

The threatened stomach: management of the acute gastric volvulus

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Received: 17 March 2015 / Accepted: 8 July 2015 / Published online: 15 August 2015
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Abstract

Introduction Acute presentation of gastric volvulus is a rare condition with a high mortality for acute ischaemia. This study was undertaken to investigate the acute management, diagnosis, and long-term outcomes of patients presenting with acute gastric volvulus.

Methods Cases were reviewed retrospectively from 2004 to 2014. Patients presenting as an emergency admission with acute gastric volvulus were included.

Results Thirty-six patients were included, five of whom had previous surgery. The mean age was 71 years old. All patients presented with vomiting and chest/epigastric pain. CT was diagnostic in all 26 patients. Barium swallow was diagnostic in two/four patients. OGD was diagnostic in 9 of 20 patients. All patients had an NG tube placed, and eight patients were treated conservatively and made a full recovery. Twenty-nine patients proceeded to surgery. Nine had a laparoscopic repair with two open conversions. Four patients had gastric necrosis, and all had open surgery with resection. Three patients had a mediastinal perforation, and one patient required an additional thoracotomy. All patients with viable stomach had a hiatal repair (where appropriate), 11 had a gastropexy, and 11 had a fundoplication. Mortality for gastric necrosis/perforation was 30 %. Mean postoperative stay was 4 days for laparoscopic repair and 8 days for uncomplicated open surgery. Nine of twenty-nine had transient dysphagia postoperatively. Three

of eight patients treated conservatively had an elective procedure subsequently.

Conclusions Acute paraoesophageal hiatus hernia requires early resuscitation and diagnosis. CT should be favoured in assessment, and an NG tube placed promptly. A conservative management may be considered safely in stable patients. Surgical management should be prompt for unstable patients. Gastric ischaemia or perforation has a mortality of 30 %. Laparoscopic repair has a shorter postoperative stay, but has a higher recurrence rate. Surgery for patients without gastric ischaemia has good long-term outcomes with minimal morbidity.

Keywords Digestive · GORD/GERD (gastro-oesophageal reflux disease) · Radiology

Gastric volvulus is a rare condition, compromising abnormal rotation of the stomach along its longitudinal (organoaxial) or transverse (mesenteroaxial) axis. Gastric volvulus may be primary or secondary. Secondary gastric volvulus is most commonly seen in relation to a paraoesophageal hiatus hernia. It may also occur due to defects of the diaphragm or abdominal adhesions.

Acute gastric volvulus classically presents with a triad of severe epigastric pain, vomiting, and difficulty or inability to pass a nasogastric tube. There is a risk of gastric ischaemia in acute gastric volvulus, which can lead to strangulation and perforation. High mortality rates have been reported [1]. A volvulus may also present with chronic symptoms of dysphagia, postprandial pain, vomiting, and breathlessness.

The treatment of acute gastric volvulus is conservative, endoscopic, or surgical. Conservative approaches may include a nasogastric (NG) tube placement or end of life

Presented at the SAGES 2015 Annual Meeting, April 15–18, 2015, Nashville, Tennessee.

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care for patients in extremis. Endoscopic approaches include endoscopic de-torsion and percutaneous gastrostomy (PEG) tube placement [2, 3]. Surgical options may be open or laparoscopic. Surgical management depends on the severity of gastric ischaemia and the underlying cause. In the setting of gastric ischaemia, gastric resection needs to be considered with control of any contamination. In more stable patients, options include repair of the diaphragmatic defect with gastropexy or fundoplication [4].

This study was undertaken in a large tertiary referral centre to evaluate the management and outcomes of patients presenting with acute gastric volvulus over a 10-year period.

Methods

All cases presenting to the Royal Victoria Infirmary in Newcastle upon Tyne with acute gastric volvulus from 2004 to 2014 were reviewed retrospectively. Patients were identified from analysis of hospital admissions and departmental database. Patients were admitted directly or transferred from other regional units. No patients were excluded. There were multiple consultant surgeons in the unit and surgery was not standardized. Medical records and imaging were reviewed.

