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Congenital transmesenteric internal hernia presenting with acute abdomen, septic shock, and extensive intestinal gangrene in a 6-year-old boy: A case report and review of the literature

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Abstract

Objective: Internal hernias are rare causes of intestinal obstruction in children. Congenital transmesenteric hernia is an uncommon but potentially catastrophic form of internal herniation because it may rapidly progress to closed-loop obstruction, bowel strangulation, ischemia, gangrene, septic shock, and death. Preoperative diagnosis remains difficult because clinical presentation is nonspecific, and imaging findings may be inconclusive.

Case description: We report the case of a 6-year-old boy who presented with acute abdomen, repeated bilious vomiting, abdominal distension, and rapidly progressive clinical deterioration. Initial investigations suggested intestinal obstruction without definitive etiology. After development of septic and hypovolemic shock, emergency exploratory laparotomy was performed. Intraoperatively, a congenital septal mesenteric defect was identified, with extensive herniation of small bowel loops causing closed-loop obstruction, vascular compromise, and gangrene of large intestinal segments. Extensive small bowel resection with partial cecal resection was performed, followed by end-to-side ileo-ascending colon anastomosis. The postoperative course required intensive care treatment, mechanical ventilation, vasoactive support, broad-spectrum antimicrobial therapy, and management of Clostridium difficile infection. Despite the severe presentation, the child recovered well and remains clinically stable during follow-up, without evidence of short bowel syndrome.

Conclusion: Congenital transmesenteric internal hernia should be considered in every child presenting with intestinal obstruction and acute abdomen, especially in the absence of previous abdominal surgery. Early surgical exploration remains essential when bowel ischemia is suspected.

Keywords: Internal hernia, congenital mesenteric defect, transmesenteric hernia, acute abdomen, intestinal obstruction, bowel gangrene.

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Introduction

Internal hernia is defined as protrusion of abdominal viscera through a congenital or acquired mesenteric or peritoneal aperture within the peritoneal cavity. Although rare, it represents an important cause of small bowel obstruction and may progress rapidly to strangulation, ischemia, and intestinal necrosis (1,2).

In children, congenital internal hernias are usually related to developmental abnormalities of the mesentery. Congenital mesenteric defects may remain silent for years and present suddenly with acute obstruction and vascular compromise. Recent pediatric reports confirm that congenital internal hernias show diverse clinical presentations and are frequently diagnosed only during operative exploration (3,4).

Congenital transmesenteric hernia is among the most dangerous forms of internal hernia because it usually lacks a true hernia sac. This allows bowel loops to move freely through the mesenteric defect, increasing the risk of closed-loop obstruction, strangulation, bowel gangrene, and septic shock (5,6). Sreekanth et al. recently reported pediatric cases in which all children required emergency laparotomy, with intraoperative findings of mesenteric defect, herniation, and small bowel gangrene (5). Similarly, Fang et al. emphasized that congenital transmesenteric hernia in children may have rapid onset and progression, with intestinal strangulation, gangrene, and septic shock occurring within a short time frame (6).

Preoperative diagnosis remains challenging. Plain radiography and ultrasonography often demonstrate only nonspecific features of bowel obstruction. Computed tomography may suggest internal hernia through indirect signs such as clustered bowel loops, mesenteric vessel crowding, displacement of mesenteric structures, and the whirl sign; however, these findings may be absent or difficult to interpret in unstable pediatric patients (1,2,4). Kim et al. recently reported that rare pediatric internal hernias may remain undiagnosed despite preoperative imaging and become evident only during surgical exploration (4).

We present a rare case of congenital transmesenteric internal hernia in a 6-year-old boy complicated by acute abdomen, septic and hypovolemic shock, extensive intestinal gangrene, major bowel resection, and successful reconstruction with - end-to-side ileo-ascending colon anastomosis. The aim of this report is to highlight the diagnostic difficulty, operative management, and favorable outcome of this uncommon but life-threatening pediatric surgical emergency.

