Intestinal Obstruction: Small and Large Bowel

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Case Presentation

A 66 year old male presented to the emergency room with 3 days of abdominal bloating, nausea, vomiting and obstipation. His last bowel movement was 2 days prior, and he was no longer passing flatus. His past medical history included coronary artery disease requiring a percutaneous coronary intervention now on dual antiplatelet therapy, atrial fibrillation on anticoagulation with apixaban, hypothyroidism, and COPD. He had a past surgical history of a laparoscopic ventral hernia repair, laparoscopic cholecystectomy, and an open left inguinal hernia repair. He had never had a bowel obstruction. He was afebrile, heart rate was 82 and blood pressure was 116/56. On exam, he was not in any distress, and his abdomen was distended but soft and minimally tender, with well healed surgical scars. There was no evidence of recurrent ventral or inguinal hernias. Lab studies revealed a WBC count of 8.6, hematocrit of 41, creatinine of 1.2 and lactate 2.4. A CT scan of the abdomen and pelvis showed dilated, fluid filled small bowel with a transition point in the mid abdomen without evidence of pneumatosis or mesenteric edema. (Fig. 88.1).

Question
How do you manage a patient with a small bowel obstruction?

Answer This patient had no signs of intestinal ischemia (fever, leukocytosis, tachycardia and acidosis unresponsive to fluids, or peritonitis), intestinal perforation (no pneumoperitoneum), or evidence of a closed loop obstruction on imaging. His history of prior abdominal surgery suggested adhesive small bowel disease, so he was initially managed non-operatively with IVF resuscitation, electrolyte repletion, NPO and nasogastric (NG) tube decompression. On placement the NG tube evacuated 1 L of bile tinged fluid.

Over the course of the next 24 h, his abdominal pain increased, and he became increasingly tachycardic without response to IV fluid. Chest x-ray showed no sign of pneumoperitoneum, but based on his worsening clinical status (pain and tachycardia), exploratory laparotomy was recommended. During the laparotomy, extensive adhesions were identified as the source of the obstruction. After lysis of adhesions, the small bowel was decompressed and its contents evacuated into the NG tube. The bowel was initially ischemic appearing, but upon decompression, looked viable. No perforations were identified. The NG tube was removed with return of bowel function and diet was advanced. He was discharged once he tolerated a diet and his pain was well controlled.

Principles of Management

Small bowel obstruction (SBO) is most commonly due to adhesive disease, however non-adhesive etiologies include volvulus, inflammatory bowel disease, incarcerated hernias, and obstructive lesions (benign or malignant) [1]. The primary concern with SBO is progression to bowel ischemia or necrosis, which is associated with a tenfold increase in mortality [1]. Since there are no physical exam findings, lab values or imaging tests that will confirm the presence of ischemia, it is a combination of these signs, symptoms and tests that must be evaluated to determine if immediate surgeries necessary. As stated in the scenario above, leukocytosis, tachycardia unresponsive to fluid administration, acidosis and peritonitis are all concerning for intestinal ischemia [2, 3]. A closed loop obstruction on CT imaging with focal peritonitis should prompt exploration as well. With the increased frequency of CT use, concerning imaging findings include pneumatosis, portal venous gas, mesenteric edema and inflammatory stranding that may favor earlier rather than later exploration but alone do not necessitate exploration.

