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# Acute Intestinal Intussusception due to Meckel's Diverticulum: A Case Report

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**Abstract** **Case Report**

Meckel's diverticulum (MD) is a persistence of the omphalomesenteric duct. It is often asymptomatic but can lead to various complications with variable clinical presentations, especially in children. We present a case of acute intestinal invagination due to Meckel's diverticulum, based on a case at the Mohammed Military Instruction Hospital (Rabat, Morocco). The symptoms of Meckel's diverticulum can vary significantly depending on the specifics of each case, and diagnostic methods are not specific. Despite the use of imaging techniques, Meckel's diverticulum is often discovered during surgical intervention. Our patient, admitted in an emergency, received surgical management, including a desinvagination procedure, which revealed the presence of a Meckel's diverticulum. This was followed by resection and anastomosis, with a favorable outcome.

**Keywords**: Intestinal Intussusception, Meckel's Diverticulum, Whirl Sign.



## INTRODUCTION

Meckel's diverticulum (MD), first described in 1809 by Johann Friedrich Meckel, results from the abnormal persistence of the omphalomesenteric duct, which normally regresses during embryonic life. It is considered the most common congenital malformation of the digestive tract, affecting approximately 2% of the general population [1].

MD is often asymptomatic and rarely presents clinically, making it a chance discovery in most cases. However, it can lead to various severe complications, including gastrointestinal bleeding, intestinal obstructions, or inflammations such as diverticulitis. These complications can present with a variety of clinical scenarios, making diagnosis challenging, especially in children. Due to the diversity of manifestations and their often acute nature, the detection and management of MD can be a major challenge in pediatrics [2].

Most cases remain asymptomatic. An uncommon complication is intussusception.

This observation describes the case of a 16-year-old patient admitted to the emergency department with acute abdominal pain, nausea, and vomiting for 6 hours.

This case highlights a rare cause of intestinal intussusception in a young adolescent, aiming to underscore the clinical, radiological, and therapeutic aspects of this condition.

## OBSERVATION

This was a 16-year-old adolescent with no significant medical history, admitted to the emergency department of Mohamed V Military Instruction Hospital due to acute abdominal pain, which had started approximately 6 hours earlier. Upon admission, the clinical examination revealed intense abdominal pain, localized in the epigastric region and of an acute type, accompanied by nausea and vomiting. Despite the severity of the symptoms, the patient's general condition was stable. The physical examination showed no abnormalities in the hernial orifices or lymphatic areas. The rest of the physical examination was normal. The biological tests were normal, and the CRP was negative. An abdominal-pelvic CT scan revealed the presence of a closed-loop obstruction in the right lateral pelvis, with small bowel loops showing a whirlpool sign and a fecal sign in the upstream small bowel loops. There was also a faint enhancement of the digestive wall, indicating a possibly ischemic incarcerated loop. Mild infiltration of the mesentery was noted on the left flank, along with intra-abdominal fluid in the pelvic region. The patient underwent surgical management with an emergency

exploratory laparotomy, which revealed a distended but viable small intestine, with the presence of an ileo-ileal intussusception and a 40 cm segment of invaginated bowel. The invaginated segment appeared purple but was viable. Reduction of the intussusception revealed a Meckel's diverticulum (**Fig2**), which was responsible for the intussusception and measured approximately 5 cm (**Fig 1**). It was located on the mesenteric border of the small intestine. A resection of the small intestine including the diverticulum was performed, followed by an ileo-ileal anastomosis using two interrupted sutures with PDS 4-0. The postoperative course was without any particularities.

