



Clinics in diagnostic imaging (105)

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Fig. 1 Abdominal radiograph obtained on admission.



Fig. 2 Abdominal radiograph obtained one day after the procedure.

CASE PRESENTATION

An 89-year-old woman with multiple comorbidities was initially being evaluated for chronic constipation. During bowel preparation with polyethylene glycol (Fortranf®, Sime Darby Marketing, Singapore), she started vomiting, and complained of abdominal pain. Physical examination showed a distended

abdomen and hyperactive bowel sounds. Abdominal radiograph was obtained (Fig. 1). A procedure was then performed and a repeat radiograph was done a day later (Fig. 2). She was able to eat and pass motion immediately post-procedure, and was discharged two days later. What is the initial diagnosis? What procedure was performed?

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Fig. 3 Endoscopic photograph of the distal sigmoid colon shows normal mucosa and an empty lumen

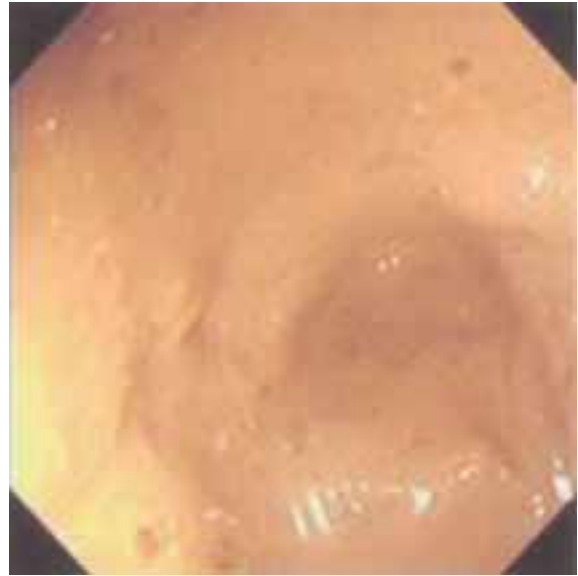


Fig. 4 Endoscopic photograph of the proximal sigmoid colon shows the colonic lumen filled with faecal material.

IMAGE INTERPRETATION

The initial abdominal radiograph (Fig. 1) showed a dilated large bowel. There was an inverted U-shaped loop (the “omega” sign) of dilated bowel located at the left side of the pelvis (“pelvic overlap sign”). Two limbs of the loop converged inferiorly around the level of the sacrum (“inferior convergence” sign). Dilated descending colon can also be seen at the left flank (“left flank overlap sign”). There was also paucity of gas in the rectum, indicating the level of obstruction to be at the sigmoid colon. Incidental finding of a right dynamic hip screw was noted. Fig. 2 showed resolution of bowel dilatation, with air seen in the rectum.

DIAGNOSIS

Sigmoid volvulus causing intestinal obstruction, with successful endoscopic decompression.

CLINICAL COURSE

This 89-year-old patient was admitted with a clinical diagnosis of intestinal obstruction, with initial radiographical features that were highly suggestive of a sigmoid volvulus. After preparing the patient with fleet enema, flexible sigmoidoscopy was performed with minimal air insufflation, which showed normal mucosa in rectum and sigmoid colon till the level of the splenic flexure. No abnormality, such as ischaemic colitis, mucosal necrosis, or a “twist” in the colonic mucosa, was noted endoscopically. However, there was a sudden change of the luminal appearance from a clean lumen in the distal sigmoid (Fig. 3), to a faeces-filled lumen at the proximal sigmoid (Fig. 4). The procedure was tolerated well.

A repeat abdominal radiograph done a day later (Fig. 2) showed resolution of the volvulus, and the patient was able to eat and pass motion normally after the sigmoidoscopy. She was discharged two days post-procedure. She was reviewed as an outpatient a week later and she remained well with a normal abdominal radiograph. She was last reviewed 13 months post-procedure and has remained well. Due to her advanced age, lack of bowel symptoms and multiple comorbidities, surgical repair was not considered.

DISCUSSION

Intestinal obstruction is a clinical diagnosis based on symptoms of vomiting, abdominal distension, constipation, and radiological findings of dilated bowel. In elderly patients, the common aetiology includes malignant obstruction, ischaemia, hernial incarceration, adhesions and rarely, volvulus⁽¹⁾. In many instances, the aetiology and level of obstruction can be identified radiologically. When a dilated loop of bowel is seen, clinicians have to identify the level of obstruction, the loop of dilated bowel proximal to it, as well as the undilated bowel distal to it. An abdominal radiograph is usually sufficient for diagnosing the level of bowel obstruction. Differences in radiological features of small and large bowel dilatation are shown in Table I. In our patient, the large distended loop of bowel with haustration and filling with faecal material are typical of an obstructed loop of large bowel (Fig. 1). The abdominal radiograph of our patient contrasts sharply with that of another patient who had small bowel dilatation due to adhesions, with the typical “stack of coins” appearance (Fig. 5).



