Acute Perforated Appendicitis in a Patient with Nonrotation of the Midgut: A Case Report

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The presence of a malrotation of the midgut in adults is identified in asymptomatic patients most commonly as an incidental finding during a workup for an unrelated disease. We report here a rare case of acute perforated appendicitis in a patient with nonrotation of the midgut. A 28-year-old man was referred to our hospital with lower abdominal pain. The radiological examination, including abdominal computed tomography, ultrasonography, an upper gastrointestinal series, and a barium enema, revealed acute perforated appendicitis accompanied by nonrotation of the midgut. Emergency surgery revealed a complicated appendix located in the middle area of the lower abdomen with a periappendiceal abscess and nonrotation of the midgut. An ileocecal resection was performed with no postoperative complication. In this case, the atypical position of the appendix led to confusion regarding the diagnosis and to a more invasive surgical intervention.

Key Words: Appendicitis, Nonrotation of the midgut

INTRODUCTION

A congenital abnormality of the midgut rotation most commonly produces clinical manifestations in infants and children, but only rarely in adults.1 For adult patients, most cases of malrotation are identified in asymptomatic patients and are detected incidentally during a workup for unrelated disease later in life.2 The presence of an intestinal nonrotation results from failure during the early second stage of embryonic development.3

By contrast, acute appendicitis is a common clinical problem in both adults and children. Diagnosis of appendicitis is based on history and physical examination. However, an atypical location of the appendix can lead to an incorrect diagnosis and result in appendiceal perforation. We report a rare case of acute perforated appendicitis in a patient with nonrotation of the midgut.

CASE REPORT

A 28-year-old man was referred to our hospital with lower abdominal pain. He presented with a two-week history of epigastric and lower abdomen pain associated with nausea and vomiting that had not improved with medical treatment. On admission, he had a blood pressure of 100/80 mmHg, a heart rate of 90/beat/min and a temperature of 36°C. The laboratory study showed an elevation in the white blood cell count to 17,170/mm3. Physical examination revealed tenderness with muscle rigidity in the lower abdomen. A plain abdominal X-ray showed a normal gas pattern. However, abdominal computed tomography (CT) and ultrasonography (US) demonstrated a perforated appendix with a complex abscess cavity at the infra-umbilical area (Fig. 1, 2) and nonrotation of the midgut. An upper gastrointestinal series and a barium enema showed that the small bowel was mainly on the right side of the abdominal cavity and that the large bowel was on the left side, suggesting nonrotation of the midgut (Fig. 3, 4).
Emergency surgery was performed with the diagnosis of acute perforated appendicitis in addition to nonrotation of the midgut. After induction of general anesthesia, a lower midline incision was made. During the laparotomy, we found nonrotation of the midgut. The small bowel was found mainly to the right side of the midline and the colon to the left side. The first and the second parts of duodenum were in their normal positions, but the third and the fourth parts were further down than normal (Fig. 5). As a result, the perforated appendix was located in the middle area of the lower abdomen. We could not identify the base of the appendix because of severe inflammation of the cecum and the presence of a periappendiceal abscess with adhesions (Fig. 5). An ileocecal resection was performed. After the abdominal cavity was washed, a drainage tube was inserted, and the abdomen was closed. The histological findings confirmed the clinical diagnosis. The patient recovered and was discharged without postoperative complication.
DISCUSSION

The midgut forms a ventral U-shaped umbilical loop of the gut, the midgut loop, by the fifth week during embryological development; the so-called physiological umbilical herniation occurs at the beginning of the sixth week. During the tenth week, the primary intestinal loop undergoes a total 270° counterclockwise rotation. Nonrotation arises when the primary intestinal loop fails to undergo the normal 180° counterclockwise rotation as it is retracted into the abdominal cavity.4,5 However, it is not clear what prevents normal rotation, which is detected in 0.2% to 0.5% of the adult population, but is clinically significant in only a minority of cases.6

