CASE REPORT

A twist in the tale

Rishi Malhotra,¹ Rejoo Daniel,² Sanja Besarovic²¹Hull Royal Infirmary, Hull, Yorkshire, UK²Department of Paediatric Surgery, Hull Royal Infirmary, Hull, Yorkshire, UK**Correspondence to**Rishi Malhotra,
rishi.malhotra@nhs.net**SUMMARY**

A 4-year-old girl presented with retching and abdominal colic and was initially diagnosed with gastroenteritis. However, progressive pain and epigastric distension led to a surgical review and she was discovered on CT scanning to have a gastric volvulus. She required urgent laparotomy to decompress the stomach and repair a perforation on the lesser curvature. Her recovery was complicated by sepsis and reperforation necessitating further laparotomy, at which time she also underwent gastropexy. The patient required long-term jejunal feeding in the hospital and at home before finally returning to normal diet and activity.

BACKGROUND

This case reminds us of a condition that is well documented, but rare in paediatric surgery. A paediatric clinician may only come across one such acute case in their career, but failure to respond appropriately may have dire consequences. The key learning points include the nature of gastric volvulus, early presenting features and risks of delayed management including risk of mortality.

CASE PRESENTATION

We present a case of a fit and well 4-year-old girl with a rare cause of an acute abdomen.

She presented to accident and emergency with few hours history of colicky abdominal pain, a small amount of loose stool and recurrent bouts of retching, although only bringing up saliva. She was admitted to the paediatrics department with an initial differential of gastroenteritis. On examination, she had a soft abdomen with no distension and no focal tenderness. She was haemodynamically stable and was not having fever. Her urine showed no evidence of infection and blood test revealed a normal amylase, C reactive protein and renal function but a mild leukocytosis. An abdominal radiograph was taken and did not raise concerns. The patient was unable to maintain oral intake and thus kept on intravenous fluid overnight. Unfortunately, she continued to retch, and the abdominal pain became constant, refractory to simple analgesia. This prompted a surgical opinion but the surgical trainees that reviewed the patient were none the wiser and eventually the consultant paediatric surgeon was called in. By this time some distension was clinically evident but no peritonism. The consultant then reviewed the abdominal film and observed a grossly distended stomach shadow that was missed by the paediatricians, radiologist and surgeons (figure 1). Insertion of a nasogastric (NG) tube was attempted by the consultant but abandoned as progress of the tube was blocked.

Figure 1 An abdominal radiograph showing central opacification of distended stomach.

The patient underwent an urgent abdominal CT with intravenous contrast that confirmed a mesenteroaxial (MA) volvulus with the antrum/pylorus lying superior and posterior to the gastro-oesophageal junction (figures 2 and 3). No free air was seen on the scan to indicate a perforation.

Figure 2 A CT scan axial cut demonstrating mesenteroaxial gastric volvulus.

CrossMark

To cite: Malhotra R, Daniel R, Besarovic S. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2012-007905

Figure 3 A CT scan coronal cut demonstrating mesenteroaxial gastric volvulus.

The patient was urgently taken to theatre for a laparotomy where the extremely distended stomach was decompressed (through minor gastrotomy) allowing it to be untwisted. Part of the spleen initially looked ischaemic but the normal colour returned after correcting the volvulus, indicating the volvulus was causing vascular compression. A linear perforation was found on the lesser curvature extending to the posterior wall of the stomach. Repair of the perforation was difficult as the vagal branches had to be avoided.

No anatomical abnormalities were identified that could have predisposed to volvulus. The stomach required stabilisation to the abdominal wall to prevent recurrence, but as the stomach wall was stretched and there was concern for ischaemia, the consultant surgeon decided to minimise gastric incisions—thus a gastrostomy was made using the opening initially made for decompression. This served as a gastropexy while facilitating drainage postoperatively.

The girl was supported with total parental nutrition and gastric aspirations were monitored. Unfortunately she became septic a week later from infection at the gastrostomy site and a new gastric perforation. She therefore underwent a relaparotomy to drain and close the abscess at the gastrostomy and repair the new perforation. This time a formal gastropexy was also performed. A new gastrostomy (for drainage) and a jejunostomy (for feeding) were also created.

