a comprehensive treatment guidelines specific for small bowel diverticulitis. In the meantime, it is deemed safe to conservatively manage uncomplicated cases without perforation.

Key words: Intestine, small, abnormalities, abdomen, acute, diverticulosis, colonic, diverticulitis, colonic, clinical protocols, tomography, computed.

INTRODUCTION

Diverticulosis is the term used to describe the formation of abnormal outpouchings from the intestinal lumen due

to mucosal herniation through weak points in the. What intestinal wall, called diverticula (Stollman and Raskin

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2004) causes these diverticula to develop is not fully understood, but it is thought to develop as a result of peristaltic dysfunction causing intermittent high segmental intraluminal pressures. Diverticulosis has been linked to several risk factors including advancing age, low-fiber diet, high-fat diet, obesity, excessive alcohol consumption, and smoking (Bohm, 2015). Most cases of diverticulosis are asymptomatic or manifest with nonspecific abdominal symptoms. Patients often do not seek medical attention until they develop diverticular bleed or diverticulitis.

Diverticulitis typically presents with localized abdominal pain or symptoms of its complications, including bowel obstruction, peritonitis, abscess or fistula formation (Gross and Katz, 2003). Diverticulitis predominantly occurs in the colon, and their occurrence in the small bowel is far less common due to their larger diverticulum size, better intra-luminal flow and relatively sterile luminal content (Harbi et al., 2017). So far, there has been numerous research conducted on colonic diverticulitis, and hence there are now well structured treatment algorithms and various grading systems to guide clinicians to tailor the most appropriate treatment option for colonic diverticulitis. However, owing to seldom occurrence there is only limited data on small bowel diverticulitis across the literature. In particular, there is no clear consensus as to whether we should be treating small bowel diverticulitis with comparable therapeutic approach to treating colonic diverticulitis (Veen et al., 2009).

Therefore, the treatment for small bowel diverticulitis is often arbitrary, that is largely based on the treating clinician's experience with colonic diverticulitis. Furthermore, there is currently insufficient data to determine whether there is definite correlation between the small bowel diverticulosis and its colonic counterpart. We herein present 2 cases of small bowel diverticulitis, where one was managed operatively and the other conservatively. Through our case report we aim to share our experience of managing small bowel diverticulitis to guide other clinicians in their decision making, and to hopefully reach a wider consensus in future.

Case report 1

A 72-year-old lady with past medical history of atrial fibrillation on warfarin, hypothyroidism, previous open cholecystectomy, and sleeve gastrectomy, presented to emergency with 2 days of sudden-onset worsening generalized abdominal pain with focal tenderness in the epigastrium. The patient also reported a single episode of non-bilious vomiting prior to the presentation, but there were no other constitutional symptoms and the patient had a normal bowel motion one day prior. On admission, the patient was clinically well with normal vital signs. On

examination, the abdomen was soft, but there was generalized abdominal tenderness that was worst in the epigastrium. The white blood cell count was elevated at $13.7 \times 10^9 /L$ with an elevated CRP of 215 (mg/L). Other blood tests were unremarkable.

Given the history of atrial fibrillation and sudden-onset of the pain, a further CT was performed to rule out an ischemic etiology. The CT revealed a segment of abnormally thickened distal jejunum within the left side of the abdomen with marked adjacent inflammatory mesenteric fat stranding, vasa recta hyperemia and multiple mesenteric lymphadenopathy. A few tiny adjacent extraluminal gas locules were also noted, in keeping with complicating perforation. There was a small-volume free fluid in the pelvis without any discrete abdominopelvic collection. The abdominal vasculature demonstrated normal enhancement without any evidence of appreciable bowel wall hypoenhancement, pneumatosis or portal venous gas to suggest an ischemic etiology. The remainder of small and large bowel was unremarkable without any obvious underlying mass lesions, except a few scattered uncomplicated colonic diverticulosis.

The patient was subsequently taken to the operating theater for an emergency laparotomy following a reversal of warfarin. A midline laparotomy was performed via the old scar. Extensive adhesions of the mid and distal small bowel loops were encountered, requiring a meticulous adhesiolysis. A contained perforation of the proximal jejunum secondary to a ruptured diverticulum was identified. Minimal turbid free fluid was seen without any intra-abdominal collection. Approximately 20 cm of proximal jejunum containing the perforation was resected using 60 mm GIA™ reloadable stapler. Hand-sewn isoperistaltic side-to-side anastomosis was then performed. Post-operatively, the patient was monitored in intensive care unit for three days with an uneventful recovery. The patient was discharged day 7 following the operation with an outpatient follow-up plan.

The histopathology of the resected specimen revealed sections of small bowel demonstrating mucosal outpouchings, consistent with diverticula. There was marked inflammatory changes with inflammatory cellular infiltrates with focal acute abscess formation with serositis, consistent with microscopic perforation. No evidence of dysplasia or malignancy was identified.

