CASE REPORT

Uncommon presentation of Meckel's diverticulum in a child with decompensated hypovolemic shock

Nihan Şık, M.D.,[1] Aslıhan Uzun, M.D.,[2] Ali Öztürk, M.D.,[1] Efil Aydın, M.D.,[3] Osman Zeki Karakuş, M.D.,[3] Murat Duman, M.D.,[1] Durgül Yılmaz, M.D.[1]

[1]Division of Pediatric Emergency Care, Department of Pediatrics, Dokuz Eylül University Faculty of Medicine, İzmir-*Türkiye*

[2]Department of Pediatrics, Dokuz Eylül University Faculty of Medicine, İzmir-*Türkiye*

[3]Department of Pediatric Surgery, Dokuz Eylül University Faculty of Medicine, İzmir-*Türkiye*

ABSTRACT

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract and may cause serious complications such as intestinal obstruction, gastrointestinal hemorrhage, or inflammation with/without perforation, which can present with non-specific symptoms and signs. We report on the case of a 2.5-year-old boy admitted to our emergency department in poor condition, with compatible signs of decompensated hypovolemic shock. This case finally resulted in intestinal volvulus and internal hernia, a very rare combination of two complications of MD, as determined in the operating room.

Keywords: Child; internal herniation; Meckel's diverticulum; volvulus.

INTRODUCTION

Meckel's diverticulum (MD) is a remnant of the omphalomesenteric duct, occurring in 1% to 3% of the population. It is localized 7–200 cm from the ileocecal valve on the antimesenteric margin of the ileum.[1,2] The lifetime risk for symptomatic MD was calculated as 4.2–9.0% in the previous studies.[2,3] It was shown that more than half of the children undergoing surgery due to complications of MD were under 5 years of age.[3,4] Here, we describe the case of a 2-year-old boy admitted to our emergency department in poor condition, with signs of hypovolemic shock. Internal hernia and intestinal volvulus due to MD were confirmed during surgery.

CASE REPORT

A previously healthy 2.5-year-old boy was transferred from a regional medical center with abdominal pain, anorexia, and vomiting 8–10 times in the past 24 h, with no history of diarrhea or fever. He was taken to the hospital twice a day and was treated with antiemetics and then discharged. At the last referral, he seemed dehydrated and lethargic, so he was given a bolus of 20 mL/kg intravenous (IV) saline and then transferred to our hospital. In the emergency department, his general condition was poor; his skin was pale with cold extremities, dry mucosal membranes, and weak peripheral pulses. There was spontaneous breathing and the capillary refill time was 4–5 s. He had tachycardia with a heart rate of 162 beats/min, tachypnea with a respiratory rate of 40 breaths/min, and hypotension of 70/46 mmHg and he was lethargic with a Glasgow Coma Scale score of 10, compatible with decompensated hypovolemic shock. Oxygen saturation and body temperature were within the normal limits. There were prominent abdominal distention and tenderness, with decreased bowel sounds and no blood on rectal examination. Weight, height, and body mass index were normal for his age at 13 kg (SDS −0.69), 93 cm (SDS −0.54), and 15.3 kg/m² (SDS −0.51).

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Address for correspondence: Nihan Şık, M.D.
Dokuz Eylül Üniversitesi Tıp Fakültesi, Çocuk Sağlığı ve Hastalıkları Anabilim Dalı, Çocuk Acil Bilim Dalı, İzmir, Türkiye
Tel: +90 232 - 412 60 21 E-mail: drnihan87@hotmail.com

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On laboratory evaluation, the red blood cell count revealed anemia with a hemoglobin level of 8.2 g/dL. The platelet count was 106,000/μL. Blood urea nitrogen and creatinine levels were increased at 30.3 and 0.72 mg/dL, and albumin and sodium levels were decreased at 2.62 g/dL and 129 mmol/L, respectively. There was metabolic acidosis with a pH of 7.09, a bicarbonate level of 12.1 mmol/L, and a lactate level of 3.3 mmol/L. The prothrombin time and activated partial thromboplastin time were 17.1 and 42.8 s with an international normalized ratio of 1.5; the fibrinogen and d-dimer levels were 1.8 mg/dL and 3.5 μg/mL.

