

Acute diverticulitis of the terminal ileum: ultrasonography and CT findings

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We describe a rare case of terminal ileal diverticulitis in a 68-year-old female with a day of history of right lower quadrant pain and tenderness, mimicking acute appendicitis. Ultrasonography revealed small sac-like out-pouching lesions with increased echogenicity of surrounding fat in thickened terminal ileum, suggesting inflamed diverticula. We diagnosed terminal ileal diverticulitis primarily by ultrasonography. The diagnosis was confirmed by subsequent computed tomography.

Keywords: Diverticulitis; Ileum; Ultrasonography; Tomography, X-ray computed

Introduction

Acquired small bowel diverticulosis is relatively rare, compared to colonic diverticulosis. Of small bowel diverticulosis, jejunum is the more frequent occurring site than ileum. Small bowel diverticula are usually asymptomatic. However, if any complication such as inflammation, perforation or bleeding developed, it could be symptomatic, particularly in the case of terminal ileal diverticulitis, which could mimic the acute appendicitis [1–3]. In the past, contrast study such as small bowel series or barium enema was used for diagnosis. Recently, the easily accessible ultrasonography (US) and computed tomography (CT) are used in diagnosis of small bowel disease [2,4]. However, imaging findings on terminal ileal diverticulitis have been rarely reported. Here, we describe a case of acute terminal ileal diverticulitis diagnosed primarily by US and subsequently confirmed by abdominal CT.

Case Report

A 68-year-old female presented to the general surgery outpatient clinic with a day history of right lower quadrant abdominal pain. Otherwise, the patient was well. The patient had undergone no surgical procedure in the past with no bowel habit change or gastrointestinal bleeding. Physical examination revealed tenderness of right lower quadrant abdomen with no palpable mass. Initial laboratory data showed slightly increased white blood cell count ($10,300/\text{mm}^3$). Other laboratory data including C-reactive protein were within normal range. Plain radiography of the abdomen showed no remarkable finding. Abdominal US using an ultrasound unit (LOGIQ E9; GE Healthcare, Berlin, Germany) was performed to rule out the possibility of appendicitis; and it showed wall thickening of terminal ileum with diffusely increased echogenicity of surrounding fat suggesting inflammation. US also revealed several small hypoechoic projections with hyperechoic center, connected to the

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CASE REPORT

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thickened terminal ileum, indicating inflamed diverticula (Fig. 1A). Wall layering of thickened terminal ileum was relatively well preserved. Color Doppler image showed increased vascularity around small diverticula (Fig. 1B). The entire appendix was well delineated to the tip with normal diameter (Fig. 1C). Subsequent contrast-enhanced abdominal CT with a dual-energy unit (Discovery CT750 HD; GE Healthcare) showed several diverticula of the terminal ileum. The terminal ileum showed diffuse mural thickening and prominent contrast enhancement with preservation of the layering

pattern and soft tissue stranding in the surrounding fat suggesting inflammation (Fig. 1D, E). Intra-peritoneal free air was not depicted. The entire appendix was well delineated without mural thickening or periappendiceal fat stranding. The patient received conservative treatment with antibiotics and was discharged after symptom relief during four hospital days.