OUTCOME AND FOLLOW-UP

The patient recovered well with antibiotics and enteral feeding thereafter. She was discharged 26 days from the date of admission with jejunostomy feeds and parents were shown how to aspirate gastric contents through a gastrostomy if required for distension/vomiting. By 2 months from the date of discharge, oral feeding was fully tolerated and the gastrostomy and jejunostomy tubes were endoscopically removed. No further complications/recurrence have developed within a year of follow-up.

DISCUSSION

A gastric volvulus is caused by the rotation of the stomach of at least 180° about an axis.¹ The stomach may twist along two axes, causing organoaxial (OA) or MA volvulus.² OA rotation occurs on an axis between the gastro-oesophageal junction and the pylorus resulting in the greater curvature lying superior to the lesser curvature. In MA volvulus, the axis plane cuts through both curvatures. Rotation causes the antrum to rise superiorly, approximating the pylorus and gastro-oesophageal junction. A mixed-type (MT) volvulus has features of both types of volvulus.

In MA and MT volvulus, twisting is described to occur on a narrow pedicle,³ compromising blood supply and thus resulting in obstruction and gastric ischaemia.⁴ MA volvulus is often secondary to anatomical abnormalities, especially related to the diaphragm.³ In OA volvulus, obstruction occurs but vascular compromise is unlikely. Chronic gastric distension predisposes to OA volvulus⁴ and this may occur intermittently. The stomach is supported in its normal position by the gastrocolic, gastrosplenic, gastrohepatic and gastrophrenic ligaments as well as the anchorage of the retroperitoneal duodenum and at the oesophageal hiatus.⁵ Congenital absence or abnormalities of these ligaments has been implicated in the aetiology of volvulus development.^{6–7} On the other hand, the volvulus may be secondary to splenic or diaphragmatic conditions as detailed by Cribbs *et al*⁸ in figure 4.

Cribbs *et al*⁸ have conducted a recent thorough literature review of 581 published cases of gastric volvulus from 1929 to 2007. Their main findings are highlighted in figure 4. A total of 252 were acute presentations of which 47 were acute on chronic. It is worth noting that all but one of the 47 acute-on-chronic cases were of the OA type, highlighting its increased tendency for intermittent symptoms. Therefore out of the 205 new acute cases, 44% were OA and 50% were MA. It is also clear that the younger children are most commonly affected, and risk declines with age among paediatric populations. Associated abnormalities which could precipitate a volvulus were found in the majority of acute cases. Diaphragmatic eventration and hernias were the most common culprits, followed by splenic abnormalities such as asplenia or wandering spleen.

The classic triad of symptoms include epigastric pain, dry retching and failure to pass an NG tube.⁹ Figure 4 highlights the major presenting features of acute gastric volvulus accumulated by Cribbs *et al*⁸—vomiting, distension and abdominal pain were the most noted symptoms. Chronic gastric volvulus has been described as more common, but the extent of this may be hard to measure as it may be frequently under diagnosed.⁶ Such children tend to have recurrent attacks of vomiting, distension, failure to thrive, gastric reflux or recurrent chest infections.⁸

Typical findings on abdominal radiographs of acute fulminant volvulus showed marked spherical dilation of stomach with little or no distal bowel gas pattern. This is the most common

581 English published cases of $\geq 180^\circ$ non transient gastric volvulus in patients

329 chronic/recurrent/intermittent cases (57%)

71% ≤ 12 months of age; 85% were of OA type

252 acute cases (43%)

47 of these were acute-on-chronic, of which 46 were OA type

252 ACUTE CASES

Ages:

21%	<1 month old
37%	1 – 12 months
27%	1 – 5 years
10%	6 – 12 years
4%	13 – 18 years

Type of volvulus:

54%	organoaxial
41%	mesenteroaxial
2%	combined
3%	not stated

Signs and symptoms:

Non Biliious vomiting	75%
Epigastric distension	47%
Abdominal pain	34%
Respiratory distress	11%
Cyanosis	10%
Haematemesis	9%
Apnoea	8%
Dyspnoea	6%

Associated abnormality:

None identified	31%
Diaphragmatic eventration	25%
Congenital diaphragmatic hernia	17%
Para-oesophageal hernia	7%
Intestinal malrotation	7%
Wandering spleen	6%
Asplenism	6%
Hiatus hernia	5%