Fig. 5 Abdominal radiograph of another patient with small intestinal obstruction due to adhesions after a prior laparotomy. Dilated small bowel loops in the middle of the abdomen have the classical “stack of coins” appearance. This patient’s small bowel obstruction responded to conservative medical measures consisting of nil by mouth and intravenous drip.

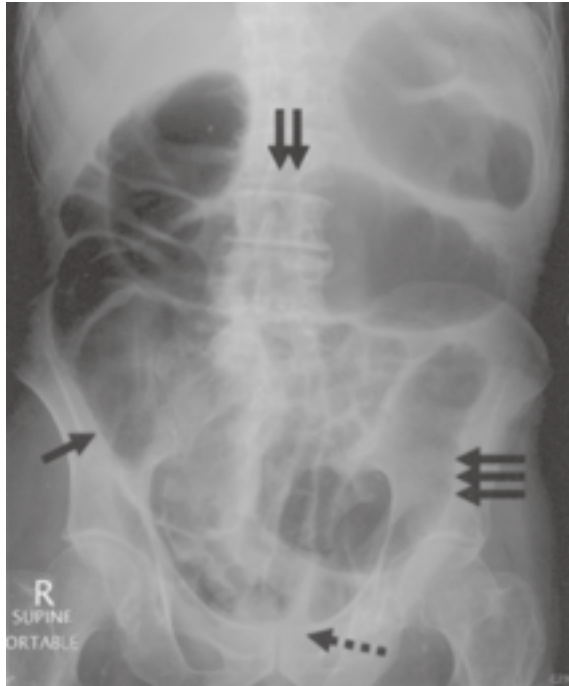


Fig. 6 Abdominal radiograph of a patient with large bowel obstruction, showing dilated caecum (single dark arrow), transverse colon (double dark arrows), and sigmoid colon (triple dark arrows). There was paucity of air at the rectum (dotted arrow), suggestive of an obstruction at the level of the recto-sigmoid area. Subsequent endoscopy and laparotomy confirmed carcinoma located at the recto-sigmoid junction.

Table I. Characteristics of small and large bowel dilatation.

Radiological features	Small bowel	Large bowel
Haustra	Absent	Present
Valvulae conniventes	Present in jejunum	Absent
Number of loops	Many	Few
Distribution of loops	Central	Peripheral
Diameter of loop	3-5 cm	>5 cm
Solid faeces	Absent	Present

Adhesions and hernia incarceration are more commonly seen in small rather than large bowel obstruction. Patients with malignant large bowel obstruction often present with subacute symptoms of intestinal obstruction prior to the acute presentation of complete obstruction. On the abdominal radiograph, cut-off between the proximal dilated bowel and the distal undilated bowel is usually not as sharp as that in patients with volvulus (Fig. 6). Chronic constipation is also a common cause of large bowel obstruction, especially in the elderly, but abdominal radiographs often reveal mild luminal dilatation with faecal shadowing throughout the whole colon, and obstruction is often relieved by laxatives administered either orally or per rectally (Fig. 7). Colonic ischaemia due to mesenteric artery thrombosis or embolus commonly

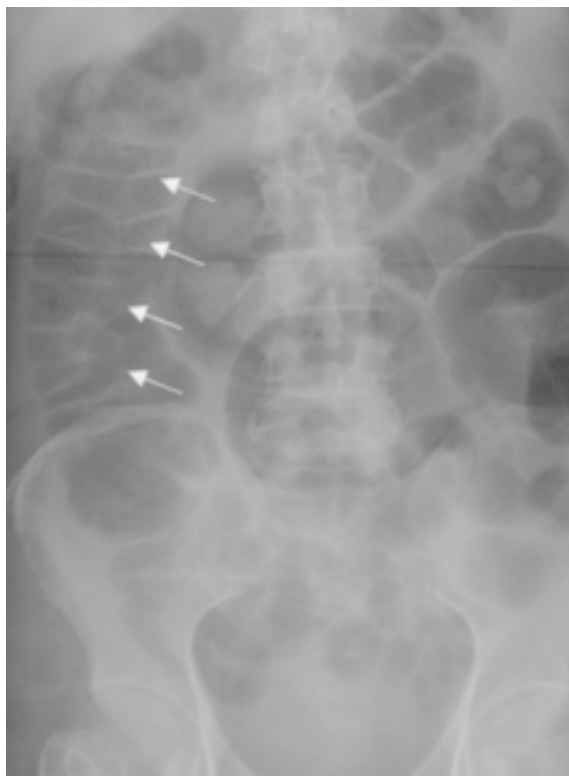


Fig. 7 Abdominal radiograph of a patient admitted for two days of constipation and abdominal distension shows generally-dilated large bowel with faecal loading (white arrows) mainly at the ascending colon. The patient’s constipation and abdominal distension were relieved by fleet enema and oral laxatives. Colonoscopy performed 3 days later did not show any obstructive lesion. The patient was discharged with a regular dose of oral laxatives.

occurs in patients with comorbidities of ischaemic heart disease and patients often present with sudden onset of abdominal pain with fresh rectal bleeding.

