CASE REPORT

Utilisation of the falciform ligament pedicle flap as an alternative approach for the repair of a perforated gastric ulcer

Mohamed Boshnaq, Amit Thakrar, Iana Martini, Samer Doughan

Department of General Surgery, Queen Elizabeth Queen Mother Hospital, Margate, UK

Correspondence to
Dr Amit Thakrar, amit.thakrar@doctors.org.uk

Accepted 3 April 2016

SUMMARY

An 83-year-old woman presented to the emergency department with sudden onset of severe abdominal pain. She had a background of ulcerative colitis managed surgically at the age of 18 years with panproctocolectomy and permanent ileostomy. On admission, clinical assessment suggested a visceral perforation and an urgent CT scan demonstrated a perforated prepyloric ulcer. Emergency laparotomy was performed and confirmed a 3 cm perforated pre-pyloric ulcer. Repair of the defect was challenging due to the absence of omental fat to patch the perforation. A modification to the standard technique was therefore performed: the falciform ligament was mobilised and its free end used as a patch to repair the defect. The patient made a good postoperative recovery. This case report highlights an alternative operative technique for the treatment of perforated gastric/duodenal ulcers in patients who lack omentum, or when omentum cannot be used to cover perforated gastroduodenal ulcers.

62 mm Hg, heart rate of 98 bpm, respiratory rate of 16 breaths per minute and oxygen saturation of 99% at an FiO₂ of 21%. Abdominal examination revealed generalised abdominal tenderness and guarding, sluggish bowel sounds and a healthy looking ileostomy in the lower right quadrant.

INVESTIGATIONS

Routine haematological tests were largely normal except for a C reactive protein of 55 mg/L and creatinine level of 124 µmol/L. Arterial blood gas results were within normal limits. A chest radiograph was equivocal for free air under the diaphragm. CT scan of the abdomen and pelvis without intravenous contrast (owing to poor renal function) confirmed the presence of free intraperitoneal gas concentrated in the upper abdomen, with the likely source being a gastric or duodenal perforation.

DIFFERENTIAL DIAGNOSIS

A perforated viscus was diagnosed based on the clinical assessment and subsequent radiological findings confirmed this to be from a gastric or duodenal source.

TREATMENT

Immediately after initial resuscitation, which included intravenous fluids and antibiotics, the patient was transferred to the operating theatre for an emergency operation. Laparotomy through an upper midline incision revealed free intraperitoneal fluid and a 3 cm perforated prepyloric ulcer. The previous panproctocolectomy was noted and no gastric masses were identified. An omental patch is routinely used for repair, however, in this case, the patient was found to have an almost complete absence of omental fat, likely as a result of her previous panproctocolectomy. The perforation was therefore primarily closed with interrupted full thickness stitches. Then, the falciform ligament was mobilised to serve as a substitute to the omentum, and a patch was fashioned. A pedicle was maintained for the falciform ligament so as to preserve its vasculature and its free end mobilised to overlay all sides of the repaired ulcer. A non-suction drain was placed in Morrison's pouch and a routine washout and abdominal closure were performed.

OUTCOME AND FOLLOW-UP

There were no intraoperative complications and the initial postoperative phase was managed in the

BACKGROUND

Since 1937, surgical repair of gastric or duodenal ulcers has been performed with the aid of an omental patch. However, there is very limited literature describing how to manage patients in whom the omentum is either not technically utilisable or is completely absent. This case adds to the limited existing literature on the merits of utilising the falciform ligament for intraoperative management of a perforated ulcer and is a useful addition to the surgeon's armoury of techniques for dealing with unexpected anatomical anomalies.

