Cureus
Part of SPRINGER NATURE

Open Access Case Report

Reversed Midgut Rotation in an Adult With Atypical Presentation as Upper Gastrointestinal Bleeding: A Case Report

Sandra Rodarte-González [1], Marlene Abigail M. Salazar Garces [1], David Julian Peña Hernandez [1], Adrián A. Negreros-Osuna [1]

1. Radiology, Hospital Regional Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado Monterrey, Universidad de Monterrey, Monterrey, MEX

Corresponding author: Adrián A. Negreros-Osuna, adrianegreros@gmail.com

Review began 06/18/2026
Review ended 07/02/2026
Published 07/05/2026

© **Copyright** 2026
Rodarte-González et al. This is an open access article distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

DOI: 10.7759/cureus.112107

Abstract

Reversed midgut rotation is the rarest subtype of intestinal malrotation and is seldom encountered in adult patients.

We present the case of a 67-year-old male admitted for a six-month history of upper gastrointestinal bleeding. Contrast-enhanced abdominal computed tomography (CT) demonstrated, as an incidental finding, reversed midgut rotation, characterized by an abnormal position of the duodenum and its relationship with the mesenteric vessels and adjacent structures. Given the absence of obstructive complications, conservative, non-surgical management was deemed appropriate. Upper endoscopy revealed active bleeding, and a hemostatic clip was placed without the need for exploratory surgery. The patient showed adequate clinical response and was discharged with outpatient follow-up.

In addition to illustrating a rare case of reversed midgut rotation, this report highlights its atypical clinical and radiologic presentation and emphasizes the importance of CT in recognizing uncommon anatomic variants that may significantly influence clinical and surgical management.

Categories: General Surgery, Radiology, Gastroenterology
Keywords: anatomic malformation, body imaging ct, digestive surgery, surgery rotations, upper gastrointestinal bleed

Introduction

Intestinal malrotation is an uncommon congenital anomaly resulting from a failure of the midgut to undergo its normal rotation around the axis of the superior mesenteric artery. This disrupts the normal anatomic configuration of the midgut, specifically involving the positioning of the duodenum, small intestine, and colon. While early-onset congenital cases typically present acutely in the neonatal or pediatric population, late-onset malrotation may also be identified in adults. In these late-onset cases, patients frequently have a slight female predominance [1-4]. The spectrum of these rotational anomalies includes non-rotation, incomplete rotation, and reversed rotation. Reversed midgut rotation is the rarest subtype, accounting for only 2%-4% of all cases, and is characterized by a reversed anatomical relationship that positions the transverse colon behind the superior mesenteric artery and the duodenum in front of it [2,5,6].

The abnormal fixation and positioning inherent to malrotation predispose patients to catastrophic complications, and the typical clinical presentation constitutes a surgical emergency due to duodenal obstruction, cecal volvulus, or mesenteric ischemia [3,4,7]. Nevertheless, a small number of patients remain asymptomatic or present with chronic, non-specific symptoms such as nausea, vomiting, weight loss, and recurrent abdominal pain [4,7].

Because adult patients frequently lack classic obstructive symptoms, the condition may remain undetected until it is identified as an incidental finding on routine investigations, such as endoscopic evaluations or radiographic studies performed for vague gastrointestinal complaints. We present the case of an adult patient with an atypical presentation in the form of upper gastrointestinal bleeding, aiming to emphasize the fundamental role of computed tomography (CT) in establishing the diagnosis of this entity.

Case Presentation

A 67-year-old male with a history of long-standing diabetes mellitus and congenital mitral insufficiency presented with a six-month history of generalized weakness, fatigue, and decreased appetite. Despite multiple emergency department evaluations at an outside institution, no definitive diagnosis had been established. One week before admission, he developed melena and coffee-ground emesis, accompanied by diffuse, intermittent epigastric pain, abdominal distension, nausea, and progressive weight loss. On physical examination, vital signs were stable, and the abdomen was soft, non-tender, and without peritoneal

signs. At this stage, based on the chief complaint and clinical examination, the primary differential diagnoses for the upper gastrointestinal bleeding included peptic ulcer disease, erosive gastritis, and gastrointestinal malignancy. Laboratory workup was notable for a hemoglobin of 5 g/dL, prompting transfusion of two units of packed red blood cells and two units of fresh frozen plasma. Blood glucose was 94 mg/dL, consistent with adequate glycemic control in the context of his known diabetes.

