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SHORT COMMUNICATION

Management of cecal diverticulitis diagnosed by computed tomography scan

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Abstract

Purpose Cecal diverticulitis is a rare entity causing right iliac fossa pain. Its symptoms may mimic acute appendicitis. Therefore, the majority of these patients undergo unnecessary surgery for suspected diagnosis of appendicitis.

Methods We report a case series of solitary cecal diverticulitis, right-sided colonic diverticulitis, and perforated cecal diverticulitis diagnosed by computed tomography scan.

Results The first two cases were successfully managed conservatively with intravenous antibiotics, rehydration, and temporary bowel rest. The third case developed a retroperitoneal abscess, which was initially drained under computed tomography guidance. However, due to development of septicemia, the patient underwent urgent right hemicolectomy. All patients recovered and were discharged during the further course.

Conclusions Computed tomography is of great value for the diagnosis of cecal diverticulitis and its differentiation from acute appendicitis. Conservative treatment is sufficient in uncomplicated cases, while surgery is reserved for those with associated large abscess or free perforation.

Keywords Cecal disease · Diverticulitis · Colonic diverticulosis · Cecum · Appendicitis · Computed tomography

Introduction

Cecal diverticula comprise 3.6% of colonic diverticula in Western countries [1]. The most common complication is cecal diverticulitis. This is a rare, but probably underdiagnosed, disease which often resembles acute appendicitis at clinical presentation [2]. Therefore, differentiation is challenging and should be supported by further imaging. However, in daily practice, the majority of these patients undergo surgery for clinically suspected acute appendicitis; in this case, the diagnosis of cecal diverticulitis is made intraoperatively.

Correct preoperative diagnosis is rarely made without computed tomography (CT). CT technology has tremendously improved allowing for better image quality with a simultaneous decrease in radiation exposure, not least because of tailoring its use to the clinical picture. Together with today's wide availability of CT scanners, this has made CT the imaging modality of choice if there is doubt in the clinical diagnosis [3].

We report a case series of solitary cecal diverticulitis, right-sided colonic diverticulitis, and perforated cecal diverticulitis diagnosed by CT scan.

Case series

Case 1

A 63-year-old female who suffered from right iliac fossa pain persisting for 3 days presented in our outpatient clinic. She had no complaints of nausea, vomiting, diarrhea or loss of appetite. She had a medical history of hypertension and hyperlipidemia, no past surgical history. The pulse rate was 85/min, blood pressure 130/85 mmHg, and body temperature 37.4 °C. The abdomen was soft, with tenderness in the right lower abdominal

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quadrant. She had no signs of rebound tenderness. Sonography revealed no detection of free intraperitoneal fluid. However, evaluation was markedly hampered by the presence of intestinal gas. Laboratory measurements showed white blood cell count of 13.2×10^9/L and a C-reactive protein of 214 mg/L. Emergency contrast-enhanced CT scan was obtained and revealed a large solitary cecal diverticulitis with adjacent inflammation of ascending colon and pericolic mesenteric fat (Fig. 1).

The patient was admitted to the ward for conservative treatment. Intravenous antibiotics and infusions were started immediately. After a short period of bowel rest, she recovered and was discharged after 5 days. On colonoscopy at 6 weeks post-treatment, malignancy could be excluded. Within a follow-up of 11 months, no recurrence was recorded.

Case 2

A 70-year-old male was admitted with a 16-h history of sudden onset of abdominal pain in the right lower quadrant. He reported no nausea, vomiting, or diarrhea. His medical history revealed an essential thrombocythemia treated with low-dose aspirin and hydroxyurea. He reported no past abdominal surgical procedures. Body temperature was 37.3 °C, pulse 84/min, and blood pressure 112/75 mmHg. The abdomen was soft, but with tenderness in the right iliac fossa. No rebound tenderness was observed. On sonography, no free intraperitoneal fluid was detected. However, a thickening of the wall of the ascending colon was recognized. Laboratory findings showed normal white blood cell count of 9.68×10^9/L and slightly elevated C-reactive protein of 20 mg/L. Subsequent CT scan revealed multiple colonic diverticula with a right-sided diverticulitis in absence of perforation or abscess.