Case report 2

A 78-year-old lady with past medical history of colonic diverticulitis, reflux esophagitis, previous laparoscopic cholecystectomy, and hysterectomy, presented with 12 h of sudden-onset right-sided abdominal pain. The pain was non-radiating, described as gripping in nature, accompanied with some nausea, but no vomiting, and was exacerbated by movements. There were no other

constitutional symptoms, and the patient reported that the pain was different to the left iliac fossa pain that she experienced with her previous colonic diverticulitis. On admission, the patient was clinically well with normal vital signs. On examination, the abdomen was soft, but there was marked tenderness in the right lumbar region and to a lesser degree in the periumbilical region. The white blood cell count was mildly elevated at $11.4 \times 10^9 /L$ with CRP of 220 (mg/L). Other blood tests were unremarkable.

Further CT revealed multiple loops of jejunum with presence of multiple diverticula, demonstrating diffuse bowel wall thickening and edema, with marked adjacent inflammatory mesenteric fat stranding and hyperemia. The radiological appearance was most in keeping with small bowel diverticulitis. There was a moderate amount of free pelvic fluid, but no definite extraluminal free gas to suggest the evidence of perforation. Interestingly, the patient also had concurrent distal colonic diverticulosis without any evidence of complication.

Given no definite evidence of perforation, the decision was made for conservative management with intravenous antibiotics and bowel rest. The patient's pain improved with improving inflammatory markers during the hospital stay. The patient was subsequently discharged day 4 following the admission with a follow-up plan for a repeat CT in 3 months.

DISCUSSION

Small bowel diverticulitis is a rare entity compared to its colonic counterpart. Hence, it is often overlooked in the differential diagnosis of acute abdomen. It is reported that the incidence of small bowel diverticulosis ranges between 0.06 and 1.9% (Kouraklis et al., 2001). However, the disease is likely underdiagnosed as most cases are often asymptomatic and present with nonspecific chronic abdominal symptoms that generally do not warrant further investigation. Furthermore, diagnosis of small bowel diverticulosis provides diagnostic challenge as endoscopic diagnosis is often not possible due to its location in the midgut. Hence, the diagnosis is mostly reliant on radiological imaging which can sometimes be difficult to interpret.

Diverticulosis can occur anywhere in the small bowel. Excluding Meckel's diverticulum, which is a specific congenital form that mainly affects the ileum, small bowel diverticulosis most commonly affects duodenum and is almost five times more common than jejunoileal diverticulosis (Gross and Katz, 2003). Duodenal diverticulosis is most commonly seen after the fifth decade of life with equal preponderance in males and females, whereas jejunoileal diverticulosis is often observed in the sixth and seventh decades with male preponderance of 1.5:1 (Akhrass et al., 1997).

As with colonic diverticulosis the etiology of small bowel diverticulosis is not fully understood, but it is thought to undergo similar pathological process to colonic diverticulosis where intestinal peristaltic dysfunction causes intermittent high segmental intraluminal pressures, leading to progressive smooth muscle fibrosis and weakened intestinal wall susceptible for mucosal herniation. This theory is further supported by higher incidence of small bowel diverticulosis seen in patients with progressive systemic sclerosis and other visceral neuromyopathies (Gross and Katz, 2003).

Almost 80% of patients with small bowel diverticulosis are either asymptomatic or only develop intermittent symptoms of uncomplicated diverticulosis including abdominal pain, nausea, bloating, flatulence, and diarrhea (Akhrass et al. 1997; Gross and Katz, 2003). However, up to 20% of small bowel diverticulosis may become complicated by bleeding, diverticulitis with or without perforation, abscess or fistula formation, bowel obstruction, and malabsorption (Akhrass et al., 1997; Gross and Katz, 2003). Interestingly, in the study conducted by Akhrass et al. (1997), jejunoileal diverticulosis was found to be more likely to develop complications than duodenal diverticulosis as 46% of jejunoileal diverticulosis had complications, compared to 13% of duodenal diverticulosis.

The most frequently encountered complication of small bowel diverticulosis is diverticulitis (Akhrass et al., 1997, Chiu et al., 2000; Kouraklis et al., 2001). Patients with small bowel diverticulitis usually present with localized abdominal pain with nonspecific constitutional symptoms, including malaise, fever, nausea, vomiting, diarrhea, and anorexia. Similar to colonic diverticulitis, it exists on a spectrum of severity ranging from localized infection to perforation with or without mesenteric abscess and peritonitis. Small bowel diverticulitis can be almost impossible to diagnose on clinical grounds alone as symptoms are often nonspecific which may mimic peptic ulcer disease, cholecystitis, colonic diverticulitis or even appendicitis depending on the location of the disease (Gross and Katz, 2003; Transue et al., 2017). Both of our cases involved jejunal diverticulitis presenting with nonspecific symptoms of acute abdomen.

Our initial differential diagnoses were thought to be ischaemic colitis, cholecystitis or perforated peptic ulcer for the first case, and appendicitis for the second case. The pre-imaging clinical diagnosis can be even more challenging when symptoms of small bowel diverticulitis is further accompanied by distracting symptoms from other complications, including bowel obstruction, generalized peritonitis, abscess, or fistula formation.

