International Surgery Journal
Thanislas PD et al. Int Surg J. 2026 Sep;13(9):1764-1768
https://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20263009

Case Report

Case report of intestinal malrotation with midgut volvulus

Paulia Devi Thanislas, Muralidharan Ramesh*, Manivannan Dhanraj, Vinodh Duraisamy, Karunanithi Visahini

Department of Surgery, Institute of General Surgery, Madras Medical College, Chennai, Tamil Nadu, India

Received: 02 June 2026
Revised: 21 July 2026
Accepted: 24 July 2026

***Correspondence:**
Dr. Muralidharan Ramesh,
E-mail: drmurali95@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Intestinal malrotation is a congenital anomaly resulting from the failure of the midgut to undergo normal rotation and fixation during embryonic development. This anatomical aberration predisposes patients to midgut volvulus, a life-threatening torsion of the primary mesenteric axis where the bowel twists around the superior mesenteric artery (SMA). If left untreated, this can rapidly progress to catastrophic bowel ischemia and necrosis.The clinical profile, comprehensive diagnostic findings, and emergent surgical management of a rare case of midgut volvulus in an adolescent patient were thoroughly evaluated. Radiological evaluation included an Upper Gastrointestinal (GI) Contrast Series and contrasted abdominal imaging to critically assess anatomical landmarks and confirm the diagnosis prior to operative intervention. Following resuscitation, the patient underwent an emergent open Ladd procedure. Intraoperative findings included the presence of chylous ascites, and the midgut volvulus was carefully untwisted in a counterclockwise direction. Ladd's bands were systematically divided, the mesenteric base was significantly broadened to prevent recurrence, and a routine inversion appendectomy was performed. The patient had an uneventful postoperative recovery. The Ladd procedure remains the definitive and gold-standard surgical treatment for this critical diagnosis, effectively placing the bowel in a stable state of non-rotation. Clinicians must maintain a high index of suspicion in patients presenting with signs of high intestinal obstruction, intermittent abdominal pain, or unexplained feeding intolerance, regardless of the patient's age.

Keywords: Midgut Volvulus, Intestinal Malrotation, Ladd Procedure, Ladd's Bands, Pediatric Surgery, Bowel Ischemia

INTRODUCTION

The embryological development of the midgut involves a highly intricate and highly regulated 270° counterclockwise rotation around the axis of the superior mesenteric artery (SMA). During the normal gestational process, the midgut herniates into the base of the umbilical cord around the sixth week of development, undergoes a 90° rotation, and subsequently returns to the abdominal cavity by the tenth week, completing an additional 180° of rotation. When this normal, sequential process of rotation and retroperitoneal fixation is interrupted or incomplete, it results in a congenital anomaly universally known as intestinal malrotation. Consequently, the duodenojejunal flexure and the ileocecal junction fail to reach their normal, widely separated anatomical positions. Instead, they remain in abnormally close proximity, suspending the entire midgut on a remarkably narrow mesenteric stalk. This specific, unstable anatomical configuration creates a dangerous pivot point that allows the midgut to twist in a clockwise fashion. This twisting leads to a dire surgical emergency known as midgut volvulus, which can cause severe vascular compromise, rapid tissue hypoxia, and potential full-thickness bowel necrosis if prompt surgical intervention is not initiated. Several studies have demonstrated that while malrotation is present in approximately 1 in 500 live births, only a fraction of

these individuals will develop a clinically significant volvulus.[1,2] Clinically reported studies suggest that the majority of symptomatic cases present within the first month of life, characterized predominantly by bilious emesis and acute feeding intolerance.[3,4] However, few studies have documented that malrotation can remain completely asymptomatic throughout childhood, only to present atypically in adolescence or adulthood with chronic, enigmatic abdominal complaints.[5,6] Understanding the spectrum of presentations and the critical nature of the embryological defect is paramount for timely diagnosis and intervention.

