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RESEARCH ARTICLE
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CASE SERIES: MIDGUT VOLVULUS IN TWO 5-YEAR-OLD BOYS – A TALE OF TWISTED BOWELS

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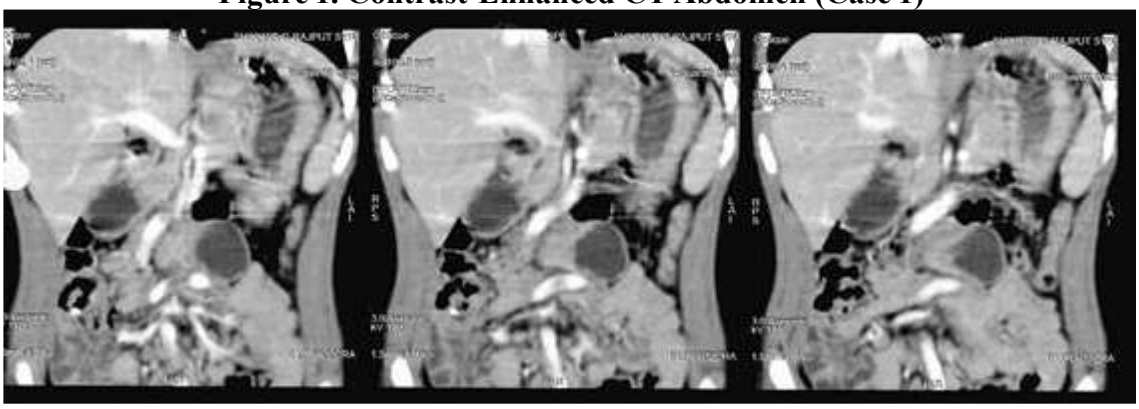
Abstract
Midgut volvulus due to malrotation is a surgical emergency that, if undiagnosed, can lead to catastrophic intestinal ischemia. Although most cases are detected in neonates, delayed presentation in older children poses a diagnostic challenge because of nonspecific gastrointestinal symptoms. We report two 5-year-old boys presenting with recurrent vomiting, abdominal pain, and poor oral intake. Despite similarities in age and clinical background, the two cases demonstrated subtle variations in presentation, laboratory profile, and imaging findings. Both underwent emergency laparotomy with Ladd's procedure and appendectomy and recovered uneventfully. This case series highlights the importance of maintaining a high index of suspicion for volvulus in school-aged children with recurrent abdominal symptoms and underscores the role of timely radiological evaluation and surgical intervention in ensuring favorable outcomes.

Introduction
Intestinal malrotation is a congenital anomaly resulting from incomplete 270° counterclockwise rotation of the embryonic midgut around the superior mesenteric artery (SMA). This abnormality predisposes children to volvulus, wherein the midgut twists around the SMA axis, leading to obstruction and potential ischemia. Although typically diagnosed in neonates with bilious vomiting, presentations beyond infancy are rare and may mimic benign gastrointestinal disorders. Delayed recognition increases morbidity and mortality. We present two cases of midgut volvulus in 5-year-old boys with different clinical courses but similar surgical management and outcomes.

Case Presentations
The first case was a 5-year-old boy who presented with two days of recurrent non-bilious vomiting, abdominal pain, and poor oral intake. He was pale but hemodynamically stable, with mild epigastric tenderness and sluggish bowel sounds. Laboratory evaluation revealed mild hyponatremia (130 mEq/L) and hypokalemia (3.1 mEq/L), with otherwise normal blood counts and inflammatory

