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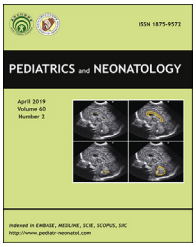

Short Communication

Intestinal obstruction caused by appendiceal knot

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1. Introduction

Appendicitis is the most common management challenge in children who undergo abdominal surgery. Currently, appendicitis accounts for approximately one-third of abdominal pain cases.[1] The lifetime risk of appendicitis is estimated as 8.67% for boys and 6.7% for girls.[2] Appendicitis is most common in older children and adolescents and is characterized by progressive central abdominal pain, with a peak incidence between 12 and 18 years.[2]

Appendiceal knot is a very rare complication of this disease. Mechanical obstruction because of appendicitis is uncommon, and closed-loop obstruction is rarer.[3] We report a case of a 4-year-old boy who presented with bowel obstruction and peritoneal signs. The appendix tip was adhered to the terminal ileum, which formed a closed loop and induced bowel incarceration.

2. Case report

A 4-year-old boy presented in our pediatric emergency department with nonbilious vomiting for 1 day. He complained of epigastric and periumbilical pain since 3 days and started vomiting one day before admission. On the morning of admission, he had nonbilious coffee ground vomiting. No fever or diarrhea was reported. The boy had no underlying disease, history of trauma to the abdomen, or any previous abdominal surgery.

At presentation, the boy was in obvious painful distress. The body temperature was 37.3 °C. The pulse rate, blood pressure, and respiratory rate were 125 beats per min, 116/80 mmHg, and 25 breaths per min, respectively. The abdomen was grossly distended. Pressing tenderness over the epigastric and right upper quadrant was noted. No muscle guarding or rebounding pain was observed.

The bowel sound was high-pitched and hypoactive. Evident leukocytosis was noted, with a WBC count of 24,600/μL and neutrophil percentage of 87.8%. The C-reactive protein, electrolyte, blood urea nitrogen, creatinine, aspartate aminotransferase, and alanine aminotransferase levels were within normal limits. A straight abdomen X-ray revealed diffused dilated small bowel loops with air-fluid levels. Under the impression of ileus, intravenous fluid and nasogastric tube decompression were given. An empirical antibiotic of Ceftriaxone was prescribed. However, the clinical symptoms did not improve after the initial management, and the patient became progressively irritable and restless. Subsequently, rebounding pain appeared after 15 h of hospital stay. Therefore, abdomen computed tomography was performed, and dilatation of small bowel loops was noted, which suggested small bowel obstruction. In addition, the appendix was swollen and dilated. Fat stranding with mild ascites at the right lower quadrant was observed. Subsequently, exploratory laparotomy was

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Figure 1 Swollen appendix tip (arrow) was found, which was adhered to the terminal ileum with an adhesion band, inducing small bowel incarceration.

performed. A swollen appendix tip was observed, which was adhered to the terminal ileum with a band, inducing small bowel ileum incarceration (Fig. 1). The jejunum and ileum were markedly dilated and congested. No perforation or necrosis was observed. The appendiceal band was released, and appendectomy was done.

Histopathology of the resected appendix revealed acute suppurative appendicitis with a marked peritoneal reaction. Moreover, markedly congested adhesive fibrous tissue with ischemic necrosis was noted. The patient was discharged uneventfully after 6 days of hospital stay post operation.

3. Discussion

Appendicitis in young children is a diagnostic challenge, and it is relatively rare in children younger than 6 years of age. The classic description of this disease in adults often deviates from that in children, thereby making diagnosis difficult. Moreover, in children, the various differential diagnoses may be difficult by using clinical and laboratory methods.[3] Intestinal obstruction from internal herniation is particularly difficult to diagnose preoperatively in children. Most often, the diagnosis is made intraoperatively. The reported complications are intestinal obstruction, volvulus, strangulation of the small bowel, and strangulation of appendix itself.[1–5] However, the entrapment mechanism of the appendix to form a band or tie is unclear. The tip of a long appendix is typically found adhered to the cecum, retroperitoneum, mesentery of ileum, or rarely the ileum itself, forming a potential space where a loop of bowel may be entrapped.[2] Acute inflammation of the appendix is probably the inciting event of this band formation.[5] Even in adults, only some sporadic cases have been reported. We searched for pediatric cases reported in English in the literature and found cases of a 21-day-old patient in Saudi Arabia, a 1-year-7-month-old patient in Taiwan, a 2-year-old patient in Pakistan,[5] and a 10-year-old patient in Nigeria.[1] Our patient was 4 years old and had an appendiceal knot with mechanical small bowel obstruction.

Although recent studies have suggested that nonoperative management could be effective in acute appendicitis,[6,7] the conservative (nonoperative) treatment is suitable only for uncomplicated cases. Caruso et al. defined uncomplicated appendicitis as being unwell but not generally ill, with localized tenderness in the right iliac region, no diffuse guarding, and no palpable mass and no signs of perforation, abscess, copious disseminated peritoneal fluid or extra luminal gas. Complicated appendicitis was defined as peritonitis or sepsis and complex mass (perforation or abscess).[6] The aim of nonoperative management is to avoid perforation of the appendix and formation of an intra-abdominal abscess. Minneci et al. listed the following inclusion criteria for nonoperative treatment candidates: age 7–17 years; abdominal pain for 48 h or less; white blood cell count less than 18,000/μL; nonruptured acute appendicitis with an appendiceal diameter of 1.1 cm or less without fecalith, abscess, or phlegmon. These inclusion criteria were selected to minimize the potential complications.[7] In the case of appendiceal knots, the appendix itself may be acutely inflamed, particularly perforated at the tip, or completely gangrenous. This entrapment results in not only intestinal obstruction and strangulation of the entrapped bowel but also ischemia of the appendix itself due to compression.[5] Apparently, this is a surgical condition and unsuitable for conservative treatment. Therefore, in all the reported cases, the patients received surgery after diagnosis.[1–5]

In sum, an appendiceal knot causing intestinal obstruction is a very rare and strange cause of intestinal obstruction. Obtaining the etiology of intestinal obstruction before the operation is difficult. The risk of appendix perforation increases, which could cause intestinal obstruction, strangulation, and ischemia of appendix. Surgical intervention is essential to prevent bowel ischemia and perforation.

Conflict of interest

The authors have no conflict of interest to declare.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.pedneo.2017.10.008.