Case description

A 6-year-old boy was admitted to the Department of Pediatric Surgery because of severe abdominal pain, repeated bilious vomiting, abdominal distension, and rapidly worsening general condition. Prior to transfer, the patient had been hospitalized at the Department of Pediatric Endocrinology because of persistent vomiting associated with laboratory-confirmed hyperglycemia. During hospitalization, the child's clinical condition deteriorated rapidly, requiring urgent surgical consultation.

Upon admission, the child appeared critically ill. Clinical examination revealed severe dehydration, tachycardia, tachypnea, abdominal distension, diffuse abdominal tenderness with muscular guarding, and diminished bowel sounds. The

clinical picture was highly suggestive of acute abdomen and advanced intestinal obstruction.

Laboratory investigations demonstrated leukocytosis, elevated inflammatory markers, metabolic acidosis, and biochemical evidence of systemic hypoperfusion. Shortly after admission, the patient developed septic and hypovolemic shock. Aggressive resuscitation was immediately initiated, including intravenous fluid replacement, broad-spectrum antibiotic therapy, central venous access, vasoactive support, endotracheal intubation, and mechanical ventilation.

Plain abdominal radiography demonstrated multiple air-fluid levels and markedly dilated bowel loops consistent with intestinal obstruction (Figure 1). Ultrasonography confirmed bowel dilatation and free intraperitoneal fluid but failed to identify the exact cause of obstruction. Because of progressive hemodynamic instability and increasing suspicion of bowel ischemia, emergency exploratory laparotomy was performed.

Figure 1: Preoperative abdominal radiograph demonstrating intestinal obstruction

Exploration of the abdominal cavity revealed a congenital septal defect of the mesentery (Figure 2A and 2B) through which extensive segments of small bowel had herniated.

The incarcerated bowel loops were tightly strangulated, producing closed-loop obstruction with severe vascular compromise. Large portions of the small intestine demonstrated irreversible ischemic changes and gangrene (Figure 2C), with partial involvement of the cecum.

The operative diagnosis was acute abdomen secondary to congenital transmesenteric internal hernia complicated by intestinal gangrene, septic shock, and severe hypovolemic shock. Extensive resection of gangrenous small bowel together with partial cecal resection (Figure 2D) was performed. Intestinal continuity was restored

using end-to-side ileo-ascending colon anastomosis. Thorough abdominal lavage was completed, drains were inserted, and the congenital mesenteric defect was carefully closed to prevent recurrence.