Results

Thirty-six patients were included with a mean age of 71 years. All patients presented with vomiting and chest/epigastric pain.

Computed tomography (CT) was diagnostic in all 26 patients. Water-soluble contrast study was diagnostic in two/four patients. Oesophagogastroduodenoscopy (OGD) was diagnostic in 9 of 20 patients. All patients had an NG tube placed, and eight patients were treated conservatively and made a full recovery.

All the cases of gastric volvulus were due to secondary causes. Paraoesophageal hernia was the cause in 34, previous abdominal trauma in 1, previous left lung lobectomy in 1, and a congenital Morgagni hernia in 1 case.

Twenty-eight patients proceeded to surgery. In four patients, this was immediate on presentation, and in a further four patients, this was within hours of initial presentation and within days for the remaining patients. Four patients had undergone previous laparoscopic paraoesophageal hiatus hernia repair (one of which had been as an emergency) and one had undergone a previous open paraoesophageal hiatus hernia repair.

Nine had a laparoscopic repair with two open conversions due to abdominal adhesions or ischaemic stomach.

Four patients had gastric necrosis, and all had open surgery with a sleeve resection of the stomach. Three patients had a mediastinal perforation, and one patient required an additional thoracotomy (Table 1).

All patients with viable stomach had a hiatal repair (where appropriate), 11 had a gastropexy, and 11 had a fundoplication. Early complications occurred in 8 of 29 patients. Mortality for gastric necrosis/perforation was 30 % (Table 2).

Mean postoperative stay was 4 days for laparoscopic repair (range 3–6 days) and 8 days for uncomplicated open surgery (range 3–18 days). Nine of twenty-nine had transient dysphagia postoperatively. Three of these patients had a recurrence (two from a laparoscopic repair), with one patient undergoing a redo procedure and two managed conservatively (Table 3).

Three of eight patients treated conservatively in the acute setting had an elective procedure subsequently, while the remainder were discharged after a period of follow-up without surgery. The remaining patients were discharged uneventfully after follow-up of up to 2 years.

Discussion

Tanner first described management of acute gastric volvulus. He described diaphragmatic repair, simple gastropexy, gastropexy and gastrocolic ligament (Tanner's operation), and partial gastrectomy. Traditional management has been open surgical reduction in volvulus with or without gastropexy [5].

The classic presentation for acute gastric volvulus (Borchardt's triad) is severe epigastric pain, retching without vomiting, and inability to pass a nasogastric tube, though in our cohort patients commonly presented with vomiting (89 %) and epigastric or chest pain (76 %). The early diagnosis of acute gastric volvulus can be difficult in elderly patients with multiple comorbidities and, as shown in this study, there can be diagnostic uncertainty on initial presentation. One-third of patients were referred in-hospital after admission under a medical team. Clinicians must maintain a high index of suspicion for a threatened stomach in the elderly patient presenting with pain, vomiting, and a CXR, suggesting a significant hiatus hernia. In the era of growing sub-specialization and centralization, one-third of our patients were referred from other hospitals within the region. This provides its own set of potential pitfalls, particularly with regard to early transfer. The need for early consultation with an Upper GI service, appropriate resuscitation, and emergent transfer cannot be stressed enough.

Our recommendation for a patient presenting with atypical chest pain and vomiting is to proceed to an early CT scan of the chest and abdomen when uncertainty exists.

Table 1 Operative approach, findings, and definitive management

	<i>n</i>
<i>Operative approach</i>	
Conservative	8
Progress to elective operation	3
Laparoscopic	7
Laparoscopic to open	2
Laparotomy	19
Additional thoracotomy	1
<i>Operative findings and management</i>	
Gastric necrosis	4
Sleeve gastric resection	3
T-tube and gastric patch	1
Mortality	1
Mediastinal gastric perforation	3
Omental patch	2
Proximal gastric resection, oesophagus stapled off, for delayed reconstruction	1
Mortality	1
<i>Management of defect</i>	
Hiatal repair	21
No hiatal repair	4
Diaphragm repair	3
<i>Fixation</i>	
Gastropexy	11
Anterior wrap	8
360° wrap	3