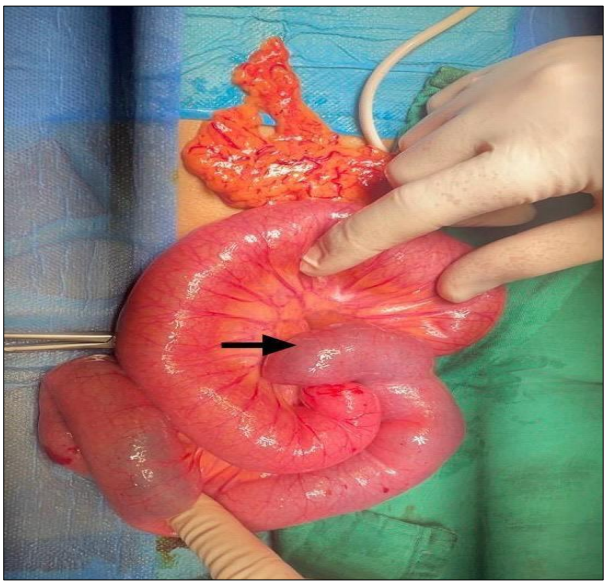

**Figure 1: Intraoperative image of the intussusception mass (black arrow).**

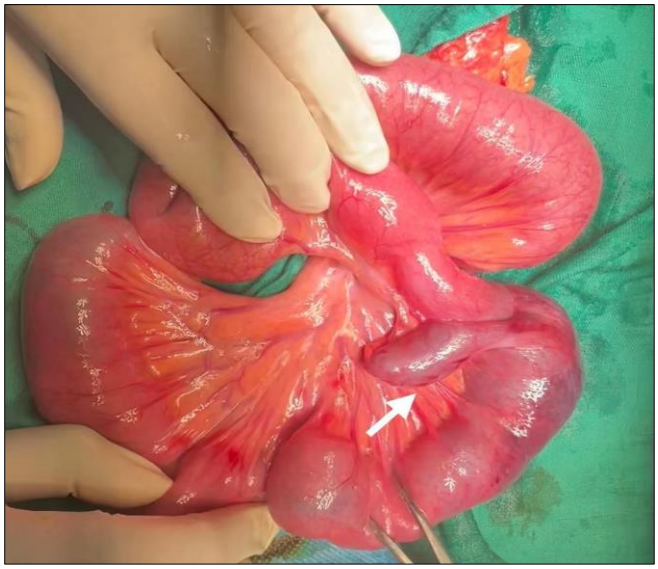

**Figure 2: Intraoperative image of Meckel's diverticulum (white arrow)**

The pathological study reveals a small intestinal mucosa showing ischemic and necrotic changes, with the presence of a Meckel's diverticulum, and no signs of malignancy.

## DISCUSSION

The incidence of Meckel's diverticulum (MD) in the general population is estimated to be around 2% [1]. The incidence of symptomatic forms of Meckel's diverticulum in children remains difficult to assess accurately, as most published studies rely on relatively small case series. However, a large-scale epidemiological study conducted by Alemayehu *et al*., estimated this incidence to be 6.4% [8], thus providing more representative data on this pathology in the pediatric population. MD is more common in boys, with a sex ratio of 1.5 to 4/1 [3]. In our case, the patient is male. It is widely recognized that complications related to Meckel's diverticulum primarily manifest before the age of 2 years [4]. Alemayehu [5], found that half of the children operated on for MD complications are typically

under 5 years of age. In our case, the patient is a 16-year-old adolescent. The complications of Meckel's diverticulum are varied and numerous. However, the most common complications are hemorrhagic, obstructive, or inflammatory. Digestive hemorrhages, often associated with ectopic gastric tissue, are the most frequent manifestations. Intestinal obstructions can result from the adhesion of the diverticulum or the presence of abnormal formations such as vessels or inflammatory lesions. Lastly, inflammatory complications such as diverticulitis occur when the diverticulum becomes inflamed, simulating acute appendicitis. These different complications are the cause of the majority of clinical cases requiring surgical management [3]. Consequently, the clinical manifestations of Meckel's diverticulum can vary significantly depending on the specific circumstances of each case, due to the diversity of possible complications and underlying mechanisms [6]. Other, rarer forms have been described, such as strangulated Littre's hernia, MD torsions, and tumors [7]. Obstructive complications of MD are caused by various mechanisms [8]. Intestinal obstruction can result from acute intussusception (AI), where Meckel's diverticulum may disrupt peristalsis and serve as the starting point for this intussusception [6]. This phenomenon is particularly common in cases of short diverticula with a wide base of implantation or in the presence of inflammation, such as diverticulitis [8]. In our case, the MD is the cause of the intussusception, given its location in the mesentery. Intestinal obstruction can also result from the presence of a band. Indeed, around 26% of Meckel's diverticula are connected to the umbilicus by a fibrous band, and the persistence of the vitelline artery can lead to the formation of a mesodiverticular band. This can cause intestinal obstruction by strangulating loops, internal hernia, or volvulus, leading to serious complications [9]. Meckel's diverticulum can also lead to intraluminal intussusception, causing intestinal obstruction. This occurs when the diverticulum folds upon itself within the intestinal lumen, disrupting the normal passage of intestinal contents and resulting in obstruction [10], which is the case for our patient.

