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Mesenteroaxial gastric volvulus associated with intestinal malrotation: a rare cause of acute abdomen

Volvo gástrico mesenteroaxial associado à má rotação intestinal: uma causa rara de abdome agudo

Vólvulo gástrico mesenteroaxial asociado con malrotación intestinal: una causa rara de abdomen agudo

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ABSTRACT

Objective: To report a rare case of mesenteroaxial gastric volvulus associated with intestinal malrotation in a young adult, emphasizing the diagnostic challenges, computed tomography findings, and the therapeutic approach adopted. **Case details:** A 26-year-old male patient presented with vomiting, abdominal distension, and cessation of fecal and flatus passage. Computed tomography and upper gastrointestinal endoscopy established the diagnosis of mesenteroaxial gastric volvulus associated with gastric ischemia. Laparoscopy revealed intestinal malrotation and splenic laceration. Following splenectomy and surgical reduction of the gastric volvulus, the patient showed clinical improvement. **Final considerations:** Acute gastric volvulus is a rare cause of acute abdomen in the emergency department. Due to its potentially severe complications, this condition requires rapid diagnosis and prompt intervention, as delayed recognition is associated with increased morbidity and mortality. Computed tomography plays a pivotal role in confirming the diagnosis and guiding therapeutic planning. Early decompression and, when indicated, surgical intervention are essential to reduce complications and improve patient outcomes.

Keywords: Gastric volvulus, Intestinal malrotation, Splenic laceration, Mesenteroaxial volvulus.

RESUMO

Objetivo: Relatar um caso raro de volvo gástrico mesenteroaxial associado à má rotação intestinal em um adulto jovem, enfatizando os desafios diagnósticos, os achados tomográficos e a abordagem terapêutica adotada. **Detalhamento do caso:** Paciente masculino, 26 anos, apresentou vômitos, distensão abdominal e interrupção da eliminação de fezes e flatos. Através da tomografia computadorizada e endoscopia digestiva alta, firmou-se o diagnóstico de volvo gástrico mesenteroaxial associado a isquemia gástrica. A laparoscopia evidenciou má rotação intestinal e laceração esplênica. Após esplenectomia e reversão cirúrgica do volvo gástrico, o paciente apresentou melhora clínica. **Considerações finais:** O volvo gástrico agudo é uma causa rara de abdome agudo no serviço de emergência. Devido às suas complicações potencialmente graves, essa condição requer diagnóstico rápido e intervenção imediata, uma vez que o atraso em seu reconhecimento

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está associado ao aumento da morbimortalidade. A tomografia computadorizada desempenha papel fundamental na confirmação do diagnóstico e planejamento terapêutico. A descompressão precoce e, quando indicada, intervenção cirúrgica são essenciais para reduzir complicações e melhorar o prognóstico dos pacientes.

Palavras-chave: Volvo gástrico, Má rotação intestinal, Laceração esplênica, Volvo mesenteroaxial.

RESUMEN

Objetivo: Reportar un caso raro de vólvulo gástrico mesenteroaxial asociado a malrotación intestinal en un adulto joven, enfatizando los desafíos diagnósticos, los hallazgos tomográficos y el abordaje terapéutico adoptado. **Detalles del caso:** Paciente masculino de 26 años que presentó vómitos, distensión abdominal y ausencia de eliminación de heces y gases. La tomografía computarizada y la endoscopia digestiva alta permitieron establecer el diagnóstico de vólvulo gástrico mesenteroaxial asociado a isquemia gástrica. La laparoscopia evidenció malrotación intestinal y laceración esplénica. Tras la esplenectomía y la reducción quirúrgica del vólvulo gástrico, el paciente presentó mejoría clínica. **Consideraciones finales:** El vólvulo gástrico agudo es una causa poco frecuente de abdomen agudo en el servicio de emergencias. Debido a sus complicaciones potencialmente graves, esta entidad requiere un diagnóstico rápido y una intervención inmediata, ya que el retraso en su reconocimiento se asocia con un aumento de la morbimortalidad. La tomografía computarizada desempeña un papel fundamental en la confirmación del diagnóstico y en la planificación terapéutica. La descompresión precoz y, cuando está indicada, la intervención quirúrgica es esenciales para reducir las complicaciones y mejorar el pronóstico de los pacientes.