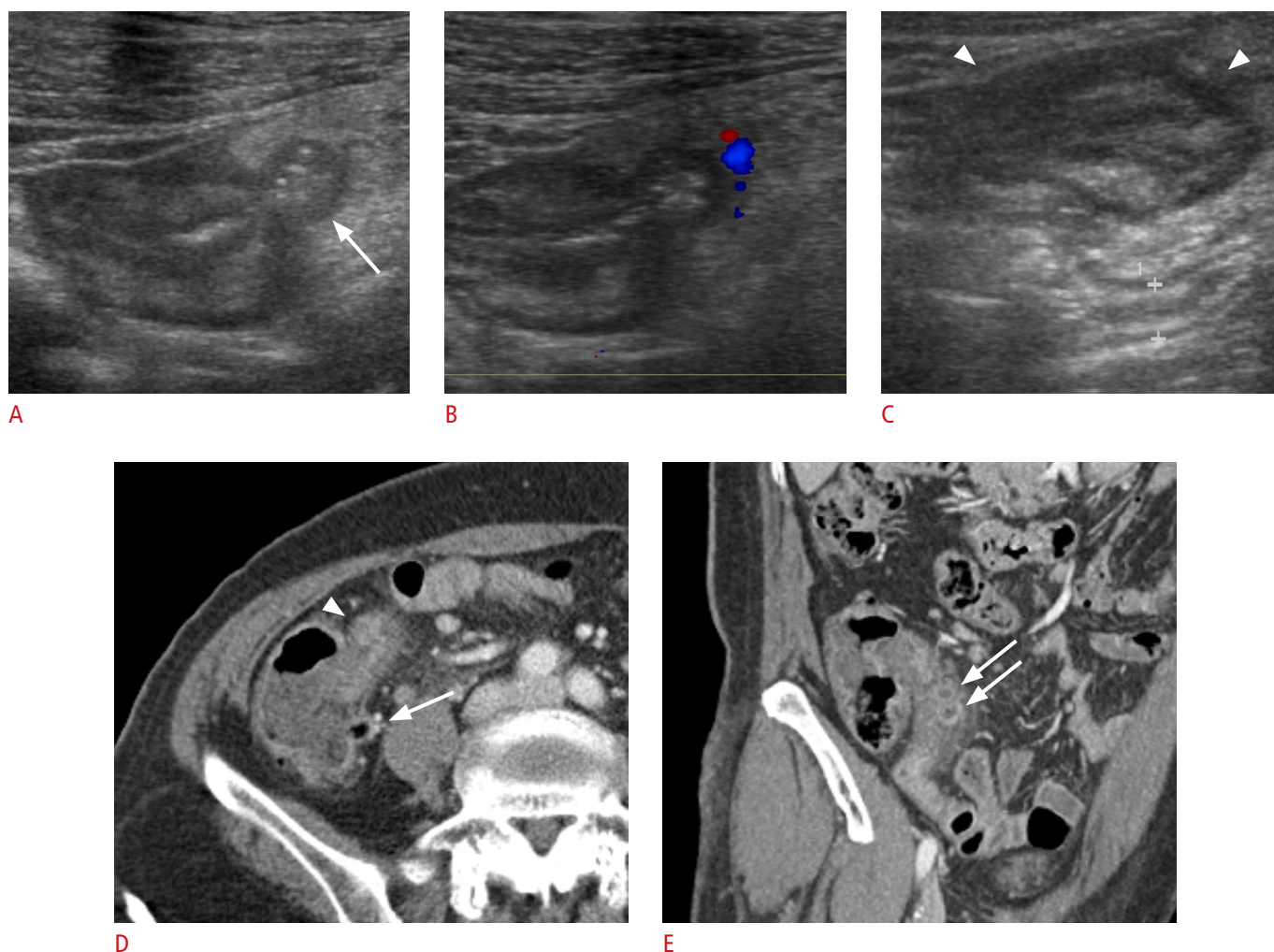


Fig. 1. A 68-year-old woman with acute right lower quadrant abdominal pain.

A. Grayscale ultrasonography (US) with 9-MHz linear transducer shows a small sac-like out-pouching lesion (arrow) with increased echogenicity of surrounding fat in the thickened terminal ileum. Layering pattern of thickened terminal ileum is preserved. **B.** Color Doppler ultrasonogram shows flow signals of increased vascularity near the out-pouching lesion in the terminal ileum. **C.** Wall thickening of the terminal ileum (arrowheads) with increased echogenicity of surrounding fat is seen. The orifice of the appendix was below the thickened terminal ileum and shows no evidence of inflammation and outer dimension of the appendix was measured about 0.3 cm (between crosshairs). **D.** Contrast enhanced axial abdominal computed tomography (CT) shows wall thickening of the terminal ileum (arrowhead) with surrounding fat stranding. The appendiceal orifice (arrow) is seen with intra-luminal aeration. **E.** On oblique coronal reformatted CT, multiple sac-like out-pouching lesions (arrows) are seen along the mesenteric border of thickened terminal ileum with preservation of mural layering pattern.