Volvulus refers to torsion of a segment of the alimentary tract, which often leads to bowel obstruction. In one survey from the United States, caecal and sigmoid volvulus accounted for 52% and 43%, respectively, of 137 patients who presented with colonic volvulus in a tertiary referral centre over a 20-year period⁽²⁾. In our patient, a dilated loop of bowel was noted at the left lower quadrant, and is associated with dilated descending colon and paucity of gas in the rectum. These combined radiological findings strongly suggest the level of obstruction to be at the sigmoid colon.

This patient's abdominal radiograph showed a number of typical features of sigmoid volvulus, namely: the "omega" sign, the "left pelvic overlap" sign, the "left flank overlap" sign, and the "inferior convergence" sign⁽²⁾. Other radiological features include the "liver overlap" sign (the distended bowel touching the lower border of the liver shadow at the right upper quadrant), the apex of the loop just underneath the left hemidiaphragm, the "northern exposure sign" (dilated sigmoid colon that ascends cephalad to the transverse colon), and the "empty left iliac fossa" sign (absence of gas shadow at the left iliac fossa)^(3,4). These radiological signs may also be seen on double contrast barium enema. In addition to confirmation of the diagnosis, reduction of sigmoid volvulus is successful in up to 70% of patients after barium enema⁽⁵⁾. However, barium enema should be avoided in patients with possible peritonitis.

Diagnosis of sigmoid volvulus can also be made on computed tomography (CT). The typical findings include a whirl pattern, caused by the dilated sigmoid colon around its mesocolon and vessels, and a bird-beak appearance of the afferent and efferent colonic segments⁽⁶⁾. Although sigmoid volvulus can often be diagnosed fairly accurately on abdominal radiographs, CT offers the added advantage of excluding other causes of intestinal obstruction in uncertain cases, such as presence of intra-abdominal abscesses, as well as diagnosing complications such as perforation⁽⁷⁾. The exact pathogenesis of sigmoid volvulus is unknown. A redundant sigmoid colon that has a narrow mesenteric attachment however appears to be an anatomical predisposition. Risk factors for the occurrence of sigmoid volvulus include old age, chronic neuropsychiatric disorders, chronic constipation, and laxative abuse⁽⁸⁾.

Accurate diagnosis and early decompression are essential for optimal management. Delay in diagnosis and treatment may lead to sigmoid ischaemia, infarction, peritonitis, and septicaemia, resulting in mortality of up to 60%⁽⁹⁾. In most instances, decompression can be done non-operatively with insertion of a rectal tube, or performing flexible sigmoidoscopy⁽¹⁰⁾. Flexible sigmoidoscopy is the preferred mode of decompression as it allows direct visualisation to avoid perforation, and visual examination of the mucosa to assess its viability. However, sigmoidoscopy should not be performed in patients who have developed clinical evidence of bowel gangrene (such as those with sepsis, fever, or peritonitis)⁽¹¹⁾.

The flexible sigmoidoscopy should be performed gently by an experienced endoscopist, with minimum air insufflation, and should be stopped immediately if the mucosa appears gangrenous, in order to minimise the risk of bowel perforation. A spiral sphincter-like "twist" of mucosa may be encountered at the point of torsion. Mucosa proximal to the volvulus can be identified as a distended segment filled with faecal material, which contrasts with the clean lumen distal to the volvulus, as seen in our patient (Figs. 3 & 4). Twisting of the endoscope for de-torsion is generally not required, as shortening of the endoscope during intubation will usually reduce the volvulus⁽¹²⁾.

Emergency laparotomy and resection with or without primary anastomosis is indicated when non-operative methods fail, or when there is evidence of strangulation, infarction, or perforation⁽¹³⁾. Post-operative mortality ranges from 6% to 60%. Factors associated with poor prognosis include advanced age, delay in diagnosis, presence of intestinal infarction, peritonitis, and shock at presentation^(10,13). Recurrence has been reported in up to 60% of cases for which surgery may be indicated⁽¹⁴⁾. Approaches for preventing recurrence include firstly, endoscopic decompression of the volvulus, followed by either resection or sigmoidopexy. Either surgical technique can be done via open laparotomy or laparoscopy^(15,16). However, no reliable clinical criteria can reliably predict recurrence.