Palabras clave: Vólvulo gástrico, Malrotación intestinal, Laceración esplénica, Vólvulo mesenteroaxial.

INTRODUCTION

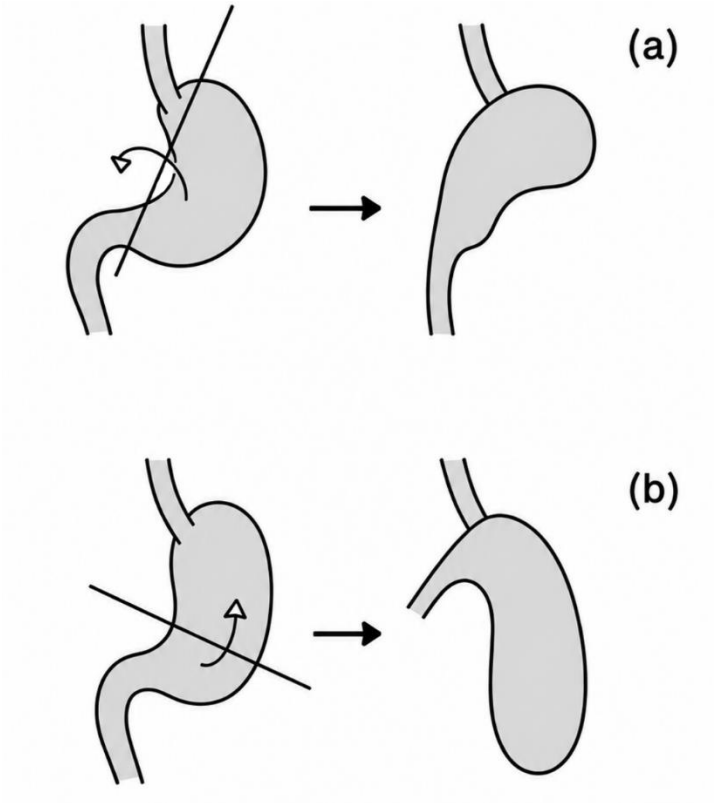
Gastric volvulus (GV) is a rare condition characterized by abnormal rotation of the stomach along its transverse or longitudinal axis (RASHID F, et al., 2010; LOPEZ PP and MEGHA R, 2022). This clinical event is not related to race or sex (RASHID F, et al., 2010); however, it is associated with high mortality rates (30-50%) (BHATTA NC, et al., 2022). Paraesophageal hernia is the main etiology associated with the development of gastric volvulus, with highest incidence occurring in individuals over 50 years of age (80-90%) and pediatric population (under one year of age) (BIRHANU AM, et al., 2024; LOPEZ PP and MEGHA R, 2022).

Gastric volvulus, although uncommon, requires early identification, since the diagnostic delay favors the rapid evolution of complications associated with pathology. This condition can be classified as acute or chronic, with clinical manifestations depending on the degree of rotation and rapidity of onset. In the acute form, the patient may present pain, intense vomiting and inability to pass a nasogastric tube (classic Borchardt's triad), while nonspecific symptoms characterize the chronic form. The most severe outcome of this pathology is ischemia followed by necrosis and perforation, resulting from strangulation of the organ (SANEKOMMU H, et al., 2023). In rare cases, splenic rupture due to splenic vessels disruption also has been described (CAVANAGH Y, et al., 2018; PETERSON C, et al., 2009). Therefore, prompt diagnosis and management must be implemented in order to avoid such undesirable conditions. In addition, the acute presentation of pathology requires urgent surgery and carries a high mortality rate (IMPERATORE K, et al., 2016).

