ASIDE Case Reports

Case Report

Internal Herniation Beneath an Omphalomesenteric Band Arising from Meckel's Diverticulum: A Rare Case Report of Small Bowel Obstruction in A Six-Year-Old Child

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ABSTRACT

Meckel's diverticulum is the most common congenital anomaly of the gastrointestinal tract and is usually asymptomatic, making preoperative diagnosis difficult in children. We report a 6-year-old boy with a 4-5-day history of progressively worsening periumbilical abdominal pain accompanied by non-bilious vomiting and acute obstipation, with no passage of stool or flatus by the time of presentation. On admission, he appeared ill with abdominal distension, focal periumbilical tenderness, rebound, and involuntary guarding. Laboratory studies did not reveal significant abnormalities. Erect and supine abdominal x-ray showed multiple air-fluid levels, and ultrasound revealed markedly dilated small-bowel loops with collapsed colonic segments, consistent with a high-grade mechanical obstruction. Urgent exploratory laparotomy identified Meckel's diverticulum with a non-patent tip that was tethered to the umbilicus by a narrow fibrotic omphalomesenteric band; several ileal loops were entrapped beneath this band, producing complete obstruction without volvulus or ischemia. The band was divided, controlled decompression through the diverticular tip was performed, and wedge resection of the diverticulum with transverse ileal closure was completed. The patient resumed oral intake on postoperative day 3 and was discharged in good condition on day 6. This case highlights internal herniation beneath an omphalomesenteric band as an important but easily overlooked mechanism of small-bowel obstruction in children. Early recognition of this mechanism and timely operative exploration are essential to prevent delays in definitive management.

1. Introduction

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract [1], with a prevalence of Approximately 1-2% in the general population, and a 2:1 male to female ratio [2, 3].

Embryologically, MD arises from incomplete obliteration of the vitelline (omphalomesenteric) duct between the fifth and seventh weeks of gestation, resulting in a diverticular outpouching on the antimesenteric border of the distal ileum [4]. MD is a true diverticulum, which contains all layers of the small intestine, and it can be found within 200 cm from the ileocecal valve; however, it is typically located within 60 cm of the ileocecal valve [2, 5].

MD is typically asymptomatic and most often identified incidentally [6]. However, when symptomatic, presentations may vary with age. Gastrointestinal bleeding is the most common reported symptom in children. Other complications can be intestinal obstruction, diverticulitis, or perforation [7, 8]. Mechanical small bowel obstruction caused by a Meckel's diverticulum is uncommon, and may arise through several distinct mechanisms such as fibrous bands (remnants of the vitelline duct), volvulus around the diverticulum or its mesenteric attachment, intussusception with the diverticulum acting as a lead point [9–11].

Because Meckel's diverticulum is uncommon in children, preoperative diagnosis is often challenging. Therefore, it is essential for pediatric surgeons to be well aware of its variable presentations. Here we report a case of complete small bowel obstruction caused by entrapment beneath a fibrotic omphalomesenteric band arising from a Meckel's diverticulum, and we discuss the diagnostic clues and operative management. In this case, the omphalomesenteric band refers to a congenital fibrotic remnant of the vitelline duct connecting the tip of the Meckel's diverticulum to the umbilicus, an anatomic configuration distinct from secondary adhesive bands or other omphalomesenteric duct anomalies [12].

2. Case Presentation

A 6-year-old boy with no prior medical or surgical history presented with severe non-positional periumbilical abdominal pain. He experienced nausea, multiple episodes of non-bilious, non-bloody vomiting, and anorexia on the day of admission. The pain initially appeared intermittently 4-5 days earlier and was managed conservatively at several outpatient visits with intravenous fluids

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and antiemetic therapy. Despite temporary relief, his symptoms progressively worsened, and on the day of admission, the abdominal pain became constant and significantly more severe, associated with marked nausea and repeated vomiting. He had regular bowel habits before this illness with no prior history of chronic constipation; however, during the acute course, he developed obstipation with no passage of stool or flatus for approximately five days.

There was no reported ingestion of foreign bodies, seeds, or nuts. During this period, he had occasional low-grade fevers, which on the day of presentation no longer responded to rectal acetaminophen.

