CASE REPORT

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A rare combination of intestinal invagination and Meckel's diverticulum in an adult: A case report

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Intestinal invagination is a common pathology amongst children, while it is a rare entity in adults. Invagination is responsible for only 1-3% of adult-onset intestinal obstruction. Meckel's diverticulum, on the other hand, is the most common congenital anomaly of the gastrointestinal tract. Most of them are asymptomatic; they are recognized when they complicate, and can present with diverticulitis, gastrointestinal bleeding, intestinal obstruction, perforation, or invagination. A 16-year-old male patient presented to our emergency department with abdominal pain. There was a palpable mass at the right paraumbilical region. Gas-liquid level was seen on the direct abdominal radiography. On the abdominal ultrasonography, it was reported that the mass might be a result of invagination. As the patient had extensive peritonitis findings, with the pre-diagnosis of obstruction as a result of invagination, surgery was decided. During the operation, it was observed that the invaginated ileum loop was too ischemic for reduction; therefore, the invaginated part was resected and ileoileal anastomosis was performed. Examination of the resected segment revealed the Meckel's diverticulum as causing the invagination. In conclusion, with this case, we aimed to present the role of Meckel's diverticulum as an initiating factor of ileoileal invagination, with inversion into the ileum.

Key words: Meckel's diverticulum, intestinal invagination, adult

Olgu sunumu: Erişkinde intestinal invajinasyon ve Meckel divertikülünün nadir kombinasyonu

İnvajinasyon erişkinde nadiren görülürken çocuklarda sık görülen bir patolojidir. İnvajinasyon erişkinlerdeki barsak tıkanıklığı başlangıçlarının sadece %1-3'ünden sorumludur. Meckel divertikülü ise gastrointestinal sistemin en sık izlenen doğumsal anomalisidir. Çoğu asemptomatikken, divertikülit, gastrointestinal kanama, barsak tıkanıklığı, perforasyon, invajinasyon gibi komplikasyonlar geliştiğinde acil şartlarda ve ameliyat esnasında tespit edilirler. On altı yaşında erkek hasta karın ağrısı şikayeti ile acilimize başvurdu. Hastanın muayenesinde, sağ paraumblikal bölgede ele gelen kitle mevcuttu. Hastanın çekilen ayakta direkt batın grafisinde hava-sıvı seviyesi mevcuttu. Kitle için yapılan ultrasonografide proksimal barsak segmentinin distale geçtiği invajinasyon tarifleniyordu. Hastada yaygın peritonit bulgularının olması nedeniyle operasyona karar verildi. Operasyonda invajine ileum ansı redükte edilmeye çalışılmışsa da başarılı olunamadı ve invajine bölüme rezeksiyon anastomoz yapıldı. Rezeke edilen bölüm incelendiğinde invajinasyona sebep olan Meckel divertikülü görüldü. Bu olguyla, Meckel divertikülünün ileoileal invajinasyonda başlatıcı faktör olabileceği akılda tutulmalıdır.

Anahtar kelimeler: Meckel divertikülü, invajinasyon, erişkin

INTRODUCTION

Invagination is defined as two consecutive segments of the gastrointestinal tract intertwining into each other (1). In children, it is the second most common cause of acute abdominal pain after acute appendicitis, while it is rare in adults. It accounts for 0.02-0.003% of all hospital admissions and for 1-3% of intestinal obstructions that require surgery (1,2).

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Meckel's diverticulum (MD) occurs as a result of the incomplete closure of the omphalomesenteric duct in the intrauterine period. It is the most common congenital anomaly of the gastrointestinal system, with a rate of 1-3%. It was first described by Fabricus Hildamus in 1598, and was defined embryologically by the German anatomist Johann Friedrich Meckel in 1809 (3). Most of them are asymptomatic; they are recognized when they complicate, and can present with diverticulitis, gastrointestinal bleeding, intestinal obstruction, perforation, or invagination. In this case, we aimed to present the role of the MD as an initiating factor of ileoileal invagination, with inversion into the ileum.

CASE REPORT

A 16-year-old male patient presented to our emergency department with abdominal pain. Abdominal distension, right lower quadrant tenderness and rebound were present on the examination. There was a palpable mass at the right paraumbilical region. The nausea and vomiting had just started, and there was no gas or feces discharge in the last 24 hours. There was no significant feature on the rectal examination. There was gas-liquid level on the direct abdominal radiography. Laboratory findings showed: white blood cell count 11200 mm^3, hemoglobin 16.6 g/dl, hematocrit 48l7%, and C-reactive protein (CRP) 228 mg/L. An abdominal ultrasonography (USG) revealed a thick, telescoping long intestinal segment with severe edema and no vascularization, located in the abdominopelvic cavity. It was thought the mass might be a result of invagination. Abdominal computerized tomography (CT) scan showed edema of the jejunal and ileal loops, entering into each other. As the patient had extensive peritonitis findings, with the pre-diagnosis of obstruction as a result of invagination, surgery was decided. During the operation, it was observed that the invaginated ileum loop was too ischemic for reduction; therefore, the invaginated segment was resected and side-to-side ileoileal anastomosis was performed. Examination of the resected part revealed the MD causing the invagination. The patient began to take oral food on the post-operative second day, and was discharged with an uneventful recovery on the sixth day.

