

# Small bowel diverticulitis: an often overlooked cause of acute abdomen

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**Abstract** We present 3 cases of small bowel diverticulitis ultimately presenting to our Emergency Department over a span of 2 years. Though the final diagnosis was the same, each patient's symptomatology was different, mimicking more common pathologies. Thus, it is important to consider this entity when confronted with signs and symptoms of acute abdomen, especially in the elderly. A missed or delayed diagnosis can lead to costly erroneous studies, incorrect treatments and delay in proper management, resulting in significant morbidity and even mortality. The variety of presentations can often be misleading; therefore, a high index of suspicion is needed on the part of the Emergency Department physician and Radiologist.

**Keywords** Jejunal diverticulitis · Ileal diverticulitis · Small bowel diverticulitis · Small bowel diverticulosis · Acute abdomen

## Introduction

Small bowel diverticulosis is an uncommon entity that is often asymptomatic; however, approximately 10% of patients will develop complications such as diverticulitis [1]. The clinical presentation is one of acute abdomen, thus overlapping with a multitude of other pathologies including appendicitis, colonic diverticulitis, cholecystitis, pancreatitis, small bowel obstruction, and renal stones, among others. If unrecognized, the delay in treatment can result in a high rate

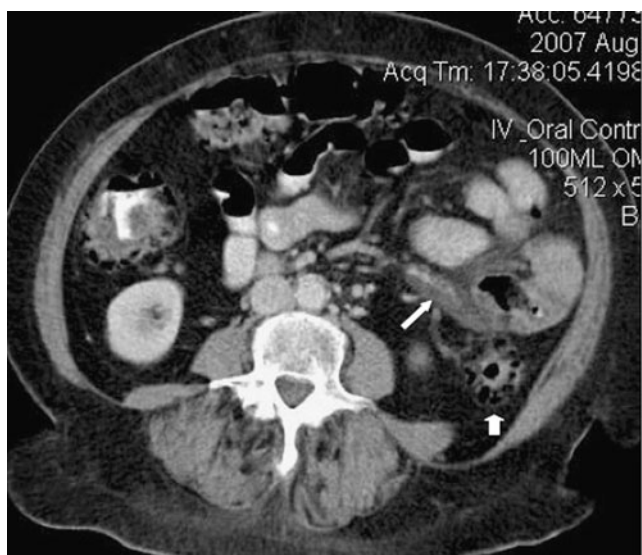
of morbidity, and sometimes mortality, when compared with colonic diverticulitis [2–4]. Given that the diagnosis of small bowel diverticulitis is often one of exclusion, a high clinical suspicion, both on the part of the Emergency Department (ED) physician and the radiologist, is needed to arrive at a timely diagnosis.

## Case 1 presentation

A 79-year-old female presented to our Emergency Department with 11 h of right upper quadrant pain that radiated to her back. The pain was characterized as persistent and dull with moderate intensity. She had a pertinent past medical history of renal colic, appendectomy, and a cholecystectomy for gallstones. Upon arrival, her vital signs were significant for hypertension. The patient appeared in moderate distress secondary to her abdominal pain. A right upper quadrant Murphy's sign was elicited upon physical examination. The remainder of the exam was unrevealing. Laboratory work-up was within normal limits. An abdominal ultrasound was ordered to look for common bile duct (CBD) pathology. The post-cholecystectomy CBD was minimally dilated at 11 mm but free of stones. The patient was held in observation because of a lack of diagnostic certainty. A plain film obstructive series was performed to rule out obstruction and was negative for obstruction. After 7 h of observation, discharge home was considered; however, the patient was instead sent for a contrast-enhanced CT of the abdomen and pelvis. Pertinent findings included extensive colonic diverticulosis and scattered jejunal and ileal diverticula. Two separate segments of jejunum were thick-walled and surrounded by inflammatory changes compatible with jejunal diverticulitis (Fig. 1). The patient was admitted with the proper diagnosis and the surgical team was consulted.