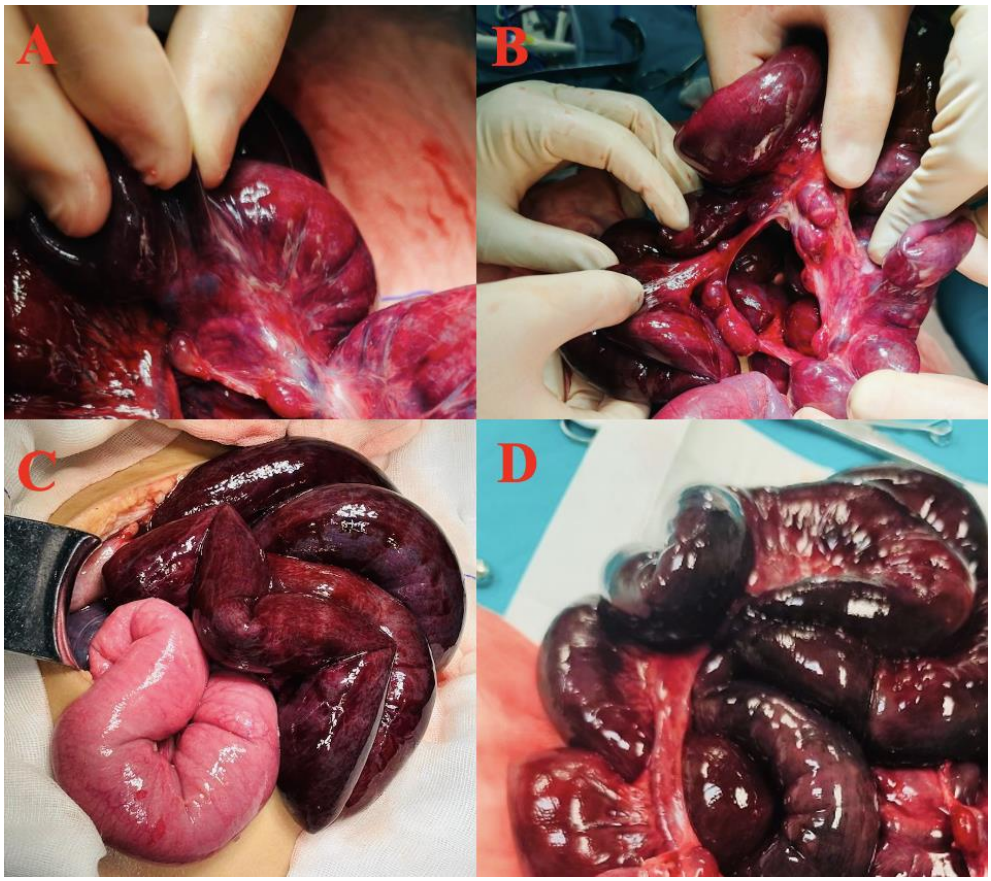

Figure 2: Intraoperative view. A and B: Congenital mesenteric defect identified during surgical exploration. C: Herniated and gangrenous small bowel loops. D: Resected bowel specimen.

Postoperatively, the patient was transferred to the Pediatric Intensive Care Unit. The recovery was complicated by prolonged septic shock requiring vasoactive support, respiratory insufficiency requiring mechanical ventilation, and severe systemic inflammatory response. Continuous analgosedation, broad-spectrum antimicrobial therapy, respiratory physiotherapy, intensive metabolic correction, and nutritional support were administered.

During hospitalization, microbiological investigations confirmed Clostridium difficile infection, which was successfully treated according to antimicrobial susceptibility testing. Gradual clinical improvement was observed, with restoration of hemodynamic stability, withdrawal of vasoactive agents, and successful extubation. Enteral nutrition was progressively introduced and well tolerated.

The patient was discharged in good clinical condition with preserved bowel function. Follow-up evaluations demonstrated satisfactory growth, normal nutritional status, and no evidence of short bowel syndrome, intestinal failure, or recurrent intestinal obstruction.

Discussion

Congenital transmesenteric internal hernia is among the rarest causes of intestinal obstruction in childhood and remains a significant diagnostic challenge because of its nonspecific presentation and potential for rapid progression toward bowel ischemia, gangrene, and death (3–6). The present case illustrates many of the characteristics consistently reported in recent pediatric literature while also demonstrating several unique features that emphasize the severity of this condition.

Similar to our patient, most published pediatric cases describe previously healthy children presenting with sudden onset of abdominal pain, bilious vomiting, abdominal distension, and signs of bowel obstruction (3,5,6). Sreekanth et al. reported a series of children with congenital mesenteric defects in whom abdominal pain, vomiting, abdominal distension, dehydration, and peritonitis were the predominant presenting symptoms (5). All patients required emergency surgical intervention, and bowel gangrene was identified in those with delayed presentation. These findings closely parallel our case, in which extensive bowel strangulation and intestinal gangrene had already developed by the time of surgical exploration.

Karmakar et al. recently reviewed several pediatric congenital internal hernias and highlighted the remarkable variability of clinical presentation (3). Some children presented with intermittent abdominal symptoms, whereas others developed fulminant intestinal obstruction with rapid progression toward bowel ischemia. The authors emphasized that diagnosis was frequently delayed because clinical manifestations were nonspecific and often mimicked more common pediatric conditions. Our patient initially presented with persistent vomiting and hyperglycemia, resulting in admission to the Department of Pediatric Endocrinology before the underlying surgical pathology became apparent. This unusual presentation further demonstrates the diagnostic difficulties associated with congenital internal hernias.

The anatomical findings observed in our patient are consistent with the pathophysiological mechanisms described in the literature. Congenital transmesenteric hernias typically lack a true hernia sac, allowing bowel loops to pass freely through the mesenteric defect (5,6,8). This anatomical characteristic explains the rapid progression toward strangulation and extensive intestinal necrosis. Fang et al. recently reported a giant congenital transmesenteric hernia in an infant complicated by severe bowel ischemia and emphasized that delayed recognition significantly increases morbidity and mortality (6). Similarly, our patient developed extensive bowel gangrene requiring major intestinal resection, highlighting the aggressive nature of this pathology.