Table 2 Complications and mortality

	<i>n</i>	<i>%</i>
<i>Complications</i>		
Pneumonia	9	
Oesophageal perforation (iatrogenic)	1	
Abdominal compartment syndrome and laparostomy	1	
Prolonged ITU stay	5	
Pleural effusion	1	
Ischaemic bowel	1	
<i>Mean length of stay</i>		
Overall	9	
Laparoscopic	4	
Open	12	
<i>Mortality</i>		
Conservative	2	(11)
Operative	2	

Table 3 Paraoesophageal hernia recurrence

Initial repair	<i>n</i>	Management of recurrence
Open gastropexy	1	Conservative
Laparoscopic gastropexy	2	Open gastropexy and PEG
Open sleeve gastric resection	1	Considering surgery

This is particularly when supported by CXR findings on admission, which we have found to be a sensitive test.

A paper by Bawahab et al. [2] devised a management algorithm for acute paraoesophageal hiatus hernia centred

on water-soluble contrast studies as a defining diagnostic test for both unstable and stable patients. On the basis of our study, we would recommend CT as the pivotal investigation. Benefits of CT scan include 24-h access, speed, definition of the anatomical defect (allowing operative planning), assessment of gastric viability, and perforation (aiding decision regarding urgency of operative intervention) [6]. In comparison with contrast swallow, CT does not require an on-site radiologist. We found CT scan to be more sensitive (100 %) than endoscopy (84 %) in diagnosis, and indeed, this has been one of the major developments over the past two decades with regard to investigation and management. A previous review of 36 patients by Teague et al. [5], where CT was utilized in only two patients, highlighted the difficulty in confirming the

diagnosis using other investigations, such that in only half of patients was the definitive diagnosis made before operation. Where there is doubt concerning the diagnosis or viability of the stomach, we then proceed directly to endoscopy.

We propose a management algorithm based upon our experience (Fig. 1). Conservative management with nasogastric or endoscopic decompression was utilized in eight patients. This can be considered in those patients who have no clinical or radiological evidence of gastric compromise,