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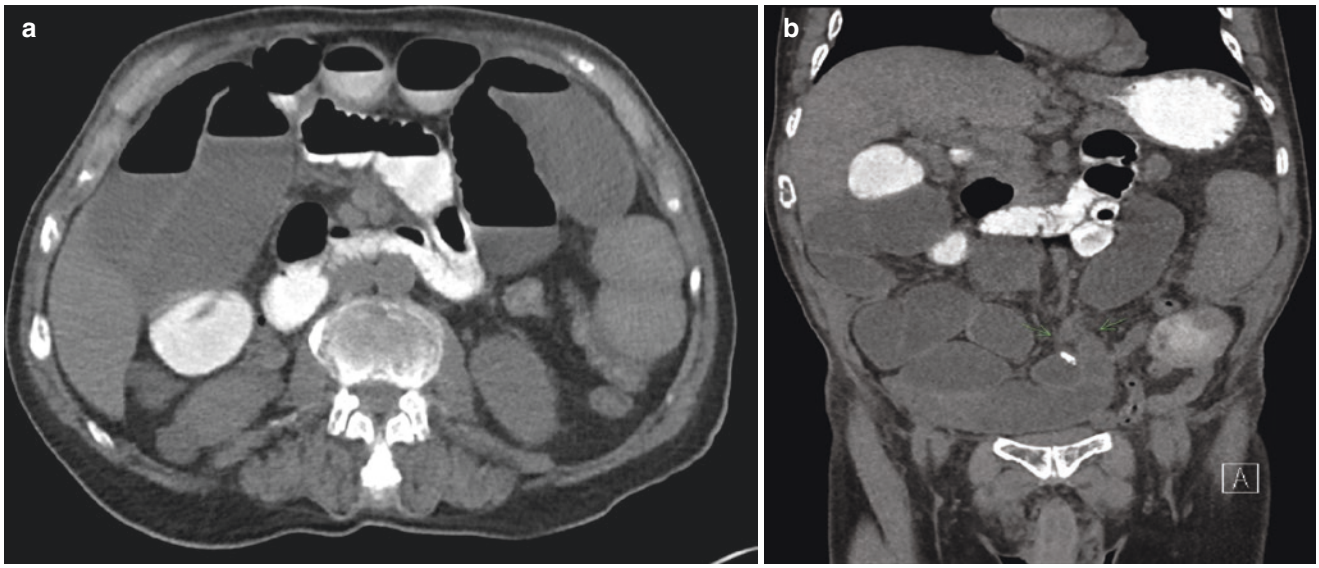

Fig. 88.1 CT scan images of small bowel obstruction. (**a**) Representative axial section of CT scan of the abdomen and pelvis with PO and IV contrast showing dilated, fluid filled small bowel. (**b**) Representative coronal section of CT scan for the same patient showing dilated, fluid filled small bowel with a transition point in the mid abdomen indicated by the arrows

Patients with SBO more commonly present without an absolute indication for exploration. In patients without immediate concern for bowel ischemia, bowel rest with NPO and NG tube decompression, fluid resuscitation, correction of electrolyte abnormalities and minimization of narcotics are trialed for a few days. Approximately 75% of SBOs resolve with non-operative management. Small, retrospective studies suggest that NG tube decompression might not be necessary, but NG tube placement continues to remain a mainstay of SBO treatment [4]. Antibiotics are not indicated [5]. Predictive models for the need for surgery using presenting symptoms, physical exam, lab values and CT imaging findings have been described but are not yet fully validated [6, 7]. Any evidence of worsened pain, tachycardia, acidosis or leukocytosis necessitates exploration [8]. (Fig. 88.2).

Classically, operative intervention for SBO is a midline laparotomy with lysis of adhesions and bowel resection as needed. Laparoscopy can also be performed in select cases. Laparoscopy offers decreased re-formation of adhesions and accelerated post operative recovery. Recent reviews suggest no significant difference in rates of intraoperative complications and overall mortality between laparoscopic and open approaches [9]. Conversion from laparoscopy to laparotomy occurs ~50% of the time with the main reason being obscured view due to intestinal distension and extensive adhesions [10]. Predictors of successful laparoscopy include operative management within 24 h of onset of symptoms, appendectomy as the only previous operation, no previous midline laparotomy, ≤ 2 previous laparotomies, and a single adhesive band [5]. Although a viable option, cases selected for laparoscopy often included less challenging and less critically ill patients prompting a selection bias in favor of laparoscopy [11]. Regardless, laparoscopy remains a viable option for more straight-forward, less complex cases.

Evidence Contour

Timing of Operating for SBO

Evidence for the optimal duration of non-operative management is lacking. Approximately 75% of SBOs treated non-operatively will resolve with conservative management, 88% of which resolve within 24 h, and the remaining within 72 h [5]. Therefore, most surgeons will observe for 48–72 h before proceeding with an operation. Recurrence of SBO after non-operative management is frequent with 12% readmitted within 1 year, increasing to 20% after 5 years [5]. The recurrence after operative management is only marginally better at 8% within 1 year and 16% within 5 years. Predictive models for the need for laparotomy using presenting symptoms, physical exam, lab values and CT imaging findings have been described but are not yet fully validated [6, 7].