The central pathological GV event is based on abnormal rotation of the organ greater than 180 degrees around predefined axes, resulting in the organoaxial or mesenteroaxial patterns (OMATA J, et al., 2016). Organoaxial volvulus happens when the stomach twists along the long axis (longitudinal) - a line connecting the gastroesophageal junction to pylorus. This is the most common type of gastric volvulus, comprising 60% of total cases, and generates an ‘inverted’’ stomach, with greater curvature resting superior to lesser curvature. On the other hand, Mesenteroaxial volvulus occurs when stomach rotates along its short axis (transverse) - a line perpendicular to the lesser and greater curvatures - and the antrum is displaced above gastroesophageal

junction (**Figure 1**) (CAVANAGH Y, et al., 2018). These abnormal displacements are favored by preexisting anatomical conditions, including hiatal hernias (although acute volvulus complicates only a small portion of these cases), diaphragm defects or ruptures, and, in rare scenarios, the laxity of the gastric fundus associated with the errant spleen (OMATA J, et al., 2016).

Figure 1 - (a) Organoaxial volvulus and (b) Mesenteroaxial volvulus.



Source: Pires MIG, et al., 2026.

GV is less frequent in young adult males (18–49 years) (AL-KHAZRAJI Z, et al., 2024). The condition in this age group is associated with diaphragm defects or hiatus, secondary to trauma or congenital factors. Clinically, the classic presentation involves sudden pain in the upper abdomen and vomiting, and surgical correction tends to evolve with excellent prognosis and recovery (AL-KHAZRAJI Z, et al., 2024; SLAOUI H, et al., 2025).

According to Bhusal A, et al. (2024), the absence of a therapeutic consensus and the scarcity of literature on gastric volvulus in adults make it difficult to standardize care. Currently, clinical management is still largely guided by anecdotal evidence, given the insufficiency of consolidated epidemiological and clinical data.

This case report adds to the existing literature by describing and discussing a rare case of acute gastric volvulus complicated with gastric ischemia and splenic rupture in a young-adult male patient with intestinal non-rotation.

CASE REPORT

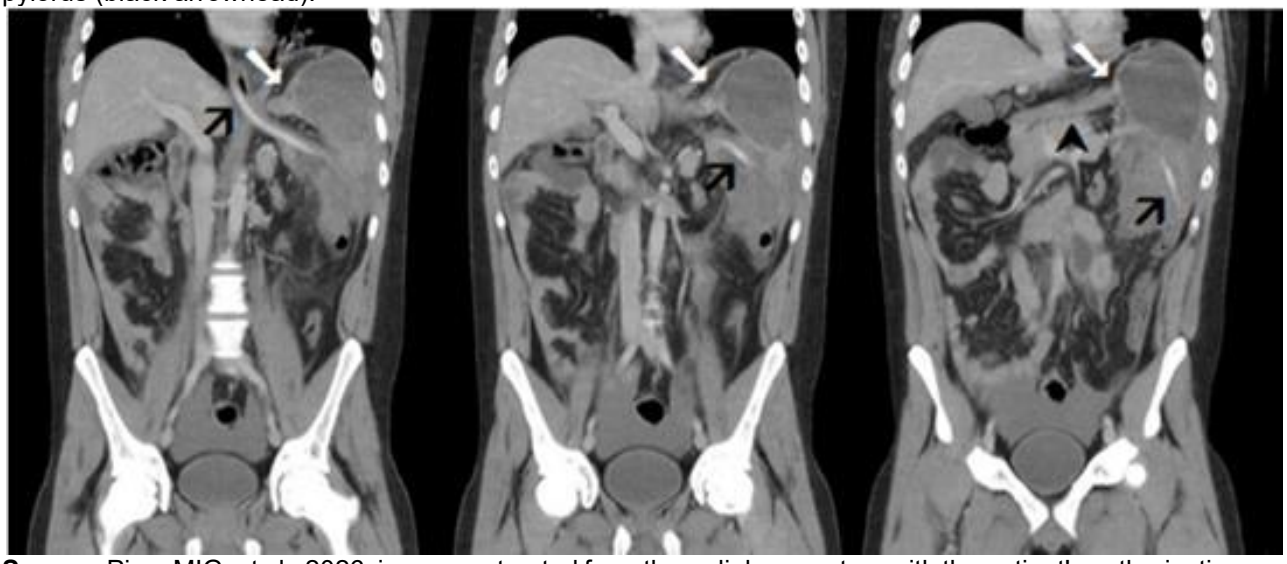
This is a case study appreciated and approved by the Research Ethics Committee (CAAE 62312321.4.0000.0020; Approval Opinion Nº 5.648.364). Male, 26 years old, sought medical attention in the Emergency Department due to intense localized pain in the left lower quadrant of the abdomen. Symptoms began four days ago, associated with nausea, vomiting, and abdominal distention, along with the absence of bowel movements and flatus. The patient had no comorbidities, history of local trauma, previous surgeries, or fever.