There was no IV access, so we immediately obtained intraosseous access and administered three doses of saline boluses of 20 mL/kg as rapidly as possible. Improvement in vital signs was observed after the saline boluses, and then IV access was obtained. Oxygen was supplied by a non-rebreather face mask with reservoir with a flow of 10 L/min. As we could not exclude septic shock, we started ceftriaxone (100 mg/kg/day) and metronidazole (30 mg/kg/day) as empirical therapy. Pantoprazole at a dose of 1 mg/kg was intravenously administered. After obtaining the laboratory results, IV Vitamin K at 0.2 mg/kg/dose and albumin at 1 g/kg/dose were administered. A urinary catheter was inserted to strictly monitor urine output. A nasogastric tube was also inserted, which resulted in the extraction of bright red discharge and blood clots. Portable abdominal radiographs demonstrated air fluid levels and dilated bowel loops (Fig. 1). Point-of-care abdominal ultrasound showed diffuse increase in thickness and dilation on bowel loops and fluid in the subhepatic and pelvic cavities and between bowel loops. Fresh frozen plasma and erythrocyte suspension were administered, the department of surgery was consulted, and the patient was immediately taken to the operating room. Surgical evaluation was performed under general anesthesia and a transverse laparotomy with the right upper incision was made. It was observed that the small intestines were rotated 540° counterclockwise. There was an omphalomesenteric duct remnant, MD, extending from the ileocecal valve to the meso-root at the 70th proximal centimeter, and a bridge-like lesion, and the small intestines were volvulated from this region as an internal hernia. The volvulated intestines were de-rotated, approximately 1 m of necrotic ileum-jejunum segment was resected, and the CLIP+DROP method was applied for lightly ischemic areas. He was transferred to the pediatric intensive care unit after surgery. The patient underwent reoperation at the 48th h, when areas in which reperfusion was expected were re-evaluated, a 20-cm segment of the ileum was resected by presenting the ileocecal valve, and an ileostomy was performed. He was intubated for 48 h and then transferred to the ward. After 10 days of IV antibiotic course, he was discharged, and the ileostomy was closed by ileocolic anastomosis 2 weeks after the operation without any complications. The informed consent was taken from the parents.

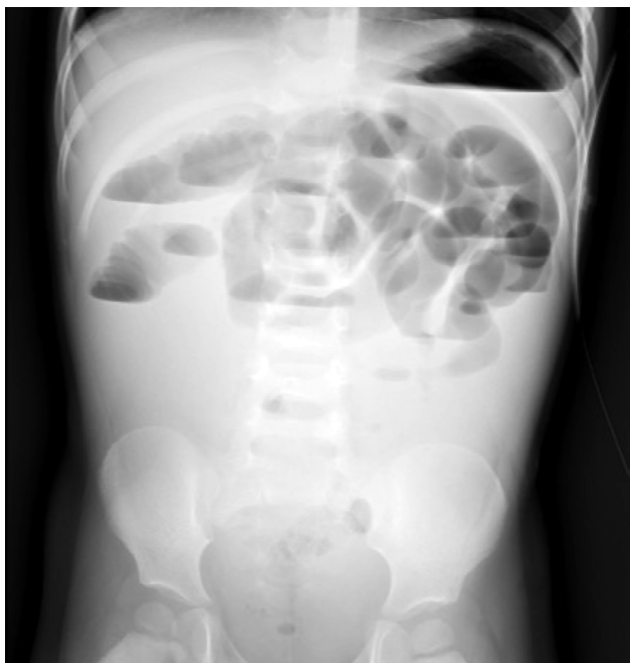

Figure 1. Plain radiography of the patient, demonstrating air fluid levels and dilated bowel loops.

DISCUSSION

We observed a child presenting with hypovolemic shock, which could be misdiagnosed as several diseases, and finally identified intestinal volvulus and internal hernia, a very rare combination of two complications of MD, in the operating room. The most common presentations of symptomatic MD are intestinal obstruction, gastrointestinal hemorrhage, and inflammation with/without perforation. In a recent review evaluating pediatric patients who were symptomatic for MD, 46.7% of them presented with obstruction, 25.3% presented with gastrointestinal hemorrhage, and 19.3% presented with inflammation.[5] Intestinal obstruction is the most common complication, mainly seen in younger children. It usually occurs due to the twisting of the small intestine around the remnant band, internal hernia from entrapment of the intestinal loop within a mesenteric fold to the MD, intussusception with the diverticulum as the leading point, inclusion of the diverticulum from an inguinal hernia, obstruction due to stenosis secondary to a foreign body, chronic diverticulitis, or neoplasms.[6] Among these, intussusception with the diverticulum as the leading point and a volvulus of the small intestine around a fibrous band attaching the MD to the umbilicus are more common.[7] This was explained by nerve fiber density in some studies, as it was found that higher nerve fiber density led to more intense local peristalsis and decreased with age, an explanation for why symptomatic cases of MD occurs more often in the pediatric population. The presence of ectopic tissue such as in the gastric or pancreatic mucosa is the main reason for hemorrhagic complications. It was also proposed that acid production in ectopic gastric mucosa increased with age. Together with the suggestion about nerve fiber density, this could help explain why children with MD presenting with intestinal obstruction were

younger than those presenting with gastrointestinal bleeding.[5]

Intestinal obstruction can present with non-specific symptoms and signs such as irritability, abdominal distension, abdominal pain, anorexia, nausea, and vomiting. Pumberger et al.[8] reported that children with intra-abdominal pathologies such as intussusception, volvulus, and bowel strangulation or incarceration could present with neurological signs such as altered consciousness, apathy, hypotonia, or seizures, particularly when a long time was lost over investigations and even lumbar puncture was performed during diagnostic work-up. Gastrointestinal symptoms may be so non-specific that physicians may fail to consider the decreased level of consciousness as the initial and predominant symptom, and some conditions could be suggestive of sepsis. Although we consider that loss of fluid and electrolyte imbalance due to intestinal obstruction was the reason for the altered mental status in the presented case, it was also suggested that altered state of consciousness can be reported as an early and cardinal symptom of some other intra-abdominal pathologies. This possibility should also be taken into account by physicians.