CASE REPORT

A 39-year-old male presented to the emergency department with a primary complaint of severe, intermittent, crampy abdominal pain that had acutely worsened over the preceding 24 hours. A detailed clinical history revealed that the patient had been experiencing chronic, intermittent episodes of postprandial abdominal cramping associated with mild nausea for the past two years, which had previously been misdiagnosed as functional dyspepsia. Other subtle clinical signs reported by the patient included early satiety, occasional non-bilious vomiting, and an unintentional weight loss of approximately 4 kilograms over the preceding six months. On physical examination, the patient was tachycardic with a heart rate of 115 beats per minute, though normotensive. The abdomen was moderately distended with significant voluntary guarding and tenderness localized predominantly in the epigastric and periumbilical regions. No palpable abdominal masses were identified, but bowel sounds were hyperactive and high-pitched during episodes of pain. Given the suspicion of a partial or high intestinal obstruction, a comprehensive radiological evaluation was immediately ordered, as it serves as the gold standard for diagnosing this condition. An Upper GI Contrast Series was performed, which definitively revealed the characteristic "corkscrew" appearance of the duodenum. This pathognomonic finding was clearly seen as the contrast abruptly tapered off in the second and third portions of the duodenum, signifying an acute torsion of the bowel. Furthermore, imaging of the anatomical landmarks demonstrated that the duodenal C-loop failed to cross the midline to the left of the spine. Additionally, the proximal small bowel was atypically found situated entirely on the right side of the abdomen, confirming the diagnosis of intestinal malrotation complicated by acute midgut volvulus.

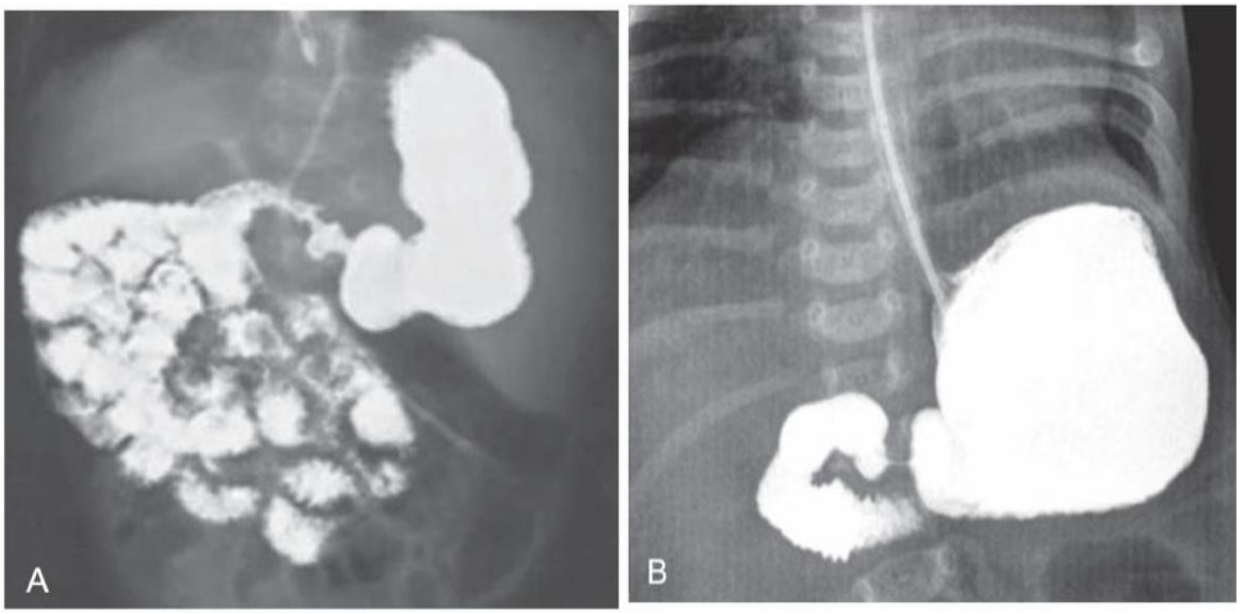

Figure 1: (A) Midgut volvulus as demonstrated by a corkscrew appearance of contrast abruptly tapering off in the duodenum and (B) intestinal malrotation. The duodenal C-loop does not cross the midline and the proximal small bowel is on the right side of the abdomen.

