CASE REPORT

Stercoral perforation of the colon in a heroin addict

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SUMMARY

A 27-year-old female heroin addict presented with a peritonitic and distended abdomen. Her medical history included depression and a 3-year history of heroin abuse with attendant constipation. CT scan showed free intraperitoneal gas, massive faecal distension of the rectum and sigmoid colon and likely bowel necrosis. She underwent an emergency Hartmann's procedure for perforation of the sigmoid colon. Pathology identified two areas of stercoral ulceration, one of them being the area of perforation. Postoperatively, the patient developed a deep vein thrombosis and is now on anticoagulant therapy. She was discharged 4 weeks after admission. The patient has been reviewed at follow-up clinic by the surgical team and specialist stoma nurses. She is coping well with good stoma function. We will perform a colonoscopy to identify any further areas of stercoral ulceration but there are no plans for further surgery at present.

BACKGROUND

Stercoral perforation of the colon was first reported by Berry in 1894.¹ Prior to 2015, <200 cases have been reported in the literature worldwide.² Of these, only two have been cited as secondary to

Figure 2 Sagittal image of gross faecal distension of the sigmoid colon.

Figure 1 Coronal image of megarectum.

chronic heroin use.^{3,4} This disease has a mortality of 32%–57% and significant morbidity.^{2,5}

The pathophysiology of stercoral perforation initiates with the formation of a faecaloma which is

Figure 3 Pinhole perforation of the serosal surface.

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Figure 4 Mucosal ulceration within the bowel lumen.

a 'localised hard, inspissated or calcified faecal mass, at least the diameter of the normal colon'.⁶ Initially this increases colonic intraluminal pressure then leads to localised ischaemic necrosis of the colonic wall. Stercoral ulceration ensues culminating in eventual perforation. Aetiologies implicated in faecaloma development can be separated into chronic constipation, anatomical anorectal abnormalities and functional anorectal abnormalities.⁶

The incidence of stercoral perforation is 3.2% of all colonic perforations in the general population.⁴ Reporting of the disease has improved with time due to better clinical, radiological and pathological diagnostic criteria.^{4 6 7} Preoperative cross-sectional imaging and resection of pathological bowel with exteriorisation of the proximal colon has led to improved patient outcome.

Due to the rarity of stercoral perforation in a heroin addict, we will discuss the presentation, benefits of preoperative imaging, surgical technique and pathology herein.

CASE PRESENTATION

A 27-year-old woman was transferred by air ambulance from a rural hospital to our tertiary referral centre with an acute abdomen with a 1-week history of worsening abdominal pain. There was a 12-hour history of worsening vomiting. Her medical history included depression and a 3-year history of heroin abuse with

Figure 5 Ganglion cells in the myenteric plexus (H&E, at high power). Ganglion cell identified by arrow.

Figure 6 Edge of ulcer with haemorrhagic necrosis and fissuring ulceration (H&E, at low power).

attendant constipation. There was no history of chronic constipation since childhood. Despite being prescribed sufficient laxatives, poor compliance with prescription medication was noted. Other medications included mirtazapine 45 mg and promethazine 25 mg at night. Following transfer, initial assessment in the emergency department confirmed that the patient was suffering from septic shock (respiratory rate 30/min, oxygen saturation 100%, heart rate 160 bpm, blood pressure 90/60 mm Hg). On examination, the abdomen was both distended and peritonitic.

INVESTIGATIONS

An arterial blood gas identified a fully compensated metabolic acidosis (H^+ 38.4nmol/L, CO_2 2.0kPa, O_2 15.2kPa, HCO_3 9.7mmol/L, lactate 11.5mmol/L). Blood results demonstrated an inflammatory process (white cell count 8.3 10⁹/L and C reactive protein 381mg/L), acute kidney injury (urea 9.9mmol/L, creatinine 119 μ mol/L, glomerular filtration rate 47ml/min) and dilutional anaemia (haemoglobin 53g/L, haematocrit 0.211%).

A femoral arterial line, catheter and nasogastric (NG) tube were inserted. Chest X-ray revealed no subdiaphragmatic air. Invasive monitoring and aggressive resuscitation took place and thereafter the patient was transferred to theatre via the CT scanner.

CT scanning of the abdomen and pelvis confirmed the presence of free intraperitoneal fluid and gas, indicating a perforated viscus and massive faecal distension of the rectum and sigmoid colon (figures 1 and 2). Portal venous gas was noted within the liver indicating likely concomitant bowel necrosis.