CASE PRESENTATION

An 83-year-old woman presented to the emergency department, with a 2-day history of extreme sudden-onset, generalised and gradually worsening abdominal pain. Her symptoms were associated with nausea but no vomiting. She had had a childhood diagnosis of ulcerative colitis for which she had required panproctocolectomy and permanent ileostomy at the age of 18 years. Her stoma was working well with no recent change in output. Her medical history included ischaemic heart disease and a pubic ramus fracture secondary to hypocalcaemia. Her family history was unremarkable. She lived independently in her own home with frequent support from her daughters. On examination she appeared frail. Her initial observations showed that she was apyrexial with a blood pressure of 126/

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To cite: Boshnaq M, Thakrar A, Martini I, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2015-213025

intensive care unit. The patient was stepped down to Level 1 care on the surgical ward on the second postoperative day. Despite a brief period of delirium between days 2 and 4, there was no evidence of sepsis. The patient returned to her baseline cognitive state by day four. Parenteral nutritional support was required during the first five postoperative days and, following a gastrograftin study on day 6, which showed no leakage, enteral nutrition was encouraged. The patient made good progress with the help of the nursing, dietetics and physiotherapy teams, and was subsequently ready for discharge on day 11. Histological examination of the ulcer biopsy showed non-specific ulceration and inflammation with no evidence of malignancy.

DISCUSSION

Omental patch repair of perforated gastric ulcers was first described by Graham in 1937, when he reported a case series of 51 patients successfully managed with the help of his novel technique. Graham's omentopexy technique is still the mainstay of emergency surgical repair of perforated gastric or duodenal ulcers.¹ This case highlights the success of an alternative technique utilising the falciform ligament in the intraoperative management of a perforated ulcer. To date, there is extremely limited literature on the use of a falciform ligament patch. Our literature search revealed the first mention of this technique in a 1978 case report by Fry *et al.*² The team found the falciform patch to be a successful technique. Since then, Munro *et al.*³ have described a case series of six patients with perforated duodenal ulcers treated laparoscopically with a falciform ligament patch. All six patients were discharged home by day 5 and no complications were reported.

Anatomically, the falciform ligament is a broad, sickle-shaped fold of peritoneum that extends from the umbilicus rostrally over the anterior superior hepatic surface.⁴ The ligament's blood supply, described in detail by Li *et al.*,⁵ is derived from numerous branches given off by a vessel formed from the left inferior phrenic artery and middle segmental artery of the liver.

The anastomoses between multiple vessels and the vessels of the falciform ligament give the latter a key role in the collateral circulation of the liver. In light of this, mobilisation of the falciform ligament is typically performed on a pedicle flap originating from the carefully-preserved left inferior phrenic and middle segment hepatic vessels, and applied to the area requiring repair.⁶ Indeed, applications of falciform ligament pedicle flaps include not only perforated gastric ulcer repair, as described in this case report, but also posterior cover of oesophagojejunal anastomosis following total gastrectomy, repair of partial lesions of the principle bile duct, common bile duct injury following clip necrosis and haemostasis of the gallbladder bed,⁶ to mention a few.

Use of the falciform ligament pedicle flap is not the only alternative surgical approach currently utilised in lieu of the classical greater omental patch (Graham) technique. Other options include jejunal serosal patch, tube duodenostomy and pyloric exclusion; however, these have been shown to carry a high incidence of duodenal dehiscence and high mortality.⁷ Other alternatives also include Roux en-Y duodenojejunostomy

and resection surgery, the latter being relevant in perforation secondary to malignant perforated ulcers or when there is a high risk of malignancy, significant bleeding or stricture.⁸ Finally, a case of subtotal gastrectomy with Billroth II reconstruction with closure of duodenal defect using a patch of antrum remnant has been described in giant duodenal ulcer perforation.⁷

In light of the technical complexity of these techniques in cases of severe peritonitis, more studies are required to validate a safe and less complex alternative to omental patch repair when indicated.

Learning points

- ▶ Graham's omentopexy technique is the mainstay of emergency surgical repair of perforated gastric/duodenal ulcers.
- ▶ Use of a falciform ligament patch is a feasible alternative technique when the omentum cannot be used.
- ▶ Case reports, to date, in the literature have shown the falciform ligament patch technique to be a successful alternative.
- ▶ More data are required to objectively validate this technique.

Contributors MB, AT and SD made substantial contributions to the conception or design of the work, or were involved in the acquisition, analysis, or interpretation of data for the work. MB, AT and IM was involved in drafting the work or revising it critically for important intellectual content. MB was involved in the final approval of the version to be published. SD was involved in the agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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