Surgical management and results

Recognizing the immediate threat of mesenteric ischemia, the patient was rapidly resuscitated with intravenous crystalloids, administered broad-spectrum prophylactic antibiotics, and taken to the operating room. The surgical choice for rotational anomalies of the intestine is the classic Ladd procedure, which was performed emergently via a standard midline laparotomy. Upon entering the peritoneal cavity, a significant volume of chylous ascites was immediately observed and suctioned. This finding is frequently seen in cases of volvulus and is likely secondary to chronic lymphatic obstruction and venous engorgement caused by the twisted mesenteric root. The entire midgut was eviscerated to expose the mesenteric pedicle, revealing a

tight, 360-degree clockwise torsion of the bowel around the superior mesenteric artery. The midgut volvulus was carefully and manually untwisted in a counterclockwise direction.

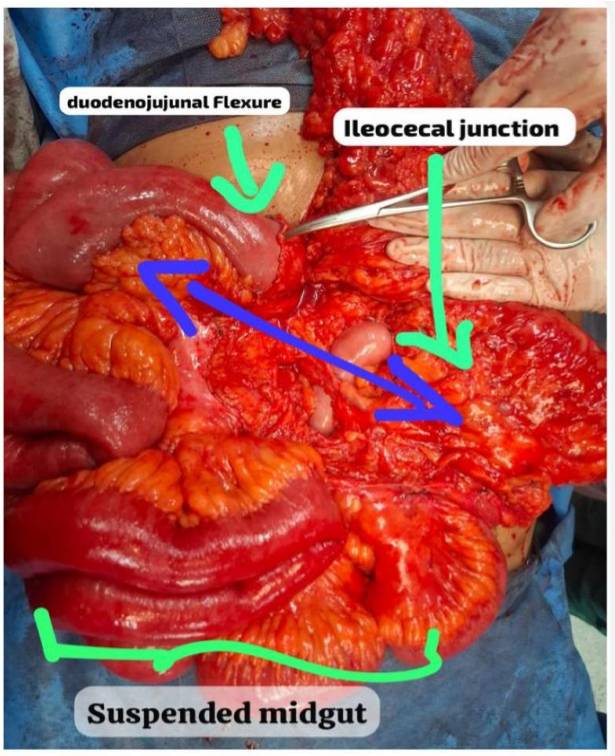

Figure 2: Intraoperative view showing the state of the bowel after resection of Ladd's Band and the untwisting of the malrotation. The suspended midgut, duodenojejunal flexure, and ileocecal junction are clearly identified.

*After resection ladds band and untwist of malrotation.

Post-untwisting, the affected small bowel appeared moderately congested, edematous, and potentially ischemic. To assess viability, the bowel was returned to the abdominal cavity, and warm, moist laparotomy sponges were placed directly on the bowel surface for a period of ten minutes. This maneuver successfully helped improve perfusion, and subsequent re-evaluation confirmed that the bowel had regained normal color and peristalsis, negating the need for any bowel resection. Following the restoration of blood flow, the procedure advanced to the division of Ladd's bands. These abnormal, dense mesenteric fibrous bands, extending from the malpositioned ascending colon and cecum across the anterior surface of the duodenum to the posterior right upper quadrant and liver edge, were sharply divided to relieve the extrinsic duodenal obstruction. To prevent any future recurrence of the volvulus, the cecum and the entire right colon were extensively mobilized to drastically broaden the mesenteric base. It should be noted that securing the cecum or duodenum to the abdominal wall with sutures (pexy) offers no proven benefit and was therefore omitted. Finally, a routine appendectomy utilizing an inversion technique was performed. This is a mandatory step in the Ladd procedure because the cecum is permanently relocated to the left side of the abdomen post-procedure, which would render any future diagnosis of acute appendicitis clinically confusing and potentially hazardous.

