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Acute Gastric Volvulus: Diagnosis and Management over 10 Years

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Key Words
Acute gastric volvulus · Hiatus hernia

Abstract
Background/Aims: Gastric volvulus is a rare, potentially life-threatening condition, which is difficult to diagnose. This study represents a series of patients with acute gastric volvulus. ***Methods:*** All patients presenting with acute gastric volvulus over a 10-year period were reviewed. ***Results:*** Twenty-one patients with a median age of 66 years were identified. Acute gastric volvulus was secondary to a paraesophageal hiatus hernia in 16 patients. The major symptoms were abdominal pain, vomiting and upper gastrointestinal bleeding/anemia. The most useful investigations were barium studies and upper gastrointestinal endoscopy. Treatment was open surgery in all patients. There were no major complications and no deaths. Median hospitalization was 8 days. ***Conclusion:*** Acute gastric volvulus is a rare condition which requires a high index of suspicion for diagnosis, which is usually based on imaging studies. The treatment is immediate surgery. Volvulus can be treated successfully by open surgery with minimal morbidity and short hospitalization.

Introduction

Gastric volvulus is an uncommon entity, comprising abnormal rotation of the stomach along its longitudinal (organoaxial) axis or about an axis joining the mid lesser and greater curvatures (mesenteroaxial). Berti [1] first described gastric volvulus in 1866 on a postmortem examination of a 60-year-old female who died of high closed loop obstruction. The first successful operation of gastric volvulus was done by Berg [2] in 1897.

When the rotation exceeds 180°, gastric obstruction or strangulation may occur. Primary gastric volvulus occurs in 30% of patients when the stabilizing ligaments (gastrocolic) are too lax as a result of congenital or acquired causes [3]. Secondary gastric volvulus, making up the remainder of patients, occurs in association with a paraesophageal hernia, acquired diaphragmatic defect, abdominal bands, or abdominal adhesions [3]. Approximately 20% of gastric volvulus cases occur in infants under 1 year of age and are often secondary to congenital diaphragmatic defects [4]. The peak incidence occurs in the fifth decade of life and is commonly seen in association with paraesophageal hernias [4]. Mortality rates of 30–50% have been reported for acute volvulus, the major cause of death being strangulation, leading to necrosis, perforation and hypovolemic shock [3, 5].

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Classic symptoms of acute gastric volvulus are known as Borchardt's triad [6], which consists of severe epigastric pain and distension, vomiting followed by violent nonproductive retching, and difficulty or inability to pass a nasogastric tube. If undetected, acute gastric volvulus can lead to ulceration, strangulation, perforation, hemorrhage, ischemia, and full-thickness necrosis [7–9].The traditional treatment of acute gastric volvulus includes laparotomy, gastric reduction, fixation and, when present, repairs of associated diaphragmatic hernia with addition of fundoplication. Different approaches include gastropexy alone, either at laparotomy [10] or by percutaneous endoscopic gastrostomy [11, 12], and laparoscopic techniques [13–15]. Endoscopy has also been used for the reduction of acute gastric volvulus [16].

We sought to examine our clinical experience with acute gastric volvulus in a study of 21 patients, in a single institution, over a 10-year period. We examine the diagnosis, surgical management, morbidity, mortality and clinical outcome.

Patients and Methods

All patients with acute gastric volvulus who presented at our institution between January 1995 and December 2004 were considered candidates for the study. Twenty-one patients were reviewed retrospectively. Patients' age, sex, main symptoms, laboratory tests, preoperative radiological investigations, etiology, type of surgical procedure performed, postoperative complications, mortality and mean hospital stay after surgery were recorded. No patient was excluded from the series.

Preoperative diagnosis was established by patients' history, followed by clinical examination, chest and abdominal X-ray radiograph, upper gastrointestinal (GI) endoscopy, ultrasonography (US) of the abdomen, and abdominal computed tomography (CT).

The treatment of acute gastric volvulus was surgical, consisting of a laparotomy, reduction of the volvulus, assessment of gastric viability, repair of any associated hiatus hernia and a Nissen fundoplication.

Results

Twenty-one patients (6 men and 15 women) with acute gastric volvulus were identified. The median age was 72 years (range 42–83). Seventeen patients were aged over 60 years and 11 over 70 years.

There were 19 patients with secondary and 2 patients with primary volvulus. The most common predisposing factor was a paraesophageal hiatus hernia in 16 patients, followed by abdominal adhesions in 3 patients. There was no iatrogenic case of gastric volvulus. Of 18 patients in whom the anatomical classification was recorded, 15 had organoaxial and 3 mesenteroaxial volvulus. The presenting features are shown in table 1.

Table 1. Presenting features of acute gastric volvulus

Symptom	Patients
Abdominal pain	19 (90)
Vomiting	15 (71)
Upper GI bleeding/anemia	12 (57)
Abdominal distension	11 (52)
Gastroesophageal reflux	7 (33)
Dysphagia	5 (24)
Respiratory symptoms/shortness of breath	5 (24)

Values in parentheses are percentages.

Table 2. Investigations ordered and diagnostic and suggestive yield

Investigation	Ordered	Suggestive	Diagnostic	No yield
Chest radiography	19	5	0	14
Abdominal radiography	18	8	0	10
Barium study	16	4	9	43
Upper GI endoscopy	15	5	6	44
Abdominal US	47	0	0	47
Abdominal CT	45	0	2	43

The most common investigations were chest radiography, abdominal radiography, barium study and upper GI endoscopy. The diagnostic yield is shown in table 2.