During the physical exam, the patient appeared dehydrated, with a heart rate of 105 bpm and blood pressure of 127/88 mmHg, no signs of tissue hypoperfusion or altered level of consciousness. The abdomen was globose, showing metallic bowel sounds and hypertympany on percussion. With the aim of promoting gastric decompression and relieving symptoms, a nasogastric tube was placed, causing the expulsion of 150 ml of darkened gastric fluid.

Laboratory exams revealed acute kidney injury (Urea 123mg/dL, Creatinine 3.63mg/dL) and acute inflammatory state (C-reactive protein 176,9mg/L, Leucocytes 29.400/uL). The moderate elevation of serum amylase and lipase was interpreted as a nonspecific finding associated with the acute inflammatory state, as the patient did not meet the clinical and laboratory diagnostic criteria for acute pancreatitis (Amylase 303U/L, Lipase 194U/L). No other significant laboratory abnormalities were identified (Sodium 137mmol/L, Potassium 5.2mmol/L, Hemoglobin 16.5g/dL, Bands 0%, Platelets 209.000/mm³).

The subsequent total abdominal computed tomography (CT) scan was performed to allow a more comprehensive assessment of the clinical condition. The imaging study showed liquid in the abdominal cavity, signs of gastric volvulus of partial torsion, revealing an upside-down gastric fundus and an upturned pylorus, along with abnormal intestinal positioning, with no evidence of pneumoperitoneum (**Figure 2**).

Figure 2 - Posteroanterior sequential image. Nasogastric tube migrating from esophagus to the gastric fundus upside down (black arrow); Upturned pylorus (white arrow); and descending duodenum emerging from the pylorus (black arrowhead).



Source: Pires MIG, et al., 2026; images extracted from the radiology system with the patient's authorization.

The CT imaging suggestive of gastric volvulus, an upper gastric endoscopy (UGE) was the initial strategy to evaluate for complications such as ischemia and to attempt endoscopic reduction of the gastric volvulus. The exam revealed a great amount of food debris and signs of ischemia of the mucosa on the middle and distal parts of the gastric body (**Figure 3**).

It was not possible to progress the endoscope to the duodenum due to the mechanical obstruction resulting from the volvulus, neither the correction of the volvulus with the UGE was successful because of the resistance encountered during attempts to mobilize the stomach.

Figure 3 - Upper gastric endoscopy.



Source: Pires MIG, et al., 2026; Images extracted with the patient's permission.

Surgical intervention was indicated because endoscopic reduction of the gastric volvulus was unsuccessful. Despite mild tachycardia, the patient remained hemodynamically stable. Subsequently, in the presence of ischemic changes, but without evidence of pneumoperitoneum, gastric perforation, hypotension or other signs of hemodynamic instability, laparoscopic approach was preferred instead of laparotomy.

The laparoscopy revealed a moderate amount of blood in the cavity due to active bleeding from the injured splenic parenchyma. The gastroesophageal junction was inferiorly displaced, and the gastric fundus was positioned below the pylorus and duodenum, consistent with the mesenteroaxial gastric volvulus previously identified on CT. The gastric body had limited mobility and exerted traction on the hepatogastric and hepatoduodenal ligaments, precluding reduction of the gastric volvulus. The cecum was positioned in the right hypochondrium, rather than in its usual position in the right lower quadrant. A splenectomy was performed, with release of the hepatogastric and hepatoduodenal ligaments, followed by a Cattell-Braasch maneuver. After these manipulations the stomach was in its proper anatomical position; however, the decision was made not to perform gastropexy, as the patient did not present with any evident primary causes of gastric volvulus, such as abnormalities of the gastric ligaments, for which gastropexy would typically be indicated.

