Case Report

Small Intestinal Diverticulosis: A Rare Cause of Intestinal Perforation Revisited

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1. Introduction

Jejunoileal diverticular disease is rare with a reported incidence of 0.02–7.1% on imaging and 0.03–8.0% on autopsy. It is usually found in patients over the age of 40 and is more common in males (male/female ratio 2 : 1). Initially described by Somerling in 1794, jejunoileal diverticulosis is rarer than duodenal diverticulosis; however, it is associated with a fourfold higher risk of complications including diverticulitis, fistula formation, perforation, and hemorrhage [1, 2]. Most small bowel diverticulae are asymptomatic; however, almost 10% may go on to develop complications as described, and thus, a more aggressive surgical approach has been warranted in such cases [3].

However, given the advanced age of patients presenting with complicated jejunoileal diverticular disease, nonoperative treatment may be a feasible option depending on the clinical condition of the patient [3]. The current practice related to perforated small bowel diverticulitis is resection of the diseased bowel and primary anastomosis if the conditions allow [3]. We present a case of a 69-year-old male who presented with abdominal pain and was diagnosed with a computed tomography scan to have a localized ileal diverticular perforation and was initially managed conservatively and discharged. He subsequently returned with recurrent symptoms and was diagnosed with perforation requiring operative intervention in terms of a laparotomy, bowel resection, and stoma creation with reversal three months later. The patient had a smooth postoperative course, and the diagnosis was confirmed on histopathological examination.

2. Case Presentation

A 69-year-old, diabetic, South Asian male presented to the emergency department of Hamad Medical Corporation (HMC) in October 2019 with sudden onset generalized abdominal pain more pronounced in the right lower quadrant and hypogastric region. He also had associated nausea.
and fever. On initial examination, he was afebrile and vitally stable and abdominal examination revealed tenderness in the right lower quadrant and suprapubic area with rebound tenderness. The remainder of his review of systems and physical exam was unremarkable. Computed tomographic (CT) examination of the abdomen showed multiple ileal diverticulae with focal wall thickening of the distal ileum and surrounding fat stranding and air loculi along the wall of the distal ileum suggestive of ileal diverticulitis with localized perforation (Figure 1). He was admitted and managed conservatively with IV fluids and antibiotics and kept nil per oral. His symptoms subsided, and he was discharged three days later.

Two days after discharge, the patient returned to the emergency department with abdominal pain like the initial presentation but worse in intensity. A repeat CT with oral contrast revealed evidence of distal ileal perforation (Figure 2).

The patient was taken for a laparoscopic exploration, and extensive peritonitis was noted; therefore, the procedure was converted to a laparotomy. We noted a perforation in the ileum 50 cm from the ileocecal valve on the mesenteric aspect of the bowel with a purulent exudate covering the terminal ileum (Figure 3). The terminal ileum was resected, and a double-barrel ileostomy was created. His recovery was uneventful, and he was discharged on postoperative day 6. Histopathological examination of the resected bowel revealed 3 diverticulae with diverticulitis along with ulceration. Enteroscopical examination through the stoma showed multiple diverticulae up to 50 cm within the proximal limb (Figure 4). Three months postoperatively, his stoma was reversed after resecting 50 cm of proximal terminal ileum which included all diverticulae. Postoperative course was uneventful, and the patient made a full recovery. Final histopathology revealed diverticular disease in the resected portion of the ileum with no evidence of diverticulitis.

3. Review of Literature

The literature review yielded 14 cases of small intestinal diverticulitis presented in Table 1. All patients except two were above the age of 70 (age ranging from 29 to 87), the majority of whom were male (male to female ratio of 2.5:1). Four patients were operated on an emergency basis. Two patients underwent surgery due to the failure of conservative treatment (Case No. 8 and 10—Table 1). Three of the patients had complicated perforated diverticulitis and were successfully managed conservatively (Cases 3, 6, and 10—Table 1). One patient was managed conservatively and discharged but returned 2 months later with recurring symptoms and was operated upon, while another patient with recurrent symptoms was managed conservatively. Interestingly, one patient had recurrent presentation after having resection and anastomosis of jejunal diverticulum a few years prior (Case No. 6—Table 1). The distribution of the type of treatment administered is displayed in Figure 1. None of the cases reported malignancy in the studied bowel specimens. Figure 5 depicts the mode of management for all cases.
Small bowel diverticulae are commonly seen in elderly males, in the sixth to seventh decade of life [8]. Acquired small bowel diverticulae are pseudo (false) diverticulae, consisting of a thin-walled outpouching formed by the mucosa and submucosa bulging through the muscular layer as opposed to Meckel’s diverticulae (congenital) which contain all layers of the intestinal wall [1]. The pathogenesis has been explained to occur in areas of muscular weakness at the points of penetration of the vasa recta vessels along the mesenteric edge of the bowel [9].