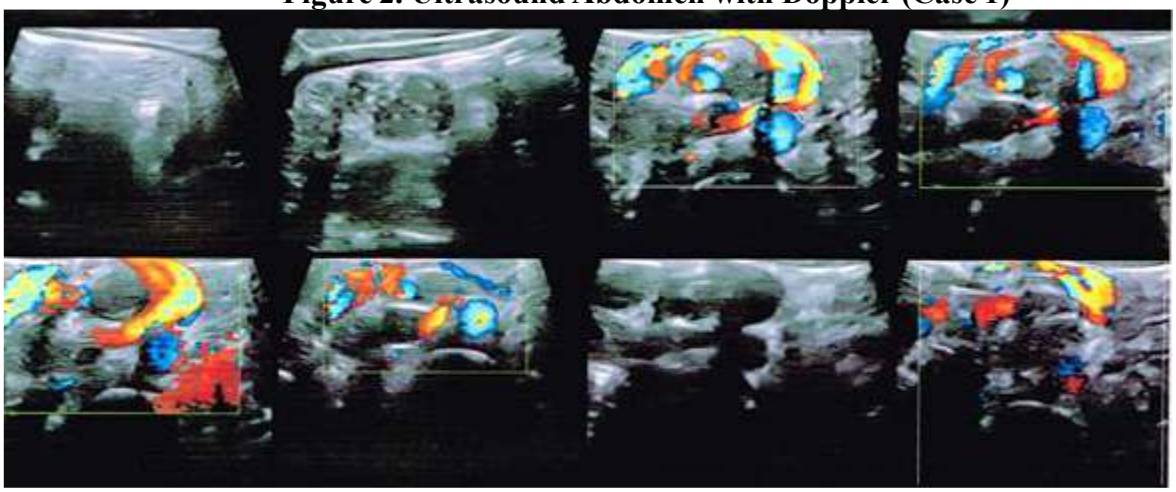
markers. Contrast-enhanced CT abdomen demonstrated malrotation with the duodenojejunal junction positioned to the right of midline and a whirlpool sign of the superior mesenteric vein around the SMA. Emergency laparotomy revealed a 270° midgut volvulus with multiple obstructing Ladd's bands but no ischemia. A Ladd's procedure with appendectomy was performed. The child had an uneventful recovery and was discharged on postoperative day seven.

Figure 1. Contrast-Enhanced CT Abdomen (Case 1)



Description: Axial CECT abdomen showing the classic *whirlpool sign*—twisting of the jejunal loops and the superior mesenteric vein (SMV) encircling the superior mesenteric artery (SMA) in the supraumbilical region. Note mild SMA narrowing and right-sided clustering of bowel loops, consistent with midgut volvulus due to malrotation.

Figure 2. Ultrasound Abdomen with Doppler (Case 1)



Description: Sonographic view demonstrating *inversion of SMA–SMV orientation* (SMV located left of SMA), suggestive of intestinal malrotation. Mild bowel wall edema is visible, without obstruction.

The second case was also a 5-year-old boy, who presented with abdominal pain, recurrent vomiting, fever, and anorexia of two days' duration. He was febrile and irritable, with diffuse abdominal tenderness but no peritoneal signs. Laboratory studies revealed mild leukocytosis and elevated CRP. Ultrasound showed abnormal SMA-SMV orientation, and CT abdomen confirmed malrotation with volvulus and proximal jejunal obstruction. On laparotomy, a 180° midgut volvulus with thick Ladd's bands compressing the duodenum was identified, but the bowel was viable. A Ladd's procedure with appendectomy was performed. The child recovered uneventfully and was discharged on postoperative day seven.

Figure 3. Contrast-Enhanced CT Abdomen (Case 2)

MSCT SCAN OF ABDOMEN WITH PELVIS (PLAIN + CONTRAST):

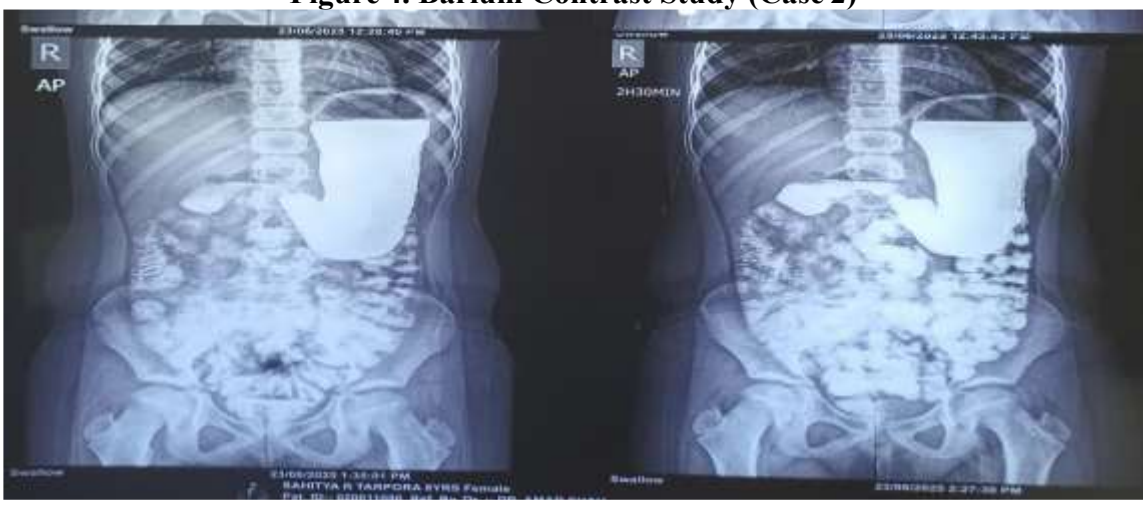
MSCT imaging was performed using sub millimeter thin contiguous axial scan of abdomen and pelvis with I.V. contrast. Coronal and sagittal reformatted images were obtained.