Management and Mortality

89% Surgical – 5.3% mortality during/post op

35% open gastropexy
23% open gastrostomy tube placement
16% CDH repair
14% diaphragmatic plication
9% laparoscopic anterior gastropexy
1.5% laparoscopic fundoplication
0.5% laparoscopic gastrostomy tube placement

10% non-surgical – 15.7% mortality

Figure 4 Summary of key findings from Cribbs *et al* literature review.

finding, but there may also be elevated diaphragm or air fluid levels visible in stomach. Occasionally, the anatomy of the stomach can be delineated on a plain film to suggest the likely volvulus pattern.³ Upper gastrointestinal barium studies have been useful in diagnosing volvulus and delineating the axial characterisation. It is thus recommended as the gold standard investigation.^{3 10} Occasionally, CT scans may be required to confirm the diagnosis and is useful in picking up other pathology. The classic image of two air–fluid levels in the stomach, separated by gastric pneumatosis,³ has also been witnessed in our case (figures 2 and 3). However, waiting for CT scanning should not lead to delays in diagnosis, as progression to gastric necrosis and perforation may then necessitate life saving total gastrectomy.³ Our patient underwent surgery within an hour from the CT. The CT did not reveal any free air, but intraoperatively a perforation was discovered. It is possible that the perforation had occurred within the short period between CT scanning and surgery, and emphasises how quickly a threatened viscus may perforate.

Various surgical strategies have been employed in acute presentations,⁸ but these essentially aim to untwist the volvulus, prevent recurrence with gastropexy, and/or repair an underlying, predisposing defect. In our case, no obvious predisposing

pathology was found. The case reminds us that this condition, in the acute form, can be missed by the inexperienced, and such delays can have serious consequences. In addition, we are reminded that surgery is the tip of the iceberg of overall patient management. Careful attention must be paid towards risk of complications, nutritional care and providing support for the young child and their family.

Learning points

- ▶ Gastric volvulus in the paediatric population is rare and can be difficult to initially diagnose.
- ▶ Main presenting features include non-bilious vomiting, or unproductive retching, with abdominal pain and distension.
- ▶ Acute presentations of volvulus need to be recognised early as delays in treatment may result in gastric ischaemia and perforation with/without compromise to other organs.
- ▶ The simplest imaging—an abdominal radiograph—may be all that is required to aid diagnosis and enable surgical review at the earliest opportunity.

Contributors RM conducted the majority of literature search and write up of article. RD was the admitting consultant involved in early management of the patient, provided initial literature used in the article and also contributed with strategy for write up of the report. SB was the consultant looking after the patient during admission, and overlooked follow-up. She also contributed with advice and direction of the report.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Berti A. Singolare attorcigliamento dele' esofago col duodeno seguita da rapida morte. *Gazz Med Ital* 1866;9:3.
- 2 Singleton AC. Chronic gastric volvulus. *Radiology* 1940;34:53–61.
- 3 Oh SK, Han BK, Levin TL, *et al.* Gastric volvulus in children: the twists and turns of an unusual entity. *Pediatr Radiol* 2008;38:297–304.
- 4 Sty JWR, Wells RG, Starshak R, *et al.* *Diagnostic imaging of infants and children*. Vol 1. Aspen, NY. 1991:161–2.
- 5 Ziprkowski MN, Teele RL. Gastric volvulus in childhood. *AJR Am J Roentgenol* 1979;132:921–5.
- 6 Campbell JB. Neonatal gastric volvulus. *AJR Am J Roentgenol* 1979;132:723–5.
- 7 Dalgaard JB. Volvulus of the stomach case report and survey. *Acta Chir Scand* 1952;103:131–53.
- 8 Cribbs RK, Gow KW, Wulkan ML. Gastric volvulus in infants and children. *Pediatrics* 2008;122:e752–62.
- 9 Borchardt M. Aus Pathologie und therapie des magenvolvulus. *Arch Klin Chir* 1904;74:243.
- 10 Fall I, Niang E, Diao YA, *et al.* [Gastric volvulus in the infant. Clinical and radiological diagnosis]. *Dakar Med* 1997;42:156–8.

Copyright 2013 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow