Gastric Volvulus Unassociated with Hiatal Hernia

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SUMMARY

Although para-oesophageal hiatal hernia is the commonest cause of gastric volvulus, other causes of gastric volvulus require emphasis and 16 cases of gastric volvulus unassociated with hiatal hernia are reported. Delayed presentation following diaphragmatic injury was common. It is recommended that a thoracolaparotomy be performed in these patients to facilitate reduction of the volvulus, and division of intrathoracic adhesions under direct vision.

In the secondary type of gastric volvulus accurate diagnosis is mandatory. Failure to recognize and treat associated disease will result in recurrence of the volvulus. A rational approach to the management of gastric volvulus is proposed.


Gastric volvulus is an abnormal rotation of the stomach, which may or may not be associated with symptoms. The first description of this condition was by Berti in 1886, and followed a postmortem observation. In 1920 Rosselet demonstrated a chronic recurrent volvulus by means of contrast radiography. Collective reviews by Buchanan, Dalgaard and Wastell and Ellis of more than 200 reported cases have prompted awareness of causative factors and the evolution of a system of classification. Gastric volvulus includes both rotation of the organ within the abdominal cavity and its dislocations into the thorax through an enlarged oesophageal hiatus or diaphragmatic defect. Although the complications of obstruction, haemorrhage, gangrene or perforation may occur in both situations, transgression of the diaphragm increases the risk of complications and renders spontaneous resolution unlikely.

Para-oesophageal hiatal hernia is the commonest cause of chronic gastric volvulus. We report 16 patients in whom chronic gastric volvulus was not associated with hiatal hernia. This experience has emphasized the need to identify associated aetiological factors before definitive surgical treatment, as well as the frequent occurrence of gastric volvulus as a late complication of diaphragmatic injury.

Classification

An acceptable classification, suggested by Wastell and Ellis, is based on that quoted by Sawyer et al. The percentages reflect the incidence of the various types of volvulus.

Volvulus may be organo-axial, rotation occurring around a line from the pylorus to the cardia (Fig. 1A). The less common mesenterio-axial volvulus occurs around the axis which runs from the centre of the greater curvature of the stomach to the porta hepatis (Fig. 1B). Occasionally only a part of the stomach is involved in the volvulus, usually the pyloric end. This type presents as an acute emergency with obstruction of the gastric lumen and vascular compromise. Rotation may be anterior or posterior. The transverse colon comes to lie in front of the stomach in an anterior organo-axial volvulus; the pylorus passes in front of the stomach in an anterior mesenterio-axial volvulus. Anterior rotation is much commoner than posterior rotation.

Fig. 1. Axis of rotation: A — organo-axial rotation; B — mesenterio-axial rotation.

Gastric volvulus directly related to the presence of intra-abdominal disease or defects in the diaphragm is termed ‘secondary’. Rarer associations include absence of the lung, hernia through a colostomy hiatus and carcinoma of the oesophagus.

When there is no associated abnormality or disease the volvulus is termed idiopathic. Before an idiopathic volvulus can occur there must be considerable laxity of the
gastrocolic ligaments which fix the stomach. It has been observed that in many patients the symptoms of volvulus appear after a large meal. When the stomach is full, the pylorus is approximated to the cardia, making rotation easier.

**CLINICAL MATERIAL**

Between 1971 and 1976, 16 adult patients with a radiologically confirmed diagnosis of gastric volvulus were seen. Patients suffering from para-oesophageal hiatal hernia were excluded from consideration.

Table I summarizes the clinical details of 10 patients with gastric volvulus not related to previous trauma. The clinical details of 6 patients with relevant antecedent trauma are summarized in Table II.

All patients presented with abdominal pain and vomiting, but the third component of Borchardt’s triad, viz. an inability to pass a tube into the stomach, was noticeably absent. A nasogastric tube was passed with ease in all patients. Severe haematemesis occurred in 3 patients. Gangrene of the stomach was the cause of the haematemesis in 2 patients and erosive gastritis in 1 patient. Barium or Gastrografin contrast studies of the upper gastro-intestinal tract confirmed the diagnosis in 14 of the 16 patients examined.