The computed tomography (CT) is now recognized as the diagnostic imaging modality of choice for small bowel diverticulosis as well as its complications. Currently, there is no specific diagnostic CT protocol for small bowel diverticulitis, however, imaging with intravenous as well

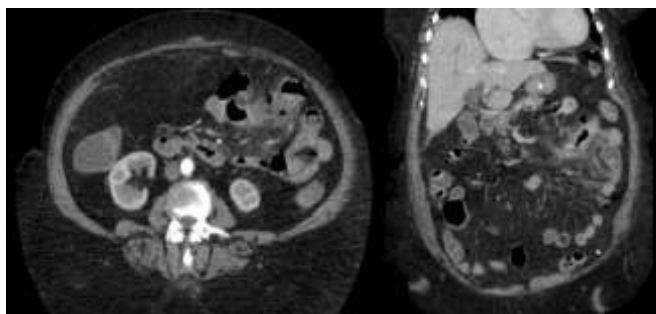


Figure 1. Arterial and portal venous phase CT of jejunal diverticulitis with micro-perforation (Case 1).

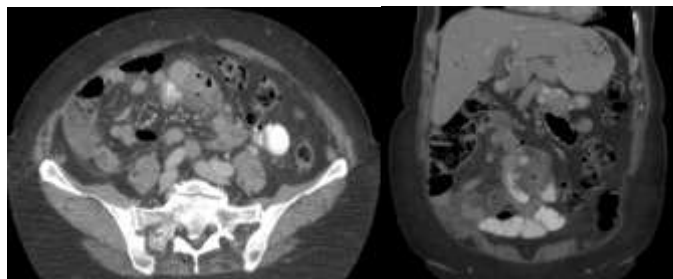


Figure 2. Portal venous phase CT of Jejunal diverticulitis (Case 2).

as oral or rectal contrast is recommended in setting of acute abdomen (Horton et al., 2000). CT findings of small bowel diverticulosis typically involve the presence of discrete and rounded outpouchings from the lumen, containing air, simple fluid, or enteric contrast (Fintelmann et al., 2008). The inflammatory findings are similar to those of colonic diverticulitis, and asymmetric small bowel wall thickening adjacent to a diverticulum with peridiverticular mesenteric fat stranding is characteristic (Hoeffel et al., 2006). Local extraluminal gas locules can also be observed with perforated diverticulitis (Transue et al., 2017), however, microscopic perforations cannot be ruled out based on the absence of extraluminal gas on CT. Despite these characteristic CT findings, due to their seldom occurrence radiologists may not be familiar with the radiological appearance of small bowel diverticulitis, especially in early phase of the disease (Transue et al., 2017). Moreover, in cases with extensive diverticula differentiating overlapping loops of bowel from diverticula can be challenging (Fintelmann et al., 2008). This was evident with our first case, where despite obvious perijejunal inflammatory changes on CT, no definite diverticula were visible. Other investigations such as magnetic resonance enterography and capsule endoscopy can be useful but it is impractical to resort to such modalities in an emergency setting (Harbi et al., 2017), hence, these are often used in incidental

diagnosis.

Currently, there are no structured guidelines for the treatment of small bowel diverticulitis (Veen et al. 2009; Transue et al., 2017). In particular, there is no clear consensus as to whether we should be treating small bowel diverticulitis with comparable therapeutic approach to treating colonic diverticulitis. Despite these, the treatment for small bowel diverticulitis is often arbitrarily based on the treating clinician's experience with colonic diverticulitis. Across the literature, there is some evidence that uncomplicated small bowel diverticulitis without perforation can often be managed conservatively with intravenous antibiotics, bowel rest, and supportive therapy (Akhrass et al., 1997; Gross and Katz, 2003). However, patients with failed medical therapy or with evidence of perforation and other complications the treatment of choice is resection of the inflamed segment and primary anastomosis (Gross and Katz, 2003). Poor prognostic factors include advanced age, associated medical comorbidities, delayed diagnosis and the time interval between perforation and surgery (Harbi et al., 2017).

It is generally quoted that as many as 50% of patients with small bowel diverticulosis have concurrent colonic diverticulosis (Lee and Finby, 1958; Longo and Vernava, 1992; Gross and Katz, 2003). This was observed in both of our patients who had radiological evidence of concurrent uncomplicated colonic diverticulosis. Currently, there is no recommendation to routinely screen for concurrent small bowel diverticulosis in patients with known colonic diverticulosis. However, in patients with chronic nonspecific abdominal complaints with known colonic diverticulosis the diagnosis of small bowel diverticulosis should be considered.

CONCLUSION

Small bowel diverticulitis is rare condition that can provide diagnostic challenge in patients presenting with acute abdomen. Despite its significance and high morbidity associated with the disease, it is often excluded in the initial differential diagnosis. The computed tomography is the mainstay of diagnostic imaging, although with few recognized limitations. It is most likely that the treatment guidelines for colonic diverticulitis can be applied to the treatment of small bowel diverticulitis, however, there is a need to devise a comprehensive treatment guidelines specific for small bowel diverticulitis. In the meantime, it is deemed safe to conservatively manage uncomplicated cases without perforation (Figures 1 and 2).

ABBREVIATIONS

CT: Computed tomography; **CRP:** C-reactive protein.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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