DJ flexure seen in right paramedian position with altered SMA-SMV relationship.

Small bowel lops are predominantly on right side with large bowel loops on left side and IC junction in left lumbar region.

Liver: Liver parenchyma appears normal. No focal or diffuse mass lesion is seen.

Figure 4. Barium Contrast Study (Case 2)



Description: Follow-through series demonstrating delayed passage of contrast from the stomach and duodenum to jejunal loops, with mild duodenal dilatation and prolonged gastric hold-up—residual postoperative changes after Ladd's procedure and duodenoplasty.

Discussion

Midgut volvulus most often presents during the neonatal period; however, it can occasionally manifest later in childhood, where clinical features are often atypical and may result in diagnostic delay **(1,2)**. In children beyond infancy, the classic neonatal triad of bilious vomiting, abdominal distension, and shock is replaced by more subtle and intermittent symptoms such as episodic abdominal pain, vomiting (bilious or non-bilious), and sometimes feeding intolerance or growth faltering **(3)**. Because these non-specific features may mimic more common conditions like gastroenteritis, constipation, or functional abdominal pain, the diagnosis of underlying malrotation can be delayed for months or even years **(1,3)**.

A systematic review by **Sharma et al. (1)** found that among children diagnosed with malrotation beyond infancy, the majority had chronic or recurrent symptoms prior to diagnosis. More than 65% of late-presenting cases experienced ongoing abdominal pain or vomiting, while others presented with malnutrition or acute intestinal obstruction **(1,3)**. Our two cases illustrate this clinical spectrum—one child exhibited subtle, chronic symptoms with mild electrolyte imbalance, while the other presented acutely with systemic inflammation and fever.

Imaging plays a pivotal role in diagnosis, especially in older children. Ultrasound with Doppler often reveals an inverted superior mesenteric artery–superior mesenteric vein (SMA-SMV) relationship, while the characteristic *whirlpool sign*, representing twisted mesenteric vessels, may be seen on CT or Doppler ultrasound **(4)**. In our cases, both ultrasound and contrast-enhanced CT confirmed abnormal SMA-SMV orientation and mesenteric vessel swirling, which facilitated prompt surgical intervention. Upper gastrointestinal contrast studies remain a valuable diagnostic adjunct in equivocal cases **(4,5)**.

Regardless of age or chronicity, the standard management for symptomatic malrotation is the **Ladd's procedure (1,5)**. This involves derotation of the volvulus, division of Ladd's bands, widening of the

mesenteric base, and appendectomy to avoid future diagnostic confusion **(4,5)**. While laparoscopic approaches are increasingly reported, open surgery remains the preferred option in acute or unstable patients **(1)**.

Timely diagnosis and intervention are the most important determinants of outcome. Population-based studies show that untreated midgut volvulus carries nearly 100% mortality due to bowel necrosis and sepsis, whereas survival is excellent when the Ladd's procedure is performed before ischemia occurs **(1,5)**. Hence, clinicians must maintain a high index of suspicion for malrotation and midgut volvulus in any child with unexplained or recurrent abdominal symptoms, especially when imaging findings suggest malrotation **(4,6)**.

Conclusion

Midgut volvulus secondary to congenital intestinal malrotation is not confined to the neonatal period—it can present in older children with atypical or recurrent gastrointestinal symptoms **(1)**. Pediatricians and emergency physicians should maintain vigilance for this diagnosis in patients with unexplained abdominal pain and vomiting. Early imaging and timely surgical intervention through the Ladd's procedure are crucial to prevent bowel ischemia and ensure favorable outcomes **(1,3-6)**.

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