CASE REPORT

Perforated duodenal diverticulae: importance for the surgeon and gastroenterologist

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SUMMARY

We present the case of a 78-year-old woman who was admitted for an elective left hemicolectomy for diverticular disease. Two days following the elective procedure, bilious fluid was noted in her pelvic drain. The patient returned to theatre, where a perforated duodenal diverticulum was excised and the defect primarily repaired. The patient then developed a low output enterocutaneous fistula which was treated conservatively with nasojejunal feeding and resolved spontaneously.

BACKGROUND

Duodenal diverticular disease is the second most common site after the colon and knowledge of its presence and complications is relevant both to those seeing patients with acute abdomen conditions, as it can mimic perforated peptic ulcer and those performing endoscopic retrograde cholangiopancreatography (ERCP), in whom it can prevent cannulation of the bile duct.

Surgical repair of a perforation does not eliminate the risk of fistula formation and suspicion should be high in those presenting with ongoing drain output and should prompt consideration of jejunal feeding.

CASE PRESENTATION

A 78-year-old woman was admitted for an elective open left hemicolectomy for recurrent attacks of diverticulitis. Her medical history also included a deep vein thrombosis following hysterectomy in 1975, a transient ischemic attack 12 years prior to admission and syndrome of inappropriate anti-diuretic hormone secretion managed via fluid restriction. She was independent in activities of daily life.

During the procedure she had episodes of hypotension requiring norepinephrine infusion. Before closure of the abdomen, the anastomosis was tested with insufflation and found to be airtight. A feeding nasojejunal (NJ) tube with draining nasogastric (NG) port was inserted to allow feeding distal to the repair but was pulled out by the patient overnight postoperatively.

Two days following the elective operation the patient became confused, developed atrial fibrillation and bilious fluid was noted from the drain site. A CT scan demonstrated extraluminal gas locules around the porta hepatis and falciform ligament (figure 1). The patient was taken for emergency relaparotomy. On opening the abdomen a perforated large periampullary duodenal diverticulum

was noted (figure 2). There was bile-stained fluid in the right paracolic gutter, subhepatic and subphrenic spaces. The colorectal anastomosis was once more tested with insufflation and noted to be intact.

The portal structures were preserved and the diverticulum excised using a linear stapler. The defect was closed with a two-layer handsewn repair with polydioxanone sutures. Abdominal washout was carried out with 10 L of normal saline. Drains were inserted into the pelvis, right subhepatic and subhepatic space.

Histology results from the diverticulectomy showed focal perforation and ischaemic damage.

Seven days following the emergency procedure while on intensive care unit she developed a fever and raised inflammatory markers with white cell count of $26.7 \times 10^9/L$ and C reactive protein of 210 mg/L.

It was noted that bile tinged fluid was still present in the pelvic drain. Methylene blue dye was injected down the NG to ascertain whether a duodenal fistula had developed. None was noted to have collected in the pelvic drain. Fluoroscopy was then arranged to investigate this further. Extraluminal contrast was noted at the level of D1 and D2 and within a contained collection suggestive of a pinhole leak.

NG feeding was suspended and an NJ tube distal to the point of the leak was inserted endoscopically through which feeding was initiated.

Outcome

The pelvic drain was removed once it stopped draining 8 weeks after the second procedure. The

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Figure 1 CT axial image demonstrating periportal free gas.

Figure 2 Intraoperative image of the duodenal perforation at the time of laparotomy.

patient was referred for rehabilitation once oral intake was resumed.

INVESTIGATIONS

CT of the abdomen pelvis day 2 postelective hemicolectomy

There was a large amount of free intra-abdominal gas which was out of keeping with expected postoperative changes, most of which was localised to the upper abdomen. Gas locules were noted tracking along the porta hepatis and falciform ligament (figure 1). Within the presacral region in the pelvis posteriorly to the site of rectal anastomosis was evidence of fluid containing gas locules.

These appearances are suspicious for extraluminal faeculent material secondary to an anastomotic leak. The bowel was otherwise of normal calibre throughout. There was no evidence of pneumatosis coli.

Histology from diverticulectomy

Macroscopic findings: necrotic small bowel showing evidence of perforation.