ABSTRACT

An 89-year-old woman was admitted for intestinal obstruction. Her abdominal radiograph showed typical features of sigmoid volvulus. Decompression was done successfully through careful flexible sigmoidoscopy with minimum air

insufflation. The patient's symptoms were relieved and she was discharged two days post-procedure. No recurrence was noted at extended follow-up. Rapid diagnosis and early decompression are key to optimal management of sigmoid volvulus.

Keywords: air insufflation, intestinal obstruction, sigmoid colon, sigmoidoscopic decompression, volvulus

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SINGAPORE MEDICAL COUNCIL CATEGORY 3B CME PROGRAMME

Multiple Choice Questions (Code SMJ 200509B)

	True	False
Question 1. Regarding causes of intestinal obstruction in the elderly:		
(a) Malignant obstruction is common and can be diagnosed accurately by physical examination.	<input type="checkbox"/>	<input type="checkbox"/>
(b) Hernia, either inguinal or femoral, can be accurately excluded by physical examination.	<input type="checkbox"/>	<input type="checkbox"/>
(c) Adhesion from prior surgery has to be considered strongly especially in those with prior laparotomy.	<input type="checkbox"/>	<input type="checkbox"/>
(d) Intussusception is only seen in young children but not in the elderly.	<input type="checkbox"/>	<input type="checkbox"/>
Question 2. Regarding the initial management of intestinal obstruction:		
(a) Patients should be kept nil by mouth and be admitted for further management.	<input type="checkbox"/>	<input type="checkbox"/>
(b) Empirical antibiotics are not indicated unless blood cultures are positive.	<input type="checkbox"/>	<input type="checkbox"/>
(c) An urgent abdominal CT should be requested once the patient is admitted to identify the cause of obstruction.	<input type="checkbox"/>	<input type="checkbox"/>
(d) Intravenous hydration should be administered cautiously for fear of fluid overload.	<input type="checkbox"/>	<input type="checkbox"/>
Question 3. Regarding investigations for intestinal obstruction:		
(a) An abdominal radiograph is usually inadequate.	<input type="checkbox"/>	<input type="checkbox"/>
(b) Barium studies should be arranged at the next available slot to assess level and cause of obstruction.	<input type="checkbox"/>	<input type="checkbox"/>
(c) For patients with suspected large bowel obstruction, bowel preparation by polyethylene glycol (Golytely®) should be administered without delay to prepare patients for early colonoscopy.	<input type="checkbox"/>	<input type="checkbox"/>
(d) CT of the abdomen and pelvis should be performed with caution for those with elevated serum creatinine.	<input type="checkbox"/>	<input type="checkbox"/>
Question 4. Regarding abdominal radiographs in patients with intestinal obstruction:		
(a) Abdominal radiographs should be done without delay for patients with suspected intestinal obstruction.	<input type="checkbox"/>	<input type="checkbox"/>
(b) Level of obstruction can be identified with certainty in most cases.	<input type="checkbox"/>	<input type="checkbox"/>
(c) The erect film is more important than the supine film, as the erect film that shows an air-fluid level confirms the diagnosis of intestinal obstruction.	<input type="checkbox"/>	<input type="checkbox"/>
(d) Abdominal radiographs can be done daily to assess progress of obstruction in those with suspected adhesion without proceeding to further imaging studies.	<input type="checkbox"/>	<input type="checkbox"/>
Question 5. Following statements are correct regarding sigmoid volvulus:		
(a) It is more commonly seen in the elderly than young patients.	<input type="checkbox"/>	<input type="checkbox"/>
(b) A colonic polyp or tumour can often be seen at the point of torsion of the volvulus.	<input type="checkbox"/>	<input type="checkbox"/>
(c) Endoscopic decompression should be the attempted first before laparotomy and open repair.	<input type="checkbox"/>	<input type="checkbox"/>
(d) If free air is detected by abdominal imaging, proceed with endoscopic decompression with caution.	<input type="checkbox"/>	<input type="checkbox"/>

Doctor's particulars:

Name in full: _____

MCR number: _____ Specialty: _____

Email address: _____

Submission instructions:**A. Using this answer form**

1. Photocopy this answer form.
2. Indicate your responses by marking the "True" or "False" box
3. Fill in your professional particulars.
4. Post the answer form to the SMJ at 2 College Road, Singapore 169850.

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1. Log on at the SMJ website: URL <<http://www.sma.org.sg/cme/smj>> and select the appropriate set of questions.
2. Select your answers and provide your name, email address and MCR number. Click on "Submit answers" to submit.

Deadline for submission: (September 2005 SMJ 3B CME programme): 12 noon, 25 October 2005**Results:**

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2. The MCR numbers of successful candidates will be posted online at <<http://www.sma.org.sg/cme/smj>> by 20 November 2005.
3. All online submissions will receive an automatic email acknowledgment.
4. Passing mark is 60%. No mark will be deducted for incorrect answers.
5. The SMJ editorial office will submit the list of successful candidates to the Singapore Medical Council.