Given the non-specific symptoms and suspicion of upper gastrointestinal bleeding, contrast-enhanced CT of the abdomen was performed before endoscopy. The study demonstrated abnormal anatomy, with clockwise rotation of the second through fourth portions of the duodenum around the superior mesenteric vessels in an intraperitoneal location (Figure *1*). The duodenojejunal junction was located to the right of the midline and anterior to the mesenteric vessels (Figure *2*).

FIGURE 1: Midgut rotation

Contrast-enhanced axial CT image in the venous phase demonstrating clockwise rotation of the second through fourth portions of the duodenum, compatible with reversed midgut rotation (arrow: duodenum; dashed arrow: superior mesenteric artery; arrowhead: superior mesenteric vein).

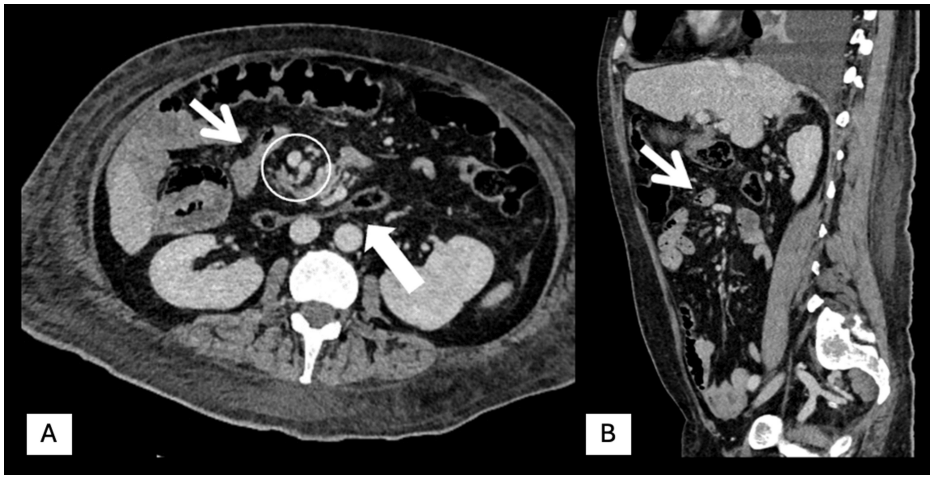

FIGURE 2: Duodenojejunal junction

(A) Contrast-enhanced axial CT image in the venous phase demonstrating the duodenojejunal junction (thin arrow) located to the right of the superior mesenteric vessels (circle) (thick arrow: transverse colon).

(B) Sagittal reconstruction confirming right-sided location of the duodenojejunal junction (thin arrow).

The cecum appeared intraperitoneal and was in the epigastrium at the midline, with leftward displacement (Figure *3*). A tubular structure compatible with the appendix was identified in the left upper quadrant, extending inferiorly and posteriorly toward the mesogastrium (Figure *3*). The ascending colon was located along the midline, predominantly in the epigastrium and right hypochondrium (Figure *4*). It crossed from anterior to posterior, medial to the gallbladder. The transverse colon coursed from right to left, posterior to the superior mesenteric vessels and anterior to the aorta and inferior vena cava (Figure *5*). The descending and sigmoid colons were in their usual positions.