Cases of MD can be identified using imaging techniques such as ultrasound, X-ray, angiography, computed tomography (CT), or magnetic resonance imaging, but they have low sensitivity and specificity. Technetium-99m pertechnetate nuclear scanning may visualize MD, taking advantage of the way the tracer accumulates in certain tissues like ectopic gastric tissue, with a sensitivity of 89.6% and specificity of 97.1%, but it may not be readily available in emergency settings, and for cases requiring immediate intervention, it is not a reasonable choice. Plain abdominal radiographs are the first imaging technique for a child with suspicion of intestinal obstruction, showing air fluid levels and dilated bowel loops, but they may not provide sufficient information. Ultrasonography provides non-specific information such as free fluid, inflammation, or dilated bowel loops and it is useful for evaluating intestinal obstructions, but it was reported that fewer than 20% of underlying etiologies could be accurately identified. CT was reported to have high reliability for the diagnosis of intestinal obstruction and it may also identify an inflamed MD, but it is unlikely to provide the diagnosis of a fibrous band of MD as the reason for obstruction.[5,9,10] We could not perform abdominal CT, because our case was an emergency and surgical intervention was immediately required. Pre-operative diagnosis of MD as the cause of complications that may mimic different pathologies is not always feasible and most cases have been diagnosed during surgery.[5]

Case reports of MD complicated with volvulus or internal hernia, which are rare complications, were previously reported, but the combination of internal hernia and intestinal volvulus as an obstruction is exceedingly rare.[11–14] We found only one such case in the literature particularly compatible with our patient, wherein the patient was a 2-year-old admitted to the hospital in poor condition, like in our case, who then underwent urgent laparotomy. There was an internal ileal hernia on an inflamed MD with an adherent band to the umbilical sinus and the herniated bowel loop was volvulated around the adhesive band.[15]

Conclusion

Cases of MD may develop serious complications, which may show rapid onset and cause serious morbidity and mortality when neglected. Accurate diagnosis remains a challenge for physicians, and especially for young children, so a high index of suspicion and prompt management is crucial. Pre-operative diagnosis of MD as the cause of volvulus or internal hernia of the small intestine, which may mimic different pathologies, is not always feasible, and most cases have been confirmed during operation. Thus, surgery should not be delayed or such cases may otherwise prove fatal to the patients.

Informed Consent: Written informed consent was obtained from the parents of the patient for the publication of the case report and the accompanying images.

Peer-review: Internally peer-reviewed.

Authorship Contributions: Concept: N.Ş., D.Y.; Design: N.Ş., D.Y.; Supervision: N.Ş., D.Y.; Data: A.U., A.Ö., E.A., O.Z.K.; Analysis: A.U., A.Ö., E.A., O.Z.K.; Literature search: A.U., A.Ö., E.A., O.Z.K.; Writing: N.Ş.; Critical revision: O.Z.K., M.D., D.Y.

Conflict of Interest: None declared.

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OLGU SUNUMU - *ÖZ*

Dekompanse hipovolemik şok ile gelen bir çocukta Meckel divertikülünün nadir prezentasyonu

Dr. Nihan Şık,[1] Dr. Aslıhan Uzun,[2] Dr. Ali Öztürk,[1] Dr. Efil Aydın,[3] Dr. Osman Zeki Karakuş,[3] Dr. Murat Duman,[1] Dr. Durgül Yılmaz[1]

[1]Dokuz Eylül Üniversitesi Tıp Fakültesi, Çocuk Sağlığı ve Hastalıkları Anabilim Dalı, Çocuk Acil Bilim Dalı, İzmir
[2]Dokuz Eylül Üniversitesi Tıp Fakültesi, Çocuk Sağlığı ve Hastalıkları Anabilim Dalı, İzmir
[3]Dokuz Eylül Üniversitesi Tıp Fakültesi, Çocuk Cerrahisi Anabilim Dalı, İzmir

Meckel divertikülü (MD), gastrointestinal sistemin en yaygın doğumsal anomalisidir ve nonspesifik semptom ve bulgularla ortaya çıkabilen, intestinal obstrüksiyon, gastrointestinal kanama veya perforasyonlu/perforasyonsuz enflamasyon gibi ciddi komplikasyonlara neden olabilir. Acil servisimize genel durumu kötü olup, dekompanse hipovolemik şok belirtileri ile kabul edilen 2.5 yaşında bir erkek çocuğu olgusunu sunuyoruz. Bu olgu, ameliyathanede, MD'nin iki komplikasyonunun çok nadir bir kombinasyonu olan intestinal volvulus ve internal herni ile sonuçlanmıştır.

Anahtar sözcükler: Çocuk; internal herni; Meckel divertikülü; volvulus.

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