TREATMENT

The patient was taken to theatre for an emergency laparotomy. On entering the abdomen, a significant volume of faeculent fluid was noted. A pinhole perforation was identified anteriorly, low in the sigmoid colon just proximal to the peritoneal reflection. It was surrounded by a halo of pressure necrosis. This was borne out in the subsequent histopathology report. Left ureteric obstruction was evident, secondary to the mass effect from faecal loading of the rectum and colon. A standard emergency Hartmann's procedure was therefore undertaken.⁸ The patient required 3 units of packed red cells, 3 units of fresh frozen plasma, 4000 mL of Hartmann's solution and 500 mL of Gelo-fusine intraoperatively.

Table 1 Factors that increase risk of stercoral perforation

Chronic constipation	Example	Anatomic anorectal abnormalities	Example	Functional anorectal abnormalities
Metabolic	Hypothyroidism, uraemia, hypercalcaemia and diabetes	Megarectum	Hirschsprung disease	Abnormal rectal sensation
Dietary	Low-fibre intake, poor oral intake and dehydration	Anorectal stenosis/atresia	—	Increase rectal compliance
Neurogenic	Spinal cord injury, multiple sclerosis, Parkinson's, Alzheimer's, cerebral palsy and spina bifida	Neoplasm	Intrinsic or extrinsic colonic compression	
Anatomic	Colonic stricture	Previous surgery	Haemorrhoidal banding and fissurectomy	
Medications	Opiates, anticholinergics, antacids iron preparations			

OUTCOME AND FOLLOW-UP

Macroscopic examination of the resected distended segment of the rectum and sigmoid colon identified a 3 mm perforation with a surrounding fibrinopurulent exudate on the serosal surface (figure 3). Within the bowel lumen, there was a 50 mm punched out area of mucosal ulceration at the area of perforation, 35 mm from the distal resection margin (figure 4). There was also a second area of 50 mm mucosal ulceration without perforation, 80 mm from the distal resection margin.

Histological examination demonstrated the rectum and sigmoid colon with a normal intrinsic architecture including normal ganglionic innervation (figure 5). The areas of ulceration demonstrated full thickness haemorrhagic necrosis with fissuring ulceration (figure 6). Granulomas and evidence of vasculitis are not identified.

Microbiology results from the intraperitoneal fluid grew *Escherichia coli*, *Lactobacillus salivarius*, *Staphylococcus epidermidis* and mixed anaerobic organisms. Broad-spectrum intravenous antibiotic therapy was instituted on the first assessment and tailored following advice from microbiology and bacterial sensitivities.

The patient was admitted to the intensive care unit for 24 hours of vasopressor and ventilatory support and 48 hours of close monitoring. Patient-controlled analgesia (morphine) was required for pain control and NG tube feeding was initiated until her stoma was active. The patient had a prolonged postoperative ileus as well as developed a deep vein thrombosis. This was treated with dalteparin during admission with apixaban for 6 months thereafter.

The patient was discharged 4 weeks postoperatively and remains well at follow-up clinic, 8 weeks after discharge.

DISCUSSION

Stercoral perforation of the colon remains an uncommon condition. It carries a high mortality and morbidity.⁹ The pathological definition initially proposed by Grinvalsky *et al* is 'perforation resulting from ischaemic necrosis due to pressure on the overlying colonic wall'.¹⁰ There are many aetiological factors that increase the risk of stercoral perforation (table 1).^{6 11}

The incidence of stercoral perforation has increased over the last 20 years from 2.3% to 3.2%.^{4 10} This is due in part to improved diagnostic criteria. Maurer *et al* proposed that the diagnostic criteria should include:

1. round or ovoid colonic perforation (not a linear tear), 1 cm diameter and anti-mesenteric;
2. faecalomas present in colon, intraperitoneal or protruding through the perforation site;

3. pressure necrosis/ulceration and chronic inflammatory reaction around the perforation site.⁴

Furthermore, Noussias addressed the issue of misreporting by differentiating spontaneous perforation (disease pathology identified) and idiopathic perforation (disease pathology not identified) which are sometimes reported as one entity.⁷

The diagnosis of stercoral perforation remains difficult. Patients at highest risk include those who are elderly, incapacitated, children and institutionalised. Hussain *et al* concluded that the prevalence of faecal impaction in nursing home residents may be as high as 48%.¹¹ Before the advent of CT imaging, only 11% of cases were diagnosed preoperatively, leading to higher morbidity and mortality.^{5 12} In part, this is due to only 61% of patients having a history of chronic constipation and a wide differential diagnosis.⁵ This has led to a change in practice over the years with preoperative imaging.

