

Role of imaging in gastric volvulus: Stepwise approach in three cases

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In this paper, we present three cases of gastric volvulus who were admitted to our hospital over one year, focusing on the diagnostic process. By comparing the cases, we present diagnostic points and endoscopic findings that should trigger suspicion and lead to a prompt diagnosis by computed tomography, thus enabling surgery at a time before necrosis of the stomach is present. A literature review is also presented.

Key words: Gastric volvulus, diagnosis, computerized tomography, gastroscopy

Gastrik volvulusta görüntülemenin yeri: Üç vakaya adım adım yaklaşım

Bu yazıda, gastrik volvulus ile hastanemize başvuran 3 vakada takip edilen tanısall süreç incelenmiştir. Tanının tomografi ile erken dönemde konulması ve mide nekrozu gerçekleşmeden cerrahi müdahalenin yapılabilmesi için vakaların karşılaştırılması, tanısall noktaların ve endoskopik bulguların değerlendirilmesi yapılmıştır. Ayrıca literatürün gözden geçirilmesi de sunulmuştur.

Anahtar kelimeler: Gastrik volvulus, tanı, bilgisayarlı tomografi, gastroskopi

INTRODUCTION

Gastric volvulus is a rare and potentially life-threatening condition, and the diagnosis can be difficult. It occurs at all ages, although predominantly in adults after the 5th decade of life (1). Obstruction and strangulation may occur when the rotation exceeds 180° (1-4). Medical literature differentiates between organoaxial (60%), mesenteroaxial (30%) and combined (10%) volvulus (1,2). Thirty percent are idiopathic due to laxity of stabilizing ligaments, while 70% are secondary to paraesophageal hernia, diaphragmatic eventration, diaphragmatic paralysis, adhesions, neoplasm, or trauma (2-6). Approximately one-third of reported cases present with acute onset, while the rest have a chronic/intermittent presentation (7). In this

paper, we present three cases of acute gastric volvulus who were admitted to our hospital during the current year. The aim is to compare these three patients step by step in order to identify the pitfalls and bonus points on the path to a correct diagnosis.

CASE REPORT

Patient 1: A 75-year-old woman with a history of Alzheimer's, hysterectomy and hiatal hernia was admitted to the cardiology ward with acute chest pain and bradycardia. After exclusion of a cardiac etiology, a surgical consult was required three days after admission due to hematemesis, epigastric pain and absence of stool. Plain X-ray showed

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no sign of bowel obstruction. A nasogastric tube was placed and 2500 ml was evacuated. Computed tomography (CT) revealed gastric retention, edematous pylorus and some ascites. Intravenous esomeprazole was started. Gastroscopy was described as showing esophagitis and a pyloric ulcer with stenosis. The nasogastric tube was left in place, and the patient received intravenous fluids and nutrition. On day 8, a repeated gastroscopy showed a cascade in the stomach (*description: the antrum lay completely cranial under the cardia*), and the endoscopist could not find a position in which to view the pylorus. An upper gastrointestinal (GI) contrast study showed no passage of contrast to the duodenum. The patient's condition was stable, but showed no sign of improvement. Laboratory tests showed no sign of infection or renal failure. Surgery was planned for her ulcer/stenosis, and laparoscopy revealed a 360° organoaxial volvulus with ischemia and necrosis of the distal stomach. On-table gastroscopy after reduction revealed ischemic ulcers. A laparoscopic subtotal gastrectomy and Roux-en-Y gastrojejunostomy were performed. Postoperatively, there were no complications; however, the patient does have low nutritional intake and dumping.

Patient 2: A 90-year-old man with a prior history of chronic obstructive pulmonary disease (COPD), gastroesophageal reflux, ventricular ulcer, and hiatal hernia was admitted with the diagnosis of gastroenteritis. He reported three days of blood-stained vomit and a temperature of 38°C. Clinical examination revealed epigastric tenderness and dehydration, and blood analyses showed leukocytosis and renal failure. Abdominal X-ray was described as normal, but on further examination, an intrathoracic air-fluid “level” was seen. Gastroscopic findings were described as esophagitis, gastric retention, ulcers, and stiffness, suggestive of cancer in the distal stomach. The pylorus could not be passed. Based on a working diagnosis of gastric cancer and retention, an attempt to place a nasogastric tube and perform an upper GI contrast study failed. At this point, the patient's C-reactive protein (CRP) was rising. Fluid therapy normalized the kidney function, and a CT with contrast was performed. The case was then diagnosed as hiatal hernia and intrathoracic organoaxial gastric volvulus (Figures 1-3). There were no radiological signs of malignancy. The patient underwent laparotomy, detorsion and Nissen fundoplication on the same day. The patient was discharged a week



Figure 1. 2D MDCT - the arrows show the right gastric vein as it can be seen following the twist of an organoaxial volvulus.

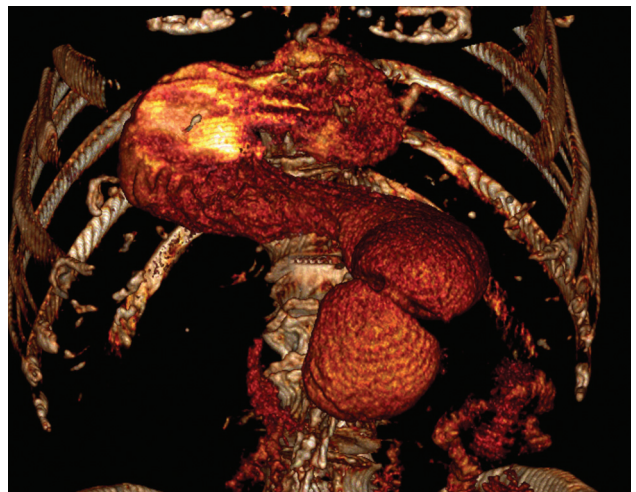


Figure 2. 3D volume rendering (VR) accomplished by means of OsiriX® v. 3.9. 64-bit software - skeletotopy of the gastric volvulus.

postoperatively and did not have further complications.