Similarly to case 1, the patient was treated conservatively and discharged in excellent condition after 4 days. On colonoscopy at 5 weeks post-treatment, multiple diverticula of the whole colon were seen. A malignancy could be excluded. Within a follow-up of 4 months, no recurrence was recorded.

Case 3

A 54-year-old female was admitted to our clinic following CT-guided percutaneous drainage of an abscess in the lower right abdominal quadrant. She had nausea, but no vomiting or diarrhea. Two months ago, she underwent emergency surgery for an acute type A aortic dissection. Body temperature was 38.7 °C, pulse 90/min, and blood pressure 100/73 mmHg. Physical examination revealed the presence of right lower quadrant tenderness, but no rebound tenderness. White blood cell count (14.0 × 109/L) and C-reactive protein (194 mg/L) were elevated. Contrast-enhanced abdominal CT scan showed an increased abscess in the right lower quadrant, despite previous drainage placement. Several cecal diverticula and heterogeneous contrast uptake of the cecum and ascending colon were detected.

Based on these findings, an emergency laparotomy was performed. On exploration, minimal free fluid was found. The cecum and ascending colon were inflamed with massive wall thickening involving the ileocecal region. The retroperitoneal abscess was opened and thoroughly flushed. Due to extensive inflammation and septicemia, right hemicolectomy as a means of discontinuity resection was performed. Histopathology confirmed cecal diverticulitis with perforation. An intraoperatively placed drainage was removed on postoperative day 15 after purulent secretion stopped following gradual withdrawal. A small superficial wound infection could be managed conservatively. She was transferred to a rehab hospital on postoperative day 35. A reevaluation of health state including colonoscopy is scheduled 6 months post-surgery with planning of delayed reanastomosis.

Discussion

The differentiation of cecal diverticulitis from acute appendicitis based on clinical presentation is challenging. Symptoms such as right iliac fossa pain and tenderness and laboratory findings including leukocytosis and elevated C-reactive protein do not increase the likelihood of determining the correct diagnosis. Some authors stated that a moderately elevated level of leukocytes and higher percentage of lymphocytes in differential counts may be indicators of cecal diverticulitis [4]. Prodromal symptoms like nausea and vomiting are less frequently reported than in appendicitis; in this series, nausea

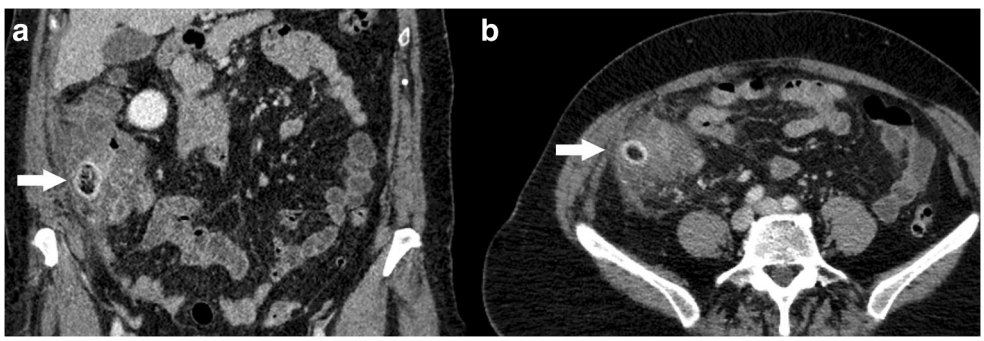

Fig. 1 Coronal (**a**) and axial (**b**) abdominal computed tomography images demonstrating a large inflamed solitary cecal diverticulum (arrows) with thickening of the colonic wall of the cecum and the ascending colon as well as stranding of the adjacent pericolic fat

was only present in case 3. None of the patients reported vomiting. Unlike typical appendicitis, a history of a relatively long duration of pain in the lower right quadrant and its stable localization without originating in the epigastrium may be of help for further distinction. Unfortunately, in many cases, these signs do not allow for reliable differentiation.