Water-soluble contrast via NG tube or by mouth can both treat and assess patients with adhesive small bowel disease [12, 13]. Patients are given a small volume of water-soluble contrast and serial abdominal plain films are obtained. Passage of contrast into the colon within 24 h of administration indicates resolution of the SBO and trials of a diet can ensue. This technique accurately predicts the need for surgery, and leads to shorter lengths of stay [14, 15]. (Fig. 88.2).

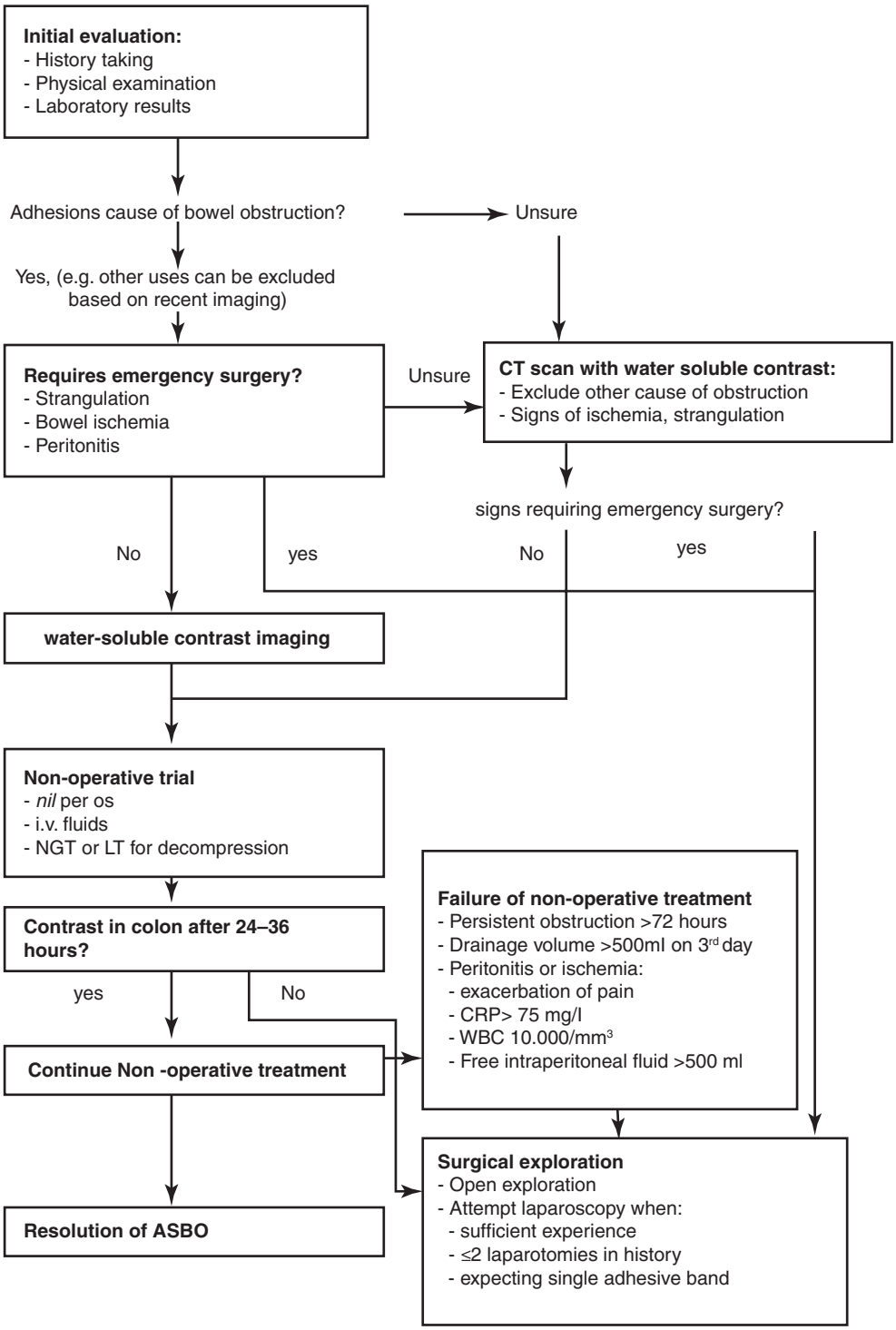

Fig. 88.2 Evidence based algorithm for the treatment of small bowel obstructions. (From Ten Broek et al. [8]. © Ten Broek et al.; licensee BioMed Central Ltd. 2018 [Creative Commons Attribution License])