On admission, he appeared ill but was hemodynamically stable, with a blood pressure of 100/60 mmHg, a pulse rate of 85 beats/min, a respiratory rate of 20 breaths/min, and a temperature of 36.4°C. Abdominal examination revealed a markedly distended abdomen with localized periumbilical tenderness. A firm mass compatible with fecal loading was palpated on abdominal examination, and distal fecal impaction was specifically assessed and excluded by rectal examination. Localized rebound tenderness and involuntary guarding were present in the periumbilical region with no generalized abdominal rigidity, consistent with evolving localized peritoneal irritation rather than diffuse peritonitis. Over the course of admission, the abdominal pain had progressively worsened with increasing tenderness, raising concern for an evolving surgical abdomen.

Initial laboratory studies showed a WBC count of $5.9 \times 10^3/\mu L$, hemoglobin 12 g/dL, and platelets $303 \times 10^3/\mu L$. Inflammatory markers were low (ESR 10 mm/h, CRP 2 mg/L). Serum electrolytes and renal function showed no clinically significant abnormalities (sodium 132.9 mEq/L, potassium 4.17 mEq/L, BUN 12 mg/dL, creatinine 0.53 mg/dL). Coagulation parameters were also normal (PT 13 sec, INR 1.1, PTT 30 sec). Other laboratory tests, including liver enzymes and pancreatic markers, were largely unremarkable. Overall, the laboratory profile showed no evidence of significant metabolic disturbance, systemic inflammation, or clinically significant dehydration.

An erect and supine abdominal radiograph demonstrated multiple air-fluid levels within dilated bowel loops, suggestive of mechanical obstruction **(Figure 1)**. Abdominal ultrasonography revealed multiple markedly dilated small bowel loops with collapsed segments in the colon and no free fluid in abdomen or pelvis, raising concern for a mechanical obstruction at the level of the distal ileum. Given the patient's clinical deterioration, his young age, and concerns regarding radiation exposure, abdominal CT-scan was not performed, and an urgent decision for surgical exploration was made to avoid delay in definitive management.

Based on the clinical presentation, several differential diagnoses were considered early in the evaluation. Acute appendicitis was considered, given the periumbilical pain and vomiting; however, it was ruled out because the absence of localized right lower quadrant tenderness, normal inflammatory markers, and lack of leukocytosis argued against it. Intussusception was also considered, but it was excluded due to no history of episodic colicky pain, bloody stools, or sonographic evidence of the target sign. Midgut malrotation with volvulus was deemed less likely because of hemodynamic stability, non-bilious vomiting, and the absence of radiologic signs of volvulus. Functional constipation or fecal impaction was also considered given the palpable fecal loading; however, this was deemed unlikely due to the absence of distal fecal impaction on rectal examination, the acute onset of symptoms in a child without a history of chronic constipation, and the presence of marked small-bowel dilatation with a collapsed colon on imaging, which favored a mechanical obstruction. The combination of progressive abdominal distension, obstipation, multiple air-fluid levels on plain radiography, and diffuse small-bowel dilatation with collapsed colon on ultrasonography favored the diagnosis of high-grade mechanical small-bowel obstruction.

The overall picture was consistent with an acute surgical abdomen in the setting of high-grade small bowel obstruction, necessitating urgent surgical intervention. Given the progression of abdominal pain to constant and severe, persistent vomiting, development of localized rebound tenderness and guarding, and radiologic evidence of high-grade mechanical obstruction, the decision was made to proceed with urgent exploratory laparotomy. Due to marked bowel distension, the need for prompt decompression, unknown preoperative pathology, and the absence of advanced laparoscopic facilities at our institution, laparoscopic approach was not attempted, and an open exploratory laparotomy was performed. Intraoperatively, a Meckel's diverticulum with a narrow fibrotic band was identified. The tip of the diverticulum was non-patent and connected to the umbilicus via a thin omphalomesenteric remnant. Several small-bowel loops were found entrapped beneath this band, resulting in complete mechanical obstruction without evidence of volvulus or torsion. The diverticulum appeared normal and non-inflamed, and all bowel segments were viable, though markedly distended, with no evidence of ischemia. Representative intraoperative findings are shown in **(Figure 2)**. The fibrous band was released, and controlled decompression of the dilated bowel was achieved using a 10-Fr Nelaton catheter inserted through a small enterotomy at the non-patent tip of the diverticulum. Wedge resection of the Meckel's diverticulum was subsequently performed, and the ileal wall was closed transversely in two layers: the inner layer with Gambee sutures and the outer layer using Lembert sutures with absorbable polyglactin (Vicryl). Estimated intraoperative blood loss was minimal (approximately 10 – 20 mL), and the total operative time was approximately 90 minutes. Histopathological examination of the resected specimen confirmed the diagnosis of Meckel's diverticulum, composed of ileal-type mucosa without evidence of ectopic gastric or pancreatic tissue. Representative histopathological sections of the resected Meckel's diverticulum are shown in **(Figure 3)**.