Intestinal nonrotation in adults may be discovered upon laparotomy for acute small bowel obstruction or other conditions, such as a peptic ulcer, appendicitis, regional ileitis and Meckel’s diverticulum.1,7-9 In most adult patients, nonrotation occurs as an isolated entity whereas in newborns, there is about a 70 percent incidence of other congenital anomalies.10,11

The important role that radiological examination plays in the diagnosis of anomalies of midgut rotation has been demonstrated. A barium enema may show the entire colon and ileocecal valve lying to the left of the midline, and an upper gastrointestinal study may reveal that the duodenojejunal junction is identified to the right of the vertebral bodies.1,12 Computed tomography can reveal a whirl-like pattern of bowel loops encircling the superior mesenteric artery (SMA) and dislocation of the superior mesenteric vein lying to the left of the SMA.13 A rotational abnormality is suspected at laparotomy if 1) abnormal peritoneal bands develop from the ileum or right colon to the parietal peritoneum or to the duodenum 2) the duodenum and/or upper jejunum is fixed to the cecum or right colon 3) the entire duodenum, particularly the third and the fourth portions, is visualized at the base of the mesentery of the transverse colon and 4) the cecum or the duodenum has an abnormal position or mobility along the right gutter.3

Even though computed tomography is enough for diagnosis, we carried out additional examinations, such as a barium enema and an upper gastrointestinal study, because we wanted to determine the abnormal positions of the duodenum and the cecum and because we had plenty of time before the operation to prepare for the operation. The barium enema and the upper gastrointestinal study confirmed our diagnosis.

A difficulty in diagnosing appendicitis may occur as a result of the abnormal location of the intestine along with nonrotation. This condition can cause confusion and misdiagnosis. In our case, the correct diagnosis was made because of immediate radiological examination, which was followed with emergency surgery. Therefore, the differential diagnosis of acute abdominal pain should include rotational anomalies.14 Surgery for adult patients with nonrotation and other inflammatory diseases is generally the accepted approach for eradication of inflammation whereas an isolated nonrotation is not necessarily repaired.5,15 In our case, we did not repair the nonrotation as there was no problem associated with the nonrotation.

In conclusion, physicians should consider abnormalities in the rotation of the intestine in the differential diagnosis of patients with an acute abdomen. The appropriate radiological examinations should be performed to confirm of the diagnosis.

REFERENCES

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국문 초록
중간장관의 비회전 환자에서 발생한 급성 천공성 촉수돌기염: 증례보고
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박성준 · 주영태 · 정철영 · 정은정 · 이영준
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성인에서 중장의 이상회전은 대부분 증상이 없다가 관련이 없는 질환에 대한 검사 중 우연히 발견된다. 우리는 중장의 이상회전을 가진 환자를 급성 천공성 촉수돌기염으로 치료한 경험을 보고하고자 한다. 28세의 남자 환자가 하복부 통증을 주소로 본원으로 내원하였다. 복부 컴퓨터 단층 활영과 초음파 검사, 상부 위장관 조영술, 바륨 관장 등의 방사선학적 검사를 통해 중장의 비회전을 동반한 급성 천공성 촉수염을 진단받았다. 응급 수술 중 하복부의 중간 지점에 위치한 협병된 촉수를 발견할 수 있었고, 촉수 주위에는 농양이 동반하고 있었으며 중장이 비회전된 소견을 보였다. 흉부 방사선검사 시행하였고 수술 후 합병증 없이 회복하였다. 이 경우, 환자는 촉수의 비정형적 위치 때문에 여러 병원을 거쳐서 진단이 늦어졌으며 결국 더 침습적인 수술을 하게 되었다. 비록 매우 드문 질환임에도 불구하고 잘만 임상에서 이런 가능성을 항상 고려한다면 같은 질환을 가진 환자를 만났을 때 더 빠른 진단과 더 나은 치료가 가능할 것으로 생각된다.

중심단어: 촉수돌기염, 중간장관의 비회전