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**Fig. 1** Axial image from a contrast-enhanced CT scan demonstrates a thick-walled segment of jejunum in the left upper quadrant (*long arrow*). Minimal oral contrast is seen within the narrowed lumen. Incidental note is made of widespread diverticula of the visualized ascending, transverse, and descending colonic segments (*short arrow*)

### Case 2 presentation

An 87-year-old female presented to our Emergency Department with 10/10 “burning” diffuse abdominal pain beginning the prior evening. She also complained of nausea, constipation, and abdominal bloating. The patient reported a history of multiple abdominal surgeries, including an appendectomy, hysterectomy, and partial bowel resection secondary to diverticulitis. Review of prior Emergency Department visits revealed an admission 3 years earlier for renal stones. Vital signs at this presentation were remarkable for tachycardia of 106 beats per minute, but otherwise stable without fever. Physical examination revealed mild tenderness in the left lower quadrant. Laboratory work-up was positive for an elevated white count of 21.1 with a left shift. The presumptive diagnosis was colonic diverticulitis. The patient was sent for a CT scan of the abdomen and pelvis with oral contrast only. No IV contrast was administered due to elevated creatinine. CT scan images revealed scattered diverticulosis involving the jejunum and ileum. Wall thickening and inflammation were seen surrounding the distal ileum in a segment where ileal diverticula were evident (Figs. 2, 3, and 4). Two extraluminal foci of air were also appreciated, compatible with small bowel diverticulitis complicated by contained perforation (Fig. 5). The patient was admitted for IV antibiotics and surgical consult.

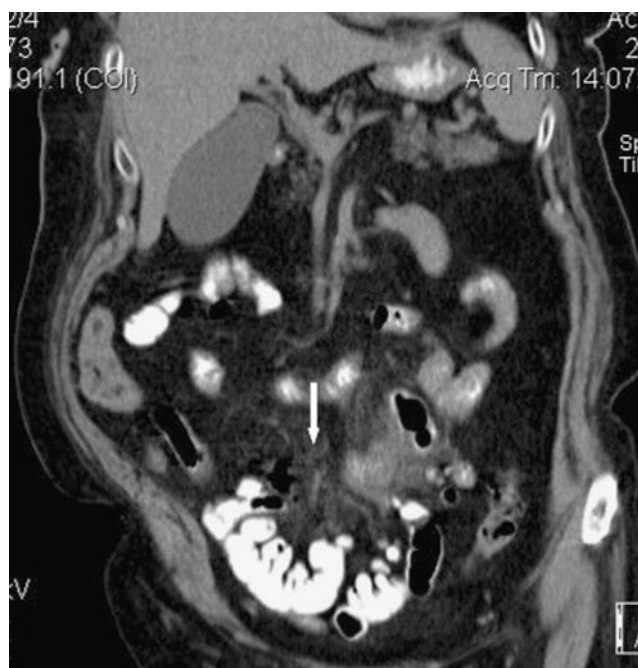
### Case 3

A 77-year-old male with a past medical history of diabetes, hypertension, cholecystectomy, and laparoscopy presented



**Fig. 2** A distal ileal loop within the mid lower abdomen is thick-walled with a sliver of oral contrast in the significantly narrowed lumen (*arrow*), as seen on this non-contrast coronal CT image

to his primary care physician with epigastric pain. Due to the nature of his complaint and past medical history, he was immediately referred to the Emergency Department for a CT scan and further work-up. Upon arrival to the ED, the



**Fig. 3** An additional non-contrast coronal CT image from Case 2 demonstrates extensive mesenteric fat stranding (*arrow*) surrounding the thickened distal ileum



**Fig. 4** An axial image through the upper pelvis of Case 2 demonstrates the extent of wall-thickening (*short arrow*) and number of diverticula (*long arrows*) arising from the affected segment of distal ileum

patient was noted to be in moderate distress. In addition to epigastric pain, he offered a history of mild nausea. His vital signs were unrevealing. Physical exam demonstrated epigastric tenderness. No additional abnormalities were identified. The patient's white blood cell count was not elevated. As instructed by his primary care physician, a CT scan of the abdomen and pelvis following the administration of oral contrast was performed. An elevated creatinine precluded the use of intravenous contrast. The study was significant for a large amount of fat stranding surrounding a segment of small bowel in the ventral, midline abdomen.