Discussion

Although diverticula in the colon and duodenum are fairly common, they are rare in the small bowel, with reported rate of 0.06% to 1.3% on autopsy predominantly involving jejunum [5]. Of jejunoileal diverticula, 80% of diverticula occur in the jejunum, 15% in the ileum, and 5% in both jejunum and ileum [1,5]. Diverticulosis of the terminal ileum is extremely rare but actual prevalence is unknown [2,6]. Diverticula of small bowel occur twice frequently in males than in females. Its prevalence increases with age, peaking at the sixth and seventh decades. Acquired diverticula tend to be larger and higher in number in the proximal jejunum and smaller and fewer when progressing distally in the small bowel. Except in the terminal ileum, jejunoileal diverticula are often multiple [7]. The pathophysiology of acquired small bowel diverticulosis is thought to be due to abnormalities of smooth muscle and myenteric plexus. These abnormalities could lead to distorted smooth muscle contractions resulting in increased intraluminal pressure and subsequent herniation of mucosa and submucosa through the weakest mesenteric site of the bowel wall ("false" diverticulum; the diverticular wall consists of mucosa, submucosa, and peritoneum, but the muscular layer is thin or absent) [5,8].

The majority of small-bowel diverticula are asymptomatic. They are usually incidentally discovered during laparotomy, barium studies, or autopsy [9]. Less than 10% cause complications such as dyspepsia, mild abdominal discomfort, malabsorption, obstruction, volvulus, and bleeding [4,5,9]. Terminal ileal diverticulitis is a rare complication. Park and Lee [2] described incidence of terminal ileal diverticulitis is 0.1% in approximately 9,000 patients with right lower abdominal pain. However, acute appendicitis, the most common clinical diagnosis, and right side colonic diverticulitis account for more than half of all diagnosed cases. The most common symptom of terminal ileal diverticulitis is acute abdominal pain resembling that of acute appendicitis. The most common complication is perforation with localized or generalized peritonitis. Gastrointestinal bleeding and small bowel obstruction are also reported but relatively rare [3].

There are no pathognomonic features or clinical symptoms indicating small bowel diverticulitis. The presenting symptoms vary widely. They are nonspecific, commonly mimicking acute appendicitis as in our case. Therefore diagnosis of small bowel diverticulitis mainly depends on imaging studies or exploratory laparotomy. US can be used as the first screening method because it is inexpensive and easily accessible. Common US findings of small bowel diverticulitis are thickening of the intestinal wall, hypoechoic irregular formations with hyperechoic center connected to the intestine suggestive of inflamed diverticula, increased echogenicity of fat tissue around the diverticular indicating inflammation and

extraluminal fluid collections with air bubbles [9].

The CT findings of small bowel diverticulitis include a mass lesion containing extraluminal air bubbles or air-fluid levels in contiguity, adjacent small bowel with thickened and hyperenhancing wall, mesenteric fat inflammation or fluid collection, and uncomplicated diverticula elsewhere in the small bowel [4,9]. If CT shows focal inflammation around the terminal ileum with normal cecum and appendix, terminal ileal diverticulitis should be considered as differential diagnosis. In our case, multiple diverticula in terminal ileum were clearly seen on CT. Differential diagnosis of ileal diverticulitis include appendicitis, colonic diverticulitis, Crohn disease and other infectious and inflammatory conditions of the terminal ileum and cecum. Conservative management is the initial treatment option for patient with non-acute symptom. However, surgery is the preferred treatment option, especially in the presence of complications [2].

In conclusion, terminal ileal diverticulitis is a relative rare disease that mimics acute appendicitis. There is no pathognomonic feature and symptom for terminal ileal diverticulitis. Therefore, imaging studies play great roles in its diagnosis. In our case, we diagnosed terminal ileal diverticulitis primarily by US in a patient with suspected acute appendicitis. The diagnosis was confirmed by subsequent CT. We should have terminal diverticulitis in mind as a differential diagnosis in a patient with right lower quadrant pain; and either US or CT could be a good diagnostic choice for terminal ileal diverticulitis.

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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