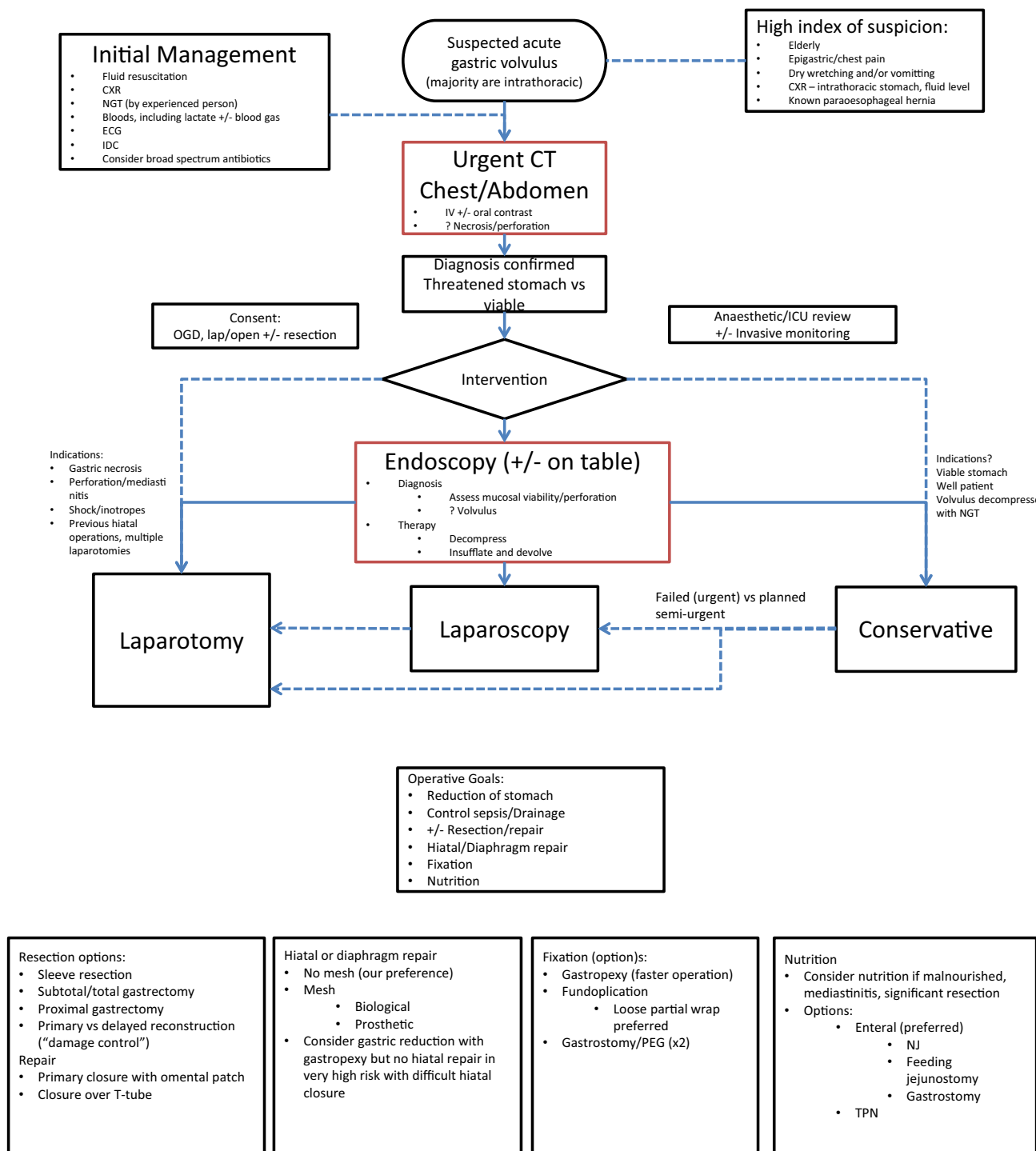


Fig. 1 Management algorithm

and acute symptoms settle with decompression. This is particularly relevant in the frail patient with high operative risk. Though acute decompression can reduce the volvulus, there is a significant likelihood of repeat volvulus as the underlying diaphragmatic defect remains and the stomach has not usually been reduced out of the chest. Consideration for semi-elective repair is warranted.

The key to management is early recognition. Patients can typically be elderly with multiple comorbidities and therefore have a limited physiological reserve. The median age in this cohort was 73 years, with 73 % having an ASA of 3 or 4. Initial management includes fluid resuscitation, broad spectrum IV antibiotics (in the setting of potential gastric necrosis/mediastinitis), oxygen supplementation, analgesia, urinary catheter, and bloods including a lactate \pm a blood gas. Passage of an NGT may enable gastric decompression though should be performed by someone with experience and knowledge of the underlying pathology, as this may not be possible beyond the GOJ in the setting of an organo-axial volvulus.

Early CT of the chest and abdomen is performed, preferably directly from the emergency department. Findings suggestive of gastric necrosis include pneumatosis of the gastric wall, free gas and fluid outside the gastric wall within the hernia sac, and lack of contrast enhancement of the gastric wall.

A decision must be made regarding the need for immediate operative intervention, endoscopy, or NG decompression.

Endoscopy plays both a diagnostic and therapeutic role. The volvulus can be decompressed to some degree, though often it is not possible to pass the endoscope across the pylorus into the duodenum. The viability of the gastric mucosa can be assessed. Paradoxically, like a sigmoid volvulus, trial distension of the stomach can at times lead to unfolding of the volvulus. A well-vascularized stomach, which has been assessed and decompressed with an NG placed, can enable consideration of operative intervention on a semi-urgent basis in daylight hours. We prefer to perform endoscopy in the operating theatre with anaesthetic support rather than in the endoscopy suite. Access to endoscopy at the time of operation is highly advisable.

Early anaesthetic and intensive care involvement is critical in unwell patients, particularly those presenting with shock and intrathoracic gastric perforation. This may include arterial and central venous access for invasive monitoring, targeted fluid resuscitation, and inotropic support. Large incarcerated paraoesophageal hernias can cause cardiac compression, compromising cardiac output, or arrhythmias.

