CASE REPORT

Gastric volvulus: a potentially fatal cause of acute abdominal pain

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SUMMARY

A woman aged 67 years attended the emergency department with acute abdominal and back pain of 1-day duration with associated vomiting. The patient had multiorgan failure. Resuscitation was started with intravenous fluids and vasopressors. An abdominal CT scan was completed which confirmed the diagnosis of acute gastric volvulus. The patient was successfully resuscitated from a cardiorespiratory arrest during transfer to the operating theatre. The patient subsequently underwent a total gastrectomy with stapling of the oesophageal and duodenal stumps. The abdomen was packed and left open as a laparostomy with a planned relook 48 hours later was to be performed. Unfortunately, the patient continued to deteriorate postoperatively in the intensive care unit despite maximum organ support for multiorgan failure. A decision was made to withdraw treatment and the patient died 10 hours postoperative. This case illustrates the presentation of acute gastric volvulus at a late stage and the high mortality rate associated with it.

BACKGROUND

Acute gastric volvulus is a rare cause of abdominal pain.¹ The presentation may be of sudden onset along with haemodynamic instability and is associated with high morbidity and mortality.² A high index of suspicion is the key to successful management and early surgical intervention is required.²

CASE PRESENTATION

A woman aged 67 years attended the emergency department with acute abdominal and back pain of 1-day duration with associated vomiting. The patient had a medical history of hiatus hernia, myocardial infarction, primary coronary intervention with two stents, hypertension and hyperlipidaemia. She had a surgical history of laparoscopic cholecystectomy 6 weeks prior to her attendance to the emergency department and a hysterectomy for endometrial cancer many years previously. On arrival to the emergency department, the patient was assessed systematically using an 'ABCDE' approach. Her airway was patent. She was tachypnoeic with an oxygen saturation of 85% on 15 L/min of oxygen via a non-rebreathing mask. She had a rapid weak pulse and her blood pressure was unrecordable. Intravenous access was established with peripheral cannulae and a central line. Resuscitation was started with intravenous fluids and vasopressors. Non-invasive monitors were attached and invasive monitoring in the form of an

arterial line instituted. Her Glasgow coma score was 15/15. She was hypothermic with a tympanic temperature of 34.8°C. Abdominal examination showed generalised distension and tenderness which was tympanic on percussion.

INVESTIGATIONS

Following initial resuscitation, an abdominal CT scan was performed. This demonstrated '*Grossly distended stomach. Gastric malrotation with 11 cm part of the pylorus and gastro-duodenal junction herniated in the thorax. Intra-peritoneal free air in keeping with a perforated viscus, most of it in relation to the posterior aspect of the distended stomach. Mild to moderate ascites*'. See figures 1–4. Initial arterial blood gas analysis showed that the lactate levels were out of range and severe acidosis was present. pH was 6.851, pCO₂ was 9.87 kPa, pO₂ was 58.06 kPa on an FiO₂ value of 0.85. Base excess was 21.6 and HCO₃⁻ was 12.6. Haemoglobin dropped from 15.1 to 8.6 g/dL. White cell count was 25.6×10⁹/L. Her coagulation profile deteriorated with time and she was hypothermic. The following figures show her initial and subsequent coagulation profile results. PT 10.9 (18.2) s, APTT 21.8 (58.4) s, fibrinogen 3.9 (1.3) g/L and platelets 374 (211)×10⁹/L. Acute chronic

Figure 1 Coronal section of the abdominal and chest CT scan without oral contrast showing grossly distended stomach.

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Figure 2 Coronal section of the abdominal and chest CT scan without oral contrast showing gastric volvulus, herniation of part of the stomach into the chest and free intraperitoneal air.

kidney injury was reported with an eGFR of 26 mL/min/1.73 m² against a baseline eGFR value of 52 mL/min/1.73 m².

DIFFERENTIAL DIAGNOSIS

Given the presenting symptoms of abdominal and back pain, a ruptured abdominal aortic aneurysm was one of the initial differential diagnoses; hence, an abdominal CT scan was performed.

TREATMENT

Resuscitation included intravenous fluids, packed red blood cells and vasopressors. A nasogastric tube was inserted which drained 2 L of bloody aspirate. Resuscitation continued in the intensive care unit in preparation for operative intervention. The patient deteriorated quickly and went into cardiorespiratory arrest during transfer to the operating theatre. A return of spontaneous circulation was achieved by the treatment of a shockable rhythm in line with Advanced Life Support principles. Intraoperative findings showed grossly distended gangrenous stomach with organoaxial rotation and 2 L of haemorrhagic fluid within the peritoneal cavity. The patient subsequently underwent a total gastrectomy with stapling of the oesophageal and duodenal stumps as a life-saving procedure. The abdomen was packed and left open as a laparostomy with a planned relook 48 hours was performed later along with consideration of a jejunostomy.

OUTCOME AND FOLLOW-UP

Unfortunately, the patient continued to deteriorate postoperative in the intensive care unit despite maximum organ support for multiorgan failure. A decision was made to withdraw treatment the following morning and the patient died 10 hours

Figure 3 Axial section of the abdominal CT scan showing distended twisted stomach.

postoperative. Histopathological examination confirmed the presence of mucosal infarction with accompanying submucosa, oedema and congestion.

DISCUSSION

The true incidence of gastric volvulus is hard to estimate.³ In adults, it affects women and men equally in the fifth decade of life.^{4 5}

Anatomically, the stomach can rotate along two axes causing organoaxial or mesenterico-axial volvulus, or a combination of both.¹ In organoaxial volvulus, the stomach wraps along its long axis, up to 360°, causing obstruction and compromising its own blood supply. Organoaxial volvulus is more common than mesenterico-axial volvulus and is usually associated with defects in the diaphragmatic hiatus.^{1 4} It is associated with higher morbidity than mesenterico-axial volvulus and can lead more frequently to strangulation and gangrene.⁴ In a case series of 25 patients with acute gastric volvulus, Carter *et al*⁴ described gastric necrosis in 28% of patients.