Congenital diaphragmatic abnormalities were present as a causative factor in 4 patients. Diaphragmatic defects in 6 patients were due to blunt or penetrating diaphragmatic injury which preceded the admission for volvulus by intervals of 6 months to 4 years. Alimentary tract lesions in the oesophagus (1), stomach (2) and duodenum (1) were detected in 4 patients. In 1 patient (case 6) both a congenital defect of the hemidiaphragm and a gastric ulcer were present. Idiopathic volvulus was diagnosed in 4 patients.

In the management of the non-traumatic group of patients, both conservative measures and a variety of operative procedures were used (Table I). Two patients with mesenterio-axial volvulus (cases 3 and 9) responded well to dietary modification. Plication of a congenital eventration of the stomach with herniation of the body of the stomach into the left thorax (Figs 2 and 3).

At laparotomy partial eventration of the left hemidiaphragm was discovered, with the stomach projecting into the defect as an organo-axial volvulus. Some thickening of the lesser and greater omentum was noted. The stomach was reduced and the diaphragm repaired by plication. Gastroscopy was not attempted. The post-operative course was uneventful.

Three weeks after the operation the patient complained of a recurrence of abdominal pain, vomiting, epigastric distension and melaena. A repeat barium meal exam-

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**CASE REPORTS**

Two case reports are presented in detail to illustrate management problems.

**Case 6**

A 44-year-old male patient complained of abdominal pain in the left upper quadrant, vomiting of bilious fluid, upper abdominal distension and weight loss. The symptoms had been present intermittently for 2 years. There was no history of antecedent trauma. Clinical examination there was evidence of recent weight loss and dehydration. Auscultation of the chest revealed diminished air entry on the left side. No other abnormal physical signs were detected. Because of the history of vomiting a nasogastric tube was passed, which yielded increasing volumes of gastric aspirate. X-ray examination of the chest showed an air-fluid level in the left lower zone. Contrast studies demonstrated an organo-axial volvulus of the stomach with herniation of the body of the stomach into the left thorax (Figs 2 and 3).
TABLE I. CLINICAL DETAILS OF PATIENTS WITH GASTRIC VOLVULUS NOT RELATED TO TRAUMA

<table>
<thead>
<tr>
<th>Case</th>
<th>Age/Sex</th>
<th>Symptoms</th>
<th>Radiological findings</th>
<th>Type</th>
<th>Aetiology</th>
<th>Direction</th>
<th>Severity</th>
<th>Treatment</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28/F</td>
<td>Abdominal pain</td>
<td>1. Gastric volvulus</td>
<td>Organo-axial</td>
<td>Secondary</td>
<td>Anterior</td>
<td>Chronic</td>
<td>Repair of diaphragm, gastropexy, colon transposition</td>
<td>Symptom-free</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Eventration left diaphragm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>45/M</td>
<td>Dysphagia, abdominal pain, vomiting</td>
<td>1. Mid-oesophageal carcinoma</td>
<td>Organo-axial</td>
<td>Secondary, ?</td>
<td>Anterior</td>
<td>Acute</td>
<td>Nil</td>
<td>Pre-operative death</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Volvulus with acute gastric dilatation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>68/M</td>
<td>Abdominal pain, flatulence, vomiting</td>
<td>Visceroptosis, gastric volvulus</td>
<td>Mesenterio-axial</td>
<td>Idiopathic</td>
<td>Anterior</td>
<td>Chronic</td>
<td>Conservative</td>
<td>Spontaneous reduction</td>
</tr>
<tr>
<td>4</td>
<td>54/M</td>
<td>Abdominal pain, vomiting</td>
<td>Gastric volvulus, chronic duodenal ulcer</td>
<td>Organo-axial</td>
<td>Secondary</td>
<td>Anterior</td>
<td>Chronic</td>
<td>Vagotomy and antrectomy</td>
<td>Symptom-free</td>
</tr>
<tr>
<td>5</td>
<td>31/M</td>
<td>Abdominal pain, copious vomiting</td>
<td>1. Gastric volvulus with eventration left hemidiaphragm</td>
<td>Organo-axial</td>
<td>Secondary</td>
<td>Anterior</td>
<td>Acute</td>
<td>Gastropexy, colon transposition</td>
<td>Recurrence of volvulus. Refuses further surgery for gastric ulcer and volvulus recurrence</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Postop. barium meal showed gastric ulcer</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>44/M</td>
<td>Abdominal pain, vomiting</td>
<td>1. Eventration left diaphragm, gastric volvulus</td>
<td>Organo-axial</td>
<td>Secondary</td>
<td>Anterior</td>
<td>Chronic</td>
<td>Repair of diaphragm, reduction of volvulus</td>
<td>Recurrence of volvulus. Treated by partial gastrectomy with good result</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Postop. barium meal showed gastric ulcer</td>
<td></td>
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</tr>
<tr>
<td>7</td>
<td>19/F</td>
<td>Abdominal pain, vomiting</td>
<td>Gastric volvulus, diaphragmatic defect</td>
<td>Organo-axial</td>
<td>Secondary</td>
<td>Anterior</td>
<td>Acute</td>
<td>Repair of Bochdalek-type hernia</td>
<td>Symptom-free</td>
</tr>
<tr>
<td>8</td>
<td>28/M</td>
<td>Abdominal pain, hematemesis due to aspirin</td>
<td>Gastric volvulus</td>
<td>Organo-axial</td>
<td>Idiopathic</td>
<td>Anterior</td>
<td>Chronic</td>
<td>Conservative</td>
<td>Symptom-free</td>
</tr>
<tr>
<td>9</td>
<td>60/M</td>
<td>Abdominal pain, congestive cardiac failure</td>
<td>Gastric volvulus</td>
<td>Mesenterio-axial</td>
<td>Idiopathic</td>
<td>Anterior</td>
<td>Chronic</td>
<td>Conservative — poor operative risk</td>
<td>Occasional pain and vomiting</td>
</tr>
<tr>
<td>10</td>
<td>40/M</td>
<td>Abdominal pain, vomiting</td>
<td>Gastric volvulus, vomiting</td>
<td>Organo-axial</td>
<td>Idiopathic</td>
<td>Anterior</td>
<td>Chronic</td>
<td>Gastropexy, colon transposition</td>
<td>Symptom-free</td>
</tr>
</tbody>
</table>
A 31-year-old female patient complained of epigastric pain and postprandial vomiting of 1 week's duration. The pain was aggravated by meals and relieved by antacids and vomiting. Three years previously she had been treated for a haemothorax complicating a stab wound of the left lower thorax. Serial chest radiographs at that time showed complete resolution of the haemothorax and full lung expansion.