The usefulness of ultrasound for detection of cecal diverticulitis is discussed controversially. While some authors from Asia report sensitivity and specificity of 89–91% and 99–100%, others do report considerably lower rates with misdiagnosis resulting in unnecessary surgery for suspected appendicitis [5]. The high sensitivity and specificity rates were achieved by experienced radiologists, which demonstrated the operator-dependent diagnostic value of this method. Moreover, due to rarity of cecal diverticulitis in Western countries, there is lack of experience in the sonographic assessment of this disease. In addition, it may be hampered by obesity, abdominal wall rigidity hindering compression, and intestinal gases. In this series, cases 1 and 2 underwent prior abdominal sonography. The characteristic ultrasonographic signs such as a rounded hypoechoic or nearly anechoic structure protruding out from the thickened colonic wall could not be identified. However, a thickening of the ascending colon was observed in case 2.

Due to the difficulties in clinical evaluation, more than three quarters of patients suffering from cecal diverticulitis are misdiagnosed with acute appendicitis; only 3–6% are diagnosed correctly prior to surgery [6].

CT scan for differentiation between cecal diverticulitis and acute appendicitis has been reported with a sensitivity and specificity of 98% [4]. Typical signs include thickening of cecal wall and stranding of adjacent pericolic fat as well as occurrence of extraluminal mass/air [7]. Therefore, the use of CT is of great value for determining accurate diagnosis in unclear cases with right iliac fossa pain. This can avoid unnecessary surgery, reduce the need for prolonged inpatient observation or repeat attendances, and finally, result in cost savings [8].

The potential benefit of a medically indicated CT far outweighs the potential risk of its ionizing radiation exposure, especially in times where low-dose CT protocols and focused CT are available [9]. We recommend abdominal sonography as first-line imaging followed by low-dose CT, if clinical examination and sonography are inconclusive.

In this report, CT scan was essential for diagnosis in all patients. Controversy exists in case of associated abscess whether to perform prior CT-guided drainage or primary surgery. Some authors advocate in such cases right hemicolectomy with primary anastomosis as percutaneous drainage was not always successful and may pose the risk of delayed surgery.

Our third case demonstrated that CT-guided drainage placement resulted in a delay of surgery with development of septicemia. Decision-making for initial percutaneous drainage was based on patient's condition, which was critical due to recent emergency surgery for acute type A aortic dissection. Nevertheless, if the patient's condition does not improve, emergency surgery is needed.

The treatment of cecal diverticulitis ranges from conservative management to aggressive surgery. Some authors advocate diverticulectomy if technically possible, while others recommend ileocecal resection or right hemicolectomy with primary anastomosis [10]. In this case, we decided for open right hemicolectomy with diverting stoma due to septicemia and multimorbidity.

Recurrence rates after conservative treatment with antibiotics vary from 0 to 25%. However, most of the recurrent cases were again successfully treated conservatively with no severe complications [11].

Conclusions

Cecal diverticulitis is a rare, but probably underdiagnosed, entity in Western countries. Correct diagnosis is rarely made preoperatively due to non-specific clinical symptoms. Sonography in experienced hands may facilitate its differentiation from acute appendicitis. In unclear cases, CT is of great value to determine the correct diagnosis and suspected complications, which is essential for choosing the right treatment.

Uncomplicated cecal diverticulitis can be successfully managed conservatively. Surgery is reserved for those with associated large abscess or free perforation with purulent or fecal peritonitis.

Availability of data and materials The data supporting our thesis is completely available in this article. Articles referred to can be found in the reference list.

Authors' contributions DWK analyzed the existing data concerning the treatment of the patients regarded and wrote the manuscript. DWK and RK selected and designed the radiological images. DWK treated the patients regarded and read and approved the manuscript. RK, SF, and HL read and approved the manuscript. All authors read and approved the final version of the manuscript.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethics approval and consent to participate Written informed consent was obtained from the patients for publication and any accompanying images. A copy of the written consent is available for review by the Editor of this journal. This study was carried out respecting the Declaration of Helsinki in its current version. Ethical approval was obtained from the ethics committee Rhineland-Palatinate, Germany (Approval number 2019-14201).

Consent to publish Written informed consent was obtained from the patients for publication and any accompanying images.

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