There are no pathognomic signs or symptoms of ileal diverticulitis; hence, it needs a high index of suspicion. Patients may have diffuse acute abdominal pain or lower abdominal pain and tenderness with right lower quadrant features mimicking appendicitis. Fever and leukocytosis may also be commonly associated [10, 11]. Elderly individuals may pose a challenge in diagnosis due to a lack of clear physical signs; however, in rare circumstances, patients may present with subcutaneous emphysema due to intraperitoneal air causing rupture of the anterior abdominal wall which may help guide the clinician towards a diagnosis of intestinal perforation [12, 13].

The suggested method of radiological examination for diverticulitis is computed tomography. In a study where CT and ultrasound (US) of the abdomen was compared, CT was found to have a slightly greater ability to detect colonic diverticulitis than US [14]. Bowel gas may compromise US, therefore making detection of small bowel diverticulitis even more challenging. Ileal diverticulitis can mimic acute appendicitis; therefore, detection by CT abdomen has an additional benefit of the reduction in negative appendectomies, thereby preventing unnecessary surgery [1, 15]. CT with intravenous contrast is recommended [1, 16, 17]. The use of oral contrast in the treatment of patients with acute abdomen, however, is debated [1, 5].

Unlike the management of colonic diverticulitis, there is no grading system to stratify disease severity. The decision to proceed with conservative or surgical management is an area of controversy owing to the rarity of the condition and therefore a dearth of literature. It is generally accepted that any patient with perforated small intestinal diverticulae with generalized peritonitis and deterioration of the clinical status of the patient should undergo an operative segmental resection examination [7]. Diverticulae may be widespread throughout the intestine; therefore, the question arises as to how much length of the bowel needs to be resected and can we leave behind grossly normal diverticulae in order to avoid the risk of short bowel.