Patient 3: A 49-year-old man with human immunodeficiency virus (HIV) and hiatal hernia experienced three days of acute epigastric pain and vomit with blood after heavy lifting. Gastroscopy the same day revealed esophagitis, gastric retention, and malrotation of the ventricle, and the duodenum was not reached. A nasogastric tube was placed. CT confirmed a large paraesophageal hernia with herniated transverse colon and an intraabdominal mesenteroaxial volvulus. The patient was transferred to a central hospital and underwent

reduction, mesh cruroplasty and fundoplication on the same day. Postoperatively, he had no complications.

DISCUSSION

Now that we have retraced our steps and found what these three patients had in common, it is rather easy to conclude that suspicion should have been triggered at endoscopy and the diagnosis verified through a prompt CT. What was in common for all three patients was a previously known hiatal hernia, epigastric pain and vomiting with hematemesis at some point. These symptoms differ somewhat from the typical Borchardt's triad (1,2), especially as far as nasogastric tube placement is concerned. This triad was defined and updated by Carter *et al.* (1) prior to the introduction of the flexible gastroscopy and CT. Data from the literature describe gastroscopy as helpful in two-thirds and diagnostic in one-third of patients (3,4). Gastroscopy demonstrated esophagitis and gastric retention in all three cases, but more importantly, it was not possible to pass the pylorus. Furthermore, gastric mucosa edema and multiple erosions/ulcers were seen (mistaken for cancer in Patient 2). Retrospectively, these findings should have been indicative of gastric volvulus, even though a clear torsion was not seen. This corresponds to findings in the literature (2,8,9).

On the other hand, when suspicion is triggered by the endoscopist, diagnosis can be readily made by CT (10-12). There is no doubt that anatomy is the cornerstone of the diagnosis. Gastric vessels can be demonstrated by CT and a 3D reconstruction of the vessels can therefore be illustrative. In our patients, CT was performed with intravenous contrast (not as an angiography with 3D reconstruction), providing the correct diagnosis in only two out of three (Table 1). In Patient 2, the diagnosis was made by following the right gastric vein as it went

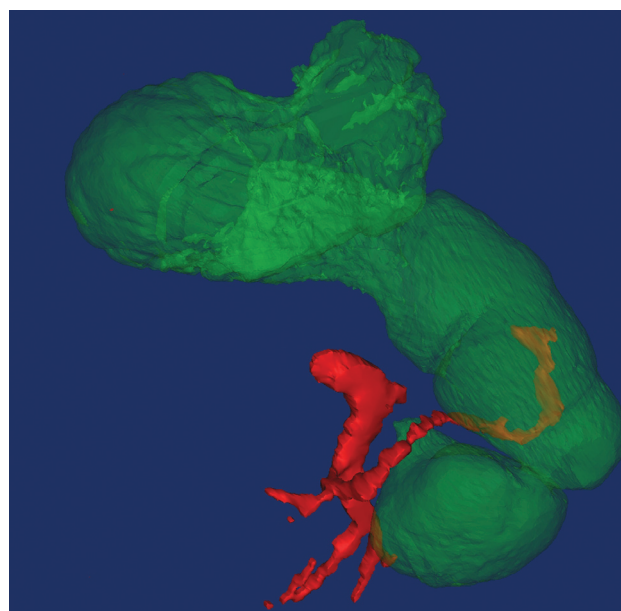


Figure 3. 3D reconstruction performed by Mimics® V14.0.1.7 software – spatial depiction of the volvulus and the right gastric vein.

dorsally across the stomach and up along what would normally be the major curvature (Figures 1, 3). With regard to the fact that the angiographic appearance of the vessels in volvulus has been described (13,14), we performed post processing of the data set by means of 3D reconstruction software (OsiriX® v. 3.9. 64-bit and Mimics® V14.0.1.7). It is our opinion that the use of CT angiography with 3D reconstruction can facilitate the diagnosis, even more so, since it is noninvasive and can be derived from the same data set (CT). Data have also been provided showing that multidetector CT (MDCT) angiography can demonstrate 3D anatomical relationships of visceral vessels (15,16).

From the standpoint of the surgeon this is even more important. Gastric volvulus is an emergency condition (non-operative mortality rates are as

Table 1. Case summaries

	Predisposing factor TYPE	Diagnosis	Time to treatment	Treatment	Complications
Patient 1	Hiatal hernia Organoaxial	(Contrast study) Perioperative	12 days	Nasogastric tube Laparoscopic subtotal gastrectomy	Necrosis Postoperative nutritional problems
Patient 2	Hiatal hernia Organoaxial	CT	5 days (8 days after onset)	Laparotomy, Nissen fundoplication and cruroplasty	None
Patient 3	Hiatal hernia Mesenteroaxial	Gastroscopy CT	1 day (4 days after onset)	Nissen fundoplication and mesh cruroplasty	None

high as 30-80%) (5,6). As demonstrated in our patients, a simple fundoplication is sufficient when the diagnosis is made in time, while a subtotal gastrectomy can be necessary in case of late diagnosis (necrosis is reported in 5-28%, most commonly in organoaxial volvulus) (1).

In conclusion, acute gastroscopic findings as described above should result in a prompt referral to a CT with question of gastric volvulus. CT angiography could be the best means of a quick diagnosis, and a vascular reconstruction may help the diagnosis in difficult cases.

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