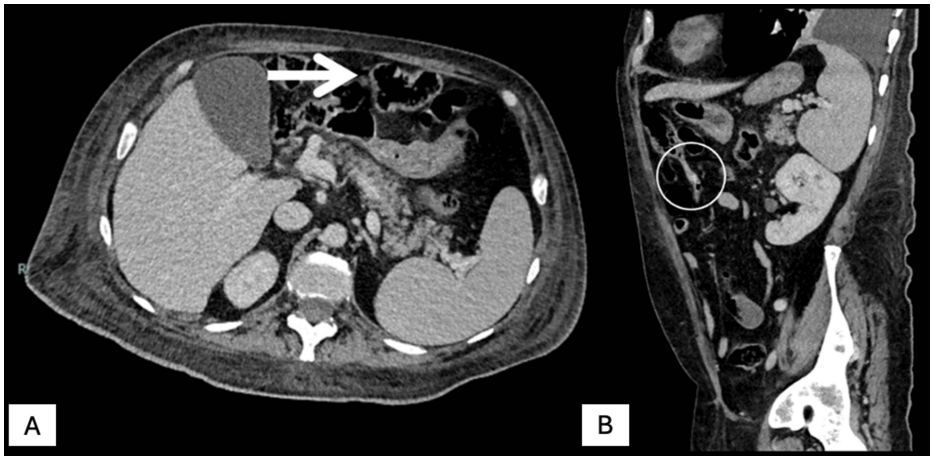

FIGURE 3: Ectopic cecum

Contrast-enhanced CT images in the venous phase. (A) Axial and (B) coronal images demonstrating an ectopic cecum (white arrow) located in the left epigastrium and the appendix (white circle) in the left upper quadrant.

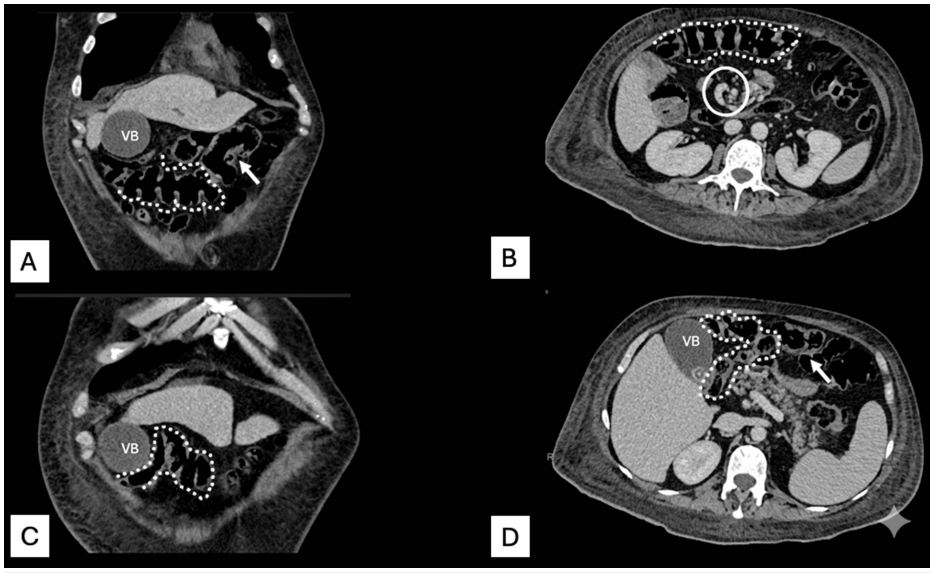

FIGURE 4: Ascending colon

Contrast-enhanced CT in the venous phase demonstrating the ascending colon (dashed line) located in the epigastrium and right hypochondrium. It courses from left to right (A, B) and subsequently from anterior to posterior, medial to the gallbladder (VB) (C, D) (circle in B: mesenteric vessels; thin arrow in A and D: cecum; VB in A, C, and D: gallbladder).