Management Differences Between Small and Large Bowel Obstruction

The case in this chapter illustrates the course of care for SBO. SBO is much more common than large bowel obstruction (LBO). Although the presenting symptoms may be similar, the causes, diagnostic work up and treatment are different. LBO is rarely due to adhesive disease, and more often results from cancers, diverticular stricture, volvulus, and hernia.

LBO is more often an emergency condition that requires early identification and intervention. With a competent ileocecal valve, an obstructed colon will lead to unrelieved colonic distension, venous outflow obstruction and bowel ischemia. Complete resection of the diseased area, damage control laparotomy and proximal diversion with ostomy

formation are all accepted options based on the clinical scenario. [16] Similar to laparoscopy for SBOs, laparoscopy in the setting of LBOs is an option in less challenging cases and advanced laparoscopic skills.

For patients with a LBO who are debilitated and cannot undergo surgery or when care is simply palliative, colonic stents can bypass an area of stricture or obstruction [17–19]. Self expandable metal stents, especially in instances of left sided malignant obstructions, have a reported success rates up to 80–90% [20, 21]. For right sided obstructing tumors, colonic stents may be used for palliation but are often technically difficult.

Other unique causes of large bowel obstruction include colonic ileus (Ogilvie's syndrome), toxic megacolon with *Clostridium difficile* infection, and fecal impaction. The clinical scenario for each of these potential causes of large bowel obstruction should help in delineating the initial management steps.

Management of Acute Small Bowel Obstruction in a Patient with No Prior Abdominal Surgery or Pathology

Previously, patients without prior abdominal surgery who developed a small bowel obstruction underwent exploration. The thought was that the source of the obstruction could be from a mass or cancer and would not resolve or that the mass would be left untreated. However, recent studies indicate that exploration may not be always necessary. Most (62–75%) of these obstructions are due to adhesions and may resolve with nonoperative management [22, 23]. In fact, similar to bowel obstructions in the setting of prior abdominal surgery, administration of gastrografin can be used to assess and treat SBOs in the setting of no prior surgery [24]. With 4.5 years of follow up, 92% of patients will not experience a recurrence if managed nonoperatively [25]. Therefore, we recommend treatment of patients without prior abdominal surgery with SBOs in a similar fashion to those patients with prior abdominal surgery with further evaluation with endoscopy, additional imaging or GI consultation as an outpatient.

CT Imaging Findings Indicative of a Need for Exploration

For almost every patient presenting to the ED with abdominal pain, CT is used in the initial assessment. Commonly reported findings concerning for SBO are "transition point", "air fluid levels", "small bowel fecalization", and "mesenteric swirling" [26]. While these findings may be helpful for operative planning, they have no correlation with severity or chronicity of an SBO, nor does it decrease the chance that the SBO will resolve with non-operative management [27].

Pneumatosis intestinalis, bowel wall thickening and hypoenhancement are highly specific signs of intestinal ischemia, however they are not sensitive and therefore require clinical correlation [28, 29]. CT findings suggestive of ischemia without corresponding physical exam findings or laboratory values is not an absolute indication for exploratory laparotomy [30, 31]. Additional imaging findings that should contribute to a more heightened need for exploration include closed loop obstruction, mesenteric edema and reduced enhancement of mesenteric veins [32]. In line with the theme of this chapter, one test alone, and in this case CT imaging, should not be used to determine the need for surgical intervention for a SBO. Rather, it is a combination of physical exam, clinical scenario, lab values and imaging that most appropriately identify those patients who need emergent operative intervention versus those who can trial a course of non-operative management.

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