Postoperatively, the patient recovered uneventfully. Oral intake was resumed on postoperative day 3, after the return of bowel function, with passage of flatus and subsequent stool prior to discharge. The abdominal incision remained clean and dry, with no signs of surgical site infection or dehiscence. The patient was discharged on postoperative day 6 in good general condition after completing the planned course of intravenous antibiotics (cefotaxime and metronidazole). At discharge, the patient was advised to follow a soft diet with gradual progression to regular diet, avoiding hard foods during the early recovery period. At outpatient follow-up, he was clinically well, tolerating a regular diet, with normal bowel habits and satisfactory wound healing. His body weight at presentation was approximately 14 – 15 kg and remained clinically stable during follow-up. A concise clinical timeline summarizing the presentation, diagnostic evaluation, surgical decision-making, and outcome is presented in **(Table 1)**.

3. Discussion

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract, resulting from incomplete obliteration of the omphalomesenteric duct during embryogenesis [13]. Approximately 1-2% of the population has MD, and the vast majority of these individuals will remain asymptomatic. When symptoms occur, they usually include intestinal obstruction,

Table 1: Clinical timeline of presentation, diagnostic evaluation, surgical decision-making, and outcome

Event	Time from Symptom Onset	Details
Symptom onset	Day 0	Intermittent periumbilical abdominal pain began
Initial outpatient management	Day 1-3	Multiple outpatient visits; treated conservatively with intravenous fluids and antiemetic therapy with transient symptom relief
Clinical worsening and Bowel symptoms	Day 1-5	Abdominal pain gradually became constant and more severe; increasing nausea and repeated non-bilious vomiting; Progressive obstipation with no passage of stool or flatus
Admission	Day 5	Ill-appearing but hemodynamically stable; markedly distended abdomen with localized periumbilical tenderness, rebound tenderness, and involuntary guarding
Laboratory evaluation	Day 5	No leukocytosis; low inflammatory markers; no clinically significant metabolic disturbance or dehydration
Imaging studies	Day 5	Erect and supine abdominal radiographs showed multiple air-fluid levels; ultrasonography demonstrated markedly dilated small-bowel loops with collapsed colon, consistent with high-grade mechanical obstruction
Decision for surgery	Day 5	Due to clinical deterioration, evolving peritoneal signs, and imaging findings, urgent exploratory laparotomy was performed
Intraoperative findings and Surgical intervention	Day 5	Meckel's diverticulum with a narrow fibrotic omphalomesenteric band tethered to the umbilicus causing internal herniation; band division, controlled decompression, and wedge resection with transverse ileal closure was performed
Postoperative recovery	Post-op Day 3	Gradual return of bowel function; oral feeding resumed
Discharge	Post-op Day 6	Discharged in good general condition; soft diet advised with gradual progression to regular diet

