

## Invagination of Meckel's Diverticulum: A Rare Cause of Recurrent Abdominal Pain in a Young Girl

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### Abstract

The invagination of Meckel's diverticulum is a very rare cause of abdominal pain in adolescents and adults. The classic clinical triad of the intussusception consisting abdominal pain, a palpable sausage-shaped mass, and bloody stools is seen infrequently. At the diagnosis, ultrasonography and computed tomography has a significant role with characteristic findings that include the "target" sign and sausage-shaped appearance. In this paper, we report a case of invagination of Meckel's diverticulum which causes recurrent abdominal pain in a young adolescent.

**Key Words:** Meckel's Diverticulum; Intussusception; Ultrasonography; Computed Tomography.

### İnvajine Meckel Divertikülü: Bir Genç Kızda Tekrarlayan Karın Ağrısının Nadir Bir Nedeni

### Özet

Meckel divertikülünün invajinasyonu, ergen ve erişkinlerde karın ağrısının çok nadir bir nedenidir. İntussepsiyonun klasik klinik bulguları olan karın ağrısı, ele gelen bir sosis şeklinde kitle ve kanlı dışkı seyrek görülür. Tanıda, ultrasonografi ve bilgisayarlı tomografisi önemli bir yere sahiptir ve hedef işareti ya da sosis görünümü ile karakteristik bulgular görülür. Bu yazıda, tekrarlayan karın ağrısına neden invajine Meckel divertikülü olgusu sunulmaktadır.

**Anahtar Kelimeler:** Meckel Divertikülü; İntussepsiyon; Ultrasonografi; Bilgisayarlı Tomografi.

## INTRODUCTION

Meckel's diverticulum is a blind sac arising from the antimesenteric border of distal ileum, approximately 40–100 cm upstream the ileocecal junction. It occurs as a congenital anomaly in about 2% of the population (1, 2). Lower gastrointestinal bleeding, obstruction, and inflammation are the most common complications that usually occur in children under 10 years old. Occasionally, inversion of Meckel's diverticulum into the lumen of the bowel can cause intussusception, ischemia, and infarction (3). The incidence of Meckel's diverticulum complications has been reported to decrease with advancing age. However, intussusception attributed to an inversion of Meckel's diverticulum may appear in older ages (4).

## CASE REPORT

A 16-year-old girl was admitted to the emergency department with a complaint of abdominal pain in the right lower quadrant. For the last 3 months, she had had similar abdominal pain attacks. The pain was unrelated to the menstrual cycle or food consumption. There were no accompanying nausea, vomiting, dysuria, hematuria, or hematochesia. The pain had the same characteristics

and location at each episode. Her medical history included appendectomy due to acute appendicitis in 2010. On the day of admission, she was constipated and no stool output occurred after a fleet enema.

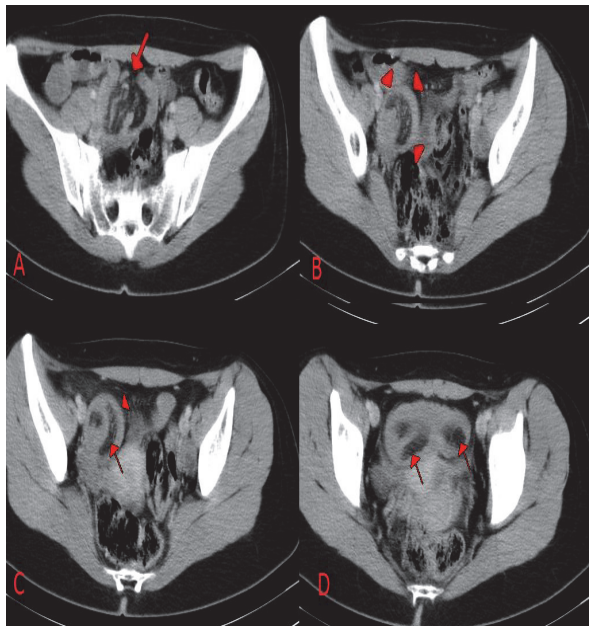
On her physical examination, the patient was alert and oriented. Her body temperature was 36.5°C; her pulse was 74 beats/minute regular; the respiratory rate was 20 breaths/minute; and her blood pressure was 110/70 mm Hg. Abdominal examination revealed hypoactive bowel sounds and there was tenderness in her right lower quadrant. She did not have defense or rebound on physical examination. Respiratory and cardiovascular system examinations were normal.