A marked clinical improvement was observed in the subsequent days, with reduction of abdominal pain, improving dietary acceptance and re-establishment of the elimination of feces and flatus. In the fourth postoperative day a UGE was performed to reevaluate the ischemia of the gastric mucosa. The exam showed significant biliary stasis, intense flat erosive pangastritis with intense hematin, bloody suffusions in the proximal gastric fundus and body and erythematous duodenitis. However, there were signs of improvement in the ischemic changes. By the sixth postoperative day, the patient was discharged, with complete resolution of the symptoms that had led him to seek emergency medical care.

Approximately three months after discharge, the patient attended an outpatient follow-up visit. He had fully resumed normal gastrointestinal habits and showed no clinically relevant abnormalities on examination. Six months after discharge, a telephone follow up confirmed continued clinical stability and absence of symptoms. He was advised to seek emergency care if symptoms recurred. No emergency department visits related to the initial condition occurred in subsequent years.

DISCUSSION

The stomach is anatomically positioned due to gastroesophageal junction and pylorus relative fixation. It is anchored to abdominal structures and diaphragm by four ligaments: gastrosplenic, gastro-colic, gastrophrenic and gastrohepatic ligaments, which maintain stability and prevent the organ rotation or displacement (WARREN C, et al., 2012).

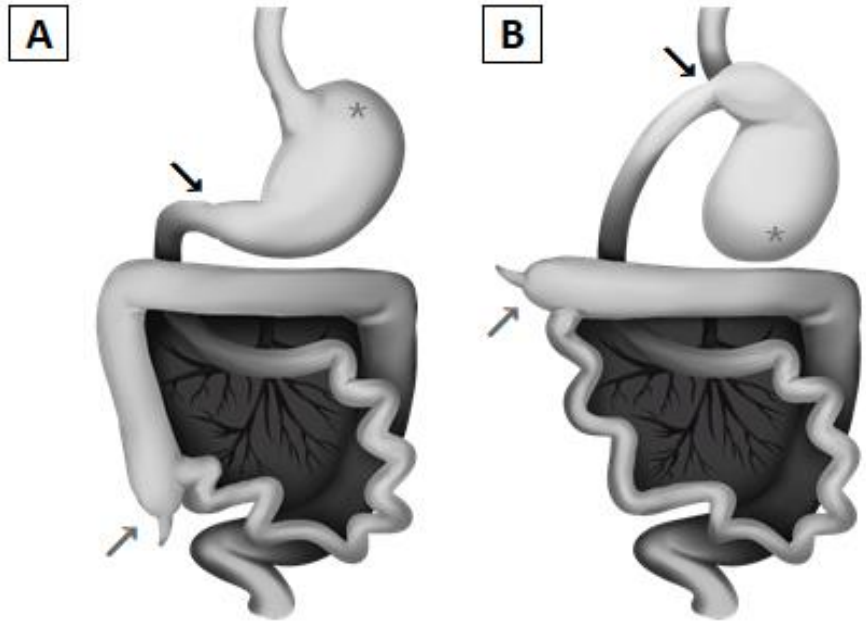
Gastric volvulus is classified as primary or secondary. The first one is defined as a result of gastric ligaments abnormalities, like agenesis or laxity, being responsible for 30% of gastric volvuli. These abnormalities can

occur as a consequence of skeletal deformity, for example, and usually presents with chronic symptoms. In turn, secondary gastric volvulus happens because of anatomical changes, such as hiatal or diaphragmatic hernias, abdominal adhesions or organs abnormalities in structure or position (e.g. spleen, stomach) (RASHID F, et al., 2010; CHAU B and DUFEL S, 2007; OOKA M, et al., 2013).

Since this patient did not have any ligaments, alterations verified through laparoscopy and he did not have any musculoskeletal abnormalities, we ran out primary cause of gastric volvulus. In the same way, there were not any kind of hernias, diaphragm alterations or abnormalities in the position of the spleen on computed tomography or directly visualized on abdominal inspection during the surgery. Moreover, no evidence of gastric or duodenal ulcer was found in upper digestive endoscopy, whereas the patient had never undergone any surgery previously - conditions which would make us consider some kind of adherence.