On clinical examination the only abnormality detected was diminished air entry at the left lung base. X-ray examination of the chest revealed blunting of the left costophrenic angle and the presence of an endotracheal air-fluid level (Fig. 5). Because of her peptic ulcer-type ination demonstrated recurrence of the volvulus and the presence of a large gastric ulcer (Fig. 4). Fibre-optic endoscopy and biopsy of the ulcer margin confirmed the diagnosis of a benign gastric ulcer. A partial gastrectomy with Billroth I anastomosis was performed, with complete remission of symptoms and no recurrence of the volvulus.

**Comment:** This patient had two abnormalities which contributed to the rotation of the stomach. Despite correction of the obvious aetiological factor, the diaphragmatic defect, failure to recognize and treat the gastric ulcer resulted in recurrence of the volvulus.

**Case 13**

A 31-year-old female patient complained of epigastric pain and postprandial vomiting of 1 week's duration. The pain was aggravated by meals and relieved by antacids and vomiting. Three years previously she had been treated for a haemothorax complicating a stab wound of the left lower thorax. Serial chest radiographs at that time showed complete resolution of the haemothorax and full lung expansion.

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**Fig. 3. Organo-axial volvulus with herniation of the stomach into the thorax.**

**Fig. 4. Fibro-optic endoscopy of the stomach showing ulceration.**
Fig. 4. Recurrence of volvulus with a large gastric ulcer (arrow).

Fig. 6. Chest radiograph: the tip of the endoscope lies near the left clavicle.

Fig. 5. Blunting of the left costophrenic angle with an air-fluid level in the left hemithorax.

symptoms fibre-optic endoscopy examination of the stomach and duodenum was attempted. Failure to visualize the pylorus prompted the taking of a chest radiograph which showed the tip of the endoscope near the left clavicle (Fig. 6). Barium contrast studies confirmed the presence of an organo-axial rotation of the stomach with obstruction of the pylorus.

At thoracotomy an 8-cm defect was found in the left hemidiaphragm through which the stomach had undergone an organo-axial volvulus, bringing with it the transverse colon. Reduction of the stomach and colon was achieved after division of extensive adhesions between the abdominal viscera, pericardium and lungs. The diaphragmatic defect was repaired in two layers with non-absorbable suture material. No gastropexy was performed. The postoperative course was uneventful, and clinical and radiological evaluation 18 months later showed no recurrence of volvulus.