The advantage of cross-sectional imaging is to rule out other pathology, such as diverticular perforation, which unlike stercoral perforation, has medical and interventional radiological management options.⁵

Current clinical practice is to obtain cross-sectional imaging, in the form of a CT scan, once the patient is physiologically optimised.^{2 11 13} One of the first case reports of pre-operative imaging was by Rozenblit *et al*, who advocated the use of CT to evaluate thickness and integrity of the colon wall, pericolic inflammation and subtle perforation.¹² Since then, and in addition to the universal finding of a faecaloma, Kumar *et al* described a triad of CT features, diagnostic of stercoral perforation, including;

1. discontinuity of the colon wall,
2. faecal matter protruding through the colonic wall or within the peritoneal cavity and
3. extraluminal air.⁶

It is well documented in the literature that stercoral perforation requires surgical management if there is any hope for patient survival.¹⁴ Previously, the preference had been exteriorisation of the bowel without resection in the form of a defunctioning colostomy. Current evidence demonstrates better survival with resection of the affected segment. The best surgical option is resection and exteriorisation of the bowel in the form of a Hartmann's procedure but mortality still remains up to 32%.^{5 14} Other surgical options include exteriorisation of the perforation without resection, closure of perforation with proximal colostomy, resection and primary anastomosis and resection, primary anastomosis and proximal colostomy. These secondary options are suboptimal with higher mortality rates.

Intraoperatively, stercoral perforation is likely to be on the antimesenteric border with 90% of cases found in the upper rectum or sigmoid and 79% having a single perforation.^{5 15} This finding can be explained by the poorer blood supply to the anti-mesenteric border, making this area more susceptible to ischaemic necrosis, ulceration and perforation as well as the recto-sigmoid having a narrow lumen and the faecolith being more dehydrated. An area of contention, and differing practice, is intraoperative use of colonoscopy. Some authors in the literature recommend the use of colonoscopy and resection of any pathological segments, on the basis that up to 28% of patients with stercoral perforation have multiple sites of stercoral ulceration.^{16 17} Maurer *et al* further states that any dilated, abnormal colon should be resected up to a subtotal colectomy.⁴ In this case, this was not feasible due to the amount of hard faeces and the

patient's unstable clinical condition. The plan is to arrange colonoscopy as part of follow-up.

There are reports in the literature of stercoral perforation in patients on a methadone programme and opioids.^{13 18 19} Previous cases of stercoral perforation in a heroin addict were managed similarly, with preoperative CT imaging and Hartmann's procedures being carried out. The previous cases highlight the difficulty in accurately diagnosing stercoral perforation and the importance of a low threshold for cross-sectional imaging and early operative intervention.^{3 4}

Contributors CDB: project lead; completed write-up of case and coordinated between all coauthors for editing purposes. FM: advisor; gave advice regarding surgical intervention and preoperative work-up during case write-up. PF: contributor; gave pathology input with images and 'pathology' section of case report. GN: advisor and editor; edited all draft case reports and gave feedback throughout case write-up.

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Patient's perspective

I didn't know what was happening when I came into the hospital. It all happened very fast. I was unwell but everyone helped and told me what was wrong. After my operation, it took me a long time to get better. I didn't like my bag (stoma) but got use to it. I have seen my nurse (specialist stoma) after my operation who has helped me use it. I am feeling a lot better. I still don't know what exactly was wrong with me but the doctors have explained my heroin made me constipated and made a hole in my bowel or something like that.

Learning points

- ▶ Stercoral perforation of the bowel is a disease with a poor prognosis, despite more accurate diagnosis and a constellation of recognised aetiologies. We report here on one of the rarer of these, namely perforation secondary to opiate abuse and constipation.
- ▶ Early consideration for urgent surgical intervention remains paramount in any patient with chronic constipation, clinical signs of peritonitis and/or radiological evidence of a perforation.
- ▶ The diagnostic criteria suggested in the literature are imperfect and where diagnostic doubt remains, emergency laparotomy is indicated based on clinical findings.
- ▶ The abuse of heroin on a chronic basis remains a risk factor for constipation. This patient cohort creates a number of management difficulties, foremost of which is their chaotic lifestyle with often poor compliance with prescribed aperients.
- ▶ The use of preoperative CT scanning is now commonplace with a Hartmann's procedure being the demonstrated intervention of choice.

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