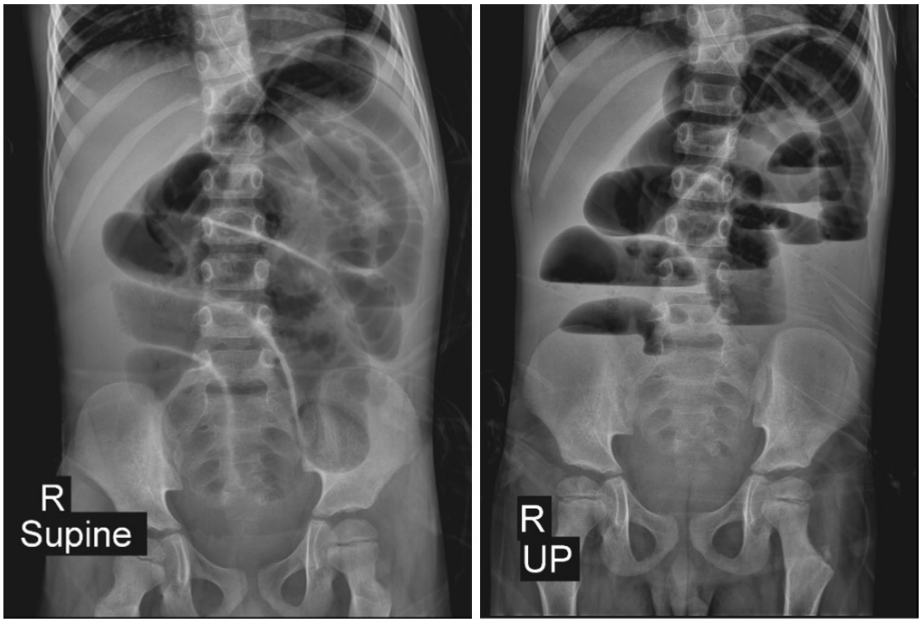

Figure 1: Supine and erect abdominal x-ray demonstrating multiple dilated small-bowel loops with prominent air–fluid levels, consistent with high-grade mechanical small-bowel obstruction.

gastrointestinal bleeding, and complications like diverticulitis or perforation [14].

Intestinal obstruction in MD most commonly results from several mechanisms, including intestinal volvulus, closed-loop obstruction, internal herniation, and intussusception. Volvulus or closed-loop obstruction is caused by a fibrous omphalomesenteric band, in which the diverticulum is tethered to the umbilicus, mesentery, or abdominal wall, creating a fixed pivot point around which the bowel can twist. This mechanism has been documented in several pediatric cases, including reports of 9-, 7-, and 5-year-old children in whom omphalomesenteric bands produced volvulus and segmental torsion requiring emergent surgical intervention [15, 16]. Internal herniation is another mechanism in which a narrow fibrous band forms a confined subband space that traps bowel loops without true torsion. This variant has been documented in infants and young children, representing a subtle but clinically significant cause of high-grade obstruction [17]. The mechanism in our case fits

