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Spontaneous Acute Mesenteroaxial Gastric Volvulus Diagnosed by Computed Tomography Scan in a Young Man

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Data Interpretation D
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Patient: Male, 23
Final Diagnosis: Acute spontaneous gastric volvulus
Symptoms: —
Medication: —
Clinical Procedure: Laparotomy
Specialty: Gastroenterology and Hepatology

Objective: Rare disease





Background: Acute gastric volvulus is a surgical emergency that requires early recognition and treatment. Acute idiopathic mesenteroaxial gastric volvulus is a rare sub-type and there are few cases reported in children and there are even fewer reports in adults.

Case Report: We report a rare case of a 23-year-old man who presented with a 1-day history of vomiting, epigastric pain, distention, and constipation. The diagnosis for mesenteroaxial type gastric volvulus was confirmed by abdominal radiography and computed tomography. The patient was successfully treated by laparotomy with resection of the ischemic stomach wall and anastomosis. Acute spontaneous mesenteroaxial gastric volvulus is rare in adults and early diagnosis is challenging due to non-specific symptoms. A missed or delayed diagnosis may result in serious complications due to gastric obstruction.

Conclusions: A patient presenting with severe epigastric pain and clinical evidence of gastric outlet obstruction should be considered as a surgical emergency to rule out gastric volvulus. High index of suspicion, early diagnosis and prompt surgical management are important for favorable outcome in patients with acute spontaneous gastric volvulus.

MeSH Keywords: Gastric Outlet Obstruction • Laparotomy • Stomach Volvulus

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Background

The definition of gastric volvulus is basically an acquired rotation of the stomach more than 180° creating a closed loop obstruction [1]. It is a rare surgical emergency condition that should be recognized promptly and treated urgently. A review of the literature revealed only a few reported cases of acute idiopathic mesenteroaxial gastric volvulus in children [2,3]. Around one-fifth of gastric volvulus cases have been reported among infants less than 1 year of age and are often associated with congenital diaphragmatic defects [4]. However, reports of such cases in adult patients are very rare. Herein, we present an unusual case of acute idiopathic mesenteroaxial gastric volvulus in a young man, with a review of the literature.

Case Report

A 23-year-old man was diagnosed with acute idiopathic mesenteroaxial gastric volvulus. He was previously healthy, but presented to the emergency unit with a 1-day history of worsening epigastric pain associated with nausea, vomiting, distention, and constipation. There was no history of fever or systemic upset. Vital signs showed heart rate 68 beats/min, blood pressure 127/82 mmHg, respiratory rate 18/min, and body temperature 36.7°C.

Upon physical examination, the patient was found to be distressed, with shortness of breath, abdominal distension and pain large epigastric mass with tenderness, and abdominal guarding. Bowel sounds were exaggerated but the rectal examination was unremarkable.

Laboratory investigations revealed a high white cell count of 16.5×10^3 (neutrophils 88%), otherwise other hematological and biochemical findings (hemoglobin 16.1 g/dL, platelets 241×10^3 u/L, albumin 30g/L, BUN 3.7 mmol/L, creatinine 89 umol/L, sodium 142 mmol/L, and potassium 4.2 mmol/L) were unremarkable.

An abdominal radiograph demonstrated an apparently large lucency in the upper abdomen towards the left, suggesting gastric dilatation (Figure 1). An abdominal computed tomography (CT) scan confirmed the diagnosis of a mesenteroaxial type of gastric volvulus with the stomach upside down. There was minimal intraperitoneal fluid, no free gas and no evidence of perforation (Figure 2A, 2B).

There was no mass or any pathological finding suggesting the cause of the volvulus. The patient was resuscitated with intravenous fluids. Insertion of a nasogastric tube was attempted, but was unsuccessful due to the twist at the gastro-esophageal junction. Laparoscopic procedure was not possible due



Figure 1. Supine abdominal X-ray showing gastric dilatation.

to the huge epigastric mass, which extended to the umbilicus, with risk of perforation. We performed laparotomy through a midline incision, revealing a hugely distended stomach with gastric wall ischemia. The stomach retained its position after surgical manipulation, but due to the gastric wall necrosis, a large perforation occurred with a huge amount of fluid and gastric content expelled to the abdomen, after which the stomach regained its normal position. Thorough examination of the stomach revealed that a 15 cm of the poster-lateral gastric wall was ischemic including the lateral greater curvature and posterior wall (Figures 3). We performed frequent irrigation and cleaning of the peritoneal cavity, followed by partial gastrectomy involving resection of the ischemic wall and a 2-layer repair of the defect with Vicryl™ 2/0 sutures (Ethicon Inc., Cincinnati, OH) (Figure 4). The J-VAC® drain (Ethicon Inc., Cincinnati, OH) was left in the lesser sac and the abdomen was closed in layers in the usual way.