Comment: Thoracotomy allowed division of extensive adhesions under direct vision and facilitated reduction of the volvulus, with return of the viscera to the abdominal cavity.

DISCUSSION

The stomach is perhaps the most mobile intra-abdominal organ and intermittent episodes of rotation unassociated with symptoms probably occur more frequently than appreciated. The condition may occur at any age, and sex incidence for all types is equal. Organo-axial volvulus occurs more commonly than does mesenterio-axial volvulus and in this series 14 of the 16 cases were organo-axial in type.
An acute volvulus constitutes an abdominal emergency, with either obstruction or strangulation of the stomach, and requires expeditious surgery. In the non-traumatic group (Table I), 3 of the 10 patients were in this category, but in the post-traumatic group (Table II), 5 of the 6 patients presented with acute gastric volvulus. Both deaths in this series were associated with an acute presentation. Because of the abundant blood supply of the stomach, gangrene due to acute volvulus is a rarity. However, 2 patients, both in the post-traumatic group, developed gangrene of part of the stomach wall, which resulted in the death of 1 patient before emergency surgery could be performed.

Secondary gastric volvulus is much commoner than idiopathic volvulus, therefore the diagnosis of gastric volvulus necessitates a thorough search for possible causative factors. Failure to discover and adequately treat contributing disease may result in a recurrence of the volvulus (cases 5 and 6). The commonest association is with para-oesophageal hiatal hernia, but other congenital and acquired diaphragmatic defects may also form abnormal spaces into which the stomach is attracted. Congenital diaphragmatic defects were present in 4 patients, but trauma was the major contributing factor in this series, affecting 6 of the 16 patients. All 6 patients were asymptomatic after the initial traumatic episode, and an interval of 6 months to 4 years elapsed from the time of injury to the diagnosis of the volvulus. Recognition of diaphragmatic injury as an aetiological factor is important, because operative reduction of the volvulus and diaphragmatic repair are greatly facilitated by a trans-thoracic approach.

Other associated conditions may result in abnormal adhesions in the axis of rotation, and include gastric ulcer, gastric carcinoma, pancreatic carcinoma, duodenal ulcer, inflammatory adhesions and oesophageal carcinoma. One-third of the reported cases of gastric volvulus are idiopathic in this series no obvious aetiological factor could be detected radiologically or endoscopically in 25% of cases.

The diagnosis of acute gastric volvulus may be suggested by 'Borchardt's triad'. Contrast studies of the gastro-intestinal tract will confirm the presence of volvulus in both the acute and chronic types. The secondary forms may present the clinical picture of the basic lesion, and the associated disease should be diligently sought for.

Organo-axial volvulus may simulate cascade configuration of the stomach, especially when the stomach lies in a transverse plane. Like volvulus, 'cascade stomach' may be idiopathic, or secondary to intrinsic or extrinsic gastric lesions causing fixation of the posterior gastric wall to the parietes. The features which differentiate 'cascade stomach' from gastric volvulus have been clearly defined by Azmy and Marey.

Acute gastric volvulus and symptomatic chronic gastric volvulus require operative treatment. If the volvulus is secondary in type, definitive treatment must include that of the associated abnormality. The possible operative procedures used to prevent recurrence of volvulus have been reviewed by Tanner: (i) repair of diaphragmatic hernia; (ii) division of adhesive bands; (iii) gastroplasty; (iv) gastroplasty with subphrenic colonic displacement; (v) partial gastrectomy; (vi) gastrojejunostomy; (vii) Opolzer's operation of fundo-antral gastropexy; (viii) repair of evagination of the diaphragm. He deprecates the use of gastrectomy, simple gastroplasty and Opolzer's operation to prevent recurrence of volvulus, but recommends gastroplasty with colonic displacement. In this procedure the stomach is fixed to the abdominal wall; the transverse colon is separated from the stomach and placed in the subdiaphragmatic space created when the rotated stomach is reduced.

CONCLUSIONS

The rational management of gastric volvulus involves: (i) recognition that the condition may be idiopathic or secondary; (ii) treatment of associated conditions on their merits; (iii) awareness of diaphragmatic injury as a possible causative factor; and (iv) the use of gastroplasty and subphrenic colonic displacement where indicated to prevent recurrence.

REFERENCES