CASE REPORT

Small bowel obstruction and perforation secondary to primary enterolithiasis in a patient with jejunal diverticulosis

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SUMMARY

We describe a rare case of small bowel obstruction and perforation secondary to a primary enterolith in an 84-year-old female patient with jejunal diverticulosis. She underwent an emergency laparotomy, small bowel resection and primary anastomosis. Multiple jejunal diverticula and a large stone were identified at the time of operation. Analysis of the stone demonstrated mainly faecal material consistent with a true primary enterolith. A literature search of Medline and PubMed revealed three cases similar to the one described. The pathogenesis and management of enterolithiasis in jejunal diverticular disease is considered.

BACKGROUND

Small bowel obstruction is a frequent case in the surgical admissions unit and the two most common causes in the UK are adhesional obstruction and herniation.¹ Intraluminal causes for small bowel obstruction are infrequent and include ingestion of foreign bodies,² bezoars,³ gallstone ileus,⁴ parasitic infections⁵ and iatrogenic causes such as postsurgical thrombus.⁶

Enterolithiasis is the presence of an enterolith within the intestinal lumen. This can result in mechanical obstruction of the small bowel which is also known as enterolith ileus or pseudogallstone ileus.⁷ This is an unusual but reported phenomenon. Cases of enterolithiasis resulting in intestinal obstruction have been associated with Crohn's disease,⁸ Meckel's diverticulum⁹ and in the paediatric population congenital defects such as luminal atresia, stenosis or intestinal aganglionosis.¹⁰ Primary enteroliths develop in locations of intestinal stasis such as within small bowel diverticula. Jejunal diverticulosis is uncommon but increasingly reported in the older population¹¹ and can cause complications due to diverticulitis, intussusception, stricture, adhesions, volvulus, malabsorption and enterolith formation, migration and distal impaction.¹²

The pathology described in this case of small intestinal obstruction and visceral perforation secondary to an enterolith at a site distal to the segment of jejunal diverticulosis is rare indeed; an extensive literature search of Medline, Embase and PubMed found three published reports to date. The case herein describes an unusual pathology and rare cause of small bowel obstruction. With an ageing population the clinician must be alert to jejunal diverticulosis and the potential complications thereof. Enterolith ileus should be considered as a differential for the cause of small bowel

obstruction when other more common pathologies have been excluded, especially in the older patient.

CASE PRESENTATION

An 84-year-old woman presented to the on call surgical team with symptoms of abdominal pain, vomiting and feeling frail.

She had a long history, stretching back over 10 years, of intermittent episodes of abdominal pain and distension that was then followed by loose stools with faecal urgency and incontinence. She had been seen in the outpatient clinic and these symptoms were felt to be secondary to adhesions. Her surgical history included carcinoma of the cervix for which she had a hysterectomy and cystectomy with the formation of an ileal conduit. She had a medical history of atrial fibrillation for which she was on warfarin, a single functioning right kidney and an atrophic left kidney.

On examination, she was dehydrated and peripherally shutdown. Her pulse was irregular with a heart rate of 120 bpm and her blood pressure was 75/40 mm Hg. Her abdomen was distended with generalised tenderness but her ileal conduit was producing urine. An arterial blood gas showed a pH of 7.35 and a base excess of -7.5. After initial resuscitation with fluids and placement of a large bore nasogastric tube an urgent CT scan of her abdomen and pelvis was performed. Plain X-ray films were not performed as this would have delayed time to CT scan.

INVESTIGATIONS

A CT scan was performed and reported as showing proximal small bowel dilation as far as a large laminated calcified mass, distal to this the small bowel is collapsed (figure 1). It also showed free fluid within the abdomen and multiple locules of free gas although there were no features of pneumobilia. The findings were reported to be consistent with small bowel perforation secondary to obstruction due to this large mass.

DIFFERENTIAL DIAGNOSIS

Differential diagnoses for an intraluminal cause of small bowel obstruction and subsequent perforation were considered such as gallstone ileus, a bezoar and an enterolith.

TREATMENT

An emergency laparotomy was performed. Purulent fluid with small bowel content was encountered on

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Figure 1 CT scan demonstrating a large calcified laminated intraluminal mass (black arrow) with proximal small bowel dilation, distal small bowel collapse and flecks of intraperitoneal gas (white arrow).

breaching the peritoneum. There were multiple interloop abscesses and the peritoneum was inflamed. The obstructing mass was located within the mid-jejunum and was the point of transition between dilated small bowel proximally and collapsed small bowel distally. There were multiple serosal tears at the site of impaction and proximal to this large uncomplicated jejunal diverticula was noted, the likely enterolith origin. A 30 cm section of mid-jejunum containing the impacted stone was resected and an end-to-end primary anastomosis was performed. The ileal conduit was remote to this pathology and there was no abnormal communication between the gallbladder and the small bowel. A thorough lavage and washout of the peritoneal cavity was performed prior to closure. The specimen was examined and the offending mass was removed from the resected jejunum; it was a large 12 cm×6 cm egg-shaped stone (figure 2). This was sent for histological and biochemical analysis.

