CASE REPORT

Recycling of jejunal effluent to enable enteral nutrition in short bowel syndrome

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Accepted 3 May 2014

SUMMARY

A 41-year-old woman developed severe abdominal pain, distension and faeculent vomiting. CT of abdomen and pelvis revealed small bowel malrotation with a right paraduodenal hernia. At emergency laparotomy, a right paraduodenal hernia containing jejunum and ileum was identified. She had a viable duodenum with 50 cm of ischaemic proximal jejunum which was exteriorised as an end jejunostomy; 180 cm of infarcted jejunum and ileum was resected. The proximal end of 150 cm of healthy ileum was exteriorised as a closed mucous fistula and 50 cm distally a feeding ileostomy was constructed. On day 5 postoperatively, jejunal effluent began to be recycled via her feeding ileostomy and she never required parenteral nutrition. Despite having only 50 cm of jejunum proximal to her stoma, recycling of effluent enabled her electrolytes to remain normal. She put on weight postoperatively and proceeded to closure of her stomas at 6 months, not requiring laparotomy.

BACKGROUND

Paraduodenal hernias account for 30–53% of internal hernias.¹ They occur when the bowel protrudes into the retroperitoneal space through a peritoneal defect near the third and fourth portions of the duodenum and have a reported lifetime risk of obstruction and bowel strangulation of approximately 50%.^{1–3} Proximal small bowel strangulation can lead to a short bowel with subsequent implications for nutrition. This case describes the presentation of a strangulated right paraduodenal hernia requiring formation of a jejunostomy and successful management of short bowel with recycling of jejunal effluent into a feeding ileostomy.

CASE PRESENTATION

A 41-year-old woman attended hospital with a 48-hour history of colicky abdominal pain. She had a background of intermittent abdominal pain and altered bowel habit for 6 years previous to this, and had been diagnosed with irritable bowel syndrome. Her bowel habit was normal but she described several episodes of vomiting during the preceding day. On examination her abdomen was soft, non-tender and not distended. Initial investigations revealed a mild leucocytosis of $12.4 \times 10^9/L$. Erect chest X-ray was unremarkable and supine abdominal films showed faecal loading in the descending colon. She was managed initially with intravenous fluids, a period of bowel rest and a single phosphate enema with good result.

Twenty-four hours after admission she developed severe abdominal pain, distension and faeculent

vomiting. She was tachycardic at 150 bpm and had generalised abdominal tenderness but no peritonism.

INVESTIGATIONS

Double contrast CT of abdomen and pelvis revealed intra-abdominal free fluid, necrotic small bowel and portal venous gas (figures 1 and 2). Small bowel malrotation with a right paraduodenal hernia was diagnosed.

TREATMENT

At emergency laparotomy, a right paraduodenal hernia containing jejunum and ileum was identified with malrotation of the mesentery at the origin of the superior mesenteric artery (figure 3). She had a viable duodenum with 50 cm of ischaemic proximal jejunum which was exteriorised as an end jejunostomy; 180 cm of infarcted jejunum and ileum was resected. The proximal end of 150 cm of healthy ileum was exteriorised as a closed mucous fistula and 50 cm distally a feeding ileostomy was constructed. The feeding ileostomy was inserted towards the closed mucous fistula to ensure her small bowel absorptive function was maximised. The mesenteric defect was repaired with interrupted absorbable sutures.

OUTCOME AND FOLLOW-UP

Postoperatively the patient required ongoing fluid resuscitation, short-term inotropic support, intravenous antibiotics and nasogastric aspirate drainage. Early elemental feeding was started on day 1 and the volume titrated up over the next 2 days.

Figure 1 CT scan of abdomen showing closed-loop obstruction (arrows) of small bowel.

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To cite: McCain S, McCain S, Harris A, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-204394

Figure 2 CT scan of abdomen showing portal venous gas.

Loperamide and codeine were added to slow intestinal transit and promote absorption. On day 5, jejunal effluent began to be recycled via her feeding ileostomy. Her enteral feed was changed from an elemental feed to a modular feed on day 8 and sandostatin was started on day 9. Her nutritional markers improved on this regime and she never required parenteral nutrition. Despite having only 50 cm of jejunum proximal to her stoma, recycling of effluent enabled her electrolytes to remain normal and she was able to return home. She put on weight postoperatively and proceeded to closure of her stomas at 6 months, not requiring laparotomy.

DISCUSSION

Normal human small intestinal length varies between about 275 and 850 cm. In general, nutritional/fluid supplementation is likely to be needed if less than 200 cm of small bowel remains. In adults the most common causes for a short bowel are Crohn's disease, superior mesenteric artery thrombosis and irradiation damage.^{4–6}

Gastrointestinal secretions are made up of 0.5 L of saliva, 2.0 L gastric juice and 1.5 L pancreaticobiliary secretions.⁷ The majority of fluid is reabsorbed in the upper jejunum. Patients with a jejunostomy will therefore tend to have a large volume stomal output, with each litre of jejunostomy fluid containing about 100 mmol/L of sodium, often leading to sodium depletion. Net potassium depletion only occurs when less than 50 cm of jejunum remains. If less than 100 cm of jejunum remains

Figure 3 Ischaemic small bowel seen at the time of surgery.

proximal to a jejunostomy the patient may lose more fluid than is taken by mouth.⁸

Most patients with a short bowel display intestinal adaptation, which attempts to restore the total gut absorption of nutrients, minerals and water to levels prior to resection. The remaining bowel undergoes structural adaptation (increasing the absorptive area) and functional adaptation (by slowing intestinal transit). This does not appear to be the case in patients with a jejunostomy, who do not display any evidence of either structural or functional adaptation at any time.^{5 9 10}

In recent years, following surgical resection resulting in a short bowel, total parenteral nutrition (TPN) has been used early, even when there is enough residual bowel, aiming to prevent nutritional deficiencies which lead to surgical wound and anastomotic breakdown.⁷ Despite the well-known benefits, this approach is not without risk, particularly with regard to central line and hepatic complications. TPN was not used in this case.

Loperamide and codeine phosphate reduce intestinal motility and therefore decrease water and sodium output from an ileostomy by 20–30%.⁷ Drugs that reduce gastric acid secretion, for example, H2 antagonists, proton-pump inhibitors or somatostatin analogues are also often given, particularly during the 6 months after surgery. This patient received all the above medication.

Cholylsarcosine has been used as bile replacement therapy with little evidence to support its use.^{11 12} Limited reports of bile/jejunostomy fluid recycling were found in the literature. Several case studies have reported the use of external transhepatic biliary drainage tubes diverted through a percutaneous endoscopic gastrostomy for pancreatic malignancy causing biliary obstruction. In a cohort of 30 patients intestinal effluent volume from proximal stomas has been shown to reduce when effluent is recycled distally. No nutritional analysis was made. All patients of this cohort received TPN.⁸ No cases have been reported in the literature of patients with short bowel managed using recirculation of jejunal effluent and enteral nutrition in isolation. In this case jejunostomy fluid was collected and immediately recycled via a feeding ileostomy, helping to eliminate any requirement for TPN. As in the previously mentioned cohort, stoma outputs were low.

Learning points

- ▶ Patients should not be diagnosed with irritable bowel syndrome unless the Rome criteria have been met. This will help prevent rare causes of abdominal pain being missed.
- ▶ Directing a feeding ileostomy tube proximally in patients with short bowel syndrome maximises small bowel absorptive function.
- ▶ Perioperative planning optimises potential success of enteral nutrition and enables closure of stomas without further laparotomy.
- ▶ The management of short bowel syndrome should involve a multidisciplinary approach.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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