The post-operative course showed delayed bowel motility for the first 7 days, with normal bowel motility gradually returning thereafter and an uneventful hospital course. A sodium diatrizoate and meglumine diatrizoate (Gastrografin®, Bayer) study performed postoperatively (day 8) showed no evidence of leak or gastric outlet obstruction (Figure 5). The patient was discharged home after 11 days of hospitalization, and no complications were reported after 2 months of out-patient follow-up.

Discussion

This is an unusual case of acute idiopathic mesenteroaxial gastric volvulus in an adult patient. It highlights the characteristic features, diagnosis, and management of this rare subtype. This case is remarkable in that only a few cases of this

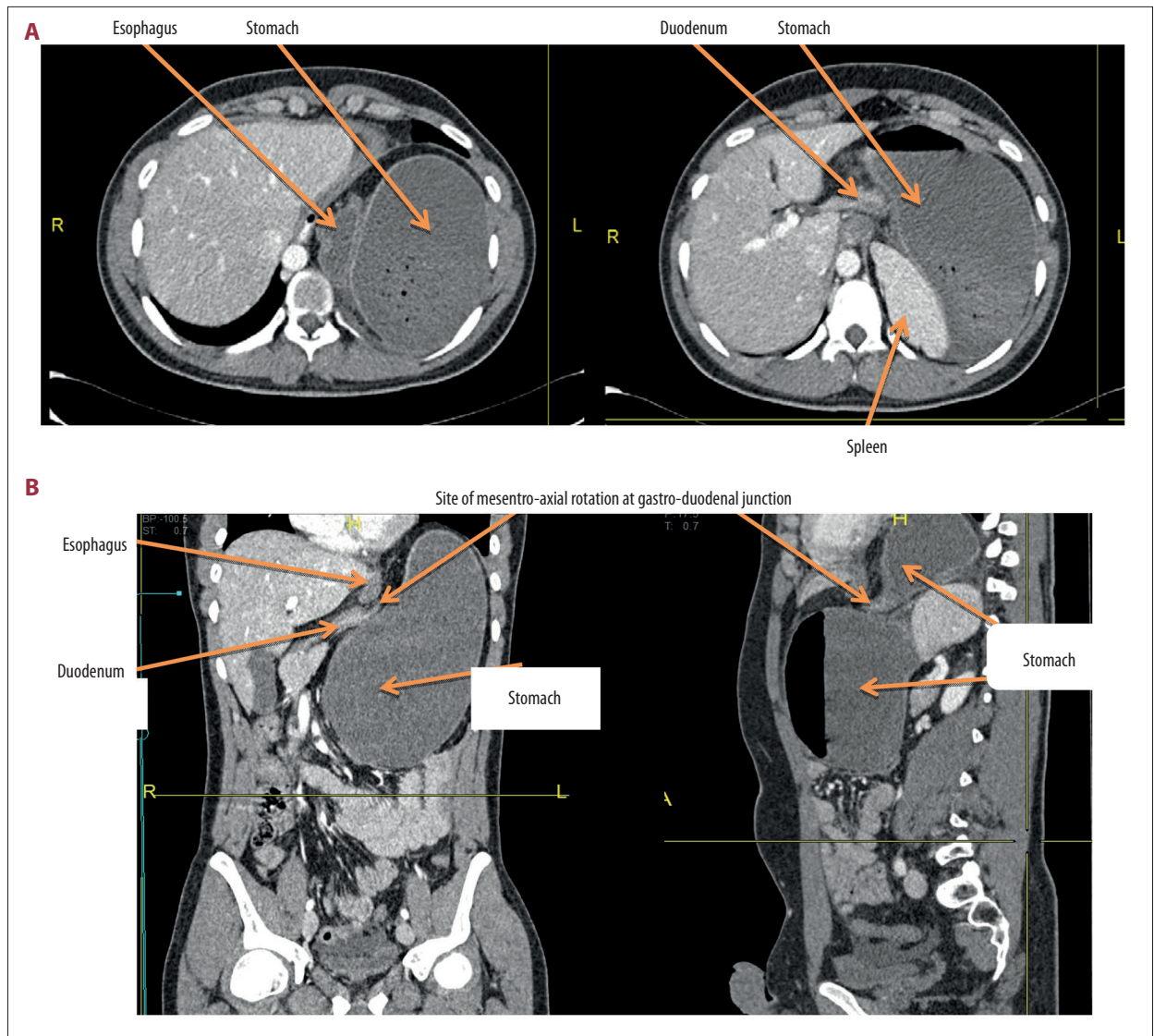


Figure 2. (A) computed tomography scan with transverse cuts showing stomach rotation. (B) Computed tomography scan with axial and sagittal cuts showing rotation point.

subtype have been reported, in neonates, infants, and young children; with a higher incidence among females, but its occurrence in adult males is even more rare [5]. Acute idiopathic mesentero-axial gastric volvulus is a rare subtype, with only 5 cases (aged 5–12 years) reported among children in the current literature [2]. Moreover, neonates, infants, and younger children often present with other subtypes of gastric volvulus [2]. Srinivasaiah et al. [5] reported a single case of idiopathic mesentero-axial gastric volvulus in a 17-year-old (adolescent) male. Similarly, the present case is unique as there is no report of this condition among young adults (age 23 years). However, 3 cases of acute mesenteroaxial gastric volvulus have been reported with different ages (41, 71 and 73 years old), 2 of them were females and 1 was male [6–8]. Gastric volvulus is more likely to occur in the fifth decade of life but in our case it was

observed at a young age. The first case of gastric volvulus was reported in 1866 by Berti and the first successfully operated case was performed by Berg in 1897 [9]. Primary gastric volvulus was reported in around 30% of cases, that was mainly caused by congenital or acquired defects [10]. However, the majority of cases (70%) were diagnosed with secondary gastric volvulus presented with paraesophageal herniation, acquired diaphragmatic defect, or abdominal adhesions. In children, acute gastric volvulus is often associated with congenital diaphragmatic defects and around half of such cases have been reported from India [2]. Paraesophageal herniation, diaphragmatic injury or surgery, and left lung resection or pleural adhesions are frequently observed predisposing factors in adults [1]. Upon further review of our patient's medical history, there was no previous indication of surgery, trauma, or

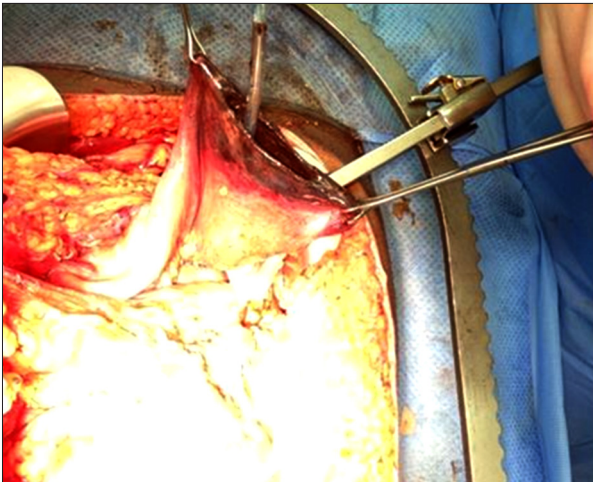


Figure 3. Perforated posterolateral stomach wall with ischemic edges, showing nasogastric tube protruding from the defect.

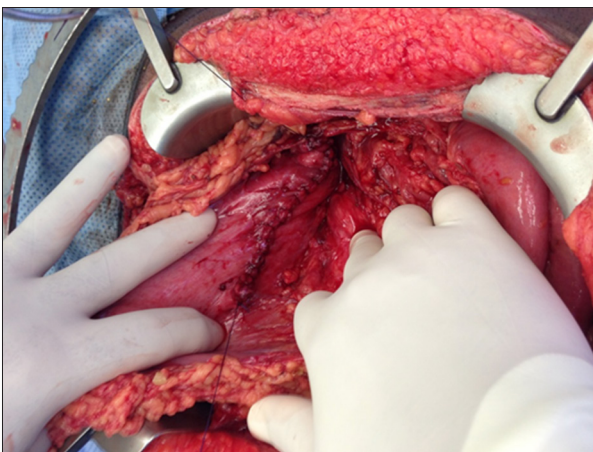


Figure 4. Postero-lateral wall repair.

other predisposing factors. This favors a diagnosis of acute idiopathic gastric volvulus.

It is often difficult to diagnose acute gastric volvulus due to non-specific presentation. The symptoms of acute gastric volvulus depend upon gastric rotation and obstruction. One-third of gastric volvulus cases mainly present with acute, sudden, and severe left upper quadrant or left lower chest pain.

The primary symptoms include severe epigastric pain and distention, vomiting, and difficulty in placing the nasogastric tube, referred to as the Borchardt triad [9]. The symptoms suggest initial blockage of the pylorus, followed by cardia obstruction and posterior gastric distention. Consistently, our case also presented with worsening epigastric pain, nausea, vomiting, distention, and constipation. Moreover, an earlier study involving 25 patients with acute gastric volvulus suggested that, in addition to Borchardt's triad, there are 3 important features

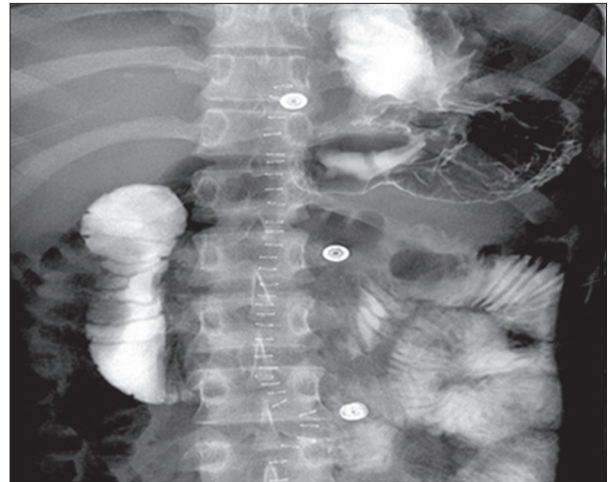


Figure 5. Oral Gastrografin study on day 8 postoperatively.

of gastric volvulus: (a) minimal abdominal findings when the stomach is in the thorax, (b) a gas-filled viscus in the lower chest or upper abdomen shown by chest radiography, and (c) obstruction at the site of the volvulus shown by emergency upper gastrointestinal series. Barium studies revealed distinctive radiological findings as the greater curvature is seen cephalad to the lesser curvature for organo-axial rotation and the pylorus is seen cephalad to the EG junction in mesentero-axial rotation [11]. The authors also highlighted other aspects of acute gastric volvulus, including the significance of chest radiographic findings and immediate contrast studies in addition to bareness symptoms.

Singleton [12] proposed the most accepted classification of gastric volvulus with 3 different categories: organoaxial, mesenteroaxial, and combined, which are based on the axis around which the stomach rotates. Organoaxial type refers to the rotation of stomach over an axis that combines the gastroesophageal junction with the pylorus. In this situation the antrum rotates in reverse direction to the fundus [13]. This type of volvulus is associated with diaphragmatic defects with frequent strangulation and necrosis reported in 5–28% of cases [11].

The mesentericoaxial volvulus, is another type, in which the mesentericoaxial axis bifurcates the lesser and greater curvatures. Herein, the antrum, twists anteriorly and superiorly, therefore the posterior surface of the stomach lies anteriorly with incomplete rotations [13]. Diaphragmatic defects are usually observed with typical chronic symptoms. Finally, combined type is a rare entity with simultaneous presentation of mesenteroaxial and organoaxial rotation of the stomach, which is typically observed in patients with chronic volvulus [10].

The most frequently observed type is the organoaxial volvulus (59%) in which the stomach rotates at the longitudinal axis. This occurs due to anterior rotation of the greater curvature,

as the duodenum and gastro-esophageal junction are fixed, causing obstruction (gastro-esophageal junction, the pylorus, or both) and strangulation [14]. The second variant is mesenteroaxial volvulus (29%) in which the rotation occurs at the trans-gastric axis, resulting in folding of the anterior gastric wall [13]. The majority of chronic volvulus cases are related to mesenteroaxial rotation. The suggested predisposing factor for mesenteroaxial volvulus is the laxity of the gastrosplenic ligament. This type of volvulus is not usually associated with diaphragmatic defects. In such cases, sudden de-torsions with recurrent acute episodes may be observed, with no evidence of complete obstruction or strangulation. Conversely, our report identified a case of acute idiopathic mesenteroaxial gastric volvulus in an adult. The third category of volvulus may present with features of both organoaxial and mesenteroaxial volvulus or remain unclassified (12%) [13]. However, such volvuli often present with chronic or recurrent symptoms.