Inflammatory manifestations of Meckel's diverticulum can be particularly misleading. Indeed, diverticulitis is often confused with acute appendicitis due to similar clinical symptoms, such as localized abdominal pain and fever. In many cases, the diagnosis of diverticulitis can only be made during surgery, as the symptoms resemble other abdominal conditions [11]. Hemorrhagic complications of Meckel's diverticulum are often favored by the presence of heterotopias, particularly gastric tissue, located in the diverticulum. This gastric tissue produces hydrochloric acid, which can lead to ulcerations and the erosion of nearby blood vessels. This erosion of vessels is the main cause of digestive hemorrhages associated with Meckel's diverticulum [9]. Hemorrhagic complications often present as rectal bleeding, which can be of low volume, but in some cases, it can also be large-scale, leading to significant blood loss [3]. Heterotopias are found in 4.6 to 71% of symptomatic MD cases [3].

The clinical presentations of MD complications are variable, and diagnostic methods are not specific [12]. Imaging techniques such as standard radiography, ultrasound, CT scan (CT), and Tc-99 scintigraphy may yield false-positive or false-negative results. While these tests are useful, they are not always reliable for diagnosing Meckel's diverticulum due to their limited ability to precisely identify the diverticulum's presence or differentiate it from other abdominal pathologies [6]. On ultrasound or CT, Meckel's diverticulum (MD) often appears as a cyst or a blind sac diverging from the ileum. However, it is often difficult to distinguish the MD from adjacent intestinal loops in the small intestine. However, the presence of a fibrous band connecting the MD to the umbilicus or mesentery provides an additional diagnostic clue, facilitating the identification of the diverticulum and differentiating it from surrounding intestinal structures [13]. Despite the use of these imaging methods, Meckel's diverticulum is frequently diagnosed during surgical exploration. Currently, laparoscopy is the method of choice for both diagnosing and treating MD. This approach allows direct evaluation and minimally invasive management, offering benefits in terms of postoperative recovery and reducing surgical risks [13]. However, in cases of obstructive manifestations, such as acute intussusception (AI) or obstruction due to a band, children are often operated on urgently. In such situations, the diagnosis of Meckel's diverticulum (MD) is frequently made during laparotomy, an open surgical exploration that allows direct visualization of the diverticulum and treatment of associated complications [14]. In our case, an emergency median laparotomy was performed in the context of acute intussusception. In the series by Huang *et al*., [4], one-third of patients were operated on by laparoscopy, which is similar to rates observed in a large-scale epidemiological study conducted in the United States, where comparable results were reported in terms of diagnosis and management of Meckel's diverticulum complications [14]. Several resection techniques for Meckel's diverticulum have been described, including laparoscopic resection with intracorporeal suturing or the use of a linear endoscopic stapler. Other methods include laparoscopically assisted resectionanastomosis or extracorporeal suturing. These approaches allow the procedure to be tailored to the clinical case's specifics, prioritizing interventions that minimize risks and promote rapid recovery [11]. In the trans-umbilical laparoscopically assisted resection, the Meckel's diverticulum and the supporting loop are exteriorized through the trans-umbilical incision, allowing manual anastomosis to be performed. This technique has the advantage of avoiding contamination of the abdominal cavity and the possible omission of ectopic mucosal tissue. It is considered a safe and effective method for managing MD and is widely recommended by most pediatric surgeons due to its

safety advantages and clinical outcomes [11]. Our patient was surgically managed and underwent a segmental resection of the small intestine, removing the MD with a manual ileo-ileal anastomosis.

## CONCLUSION

Meckel's diverticulum (MD) can remain asymptomatic for a prolonged period but can lead to serious complications that threaten vital prognosis. These complications are varied and occur more frequently in young children. Diagnostic tests are not very specific, often leading to a perioperative diagnosis. Therefore, complicated MD should be included in the differential diagnosis when an acute abdomen, intestinal obstruction, or lower gastrointestinal bleeding occurs. Diagnostic and therapeutic laparoscopy is the method of choice, especially in the presence of hemorrhagic or inflammatory complications.

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