OUTCOME AND FOLLOW-UP

She had a stormy postoperative course suffering with an ileus, poor nutrition, diarrhoea and oral candidiasis. Initially she was managed in the intensive care unit for 48 h before being transferred to the surgical ward. She received 2 months of inpatient care before being discharged home with a package of care ongoing rehabilitation.

The CT scan was reviewed in light of the operative findings and the appearance of her gallbladder did not show any stones,

Figure 2 A 12×6 cm offending enterolith removed from the mid-jejunum, it had become impacted at a site distal to the large jejunal diverticula.

Figure 3 The same CT scan as figure 1 at the level of the gallbladder (black arrow) there was no pneumobilia or cholecystoenteric fistulation and the gallbladder was thin walled, these findings are inconsistent with gallstone ileus.

thickening of the wall, surrounding inflammation or fistulation (figure 3).

Histological and biochemical analysis of the stone showed calcified faecal matter with only a trace of cholesterol and no bile pigments—consistent with the diagnosis of a primary enterolith.

DISCUSSION

Small bowel obstruction is a common surgical presentation. The aetiology can be classified into extrinsic, intramural and intraluminal. Postoperative adhesional small bowel obstruction accounts for 74% of all cases¹³ and 9% of individuals with previous abdominal or pelvic surgery will experience small bowel obstruction of any cause.¹⁴ Gallstone ileus has been implicated in 1–4%⁴ and there are only 41 reported cases of primary jejunal enterolithiasis resulting in small bowel obstruction.¹⁵

A literature search of Medline, Embase and PubMed from 1902 excluding Crohn's disease, Meckel's diverticulum, bezoar and children and limited to articles in English found only 26 articles of which 13 were duplicates and 1 was not relevant. The remaining 12 articles report on 24 cases of which 11 are of obstruction without perforation, 10 are cases of perforation at the site of jejunal diverticulum and 3 report perforation at a site distant to the diverticulum,^{7 16 17} as was the case in this patient.

Enteroliths are endogenous foreign bodies within the gastrointestinal tract. They can be classified into primary and secondary. Primary enteroliths are formed inside the gastrointestinal tract and can be subdivided into 'true' formed from normal intestinal chylous components and 'false' formed from ingested indigestible matter collectively known as the bezoars.³ Secondary enteroliths are formed outside the gastrointestinal tract and require a process of fistulation to gain access to the lumen, such as gallstone ileus.³

True primary enteroliths require stasis to accumulate particulate matter and develop into stones. This may occur from bile salt metabolism by bacteria with consequential precipitation of insoluble products or may arise due to concretions of chylous components.¹⁸ Enteroliths form in segments of the intestine bypassed by normal luminal flow such as diverticulum, regions loculated by stricture formation and blind ending pouches following surgery.⁸ They can occur in the absence of a structural abnormality in those with an intestinal motility disorder.¹⁹

Acquired or 'false' small intestinal diverticula (as distinct from congenital or 'true' diverticula such as Meckel's diverticulum) are most commonly found in the duodenum and infrequently

found in the jejunum or ileum.²⁰ Jejunal diverticula have a reported prevalence of 0.06–1.3% in autopsy studies^{21–23} and 2–2.3% in a radiological imaging series.^{24–25} The pathophysiological process leading to their development is not clear, however, dysfunction at the level of the smooth muscle cells or the myenteric plexus has been postulated.²⁶ Increased intraluminal pressure results in herniation of the mucosa and submucosa at points of intrinsic weakness, the sites at which blood vessels enter the wall, hence acquired small bowel diverticula tend to be found on the mesenteric border.²⁷

The majority of patients with jejunal diverticulosis are asymptomatic and it is an incidental finding although 10% require surgical intervention.²⁸ Complications include inflammation, perforation of the diverticulum, anaemia due to malabsorption and bleeding, intussusception, volvulus and enterolith formation.^{20–29} Enteroliths can cause obstruction via direct encroachment into the lumen or via expulsion with migration and resultant distal impaction—the so-called ‘tumbling ileus’ phenomenon which has been described in gallstone ileus.³⁰ Enteroliths can cause perforation via direct erosion of their housing diverticulum or secondary to mural necrosis in intestinal obstruction and dilation.

Obstruction due to enterolithiasis can be managed conservatively with fluid resuscitation and decompression via nasogastric catheterisation. If this fails or if there is complicated jejunal diverticular disease then operative management is indicated. Laparoscopic or open lysis and milking of the enterolith into the caecum has been described,³¹ if this fails then the enterolith should be removed via an enterotomy, if this is not possible, a resection with anastomosis is indicated.²⁶

Learning points

- Small bowel obstruction is a common surgical presentation and in the absence of hernias or previous surgery other less common aetiologies should be sought.
- Enterolithiasis is a definite entity which can present as partial or complete small bowel obstruction and must be held as a differential to gallstone ileus.
- Jejunal diverticulosis is becoming increasingly identified due to more widespread use of highly sensitive imaging studies and the clinician being aware of possible complications.

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Competing interests None.

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