The exact cause of gastric volvulus remains unclear. The pathogenesis of gastric volvulus could be explained by relaxation of the gastrosplenic or gastrocolic ligaments, which may cause gastric distention and excessive rotation, which eventually predispose to the stage of volvulus development [15]. The diaphragmatic defects commonly associated with gastric volvulus allow stomach displacement. Congenital diaphragmatic defects and Morgagni and paraesophageal hernia are the major predisposing factors associated with acute gastric volvulus. Congenital diaphragmatic defects in children and paraesophageal hernia among adults are the most frequently involved predisposing factors [10]. The other factors include diaphragmatic injury and eventration, left lung resection, or pleural adhesions, intra-abdominal adhesions, gastric ulcer, and stomach obstruction caused by extrinsic pressure from adjacent masses [11].

The diagnosis of acute gastric volvulus usually depends upon clinical suspicion and radiographic investigations. Abdominal radiographs provide a clue to suspect gastric volvulus. Supine radiographs show spherical appearance of the stomach in cases of mesenteroaxial volvulus. The upright films usually reveal double air fluid level, one inferior and left, with normally located fundus, and the other with superior and right, showing the displaced antrum [16]. However, abdominal CT scans provide more accurate diagnosis with specific details of the anatomical abnormalities [17]. Consistently, in our case, the abdominal radiograph demonstrated an apparently large lucency in the upper abdomen towards the left, raising concerns for gastric dilatation, whereas the final diagnosis of mesenteroaxial gastric volvulus was made based on findings on abdominal CT scan.

Acute mesenteroaxial gastric volvulus is rare in adults and early diagnosis is challenging due to non-specific symptoms. A missed or delayed diagnosis may result in serious complications due to obstruction, which includes strangulation,

perforation, hemorrhage, ischemia, and severe necrosis [9]. Strangulation and perforation remain the most frequent complications of acute gastric volvulus, with a higher rate of mortality (30–60%) attributed to strangulation and infarction [18]. Therefore, early diagnosis and surgical management are important and the latter should be performed urgently in patients with acute gastric volvulus. Non-surgical management may be successful in some patients; however, due to risk of recurrence of volvulus, most investigators recommend surgical intervention with gastric decompression, reduction of the volvulus, correction of predisposing factors, and fixation of the stomach to prevent recurrence [10].

Conservative treatment can be performed in clinically stable patients. This therapeutic modality is mainly useful in mesenteric-axial volvulus cases with no obvious cardia obstruction [19]. An endoscopic examination can be diagnostic to evaluate the gastric mucosa or therapeutic to reduce the gastric volvulus. Endoscopic treatment allows volvulus decompression and reduction, which has been successfully used to treat patients with high surgical risk and acute presentation [20]. Endoscopic reduction is usually effective for intra-thoracic volvulus, which could be substantiated by further laparoscopic approach. It allows safe reduction, placement of a gastrostomy tube, and treatment of underlying diseases like hiatal hernia [21]. In most cases, endoscopic management is considered to treat chronic gastric volvulus.

The goal of surgical intervention is to repair the volvulus and limit the chance of recurrence through stomach fixation and management of diaphragmatic hernia [9].

The preferred surgical procedure is anterior gastropexy, in which the greater curvature of the stomach is fixed to the anterior abdominal wall [9,10]. However, if gastric necrosis has occurred, partial or total gastrectomy is preferred, depending on the extent of ischemia. In an earlier case report on acute idiopathic mesenteroaxial gastric volvulus, the imaging findings were confirmed by laparotomy, and gastropexy was performed with favorable outcomes [5]. We performed laparotomy to resect the ischemic wall and performed 2-layer repair of the defect with Vicryl 2/0. The postoperative course was uneventful and there were no major complications reported on follow-up. The medical history and imaging of our patient revealed no evidence of previous surgery, trauma, or other predisposing factors favoring a diagnosis of idiopathic gastric volvulus, which was treated successfully by laparotomy.