All patients were managed by open surgery. They had preliminary nasogastric tube decompression of the obstructed stomach and underwent a concurrent Nissen fundoplication. The nasogastric tube was removed 2–4 days after the operation and the patients tolerated a liquid diet. The upper GI contrast study was performed on the third to the fifth postoperative day and confirmed complete reduction of the stomach without any evidence of obstruction in all patients.

There were no major complications and no postoperative deaths. Three cases of wound infections and 2 cases of atelectasis occurred in 5 patients. One patient complained of postoperative dysphagia, which settled spontaneously, and no reoperation was required.

The median hospitalization was 8 days (range 6–12). By the 1-year follow-up visit, all patients remained well without signs of gastroesophageal reflux disease, dysphagia, obstruction, or chest pain.

Discussion

Thirty years ago, Tanner [17] outlined the methods of gastric volvulus surgical repair. These included diaphragmatic hernia repair, simple gastropexy, gastropexy and gastrocolic ligament (Tanner's procedure), partial gastrectomy, gastrojejunostomy, fundoantral gastrogastrostomy (Opolzer's procedure) and repair of the diaphragm. The traditional treatment includes open surgical reduction, with or without gastropexy. In recent years, different approaches using laparoscopy with combination of endoscopy and or gastrostomy have been described [15, 18].

The diagnosis of acute gastric volvulus can be difficult. Carter et al. [5] suggested three additional findings that may be very suggestive of gastric volvulus: minimal abdominal findings when the stomach is in the thorax, a gas-filled viscus in the lower chest or upper abdomen on chest radiograph, especially when associated with a paraesophageal hernia, and obstruction at the site of the volvulus shown by upper GI series. The diagnosis of gastric volvulus is usually based on barium studies [19]. Plain radiographs may give a clue to suspect this condition [20], while a CT can offer an immediate diagnosis with all anatomical details [21]. In this series, the most common investigations were plain chest and abdominal radiography, barium studies and upper GI endoscopy. Barium studies provided the greatest yield (81%), being diagnostic in 9 of 16 patients and suggestive of volvulus in 4. Upper GI endoscopy was diagnostic in 6 of 15 patients and suggestive in 5; upper GI endoscopy provided the second greatest yield (73%). Plain chest and abdominal radiographs were not diagnostic but suggestive in 5 of 19 patients and in 8 of 18 patients, respectively. Seven patients underwent abdominal US and 5 abdominal CT. US was neither diagnostic nor suggestive, while CT was diagnostic in 2 patients. While a CT is not necessary to diagnose gastric volvulus, we suggest that a CT finding of the stomach in an unusually high position or an abnormal axis of the stomach with the antrum and gastroesophageal junction at the same transverse level in a patient with acute abdominal pain and vomiting should elicit the suspicion of a gastric volvulus. In our studies, abdominal CT provided a yield of 40%.

There are no specific laboratory tests to confirm or suggest the diagnosis. Elevations in amylase and alkaline phosphatase have been reported, which can lead to a missed diagnosis [22]. Williams et al. [23] reported 2 patients with gastric volvulus in which the amylase level exceeded 1,000 IU/l, leading to the misdiagnosis of acute pancreatitis. In this series, alkaline phosphatase levels were normal in all patients, while amylase levels exceeded the normal value in 1 patient only.

The signs and symptoms of gastric volvulus depend upon the rapidity of onset, the degree of rotation, the chronicity, the degree of obstruction, and whether the volvulus is above or below the diaphragm. In the present series, most patients had secondary volvulus, usually due to hiatus hernia, and all presented acutely with epigastric pain, abdominal distension, vomiting or upper GI hemorrhage and anemia. Additional associated symptoms included dysphagia, reflux, and shortness of breath. Eighty-one percent of patients were aged over 60 years and 52% over 70 years. The patient sample represented a predominantly elderly population, similar to that in previous reports [24]. Most of the patients (n = 15) were found to have organoaxial volvulus of the stomach, while the most common predisposing factor was a paraesophageal hiatus hernia (76%).

Treatment of acute gastric volvulus is a surgical emergency. Surgical goals are to reduce the volvulus and prevent recurrence by fixing the stomach within the abdomen and repairing any predisposing factors, namely diaphragmatic defects. In this study, all patients were treated surgically and underwent a concurrent Nissen fundoplication. Stomach decompression with a nasogastric tube was attempted. Necrosis was not observed. We used a tube gastropexy in all patients. Inserting this tube helps to identify and free the subdiaphragmatic esophagus. The tube also avoids dangerous compromise of the esophageal lumen because of a too tight fundoplication and reduces the stomach into the abdomen. We left this tube in place until the end of the operation. We repaired the diaphragm by approximating the right and left crus with interrupted 2-0 silk sutures, starting as low as possible to decrease tension on every stitch and to admit an index finger loosely over the esophagus with the gastropexy tube in place. If there was too much tension, a relaxing incision was made over the right crus to allow a tension-free closure. We avoided prosthetic mesh closure of the hiatal opening because of the risk of mesh erosion into the esophagus, mesh migration into the stomach, and because of ulcerations and strictures.

The patients' operative and postoperative courses were uneventful. There were no major complications and no postoperative deaths. All patients remained well without signs of gastroesophageal reflux disease or dysphagia 1 year postoperatively.

It is important to note that none of these patients were treated conservatively. We believe that because of the risk of future strangulation and death associated with the conservative management of gastric volvulus, patients should be offered operation.

In summary, acute gastric volvulus is a rare condition with nonspecific and vague symptoms, which requires a high index of suspicion for diagnosis. If suspected, a barium study and an upper GI endoscopy are likely to be of much greater value than any other investigation. Open surgical repair of acute gastric volvulus is safe and efficacious and it is associated with excellent outcome. High-risk and elderly patients with acute gastric volvulus may particularly benefit from this approach.

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