As the exact management strategy may not be known until the stomach is properly assessed, we consent patients for all possibilities, including on-table endoscopy, with the

potential for laparoscopy or laparotomy to repair the problem. The patient is counselled that this may include a hiatal repair and potentially a gastric or oesophageal resection \pm thoracotomy, or feeding jejunostomy or gastrostomy.

Indications to proceed directly to laparotomy include confirmed perforation/mediastinal contamination, shock/hypotension, and severe sepsis. Consider placement of a bougie to assist identification of the oesophagus at laparotomy. The usual considerations for giant paraoesophageal hernia repair apply, including preservation of the vagal nerves. In particular, the short gastric vessels should be preserved to optimize gastric perfusion. There is good support in the literature for laparoscopy where feasible, and this should be considered when appropriate [7–9].

With regards to hiatal repair and fixation, in the frail elderly patient with a large hiatal defect consideration may be given to simply reducing the stomach with fixation via anterior abdominal and diaphragmatic gastropexy without hiatal repair. This can be an effective but rapid option, significantly reducing the operative time. In the overwhelming majority of patients, hiatal repair is achievable; however, we do not advocate the use of mesh for the repair of the hiatus, particularly in the setting of contamination. The choice between gastropexy and fundoplication to fix the stomach is left to individual. As the fundoplication is primarily for fixation rather than reflux, we tend towards a loose anterior 180° wrap. The decision between gastropexy and fundoplication may depend on the status of the patient during surgery and technical considerations such as previous surgery or doubt in the integrity of the stomach. We have found good outcomes for both approaches in this series and would advocate either approach as options to the operating surgeon. A gastropexy may be preferred where there is known oesophageal dysmotility.

Traditionally, Tanner described a number of methods of gastropexy in open surgery. The Tanner's gastropexy involves division of the gastrocolic ligament/omentum along with gastropexy. This is postulated to reduce the upward traction on the greater curve on the stomach to reduce the risk of recurrence [10]. With the advent of laparoscopic surgery, an anterior gastropexy has been favoured for technical ease. This is based upon fixation of the greater curve of the stomach to the anterior abdominal wall [11]. This has shown favourable results with comparable recurrence rates [12].

In agreement with other series, we would support excision of the hernia sac during dissection when possible. This is believed to reduce recurrence rates following hiatal dissection [4]. We support this view for the reason that a retained hiatal sac permits a recurrence to return to its original position. We also feel there is a risk that adhesions to the sac not dissected during surgery will also encourage

recurrence. It has been accepted that sac dissection has risks of bleeding or damage to the stomach [5]. For this reason, we would advocate dissection only where it is felt technically feasible.

A proportion of the patients in our cohort presented with gastric necrosis. The majority of gastric necrosis perforation occurs at the fundus. Owing to this favourable anatomical location for access, this can be either repaired or excised with a sleeve resection (usually with linear stapler).

The commonest complications following presentation with acute volvulus are pneumonia and prolonged ICU stay due to respiratory recovery. This relates to the direct surgical effects from a thoracic reduction and the comorbidities of this presenting group. In our series, the length of stay was significantly shorter in the laparoscopic group, but this is confounded by a selection bias as this group were stable on initial assessment with favourable surgical options.

There is still a significant mortality associated with the acute gastric volvulus. A mortality rate of 11 % is indicative of the fact that the “threatened stomach” presents in an elderly age group with significant comorbidity and perioperative risk. These patients do not tolerate a delay in diagnosis, particularly in the setting of gastric necrosis or perforation.

Conclusions

Acute gastric volvulus requires early resuscitation and diagnosis. CT should be favoured in assessment and an NG tube placed promptly. A conservative management may be considered safe in stable patients. Surgical management should be prompt for unstable patients. Gastric ischaemia or perforation has a mortality of 30 %. Laparoscopic repair

has a shorter postoperative stay but has a higher recurrence rate. Surgery for patients without gastric ischemia has good long-term outcomes with minimal morbidity.

Compliance with ethical standards

Disclosures D. Light, D. Links and M. Griffin have no conflicts of interest to declare.

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