The abdominal CT performed on admission has demonstrated a Mesenteroaxial volvulus and a right-side predominance of small intestine loops and the presence of the cecal appendix and cecum in the upper right quadrant (URQ). This anatomical configuration is described in the Stringer's classification of intestinal malrotation as the IIIA subtype (No rotation of colon). In this subtype, the colon does not finish the last ninety degrees of counterclockwise rotation (from 180 to 270 degrees), and the cecum stays in the URQ. Only association between this malformation and intestinal volvulus, but not gastric volvulus, has been described in the literature. Although, as long as we have not found other factors which could justify the aforementioned case, not even in laparoscopy, it is reasonable to infer that such malformation has contributed, at least to some degree, to the exposed (**Figure 4**) (AYANE G and KADIMO K, 2018).

Figure 4 - (A) Normal anatomy and (B) Mesenteroaxial volvulus with intestinal malrotation. Pylorus (black arrow); cecum and appendix (gray arrow); and gastric fundus (asterisks).



Source: Pires MIG, et al., 2026.

Therefore, our stronger hypothesis was a Mesenteroaxial gastric volvulus as a consequence of intestinal non-rotation and complicated stomach ischemia, which was reverted posteriorly. Ooka M, et al. (2013) already previously described the coexistence of gastric volvulus, wandering spleen and intestinal non-rotation in an adult male patient, although probably both clinical outcomes developed simultaneous and secondarily to congenital abnormality during embryonic development, and not one condition as a consequence of another.

Although causality cannot be established based on a single report, the atypical visceral disposition resulting from intestinal malrotation may have modified the anatomical relationships and supporting structures of the

stomach, acting as a facilitating factor for stomach rotation (KAYASTHA K and SHEIKH A, 2011). In this scenario, the ischemic complications observed may be justified by the impairment of arterial flows and venous return induced by the volvulus, which triggers gastric congestion, ischemia, and risk of transmural necrosis in the absence of treatment (ALBLOUSHI D, et al. 2021; PEÑA-GONZÁLEZ R-R, et al. 2023). At the same time, the splenic injury may have been caused by the traction forces caused during the torsion of the organ. Given the close anatomical relationship between the stomach and the spleen through the gastric vessels and the gastrosplenic ligament, a marked gastric rotation can transmit mechanical stress to the splenic hilum, which can lead to splenic injury (OMATA J, et al. 2016; OYACHI N, et al. 2022). Although this mechanism is hypothetical, it plausibly substantiates the coexistence of gastric ischemia and splenic injury in this patient.

Splenic laceration with hemoperitoneum is a rare but possible complication of anomalous stomach rotation, likely caused by traction on splenic vessels and gastric ligaments. In the case report described by Cavanagh Y, et al. (2018), gastric torsion induced avulsion of the spleen due to the traction forces exerted on the splenogastric ligaments, culminating in hemoperitoneum in a 66-year-old female patient. The wandering spleen has an estimated incidence between 0.2% and 0.25%, which exhibits a bimodal pattern of occurrence, concentrated in children under 10 years of age (with a predominance of females and representing one third of the records) and in women of childbearing age. This pathology is characterized by hypermobility and displacement from the original position to another location, resulting from the underdevelopment or absence of gastrosplenic, splenorenal, and splenocolic ligaments. In view of this structural laxity, the elongation of the vascular pedicle predisposes the organ to torsion events. This phenomenon manifests clinically as acute abdominal pain and presents a risk of progression to splenic infarction, a serious and potentially fatal complication (PATIL VL, et al. 2020).

Additionally, acute gastric volvulus tends to manifest itself with severe pain, vomiting (or impossibility to) and difficulty or inability to pass a nasogastric tube, the well-known Borchard's triad, which appears in 70% of acute organoaxial volvulus. However, if there is no resistance to passing the nasogastric tube, it is favorable to the diagnosis of Mesenteroaxial volvulus, since it is not common to present with lower esophageal sphincter torsion, which remains open (BHUSAL A, et al., 2024; BHATTA NC, et al., 2022; LOPEZ PP and MEGHA R, 2022). The nasogastric tube resistance associated with acute organoaxial diagnosis was observed in the case reports of Bhatta NC, et al. (2022) and Bhusal A, et al. (2024), whose male patients aged 21 and 38 years, respectively, reported non-incarcerated organoaxial gastric volvulus, the diagnosis of which was confirmed on CT.