One of the most remarkable aspects of the present case is the development of both septic and hypovolemic shock before definitive diagnosis. Although bowel ischemia and gangrene have been reported in previous studies, relatively few pediatric reports describe such advanced systemic compromise at presentation (3,6,11). The progression from intestinal obstruction to septic shock in our patient likely resulted from bacterial translocation across necrotic bowel, systemic inflammatory response, fluid sequestration within the obstructed intestine, and severe dehydration. This

sequence illustrates the catastrophic consequences of delayed diagnosis and emphasizes the need for early operative intervention.

The diagnostic challenges encountered in our patient are also consistent with contemporary literature. Despite significant advances in imaging techniques, preoperative diagnosis of congenital internal hernia remains difficult (1,2,4). Conventional abdominal radiography usually demonstrates only nonspecific signs of intestinal obstruction, while ultrasonography rarely identifies the mesenteric defect itself. Kim et al. recently reported a series of rare pediatric internal hernias in which definitive diagnosis was established intraoperatively in all patients despite extensive preoperative evaluation (4). Similarly, in our patient, imaging studies suggested bowel obstruction but failed to identify the underlying congenital mesenteric defect, making emergency surgical exploration both diagnostic and therapeutic.

The surgical strategy employed in our patient corresponds with current recommendations described in the literature. The primary objectives of treatment include reduction of herniated bowel, assessment of intestinal viability, resection of necrotic segments, restoration of intestinal continuity, and closure of the mesenteric defect to prevent recurrence (4–6). However, unlike several recently reported cases in which bowel viability was preserved and resection was avoided, our patient required extensive small bowel resection and partial cecal resection because of advanced gangrenous changes (5,6). The need for major intestinal resection reflects the severity of disease at presentation and distinguishes this case from many previously published reports.

Another important aspect is the postoperative outcome. Major bowel loss in childhood raises concerns regarding intestinal failure, nutritional deficiency, and short bowel syndrome. Nevertheless, recent pediatric studies have demonstrated that favorable long-term outcomes are achievable when timely surgical management is combined with intensive postoperative support and nutritional rehabilitation (3,5,6). Despite extensive bowel resection, our patient demonstrated satisfactory recovery, normal gastrointestinal function, and absence of short bowel syndrome during follow-up. This favorable evolution is comparable to the best outcomes reported in contemporary pediatric series and further supports aggressive management in critically ill patients.

Compared with recently published pediatric cases, our patient represents an unusually severe manifestation of congenital transmesenteric internal hernia. The combination of acute abdomen, extensive bowel gangrene, septic shock, hypovolemic shock, prolonged intensive care treatment, Clostridium difficile infection, and successful restoration of intestinal continuity with end-to-side ileo-ascending colon anastomosis is rarely described in the current literature. Therefore, this case contributes valuable clinical information regarding the presentation, management, and outcome of one of the most serious forms of congenital internal hernia encountered in pediatric surgical practice.

Overall, the available literature and the present case collectively demonstrate that congenital transmesenteric internal hernia remains a potentially fatal but treatable condition. Early recognition, prompt surgical exploration, aggressive resuscitation, and multidisciplinary postoperative management remain the key factors influencing survival and long-term outcome.

Conclusions

Congenital transmesenteric internal hernia is a rare but potentially fatal cause of acute abdomen and intestinal obstruction in children. The condition should be suspected in pediatric patients presenting with bowel obstruction, bilious vomiting, abdominal distension, peritonitis, or rapid clinical deterioration, particularly in the absence of previous abdominal surgery.

Because preoperative diagnosis is often difficult and imaging findings may be inconclusive, early surgical exploration is essential whenever bowel ischemia or strangulation is suspected. Prompt operative management, resection of nonviable bowel, closure of the mesenteric defect, restoration of intestinal continuity, and intensive postoperative care are the key determinants of successful outcome.

The present case demonstrates that even extensive bowel gangrene complicated by septic and hypovolemic shock can result in excellent recovery when timely multidisciplinary management is provided.

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