5. Conclusion

Non-Meckel’s small intestinal diverticulitis is a rare entity and usually a disease of the elderly and thus carries a high potential for mortality. Delay in diagnosis may also increase the burden of morbidity and mortality. CT scans of the abdomen are the diagnostic modality of choice. However, in the presence of a negative CT and complicated patient symptomatology, diagnostic laparoscopy may be an acceptable option. The choice of conservative versus surgical management is a point of debate given that patients with complicated perforated diverticulae have been successfully managed conservatively. However, the risk of recurrence with a more severe presentation needs to be kept in mind as was the case in our patient. It is advisable to perform surgery for those patients with evidence of generalized peritonitis and deteriorating clinical parameters. Recurrent symptoms after conservative management may warrant surgical exploration depending on the clinical presentation of the patient. Resection of the affected segment of the bowel loop is the current...
| No. | Age | Sex | Symptoms | Signs | WBC/L | Past medical history | Method of diagnosis and findings | Management | Histology | Follow-up | Ref. |
|-----|-----|-----|----------|-------|-------|----------------------|---------------------------------|------------|----------|-----------|------|
| 1   | 82  | M   | LLQ and hypogastric pain | Diffuse tenderness | 18.2  | CT: jejunal diverticulitis with perforation | Surgical resection | Multiple jejunal diverticulae, No malignancy | Uneventful | [4]    |
| 2   | 48  | F   | RLQ pain | Localized tenderness | 15.6  | CT: thickening of the distal jejunal loop with extraluminal air bubbles | Surgery resection | Multiple jejunal inflamed diverticulae | NA | [4]    |
| 3   | 87  | M   | Abdominal pain & fever | Tenderness in LLQ | 13.8  | CT: small intestinal diverticulitis with perforation | Conservative | 6 monthly follow-up for 5 years, no recurrence | 6 monthly follow-up for 5 years, no recurrence | [5]    |
| 4   | 78  | F   | Abdominal pain +diarrhea | NA | 16.4  | Hypertension, hyperlipidemia, atrial fibrillation, and diabetes. Osteosarcoma of the thigh with lung metastasis | CT: small intestine diverticulitis, with a large diverticulum (4.7 cm) near the jejunum | Conservative | Small bowel obstruction one year later, managed conservatively. Dead at 7 years-esophageal adenocarcinoma | [5]    |
| 5   | 76  | M   | Postprandial abdominal pain | NA | 19.9  | Right hemicolectomy for hepatic flexure adenocarcinoma one year prior | CT: multiple jejunal diverticulae with an inflammatory process | Conservative | 8 months follow-up, no recurrence | [5]    |
| 6   | 87  | M   | Epigastric pain for one week, bloating, loose stools | RUQ guarding and tenderness | 7.7   | Segmental resection and anastomosis of perforated jejunal diverticulum 3 years prior. Colonic diverticulae | CT: localized perforation of the small bowel with multiple dilated loops of small bowel surrounding an area of marked soft tissue stranding with multiple small locules of gas | Conservative | No recurrence | [7]    |
| 7   | 35  | M   | RLQ pain | Guarding and tenderness in RLQ. Febrile | 15.5  | Ileal & colonic diverticulosis | CT: Sigmoid diverticulitis. Repeat CT on 2nd admission confirmed | Conservative. Readmitted 2 weeks later, managed conservatively, Elective surgery performed later | Elective surgery performed later | [8]    |
| 8   | 73  | F   | Diffuse +lower abdominal pain | Diffuse tenderness, hypobowel sounds | 5.8   | LGI bleeding 3 months prior. Descending colon diverticulosis | Barium enema X-ray | Multiple diverticulae in the terminal ileum, one perforated. No malignancy | Died post-op day 8-acute myocardial ischemia. Autopsy-multiple small bowel diverticulae, not inflamed | [10]   |
| 9   | 29  | M   | Right-sided lower | Diffuse guarding | 23    | Recently diagnosed renal disease | Diagnostic laparoscopy | Diagnostic laparoscopy converted to laparotomy |  | [18]   |
| No. | Age | Sex | Symptoms | Signs | WBC/L | Past medical history | Method of diagnosis and findings | Management | Histology | Follow-up | Ref. |
|-----|-----|-----|----------|-------|-------|----------------------|----------------------------------|------------|-----------|-----------|------|
| 10  | 81  | M   | Right lower abdominal pain | Tender mass in the right flank | 13.9  | Significant weight loss | CT: cavitated thin-walled lesion in RIF | Conservative till day 6; laparotomy with resection and anastomosis | Single inflamed diverticulum. No malignancy | Discharged on day 5 post-op | [19] |
| 11  | 79  | M   | Diffuse abdominal pain | Generalized tenderness with signs of peritonitis | 16    | Hypertension, chronic obstructive pulmonary disease, diabetes, and cholecystectomy | CT: thickening of the distal jejunal loop and thickening and infiltration of the mesenteric fat and free air in the mesentery | Surgical resection and anastomosis | Multiple jejunal diverticulum. No malignancy | [20] |
| 12  | 67  | M   | Abdominal pain | NA | 12.2 | Colonic diverticulosis and an episode of gastrointestinal bleeding one year before | CT: colonic diverticulosis. Multiple diverticula of the small intestine, with signs of inflammation | Initially conservative. Presented 2 months later with recurrence, managed with surgical resection underwent double enterectomy | No evidence of malignancy | NA | [21] |
| 13  | 77  | M   | Localized abdominal pain tenderness | RLQ tenderness | 11.4  | Gunshot wound to the abdomen requiring an exploratory laparotomy | CT: focally thickened loop of small bowel in the anterior midabdomen with a small collection adjacent to the thickened small bowel measuring 2.8 cm × 1 cm | Conservative | Well after 1 year follow-up | [22] |
| 14  | 82  | F   | Generalized abdominal pain for one day | Generalized abdominal tenderness with signs of peritonitis | 18.2  | CT: multiple small bowel diverticulae with surrounding pockets of free air adjacent to the jejunal diverticula | Laparotomy-2 pin hole perforations-primary closure | NA | | [23] |

WBC: white blood cell count; NA: not available; RUQ: right upper quadrant; RLQ: right lower quadrant; LLQ: left lower quadrant; CT: computed tomography; references: [4, 5, 7, 8, 10, 16–21].
standard keeping in mind the risk of short bowel and its associated concerns when determining the length of resection. Primary anastomosis may be performed if no doubts regarding bowel viability exist. Informed consent was obtained from the patient for publishing this case report.

**Conflicts of Interest**

The authors have no conflicts of interest to declare.

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