International Journal of Medical Sciences And Clinical Research

VOLUME Vol.06 Issue02 2026
PAGE NO. 41-43
DOI 10.37547/ijmscr/Volume06Issue02-10

Meckel's Diverticulum Complicated By Bleeding In Children

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Received: 20 December 2025; **Accepted:** 11 January 2026; **Published:** 15 February 2026

Abstract: Meckel's diverticulum is the most common congenital anomaly of the gastrointestinal tract and represents a frequent cause of unexplained lower gastrointestinal bleeding in children. Bleeding associated with Meckel's diverticulum is often massive, recurrent, and difficult to diagnose preoperatively, leading to delays in appropriate surgical management.

Keywords: Diverticulum, bleeding, hematemesis, hematochezia, melena.

Introduction: Objective

The aim of the study was to improve the outcomes of treatment of Meckel's diverticulum complicated by bleeding in children by optimizing diagnostic approaches and surgical tactics.

Methods

This study is based on the experience of surgical treatment of 27 pediatric patients who were treated at the Second City Children's Surgical Hospital (2-GDSCH) from 2017 to 2024. All patients underwent comprehensive clinical and laboratory examinations, received hemostatic therapy, and were monitored dynamically.

Results

After the cessation of gastrointestinal bleeding, it is necessary to conduct instrumental and additional diagnostic investigations to accurately identify the bleeding source and determine the optimal surgical treatment strategy.

Relevance

According to autopsy data, Meckel's diverticulum occurs in approximately 2% of cases, while intraoperatively it is detected as a concomitant pathology in 0.1–0.3% of patients [1,2,3].

Meckel's diverticulum is a protrusion located on the antimesenteric border of the ileum. The distance of the diverticulum from the ileocecal (Bauhin's) valve varies widely, ranging from 10 to 90 cm [4,5,6]. The younger the child, the shorter this distance; in children under 6 months of age, it averages 20 cm. The wall structure of Meckel's diverticulum is similar to that of the small intestine; however, its mucosa often contains heterotopic tissues, such as gastric or pancreatic tissue.

A clear association has been established between the presence of heterotopic gastric or pancreatic tissue in the diverticulum and gastrointestinal bleeding [7,8,1].

The diverticulum may be free or remain connected to the vitelline duct, adhering to the umbilicus. An attached diverticulum more often causes intestinal obstruction. Numerous reports describe acute surgical conditions associated with incomplete involution of the vitelline duct.

Complications most frequently occur in children aged 3 to 10 years and are commonly associated with bleeding from Meckel's diverticulum or the presence of a wide umbilical fistula [2,8,3].

The relevance of this problem lies in the fact that, in most cases, conservative therapeutic and preventive measures remain insufficiently effective, resulting in

recurrent bleeding.

METHODS

The study included 27 children aged from 4 months to 12 years who were treated between 2017 and 2024. Patients were distributed as follows:

- 4 months to 4 years,
- 4 to 7–8 years,
- 8 to 12 years (5patients), all presenting with intestinal bleeding caused by Meckel's diverticulum.

Emergency surgery was performed in 24 cases. There were 9 girls and 18 boys.

In addition to clinical observation, the following investigations were conducted:

- general clinical and biochemical laboratory tests;
- abdominal ultrasonography.

According to indications, multislice computed tomography (MSCT), magnetic resonance imaging (MRI), gastroscopy, and colonoscopy were performed.

Visual diagnostic methods included dynamic assessment of symptoms:

- local symptoms: hematemesis (bloody vomiting), hematochezia (bright red blood per rectum), melena (tarry stools);
- general symptoms: decreased hemoglobin levels, pallor of the skin, tachycardia.

The abdomen was usually of normal shape, symmetrically involved in respiration, soft on palpation, and without signs of peritoneal irritation. Digital rectal examination revealed accumulation of dark blood, sometimes with clots.

Treatment effectiveness was assessed based on patient complaints, clinical signs of the underlying disease, and comparison of laboratory and ultrasound findings before and after treatment

RESULTS AND DISCUSSION

Bleeding in 28 patients often occurred against the background of complete well-being. 21 children were admitted with a diagnosis of "gastrointestinal bleeding of unknown etiology", 3 with bleeding and intestinal polyposis, and 4 with intestinal intussusception.

Single episodes of bleeding were observed in 6 children, recurrent bleeding in 13, and relapsing bleeding in 9. In cases of multiple bleeding episodes, the interval ranged from several hours to several days, and occasionally several months.

Most patients were admitted within the first 24 hours after the onset of bleeding, manifested by bloody stools. Clinically, bleeding from Meckel's diverticulum did not have specific distinguishing features and resembled acute intestinal bleeding of other etiologies. The clinical presentation depended on the intensity, volume, duration of bleeding, and the age of the patient.

Since preoperative identification of the true cause of bleeding was not possible, all patients underwent laparotomy via a transrectal approach (16 cases) or a midline incision (12 cases). Meckel's diverticulum was identified at a distance of 25–90 cm from the ileocecal junction.

A combination of Meckel's diverticulum with an incomplete vitelline duct fistula was observed in 6 patients. In 5 cases, a fibrous band (remnant of the vitelline duct) connecting the tip of the diverticulum to the umbilicus was detected.

In 16 patients with a narrow-based diverticulum, diverticulectomy was performed using a technique similar to standard appendectomy, with ligation, transection, and invagination of the stump using a purse-string suture.

In 7 patients with a wide-based diverticulum, wedge resection was performed.

In 4 patients, segmental resection of the small intestine with the diverticulum and end-to-end anastomosis was required.

Ulceration of Meckel's diverticulum develops due to the presence of islands of heterotopic gastric-type mucosa or pancreatic tissue. Peptic ulcers of the diverticulum were observed in 18 children across different age groups.

Bleeding from a peptic ulcer of Meckel's diverticulum should be differentiated from intestinal intussusception, intestinal polyps or polyposis, bleeding intestinal hemangioma, erosive hemorrhagic gastritis, and peptic ulcer disease of the stomach and duodenum.

Therefore, during the differential diagnosis and intraoperative revision of the abdominal cavity in

children with gastrointestinal bleeding, all the above-mentioned sources should be considered.

All patients were discharged with complete recovery. Long-term follow-up demonstrated satisfactory condition, with physical development close to or within normal age norms.

CONCLUSIONS

- A history of periodic bloody stools in a child with otherwise good health should prompt consideration of Meckel's diverticulum.
- In cases of severe gastrointestinal bleeding in a child without prior illness, a peptic ulcer of Meckel's diverticulum should be suspected first.

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