Gastric volvulus can be primary or secondary to other factors. In primary gastric volvulus, the mechanism is attributed to laxity of the ligaments supporting the stomach, that is, the gastocolic, gastrolenal, gastrohepatic and gastrophrenic ligaments. On the other hand, secondary gastric volvulus is more common and is caused by predisposing factors that facilitate rotation of the stomach such as hiatus hernia, traumatic diaphragmatic hernia, gastric tumours and ulcers, diaphragmatic eventration, phrenic nerve palsy and adhesions from other surgeries.^{1 6 7}

PRESENTATION

Presentation of gastric volvulus can vary from non-specific symptoms such as upper abdominal discomfort, hiccups and bloating in chronic gastric volvulus to life-threatening

Figure 4 Sagittal section of the abdominal and chest CT scan showing gastric volvulus, free intraperitoneal fluid and air leak.

emergency in the form of severe sudden-onset upper abdominal pain with vomiting in acute gastric volvulus.^{4 8} In 1904, Borchardt described upper abdominal pain, retching without vomiting and the inability to pass a nasogastric tube into the stomach as the classical triad of gastric volvulus presentation. Minimal abdominal examination findings may be apparent when the stomach is in thorax.⁴ Gastric volvulus can also be associated with haematemesis, nausea and hiccups. Haemorrhage may signal ischaemia and mucosal sloughing.⁹

INVESTIGATIONS

Initial investigations include plain X-rays which may show a gas-filled stomach in the thorax.⁴ Contrast-enhanced studies are also beneficial in the diagnosis of volvulus.⁹ The term 'upside-down stomach' has been described with some confusion. Some authors have described organoaxial volvulus as an 'upside-down stomach' where the greater curvature is displaced superiorly and the lesser curvature inferiorly.^{10 11} However, other authors have used the term to describe mesenterico-axial volvulus where the antrum is displaced superiorly and the fundus inferiorly.¹²

The abdominal CT scan has transformed the diagnosis of gastric volvulus. It can demonstrate the anatomical defects, show evidence of perforation, pneumatosis in the stomach wall and allow the exclusion of other pathologies.^{11 12} Oesophagogastrroduodenoscopy (OGD) may also be of help. In acute gastric volvulus, it may show mucosal congestion and ulceration together with the inability to pass the scope through the pylorus.¹³ In chronic gastric volvulus, OGD has also been used to restore the normal anatomical position of the stomach inside the abdomen. Care should be taken not to cause perforation while attempting this manoeuvre. Hence, all patients

should be assessed for possible ischaemia or perforation and, if suspected, OGD should not be attempted.^{10 13}

TREATMENT

The initial management for acute gastric volvulus includes resuscitation, placement of a nasogastric tube, gastric decompression and resting in the prone position.^{5 6} Emergency laparotomy is the option of choice to prevent complications such as strangulation, gangrene and perforation.^{2 4} The aim of the surgical procedure is to restore the normal anatomical position of the stomach and to prevent further episodes by correcting the predisposing factors with or without gastropexy.^{1 4} In the event of complications such as gangrene and perforation, gastrectomy or partial gastrectomy should be performed. The approach to surgery can be performed by open and laparoscopic techniques.^{7 14 15}

In 1968, Tanner described methods for the surgical management of chronic gastric volvulus emphasising that gastropexy must be considered in cases of primary gastric volvulus and the importance of the management of predisposing factors in cases of secondary gastric volvulus. Some of the options include gastrectomy, repair of diaphragmatic hernia, release of adhesions and bands which may contribute to volvulus and gastropexy with colonic displacement (Tanner's procedure).¹ Gastropexy can be achieved using different techniques.¹⁴ In the simplest form, the stomach is sutured to the anterior abdominal wall.⁶ However, simple gastropexy without repair of the predisposing factors in cases of secondary gastric volvulus is associated with a high risk of recurrence.^{1 6}

More recently, a laparoscopic approach has been adopted to manage acute gastric volvulus.^{7 14 15} Untwisting the stomach and repair of secondary defects such as hiatus hernia have been treated successfully using a laparoscopic approach.^{7 14 15} Performing antireflux surgery in the same sitting, when repairing the paraoesophageal defect, may be attempted.^{14 15}

In a case series of 29 patients who presented with acute gastric volvulus, 13 underwent laparoscopic surgery with 2 conversions to open surgery, another 13 underwent open surgery and 3 were treated conservatively. None of the patients had any major complications.⁷

Other less invasive methods can be attempted for patients with acute gastric volvulus, especially those who are at high surgical risk due to their comorbidities. One of these methods is the use of dual endoscopy in the form of OGD to untwist the volvulus, with fixation with a PEG tube.¹⁶ A combination of a laparoscopic reduction in acute gastric volvulus and fixation with a PEG tube have also been reported as another successful method of gastropexy.^{17 18} However, performing gastropexy endoscopically using a PEG tube has its own limitations due to the risk of recurrence consequent to inadequate fixation, persistence of predisposing factors such as hernias and adhesions from other surgeries and the potential that the fixation point will act as an axis for further rotations.¹⁹

Learning points

- ▶ Acute gastric volvulus is an important rare cause of acute onset abdominal and back pain.
- ▶ A high index of suspicion, bearing in mind the predisposing factors, is important for diagnosis.
- ▶ There is a high mortality rate associated with acute gastric volvulus; hence, early surgical intervention is advised.

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