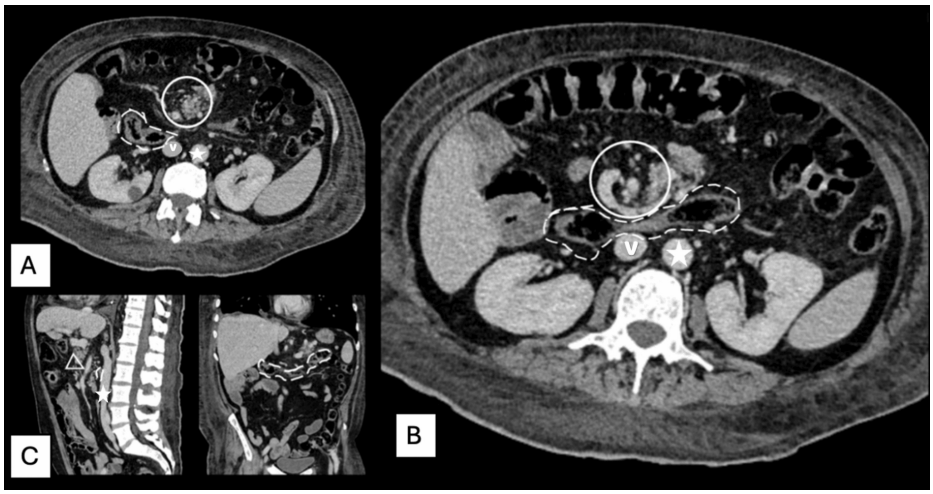

FIGURE 5: Transverse colon

(A, B) Contrast-enhanced CT in the venous phase demonstrating the transverse colon (dashed line) crossing from right to left posterior to the mesenteric vessels (circle in A and B) and anterior to the inferior vena cava (V in A and B) and aorta (star in A, B, and C). (C) Sagittal and coronal reconstruction demonstrating the normal origin and course of the superior mesenteric artery (triangle) (dashed line: transverse colon; star: aorta).

The superior mesenteric artery demonstrated normal origin and course. However, the superior mesenteric vein emerged to the left of the artery, crossed anteriorly, and positioned itself to its right. It showed counterclockwise torsion posterior to the pancreas and anterior to the transverse colon.

No dilated small or large bowel loops were observed. There was no bowel wall thickening, no signs of intestinal ischemia, no evidence of acute obstruction, and no peritoneal fluid. Furthermore, there was no hyperdense intraluminal fluid to suggest acute hematoma, nor was there focal hyperdense contrast extravasation to indicate active bleeding at the time of the scan.

Upper gastrointestinal endoscopy performed the following day revealed active bleeding in the duodenum, which was successfully managed with endoscopic placement of a hemostatic clip (Figure *6*). Histopathological analysis of biopsies obtained during the procedure demonstrated non-specific chronic

inflammatory changes with no evidence of malignancy, alongside a confirmed active *Helicobacter pylori* infection. Because the CT scans had already confirmed an absence of bowel obstruction or ischemia related to the reversed midgut rotation, prophylactic surgical intervention for the anatomical variant was deferred in favor of conservative management.

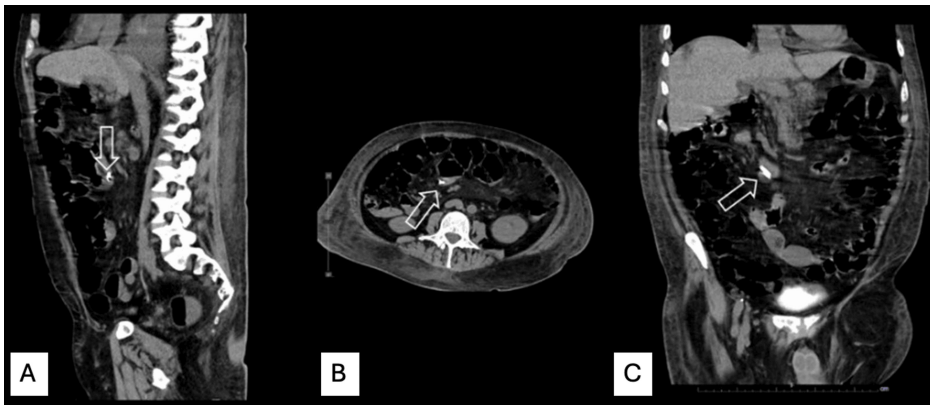

FIGURE 6: Hemostatic clip

Non-contrast CT image (B) and sagittal (A) and coronal (C) reconstructions demonstrating a hyperdense, irregular structure (white arrow) compatible with a hemostatic clip.