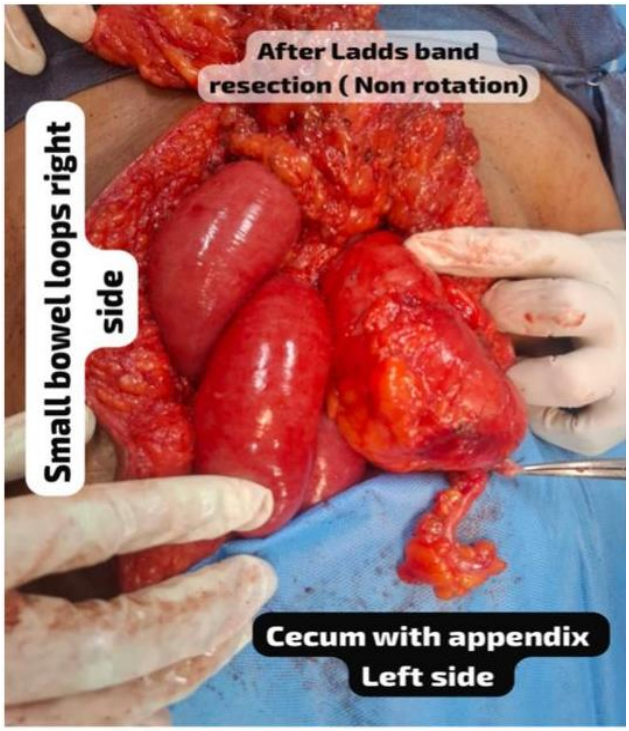

Figure 3: View demonstrating that appendectomy (inversion) is routinely performed because the cecum lies on the left side of the abdomen after the Ladd procedure. The small bowel loops are positioned on the right side, while the cecum with the appendix is relocated to the left side.

*Appendectomy(inversion) is routinely performed because the cecum lies on the left side of the abdomen after the ladd procedure.

Exclusion criteria

The patient's postoperative course was largely unremarkable. The nasogastric tube was removed on postoperative day two following the return of normal bowel function and the passage of flatus. The patient was sequentially advanced from a clear liquid diet to a regular diet, which he tolerated without any nausea or recurrent abdominal cramping. He was discharged on postoperative day five in stable condition. Routine follow-up was conducted at two weeks, three months, and six months post-surgery. At the six-month follow-up evaluation, the patient reported complete resolution of his chronic abdominal pain and early satiety. He had successfully regained 5 kilograms of body weight and had returned to all normal physical activities without restriction. There were no clinical signs of recurrent obstruction or malabsorption.

DISCUSSION

Intestinal malrotation encompasses a spectrum of rotational and fixational anomalies of the embryonic gut. While traditionally viewed as a pediatric pathology, this case report underscores the reality that malrotation and subsequent midgut volvulus can present at any age. The fundamental risk of developing a midgut volvulus is inversely proportional to the width of the mesenteric base.[7] In scenarios of complete non-rotation, there is paradoxically a relatively broad mesenteric base maintained between the duodenojejunal junction and the cecum, leading to a lower overall risk of twisting. Conversely, when the duodenojejunal limb rotates normally but the cecocolic segment does not, the resulting exceptionally narrow base significantly increases the biomechanical risk of volvulus.[8] Our present study findings highlight several critical parameters that warrant careful comparison with previous studies.

Age of presentation

In the literature, over 75% of symptomatic malrotation cases present within the first month of life with acute bilious vomiting.[9] However, our patient presented at 15 years of age. Previous studies by Nehra et al. indicate that adolescent and adult presentations are more insidious, often characterized by chronic abdominal pain, weight loss, and failure to thrive, mirroring the exact symptomatology observed in our patient.[10] The chronic intermittent nature of our patient's symptoms prior to the acute volvulus aligns perfectly with the literature detailing partial, intermittent torsion that spontaneously resolves before a catastrophic event occurs.

Diagnostic modalities

Radiological evaluation is paramount. In pediatric cohorts, ultrasound is frequently utilized to identify the inversion of the superior mesenteric artery and vein. However, as demonstrated in our case, the Upper GI Contrast Series remains the most definitive diagnostic tool across all age groups. Consistent with the landmark descriptions in earlier studies, the present case exhibited the classic "corkscrew" sign and the failure of the duodenal C-loop to cross the midline.[11] Adult studies sometimes advocate for Computed Tomography (CT) scans due to their ability to visualize the "whirlpool sign" of twisted mesenteric vessels; nonetheless, our reliance on the Upper GI series provided an unequivocal diagnosis without delaying surgical intervention.[12]