Further, also dilation of stomach can occur with gastric obstruction, while hematemesis probably appears when there is gastric ischemia (JACOB C, et al., 2021; LOPEZ PP and MEGHA R, 2022; RASHID F, et al., 2010). Thus, this patient developed hematemesis as a consequence of gastric ischemia (confirmed with upper gastric endoscopy), and there was no resistance in passing the nasogastric tube for gastric decompression. Then, Mesenteroaxial volvulus was the most likely hypothesis, and it was confirmed with computed tomography and later with abdominal inspection through laparoscopy. Azhar A, et al. (2023), also reported Mesenteroaxial gastric volvulus in a 30-year-old patient, however, the patient had a congenital diaphragmatic malformation called Bochdalek's hernia, which was corrected through successful emergency surgery.

It should be noted that as soon as there is a suspicion of gastric volvulus, based on clinical history and physical exam, the diagnosis must be confirmed radiologically. A chest X-ray can demonstrate double air-fluid level and/or spherical stomach. Barium swallow may be helpful in some cases, and abdominal CT is important to confirm the diagnosis in addition to providing the nature of the volvulus and assisting the therapeutic planning (LOPEZ PP and MEGHA R, 2022).

Management of gastric volvulus is divided into initial treatment and definitive treatment. Initial treatment involves stabilizing the patient (fluid resuscitation and electrolytic disturbs correction), gastric decompressing with nasogastric tube and relieving symptoms with administration of prokinetic medication. When nasogastric tube failed to be passed bedside, endoscopic guided placement could be instituted. This procedure also allows volvulus reduction in some cases and represents an attempt for patients with high risk of undergoing surgery. On the other hand, definitive treatment aims to restore the stomach to anatomic position, correct abnormalities

associated with the volvulus and prevent recurrence. Even if conservative management proved to be safe in stable patients, surgical management continues to be the treatment of choice and should be promptly adopted for unstable patients. If gastric ischemic areas are visualized and eventually reperfusion does not happen after reduction, resection is necessary or second-look should be planned. Finally, surgical management should be chosen according to etiology. In primary gastric volvulus, the gastropexy (fixation of stomach to abdominal wall) is indicated, while in secondary volvulus, an important step is repairing the triggering factor (e.g. diaphragm defects, hiatal hernia) and gastric fixation is not mandatory (JACOB C, et al., 2021; LIGHT D, et al., 2015; YATES R, et al., 2015).

Although gastropexy is widely indicated to mitigate the risk of recurrence, it was decided not to perform the procedure in the present case. This approach was justified by the absence of evident primary factors for gastric volvulus, such as defects in the ligament fixation of the organ associated with the achievement of a satisfactory anatomical restoration by means of laparoscopic reduction. Considering the unusual association with intestinal malrotation and the lack of clear evidence to guide management in this context, the surgical strategy was individualized.

Laparoscopic interventions offer better clinical outcomes compared with traditional open surgery in the management of gastric volvulus. Advantages include better aesthetic outcomes, lower morbidity rates, and functional recovery. In addition, it is necessary to constantly improve diagnostic tools to consolidate more rigorous criteria for gastric volvulus, allowing precise interventions to be established (BHUSAL A, et al., 2024).

The present case highlights the exceptional association between mesenteroaxial gastric volvulus and intestinal malrotation, a rare and potentially fatal condition that poses a significant diagnostic challenge due to its low prevalence and nonspecific clinical presentation. Among the main lessons learned, this report underscores the importance of including this condition in the differential diagnosis of patients presenting with acute abdomen, reinforcing the pivotal role of CT in early diagnosis and of timely intervention in achieving favorable outcomes. By describing this unusual presentation, this case contributes to the literature and clinical practice by raising awareness of this potentially fatal entity and promoting its early recognition, thereby helping to reduce complications and associated morbidity and mortality.

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