Following clinical and hemodynamic improvement, with an uncomplicated hospital course and no recurrent bleeding episodes, the patient was discharged on gastroprotective therapy and treatment for *Helicobacter pylori* infection (omeprazole, bismuth, levofloxacin, metronidazole, and amoxicillin) to address the underlying chronic inflammation and prevent recurrent hemorrhage. He remains under close follow-up with internal medicine and gastroenterology.

Discussion

During normal embryologic development, between the fifth and tenth weeks of gestation, the midgut undergoes a 270-degree counterclockwise rotation around the superior mesenteric artery. This process results in the normal anatomic configuration of the duodenum, small intestine, and colon [5,7].

Reversed midgut rotation was first described by Landolsi in 1883 [6] and occurs when the physiological rotation is altered, and the intestinal loop rotates clockwise, typically by approximately 90 degrees [2,6]. Consequently, the normal anatomic relationship between the duodenum, transverse colon, and superior mesenteric vessels is reversed. In this variant, the transverse colon is situated posterior to the superior mesenteric artery and superior mesenteric vein, while the duodenum lies anterior to these vascular structures.

Due to the limited number of reported cases, the pathophysiology of this condition is not fully understood. It has been suggested that deficient fixation and increased mobility of the ascending colon and cecum, combined with abnormal anatomic positioning, create a narrow retroarterial space through which the colon passes [4,7]. This predisposes patients to luminal stenosis, transverse colon obstruction, and volvulus -- potentially involving the ileocecal region, right colon, or the entire midgut [3,8].

A review of the literature reveals that the majority of documented adult cases of reversed midgut rotation present with acute mechanical complications. For instance, Singer et al. and Landolsi et al. described cases characterized by severe transverse colon obstruction and cecal volvulus, respectively [1,6]. In those instances, the acute presentations were direct consequences of the anatomical malformation, such as mechanical shearing and compression caused by the narrow retroarterial space.

In stark contrast, our patient completely lacked any signs of mechanical obstruction or vascular compromise, presenting instead with upper gastrointestinal bleeding. This divergence can be logically explained by the distinct etiology of the symptoms. While most symptomatic reversed malrotations in the literature are driven by extrinsic physical torsion of misplaced bowel loops [3,8], our patient's acute presentation was precipitated by an independent intrinsic mucosal pathology.

The reversed midgut rotation in this instance was a clinically silent, incidental finding that was unmasked only because of the exhaustive cross-sectional imaging required to investigate the vague abdominal pain and severe anemia. This distinction holds significant weight for clinical decision-making. Recognizing that a profound anatomical variant can coexist with, but not necessarily cause, an acute gastrointestinal

presentation is crucial. As demonstrated in this case, accurately attributing the bleeding to an infectious etiology rather than mechanical torsion allowed the clinical team to avoid an unnecessary exploratory laparotomy and safely pursue conservative, targeted pharmacological management. Differential diagnostic considerations based on the chronic/anatomical presentation before the endoscopic findings in our case included angiodysplasia, superior mesenteric artery syndrome, and intermittent volvulus.

Multiphase CT is the imaging modality of choice for evaluating intestinal malrotation [5,9]. It allows detailed assessment of intestinal and vascular anatomy, which is particularly useful in adults with atypical or non-specific symptoms in the absence of bowel obstruction, as demonstrated in our case. CT also plays a crucial role in surgical planning when intervention is required [4,9].

Characteristic imaging findings of reversed rotation include an ectopic cecum (frequently located in the left upper quadrant), small bowel loops positioned along the midline or within the right hemiabdomen, the transverse colon situated posterior to the superior mesenteric artery, and the duodenum positioned anterior to the mesenteric vessels [2,5,9-11].