**Fig. 5** An additional axial image from Case 2 reveals two extraluminal foci of air (*arrow*) compatible with contained perforation



**Fig. 6** A coronal image from a contrast-enhanced CT scan demonstrates a large air-filled, diverticulum along the mesenteric border of a segment of small bowel in the ventral mid abdomen (*arrow*). There is extensive bowel wall thickening and mesenteric fat stranding



**Fig. 7** An additional coronal image demonstrates a second, large, contrast-filled diverticulum arising along the mesenteric border of small bowel (*arrow*). Mildly dilated air and contrast-containing proximal small bowel is seen within the left upper quadrant

Multiple outpouchings of air and contrast were determined to be diverticula (Figs. 6 and 7). Small bowel proximal to the site of inflammation was dilated (Fig. 7). Prominent mesenteric lymph nodes were appreciated. Incidental note was made of multiple colonic diverticula. The imaging impression was small bowel diverticulitis complicated by a partial, low-grade small bowel obstruction.

## Discussion

The incidence of small bowel diverticulosis is quite low when compared with the 15–40% of adults over the age of 40 who are found to have colonic diverticula. It is estimated that 0.02–6.0% of the population are incidentally found to have duodenal diverticula on imaging studies [5]. Collectively, the jejunum and ileum are affected in approximately 0.07–1.0% of the population; however, jejunal diverticula are seven times more common than those which arise from the ileum [5–7]. These numbers are likely gross underestimations of the true incidence as autopsy series have produced estimates in the range of 0.2–20.0% for duodenal diverticula and 0.07–8.0% for jejunoileal diverticula [8].

There are two types of small bowel diverticula, congenital and acquired. Congenital are true diverticuli in that they are composed of all three intestinal layers, such as the case with Meckel's diverticulum. These usually present themselves early and are not addressed in this discussion. The acquired version only consists of the mucosal and submucosal layers without intervening musculature. It is hypothesized that extensive intraluminal pressure results in herniation of the mucosal and submucosal layers through a muscular defect at points of entrance of blood vessels located on the mesenteric side of bowel [9]. The bowel wall musculature may or may not be structurally abnormal. The fact that small bowel diverticula occur almost exclusively in adults over 40 years old supports the chronicity of the proposed mechanism [6].

While the majority of patients are asymptomatic, approximately 10% of individuals develop complications [5]. Those with jejunoileal diverticula are four times more likely to have a complication in general and 18 times more likely to perforate than individuals with duodenal diverticula. Diverticulitis is just one of the many complications; others include bleeding, perforation with or without peritonitis, and small bowel obstruction [10].

It is the variability in symptomatology that makes diagnosing small bowel diverticulitis so difficult. Diverticulitis affecting the distal ileum will mimic appendicitis with right lower quadrant pain, fever, and leukocytosis. If perforation of the diverticulum results in abscess formation, it is often difficult to determine the source as perforated appendicitis can present in a similar fashion. The same is

true for patients with left lower quadrant pain. In the setting of fever and an elevated white count, as in Case 2, sigmoid diverticulitis is a more common diagnosis. While initial treatment may be the same for the two entities, definitive treatment with surgical resection of the affected bowel is drastically different.

Pain associated with mid-distal jejunal diverticulitis can overlap with gallbladder pathology in the presence of right upper quadrant pain and clinical signs of infection. As in Case 1, mid-distal jejunal diverticulitis can also present as right upper quadrant pain with radiation to the back, a classic symptomatology of renal colic. Case 2 was further misleading by the patient's past medical history of true renal stones. As in Case 3, epigastric pain and nausea, a classic presentation of pancreatitis, was found to be related to mid jejunal diverticulitis. Since the procedure of choice for small bowel diverticulitis is resection of the involved bowel, a correct diagnosis is of utmost importance [11, 12].

When confronted with signs and symptoms of acute abdomen, especially in the elderly population, small bowel diverticulitis is a real consideration. Morbidity can be high when there is a significant delay in making the correct assessment. Early intervention has been shown to be beneficial. For definitive pre-operative diagnosis, a CT scan can be helpful. Small bowel wall thickening with adjacent mesenteric fat stranding, free fluid, or foci of extraluminal air are the principal findings.

## Conclusion

We present three cases of small bowel diverticulitis, each presenting with classic signs and symptoms of a more common pathology: right upper quadrant and flank pain mimicking both biliary and renal colic, left lower quadrant pain mimicking sigmoid diverticulitis, and epigastric pain mimicking pancreatitis. Because of the morbidity and mortality associated with a delay in diagnosis, small bowel diverticulitis should be a consideration in all presentations of abdominal pain, especially in the older population and those with a history of colonic diverticula.

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