Intraoperative findings and tissue viability

A major comparative parameter is bowel viability at the time of laparotomy. Historically, delayed diagnosis in older children and adults results in a higher rate of bowel resection due to irreversible ischemia.[8] In our present study, the rapid presentation to the emergency room and immediate surgical exploration allowed for the salvage of the entire midgut. The presence of chylous ascites, noted in our case, is a well-documented marker in previous studies indicating chronic lymphatic obstruction, validating the patient's history of prolonged, intermittent symptoms prior to the acute emergency.[7]

Surgical technique

The surgical approach utilized in our case strictly adhered to the principles established by William E. Ladd in 1936.[13] When comparing surgical techniques, the division of Ladd's bands and the broadening of the mesenteric base are universally agreed upon as non-negotiable steps. Interestingly, while some modern studies have debated the necessity of a prophylactic appendectomy, our institution strictly adheres to this practice. As observed in our operative findings, the Ladd procedure does not "correct" the intestinal rotation; instead, it intentionally places the bowel in a stable state of non-rotation. Post-operatively, the intestines are returned to the abdominal cavity with the small bowel residing entirely on the right side and the large bowel/colon positioned on the left. Consequently, removing the appendix prevents dangerous future misdiagnoses of left-sided appendicitis.[10]

Recurrence rates

It is critical to note that even after a technically successful Ladd procedure, there remains a reported risk of recurrent midgut volvulus. Previous large-scale retrospective studies suggest a recurrence rate of approximately 2% to 10%, heavily dependent on the extent to which the mesenteric base was broadened during the initial operation.[8] Our technique heavily emphasized maximizing the distance between the duodenojejunal junction and the cecum to mitigate this specific risk parameter.

CONCLUSION

In conclusion, midgut volvulus remains a critical, time-sensitive diagnosis that requires prompt surgical intervention focusing on untwisting the volvulus, dividing obstructing bands, broadening the mesenteric base, and performing an appendectomy. Clinicians must remain vigilant and maintain a high index of suspicion in patients presenting with relevant symptoms, irrespective of the patient's age. The detailed comparative analysis of symptomatology, imaging, and operative techniques reinforces the necessity of the standard Ladd procedure to ensure optimal patient outcomes.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Applegate KE, Anderson JM, Klatte EC. Intestinal malrotation in children: a problem-solving approach

to the upper gastrointestinal series. Radiographics. 2006;26(5):1485-500.
2. Mall FP. Development of the human intestine and its position in the adult. Bull Johns Hopkins Hosp. 1898;9(90-91):197-208.
3. Dott NM. Anomalies of intestinal rotation: Their embryology and surgical aspects: With report of five cases. Br J Surg. 1923;11(42):251-86.
4. Dott NM. Volvulus neonatorum. Br Med J. 1927;1(3448):230-1.
5. Rixford E. Failure of primary rotation of the intestine (left-sided colon) in relation to intestinal obstruction. Ann Surg. 1920 Jul;72(1):114-20.
6. Nehra D, Goldstein AM. Intestinal malrotation: varied clinical presentation from infancy through adulthood. Surgery. 2011;149(3):386-93.
7. Sabin FP. Biographical memoir of Franklin Paine Mall 1862-1917. Natl Acad Biogr Mem. 1934;16:65-122.
8. Murphy FL, Frimberger D, Puri P. The long-term outcome of patients with intestinal malrotation. Pediatr Surg Int. 1998;13(5-6):367-9.
9. Ladd WE. Congenital obstruction of the duodenum in children. N Engl J Med. 1932;206(6):277-283.
10. Prieto R, Pascual JM. Norman M. Dott, master of hypothalamic craniopharyngioma surgery: the decisive mentoring of Harvey Cushing and Percival Bailey at Peter Bent Brigham Hospital. J Neurosurg. 2017;127(4):927-940.
11. Darwin F. Francis Galton. Eugen Rev. 1914;6(1):1-17.
12. Ladd WE. Surgical diseases of the alimentary tract in infants. N Engl J Med. 1936;215(16):705-708.
13. Ladd WE. Surgical management of intestinal malrotation. Ann Surg. 1936;103(6):873-82.

Cite this article as: Thanislas PD, Ramesh M, Manivannan D, Duraisamy V, Visahini K. Case report of intestinal malrotation with midgut volvulus. Int Surg J 2026;13:1764-8.