Microscopic findings: mucosa showing various degrees of ischaemic ulceration in-keeping with focal perforation.

Fluoroscopy undertaken 5 weeks following the emergency relaparotomy

Extraluminal contrast at the level of D1 and D2 and within a contained collection.

DIFFERENTIAL DIAGNOSIS

A perforated peptic ulcer often presents in a similar fashion as a perforated duodenal diverticulum; with fevers, vomiting and abdominal pain. It is often difficult to distinguish a perforated peptic ulcer and duodenal diverticulum, even with CT imaging (as discussed below).

However, there may be aspects of the medical history, such as use of steroids or non-steroidal anti-inflammatory drugs which would increase the risk of peptic ulcers. The only definitive way to establish the correct diagnosis is at laparotomy, when the bowel can be visualised.

TREATMENT

Surgical treatment involved diverticulectomy and primary repair with NJ feeding.

The patient had intensive input from the multidisciplinary team including occupational and physiotherapists, speech and language therapists, dieticians and also the mental health liaison team.

OUTCOME AND FOLLOW-UP

Three months following the emergency operation the patient was transferred for inpatient rehabilitation following the initiation of oral feeding with continued supplementary NJ feeding.

DISCUSSION

The incidence of duodenal diverticular disease is 1–5% in radiological series and 11–22% in autopsy series and the prevalence increases with age.¹ In 62% of patients it involves the second part of the duodenum. Although it is common, it only becomes symptomatic in 1–5% of patients.² Symptoms arise from biliary-pancreatic complications including jaundice, cholangitis or pancreatitis and after failure to cannulate the bile duct at ERCP. Perforation is rare with only 202 cases ever reported until 1992,³ but has a mortality rate of 20%. Symptoms of perforation are identical to perforated peptic ulcer and include vomiting, fever, tachycardia and acute epigastric pain. In this case, bile-stained small bowel contents in an abdominal drain was noted. As the perforation is retroperitoneal, peritonitis is not always present.

Diagnosis can be difficult using imaging with many perforations being missed. However a retrospective review of patients diagnosed with perforated duodenal diverticula showed evidence of diverticular disease and gas extraluminally on CT.⁴ Also, often the differentiation between perforated peptic ulcer and perforated duodenal diverticula is usually unclear until laparotomy and hence this is especially relevant for the general surgeon.

Treatment can be conservative with elimination of oral intake, NG tube insertion and broad-spectrum antibiotics.⁵ There are reports of patients recovering with this treatment alone.^{1 5} Operative treatment in centres with appropriate experience in patients who are fit is preferred to minimised intra-abdominal collections and ongoing discharge from a duodenal fistula.

Operative treatment involves diverticulectomy, however other procedures such as a Whipple's procedure may be necessary in giant diverticulae.³ A review of 61 patients treated for perforated duodenal diverticular disease showed that of the 47 treated surgically, 16 (36%) suffered complications including fistulae, abscesses and wound infections.³ The mortality of duodenal fistula is approximately 31% and hence where fit, surgery is preferred.²

Relevance to ERCP

Retrospective studies looking at the outcome of ERCP found that duodenal diverticulae can make cannulation of the papilla of Vater difficult. One study showed that cannulation failure rate was 11.8% in those with the papilla within the diverticulae compared with 5.7% in those without.⁶ A recent retrospective analysis of the outcome of ERCP showed that cannulation was difficult in 79% of those with duodenal diverticulae compared with just 9.7% in those without.⁷ These findings were statistically significant and therefore knowledge of duodenal diverticular disease and its associated complications is required for all clinicians carrying out ERCP.

Learning points

- ▶ The differential diagnosis of perforated peptic ulcer includes perforated duodenal diverticulum.
- ▶ After diverticulectomy and repair duodenal fistula remains a serious risk.
- ▶ A dual lumen nasojejunal feeding and nasogastric aspiration tube placed at operation can aid early return to enteral feeding while allowing the fistula to heal.
- ▶ Duodenal diverticular disease can lead to difficulty cannulating the papilla of Vater during endoscopic retrograde cholangiopancreatography.

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Competing interests None.

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