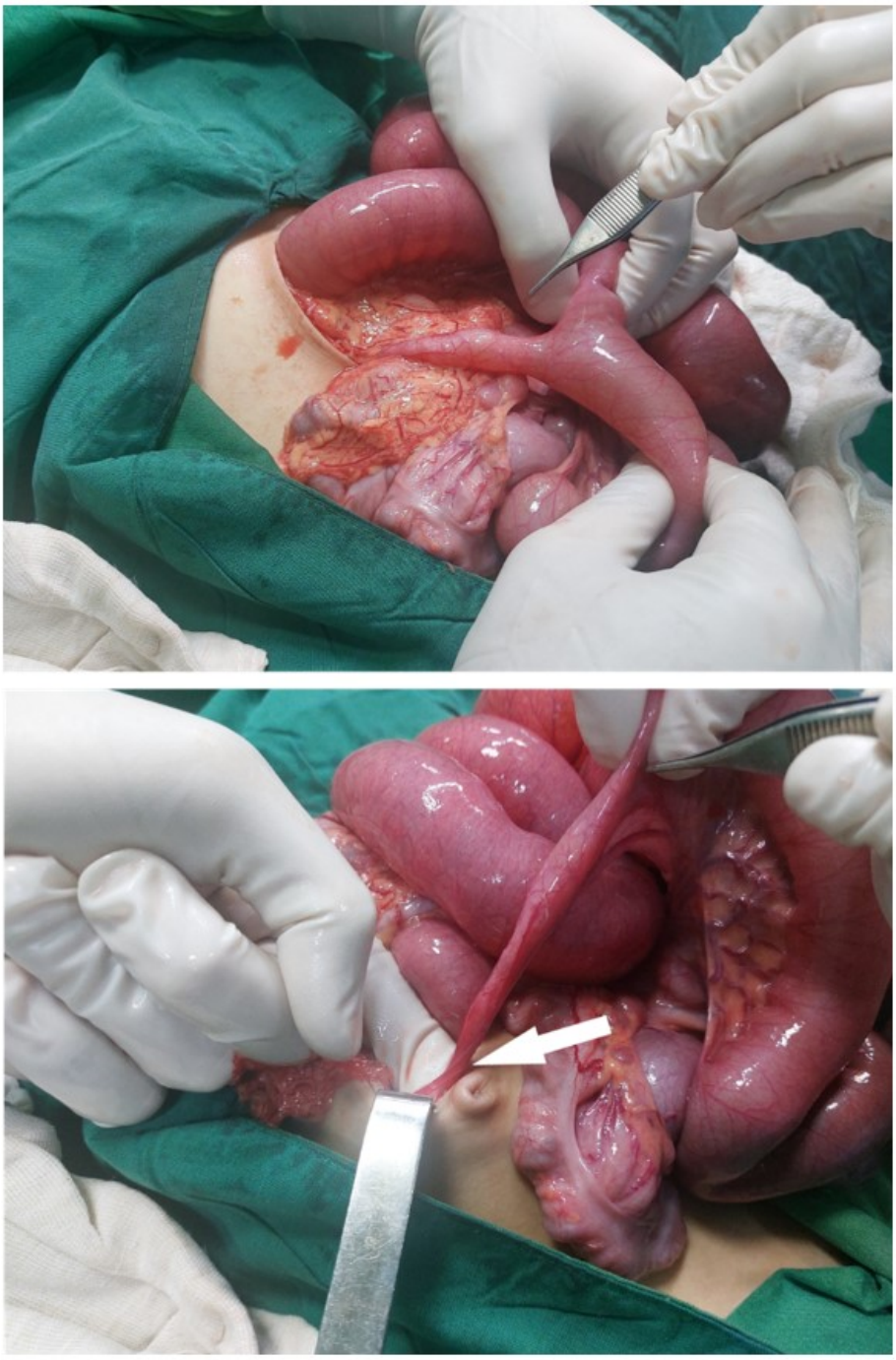

Figure 2: Intraoperative photograph showing a Meckel's diverticulum arising from the antimesenteric border of the ileum. A thin fibrotic omphalomesenteric band extends from the tip of the diverticulum to the umbilicus (white arrow), beneath which several small-bowel loops were entrapped, causing complete obstruction.

within this category: a narrow fibrotic omphalomesenteric band arising from the non-patent tip of the diverticulum extended to the umbilicus, creating a confined space beneath which several small-bowel loops became entrapped. Unlike many reported cases, there was no volvulus, torsion, or inflammation, and the bowel remained viable despite marked dilation. Another well-recognized mechanism is intussusception, in which the diverticulum serves as a pathological lead point, allowing the diverticulum and adjacent ileum to telescope into the distal bowel segment. This mechanism has been noted across multiple pediatric reports in which MD served as the initiating focus for ileo-ileal or ileocolic intussusception [18].

As in our case, the nonspecific nature of symptoms in MD often leads to delayed diagnosis, and initial differentials may include appendicitis, bowel obstruction, or cholecystitis. Progression to gangrene or perforation can result in peritonitis and sepsis, highlighting the need for early diagnosis [19]. The clinical picture of our case supported the diagnosis of high-grade mechanical obstruction, but did not indicate the underlying etiology. This underscores the

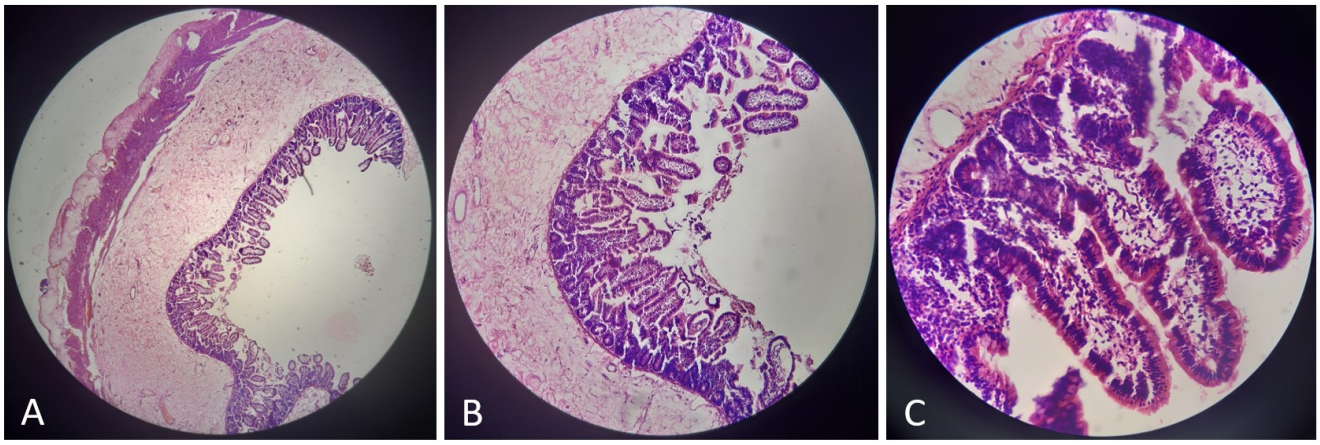

Figure 3: Histopathological sections of the resected Meckel's diverticulum showing ileal-type mucosa without ectopic gastric or pancreatic tissue (Hematoxylin and Eosin stain, A: ×4, B: ×10, C: ×40).

well-recognized difficulty of diagnosing MD-related obstruction preoperatively.