The laboratory investigation revealed a hemoglobin value of 11.6 g/dL with a hematocrit level of 50.2%. The complete white blood cell count was  $6 \times 10^3/\mu\text{L}$  ( $6 \times 10^9/\text{L}$ ) with a platelet count of  $200 \times 10^3/\mu\text{L}$  ( $200 \times 10^9/\text{L}$ ). The findings on the electrolyte panel, liver, and renal function tests were normal. We performed an abdominal ultrasonography (US) and computed tomography (CT) (Figure 1, 2). The patient then underwent emergency surgery. During the operation, we observed invagination of Meckel's diverticulum in the lumen of the distal ileum (Figure 3). After correcting the intussusception, the Meckel's diverticulum was resected and the surgical

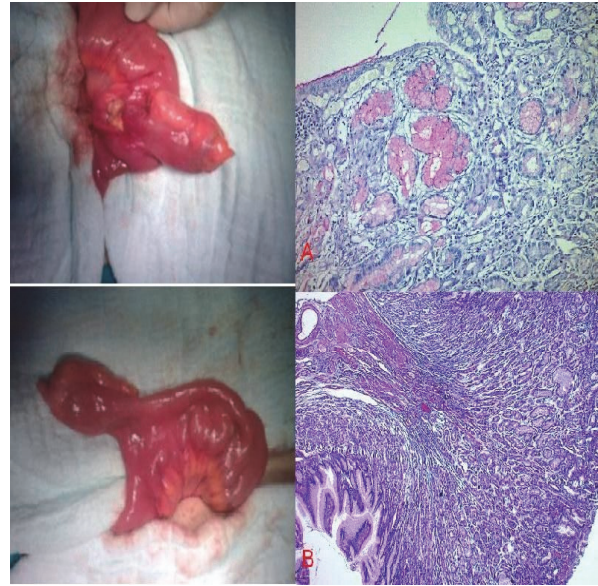
procedure ended without any complications. The pathologic diagnosis was reported as Meckel's diverticulum, which was in line with gastric mucosa and intestinal metaplasia (Figure 3). The postoperative period was uneventful and the patient recovered quickly after the surgery. She was discharged on the fourth day of her hospitalization.



**Figure 1.** The abdominal ultrasonography shows the 'target sign', appearing as concentric alternating echogenic and echo-poor rings.



**Figure 2.** Contrast-enhanced abdominal computed tomography scans demonstrate (A) typical intussusception with a lead point (arrow), (B, C) target sign and associated bowel wall thickening (arrow heads) accompanied by entrapped perienteric fatty tissue (arrow), (D) intraluminal elongated fatty mass entrapped in perienteric fatty tissue (arrows).



**Figure 3.** Intraoperatively, Meckel's diverticulum was found to be invaginating the lumen in the distal ileum. Pathological evaluation of the surgical specimens, (A) focal reaction was seen in musikarmin and alcian blue pH2.5; (B) gastric mucosa with intestinal metaplasia.

## DISCUSSION

Intestinal invagination is a rare entity in young adults. Invagination is responsible for 1-2% of the onset intestinal obstruction in adult (5, 6). In adults, a diagnosis of intussusception is often difficult and not often made before laparotomy (7).

The "target" and "donut" signs in the transverse view and the "pseudokidney" sign in the longitudinal view can be observed on the abdominal ultrasonography (8). The "target" sign appears as the concentric alternating echogenic and echo-poor rings, which represent compressed mucosal, serosal surfaces, and edematous bowel wall in the abdominopelvic cavity (Figure 1). In acute abdomen cases, the major limitation of US is the presence of air in the bowel.

The CT scan has been used to evaluate patients with intestinal obstruction or abdominal masses that cause intussusception at the final diagnosis (9). The intussuscepted mass with edematous bowel wall and mesentery within the lumen cause a characteristic target sign or sausage-shaped appearance (6, 9). In our patient, the CT showed a target-like intraluminal soft-tissue mass with a lead point associated with bowel wall thickening and fat attenuation in the pelvic ileal loop (Figure 2).

Different diseases that include lipoma, polyps, vascular malformations, lymphoma, and metastasis can cause intussusception in the small bowel. The CT can help differentiating these lesions from each other. Invaginated Meckel's diverticulum is seen on the CT scan images as an intraluminal fatty mass that corresponds to the entrapped perienteric fatty tissue

within the inverted serosa of the diverticulum and it is surrounded by a thick collar of enhancing soft tissue that further corresponds to the diverticular wall and consists of full layers of the intestinal wall (6, 10).

Differential diagnosis of lipoma from Meckel's diverticulum is important, because it includes macroscopic fatty tissues. On CT, a lipoma has a thinner layer covering the fatty mass when compared with the inverted Meckel's diverticulum. In a lipoma, the covering is only a thin layer of mucosa in contrast to the thick full layers of intestinal wall in invaginated Meckel' diverticulum (3). Polyps, vascular malformation, lymphoma, and metastasis do not have fatty tissue components, so they can easily be differentiated from Meckel' diverticulum (3, 10). Moreover, invaginated Meckel's diverticulum is almost always solitary, but polyps associated with polyposis syndromes are usually multiple.

In patients with small bowel intussusception, the resection of benign enteric lesions is required in order to prevent recurrence. So differential diagnosis with CT is important for the management of intussusception.

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