DISCUSSION

Intestinal invagination is a common pathology amongst children, while it is a rare entity in adults. Ninety-five percent of invaginations occur in childhood. Invagination is responsible for 1-2% of adult-onset intestinal obstruction (2).

The invagination shows itself frequently with complete obstruction findings, as acute abdominal pain, nausea and vomiting, as it may present with subacute and chronic findings, as a result of partial obstruction. In 24-42% of the studies, it was observed that it can produce symptoms of an abdominal mass (4). Our case had abdominal pain of acute onset, with subsequent distension and nausea and vomiting.

Ultrasonography (USG) is accepted as the most valuable noninvasive diagnostic tool in patients who are thought to have invagination. The findings of invagination on USG are as follows: soft tissue mass with 2.5-5 cm diameter, target sign, multiple concentric ring sign, "pseudokidney" sign, and the sandwich sign. The sensitivity, specificity and negative predictive value of USG for the diagnosis of invagination are 98-100%, 88% and 100%, respectively (5). Although the gold standard for invaginations is CT, it provides 50-80% diagnostic data (2). In our case, abdominal USG was performed for atypical abdominal pain, and the invagination image was seen. As the invagination was diagnosed with suspected clinic of progressing obstruction, imaging studies including abdominal USG and CT scan were performed under emergency conditions and revealed 'target lesions' suggestive of small bowel intussusception and free-fluid in the abdominal cavity. Intestinal invagination is a common pathology amongst children, while it is a rare entity in adults. Invaginations are classified as gastroduodenal, enteric, ileocecal, and colonic, according to their localizations (4,6). The most common invaginations are the enteric invaginations, and they account for more than half of the cases (6). Our case also had ileoileal invagination. Of the 80-90% of adult-onset invaginations, the etiologic factor can be revealed (6). While a malignancy is usually the effective factor for the colonic type, the intestinal type generally includes an initial factor such as a polyp, ectopic pancreas or MD (5). Our case also had MD as an initial factor (Figure 1). Pre-operative diagnosis of MD is usually not possible; abdominal USG and CT frequently show secondary changes. Diverticulitis is especially mistaken as acute appendicitis, and with this pre-diagnosis, it is determined peri-operatively (3,7).

The most frequent complication of MD in adults is small intestinal obstruction (8). The obstruction

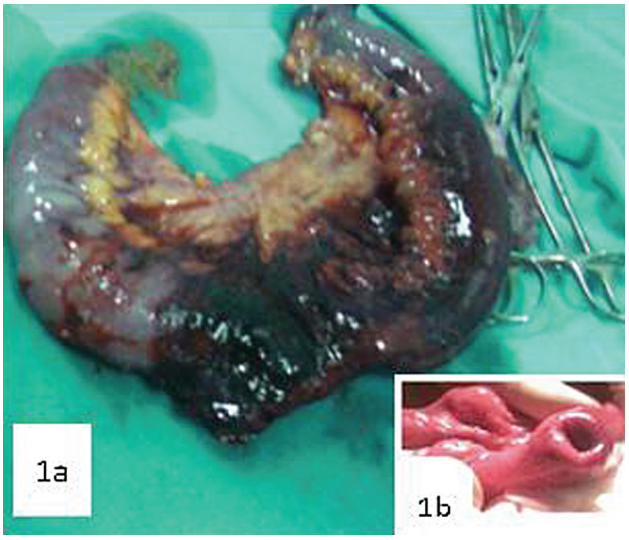

Figure 1. Meckel's diverticulum (MD) was the initiating factor in our case **(A)**. The ischemic intestinal segment was resected with the MD included **(B)**.

may occur by several mechanisms, as intestinal or cecal volvulus over the strip that extends from the diverticulum to the abdominal wall, invagination, simple obstruction by the encircling of the intestine by the strip, internal herniation, and incarceration of the diverticulum into the inguinal hernia (8,9).

The treatment for symptomatic MD is surgery. However, the pre-operative diagnosis is extremely difficult, because its symptoms overlap with those of many other diseases. Cases are generally operated with a pre-diagnosis of acute abdomen and are diagnosed peri-operatively (7,9). Inverted MD was also an initial factor for invagination in our case, and with the inflammation and the ischemia, it caused acute abdomen.

The basic treatment of adult-onset invagination is surgery (10). If intestinal nutrition is not compromised due to invaginations that occur post-operatively because of adhesions, de-invagination may be successful. In the case of noninflammatory invaginations with a known causative factor (MD, lipoma), recurrence may be prevented with enterotomy and polypectomy (2,6,10).

Barussaud et al. (10) attempted reduction in 25 patients in a study including 44 patients; they were successful in 14 cases, and they continued with limited resection. However, Begos et al. (6) suggested that in patients with inflammation and ischemia and colonic invagination, de-invagination might cause perforation; therefore, resection should be performed without reduction. In our case, de-invagination of the invaginated segment was attempted, but the inflamed and edematous MD prevented total reduction of the ileal segment. The inflamed and ischemic intestinal segment was resected, including the MD (Figure 1).

The complications related with MD should be kept in mind in the pre-diagnosis in young patients presenting with acute abdomen and ileus. A good knowledge of the clinical findings of MD would facilitate the decision to operate and the timing of the surgery, thereby preventing problems such as misdiagnosis and increase in morbidity in patients with a pre-diagnosis of acute abdomen.

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