Conclusions

Acute idiopathic mesenteroaxial gastric volvulus in a young man is very rare. A patient presenting with a severe epigastric

pain and a clinical evidence of gastric outlet obstruction should be considered a surgical emergency to rule out gastric volvulus. We believe that a high index of suspicion, early diagnosis, and surgical management are important for successful outcomes in these cases.

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References:

1. Svecik WE, Steiner IP. Acute gastric volvulus: Case report and review of the literature. *CJEM*, 1999; 1: 200–3
2. Ratan SK, Grover SB. Acute idiopathic mesenteroaxial gastric volvulus in a child. *Trop Gastroenterol*, 2000; 21: 133–34
3. Kotobi H, Auber F, Otta E et al: Acute mesenteroaxial gastric volvulus and congenital diaphragmatic hernia. *Pediatr Surg Int*, 2005; 21: 674–76
4. Harford WV, McArthur KE. Diverticula, hernias, volvulus, and rupture. In: Sleisenger MH, Fordtran JS (eds.), *Gastrointestinal Disease: Pathophysiology, Diagnosis, Management*. 5th ed. Philadelphia, Pa: Saunders, 1993; 481–83
5. Srinivasaiah N, Nichanametla A, Kasaranenia R et al: Acute idiopathic mesentero-axial gastric volvulus in adolescence: A rare occurrence. *Grand Rounds* 2007; 7: 51–53
6. Ahmed A: Acute mesenteroaxial gastric volvulus on computed tomography. *S Afr J Rad*, 2013; 17: 21–23
7. Urasaki Y, Nozawa S, Matsui J et al: A case of acute gastric mesenteroaxial volvulus corrected by endoscopy. *Prog Dig Endosc*, 2013; 82: 114–15
8. Woon CY, Chung AY, Low AS, Wong WK: Delayed diagnosis of intermittent mesenteroaxial volvulus of the stomach by computed tomography: A case report. *J Med Case Rep*, 2008; 2: 343
9. Gourgiotis S, Vougas V, Germanos S et al: Acute gastric volvulus: Diagnosis and management over 10 years. *Dig Surg*, 2006; 23: 169–72
10. Wasselle JA, Norman J: Acute gastric volvulus: Pathogenesis, diagnosis, and treatment. *Am J Gastroenterol*, 1993; 88: 1780–84
11. Carter R, Brewer LA, Hinshaw DB: Acute gastric volvulus. A study of 25 cases. *Am J Surg*, 1980; 140: 99–106
12. Singleton AC: Chronic gastric volvulus. *Radiology*, 1940; 34: 53–61
13. Milne LW, Hunter JJ, Anshus JS et al: Gastric volvulus: Two cases and a review of the literature. *J Emerg Med*, 1994; 12: 299–306
14. Teplick G, Haskin M: *Surgical radiology*. 3rd ed. Philadelphia: W.B. Saunders, 1980; 482
15. Askew AR: Treatment of acute and chronic gastric volvulus. *Ann R Coll Surg Engl*, 1978; 60: 326–28
16. Gurney JW, Olson DL, Schroeder BA: The gastric bubble: Roentgen observations. *Radiographics*, 1989; 9: 467–85
17. Coulier B, Ramboux A: Acute obstructive gastric volvulus diagnosed by helical CT. *JBR-BTR*, 2002; 85: 43
18. Samuel M, Burge DM, Griffiths DM: Gastric volvulus and associated gastro-oesophageal reflux. *Arch Dis Child*, 1995; 73: 462–64
19. Jacob CE, Lopasso FP, Zilberstein B et al: Gastric volvulus – A review of 38 cases. *ABCD Arq Bras Cir Dig*, 2009; 22: 96–100
20. Bhasin DK, Nagi B, Kochhar R et al: Endoscopic management of chronic organoaxial volvulus of the stomach. *Am J Gastroenterol*, 1990; 85: 1486–88
21. Cameron BH, Blair GK: Laparoscopic-guided gastropexy for intermittent gastric volvulus. *J Ped Surg*, 1993; 28: 1628–29

Statement

This case report was approved with a waiver of informed consent by the Ethics Committee of the Medical Research Center (IRB#14470/14) at Hamad Medical Corporation, Doha, Qatar.

Disclosure statement

None of the authors has any conflict of interest.