Several imaging modalities may aid in the evaluation of suspected Meckel's diverticulum. Abdominal X-ray can demonstrate secondary signs, such as small-bowel obstruction, pneumoperitoneum, or occasionally a gas-filled diverticular structure; however, its specificity for MD is low. Computed tomography provides a more detailed assessment of bowel dilation and transition points, yet differentiating a Meckel's diverticulum from normal small-bowel loops can be challenging [20, 21]. Among the available modalities, technetium-99m pertechnetate scintigraphy offers higher diagnostic value by identifying ectopic gastric mucosa within the diverticulum, though its sensitivity decreases when such mucosa is absent [20]. Overall, despite these options, preoperative identification of MD remains difficult, especially in pediatric patients presenting with nonspecific symptoms. In this case, the diagnosis was based on abdominal radiography and ultrasonography, and given the physical examination findings and the patient's clinical deterioration, immediate laparotomy was pursued without delay.

Surgery is the treatment of choice for Meckel's diverticulum, with both laparoscopic and open approaches showing favorable results [22]. In cases of small bowel obstruction caused by Meckel's diverticulum, diverticulectomy, segmental, and wedge resection are acceptable options. The surgical approach depends primarily on intraoperative findings, including diverticular base width, surrounding inflammation, the condition of the adjacent ileum, and the presence of ectopic mucosa [23]. Pediatric reports on Meckel's diverticulum have suggested that, when the diverticular base is narrow, the adjacent ileum is healthy, the ectopic mucosa is not present, and no extensive inflammation exists, wedge resection is often favored, as it avoids mesenteric dissection and the need for bowel anastomosis, resulting in shorter operative time and fewer complications [9, 24]. In contrast, segmental ileal resection with primary anastomosis is generally preferred in the presence of a broad-based diverticulum, extensive adjacent inflammation, or the presence of ectopic mucosa [25, 26]. Accordingly, in our case, the diverticular base was narrow and intact, the adjacent ileum was viable, and no intraoperative evidence of surrounding inflammation was identified. Therefore, wedge resection with transverse ileal closure was performed to preserve luminal diameter and avoid unnecessary mesenteric dissection. Histopathological examination confirmed Meckel's diverticulum without ectopic tissue, further supporting the decision for wedge resection rather than segmental ileal resection.

This case was managed exclusively on the basis of bedside clinical evaluation and surgical judgment. In resource-limited clinical settings, the management of acute pediatric small-bowel obstruction often relies on careful clinical assessment and ultrasonography, with a low threshold for prompt open surgical exploration when advanced imaging or minimally invasive options are unavailable or impractical; our approach is consistent with prior reports highlighting the importance of timely laparotomy in preventing adverse outcomes in such contexts [27].

Overall, this case reinforces the importance of maintaining a high index of suspicion for MD-associated band obstruction in children presenting with acute surgical abdomen and high-grade small-bowel obstruction, particularly when unresponsive to conservative management. Early operative exploration remains the cornerstone of management when MD-associated obstruction is suspected.

4. Conclusion

This case illustrates that fibrotic omphalomesenteric remnants related to Meckel's diverticulum can serve as a focal point for internal herniation and result in complete small-bowel obstruction in the absence of volvulus or ischemia. Recognition of this uncommon mechanism is important in children presenting with progressive abdominal pain, distension, and radiologic features of high-grade obstruction unresponsive to conservative management. This report highlights the role of timely surgical exploration in establishing the diagnosis and achieving definitive treatment.

Conflicts of Interest

The authors declare no conflicts of interest.

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None.

Informed Consent

Written informed consent was obtained from the patient's parents/ legal guardian for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request. In accordance with institutional policy and national guidelines, formal IRB/ethics committee approval was not required for publication of a single case report.

Large Language Model

Generative AI tools (ChatGPT, OpenAI) were used during the revision process solely for language polishing and formatting. No AI tool was used for data generation, analysis, or interpretation of clinical findings. All content was reviewed and approved by the authors, who take full responsibility for the accuracy and integrity of the manuscript.

Authors Contribution

RK was responsible for conceptualization, case identification, surgical management, and writing the original draft, as well as reviewing the work. AF contributed to the case presentation, literature review, and writing the original draft. All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Data Availability

No datasets were generated or analyzed for this case report. All relevant clinical information is included in the published article.

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