Conclusions

Reversed midgut rotation is an exceedingly rare congenital anomaly that poses a significant diagnostic challenge, particularly when it incidentally coexists with unrelated acute pathologies such as upper gastrointestinal bleeding, rather than presenting with a classic obstructive pattern. Familiarity with its characteristic CT findings, including an ectopic cecum, a retroarterial transverse colon, and an anterior duodenum, is essential to avoid diagnostic delay. This case demonstrates that recognizing these anatomical variants and confirming the absence of mechanical complications allows clinicians to safely attribute acute symptoms to their true intrinsic causes, thereby avoiding unnecessary exploratory surgery and facilitating appropriate conservative management.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Sandra Rodarte-González, Adrián A. Negreros-Osuna, David Julian Peña Hernandez, Marlene Abigail M. Salazar Garces

Acquisition, analysis, or interpretation of data: Sandra Rodarte-González, Adrián A. Negreros-Osuna, David Julian Peña Hernandez, Marlene Abigail M. Salazar Garces

Drafting of the manuscript: Sandra Rodarte-González, Adrián A. Negreros-Osuna, David Julian Peña Hernandez, Marlene Abigail M. Salazar Garces

Critical review of the manuscript for important intellectual content: Sandra Rodarte-González, Adrián A. Negreros-Osuna, David Julian Peña Hernandez, Marlene Abigail M. Salazar Garces

Supervision: Sandra Rodarte-González, Adrián A. Negreros-Osuna, David Julian Peña Hernandez, Marlene Abigail M. Salazar Garces

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Singer JA, Korn R: Reversed rotation of the midgut presenting as duodenal and transverse colon obstruction in a 19-year-old man. J Am Coll Surg. 2003, 197:1048-9. 10.1016/j.jamcollsurg.2003.06.007
2. Balamoun H, Mohammad R, Hamade A: Reversed rotation of the midgut in adults--a case report . Ann R Coll Surg Engl. 2010, 92:W3-5. 10.1308/147870810X12822015504446
3. Berardi RS: Anomalies of midgut rotation in the adult . Surg Gynecol Obstet. 1980, 151:113-24.
4. Wang CA, Welch CE: Anomalies of intestinal rotation in adolescents and adults . Surgery. 1963, 54:839-55. 10.3919/jjsa.70.3046
5. Deniffel D, Goerke SM, Rummeny EJ, Laubenberger J: Novel variant of reversed midgut rotation - retro-

arterial proximal jejunum and transverse colon: a case report and review of the literature. J Med Case Rep. 2018, 12:261. 10.1186/s13256-018-1802-0

6. Landolsi S, Trabelsi M, Dziri W, Firas J, Ridene I, Chebbi F: Reversed midgut rotation revealed by cecal volvulus in the elderly: a case report. Int J Surg Case Rep. 2023, 111:108881. 10.1016/j.ijscr.2023.108881
7. Pickhardt PJ, Bhalla S: Intestinal malrotation in adolescents and adults: spectrum of clinical and imaging features. AJR Am J Roentgenol. 2002, 179:1429-35. 10.2214/ajr.179.6.1791429
8. Durkin ET, Lund DP, Shaaban AF, Schurr MJ, Weber SM: Age-related differences in diagnosis and morbidity of intestinal malrotation. J Am Coll Surg. 2008, 206:658-63. 10.1016/j.jamcollsurg.2007.11.020
9. Zissin R, Rathaus V, Oscadchy A, Kots E, Gayer G, Shapiro-Feinberg M: Intestinal malrotation as an incidental finding on CT in adults. Abdom Imaging. 1999, 24:550-5. 10.1007/s002619900560
10. Matzke GM, Dozois EJ, Larson DW, Moir CR: Surgical management of intestinal malrotation in adults: comparative results for open and laparoscopic Ladd procedures. Surg Endosc. 2005, 19:1416-9. 10.1007/s00464-004-8249-7
11. Hernando-Almudí E, Cerdán-Pascual R, Vallejo-Bernad C, Martín-Cuartero J, Sánchez-Rubio M, Casamayor-Franco C: Adult intestinal malrotation associated with intestinal volvulus . Cir Cir. 2017, 85:424-7. 10.1016/j.circir.2016.05.012