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Midgut Volvulus with Chronic or Recurrent Gastrointestinal Symptoms in Children: A Retrospective Series of 10 Cases

Fatima Zahra Bougueddach[1*], Anas Abouelkheir[2], Imane Boussouab[3], Fadoua Idrissi Fawzi[4], Zineb Hammoumi[5], Nadir Ferram[6]

[1,2,3,4,5,6]Department of Pediatric Visceral Surgery, Abderrahim Harouchi Mother and Child Hospital, Ibn Rochd University Hospital Center, Casablanca, Morocco

ABSTRACT

Background: Midgut volvulus is a potentially devastating consequence of intestinal malrotation. Although frequently recognized in infancy as an acute surgical emergency, it may also present with recurrent gastrointestinal symptoms, delaying diagnosis. **Methods**: We retrospectively reviewed 10 children operated on for midgut volvulus associated with intestinal malrotation at a tertiary pediatric surgical unit between September 2016 and December 2022. Clinical manifestations, imaging, operative findings, treatment, and available follow-up were analyzed descriptively. Results: Age at surgery ranged from 11 days to 14 years. All 10 patients had a history of intermittent bilious vomiting; four also experienced recurrent abdominal pain. Ultrasonography contributed to diagnosis in all cases through findings including the whirlpool sign and/or abnormal superior mesenteric vessel relationships. Surgery confirmed midgut volvulus ranging from one to four turns. No bowel necrosis was found, and no intestinal resection was required. All children underwent open Ladd procedures, including detorsion, division of Ladd bands, widening of the mesenteric base, bowel repositioning, and appendectomy. No major early postoperative complication was documented. At the most recent clinical assessments, performed in late 2025 for five children and in 2026 for five, no recurrent volvulus or persistent vomiting or abdominal pain was reported. Conclusion: Recurrent bilious vomiting should prompt investigation for malrotation and intermittent midgut volvulus, even beyond infancy. Timely imaging and definitive surgery may prevent bowel loss.

KEYWORDS: intestinal malrotation; midgut volvulus; recurrent bilious vomiting; ultrasonography; Ladd procedure; pediatric surgery.

INTRODUCTION

Intestinal malrotation results from abnormal embryologic rotation and fixation of the midgut and may leave a narrow mesenteric pedicle vulnerable to volvulus. Midgut volvulus can rapidly compromise intestinal perfusion and demands prompt recognition and operative management [1]. While neonatal bilious vomiting is a classic warning sign, children presenting later may experience recurrent vomiting and abdominal pain, creating opportunities for diagnostic delay [2,3]. Ultrasonography, particularly assessment of the superior mesenteric vessels and the whirlpool sign, has become an important diagnostic tool, although a negative or equivocal examination cannot independently exclude malrotation [4,5]. We describe the clinical presentation, diagnostic findings, surgical management, and outcomes of 10 children treated for midgut volvulus in our institution.

PATIENTS AND METHODS

We conducted a single-center retrospective descriptive study of 10 children who underwent surgery for midgut volvulus associated with intestinal malrotation between September 2016 and December 2022 in the Department of Pediatric Visceral Surgery, Abderrahim Harouchi Mother and Child Hospital, Casablanca, Morocco. Available clinical histories, imaging findings, operative reports, postoperative courses, and subsequent clinical assessments were reviewed. The analysis was descriptive; no comparative or inferential statistical testing was performed. Follow-up findings reflect the last documented clinical assessments rather than a uniform surveillance interval.

RESULTS

The series comprised 10 children aged 11 days to 14 years at surgery. Intermittent bilious vomiting was reported in all patients (10/10, 100%); recurrent abdominal pain was reported in four (4/10, 40%). Abdominal ultrasonography was contributory in all 10 patients, identifying findings consistent with malrotation or volvulus, including a whirlpool configuration and/or inversion of the

usual superior mesenteric artery–vein relationship. These findings were not uniformly present in every patient. Plain abdominal radiographs demonstrated air–fluid levels in several children; the precise number was not available for analysis.

All patients underwent surgery through a supraumbilical midline laparotomy. Intraoperative exploration confirmed midgut volvulus, with one to four turns, associated with malrotation. The bowel remained viable in all cases; no intestinal necrosis was identified and no resection was necessary. Treatment consisted of detorsion followed by a complete Ladd procedure: division of obstructing peritoneal bands, broadening of the mesenteric base, positioning of the small bowel on the right and colon on the left, and appendectomy. No major early postoperative complication was documented.

All 10 children had a subsequent clinical assessment: five were last examined in late 2025 and five in 2026. At these assessments, no recurrence of volvulus and no ongoing vomiting or abdominal pain were reported. Because follow-up durations were heterogeneous and the sample was small, these observations cannot establish long-term recurrence rates.



Figure 1. Intraoperative view showing exteriorized small-bowel loops and their mesenteric attachment during exploration for midgut volvulus.



Figure 2. Intraoperative view of the small-bowel mesentery and ileocecal region, illustrating the mesenteric anatomy assessed during the Ladd procedure.

DISCUSSION

This series highlights a clinically important presentation of malrotation-associated midgut volvulus: recurrent bilious vomiting across a broad pediatric age range, rather than exclusively catastrophic neonatal obstruction. A retrospective Swedish cohort and a multicenter pediatric series similarly describe variation in age and presenting symptoms, including chronic or intermittent manifestations in older children [2,3]. The presence of recurrent symptoms should therefore not be interpreted as reassuring when the emesis is bilious.

Ultrasonography was contributory in all patients in our selected surgical series, but this proportion should not be interpreted as a measure of sensitivity or specificity: the cohort contains only surgically confirmed cases and is subject to selection bias. In a

systematic review and meta-analysis of 17 studies involving 2,257 participants, ultrasound had a pooled sensitivity of 94% and specificity of 100% for malrotation with or without volvulus [4]. Ultrasound signs are complementary rather than interchangeable: a whirlpool configuration directly suggests twisted mesenteric vessels, whereas an abnormal superior mesenteric artery–vein relationship supports malrotation but is not independently definitive. Expert guidance emphasizes interpreting imaging alongside clinical suspicion and using additional investigation when findings remain equivocal [5].

The absence of necrosis or intestinal resection in our patients is encouraging but cannot be causally attributed to any single diagnostic or therapeutic factor. The operative objectives were to relieve torsion and duodenal obstruction and reduce the risk of recurrent volvulus by widening the mesenteric base. These are central principles of the Ladd procedure [1]. All children in our cohort underwent an open approach, which provided direct assessment of bowel viability and mesenteric anatomy. Our findings do not permit comparison with laparoscopy or conclusions regarding superiority of one approach.

The principal limitations are the retrospective, single-center design, small sample, absence of a non-volvulus comparison group, incomplete case-level timing and imaging data, and nonstandardized follow-up. These limitations preclude estimates of diagnostic accuracy, the frequency of delayed diagnosis, and long-term recurrence risk. Nevertheless, the consistency of the recurrent bilious vomiting history and the operative confirmation of volvulus underscore the need to maintain clinical suspicion beyond the neonatal period.

CONCLUSION

In children of any age, recurrent bilious vomiting warrants timely assessment for intestinal malrotation with intermittent midgut volvulus. Ultrasonography can provide valuable diagnostic evidence, but findings must be interpreted in the clinical context. Definitive surgical treatment by the Ladd procedure was associated with bowel preservation and favorable documented outcomes in this small retrospective series.

DECLARATIONS

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