

REVIEW ARTICLE

The Clinical Management of Acute Mechanical Small Bowel Obstruction

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KEYWORDS:

Small Bowel Obstruction

Conservative Management

Acute mechanical small bowel obstruction (AMSBO) is a common emergency and a significant cause of hospitalization. Due to the variation in small bowel obstruction-related symptomatology, many patients are unaware of the seriousness of their clinical condition and do not seek immediate medical attention. Consequently, such patients forego a visit to the hospital emergency department and often present to their primary care physician (PCP). PCPs, with hospital admitting privileges, and other hospital-based physicians, must have a sound understanding of the principles underlying the treatment of AMSBO. All patients with suspected AMSBO should be hospitalized and treated initially with conservative management. This includes bowel rest with early decompression, fluid resuscitation, and correction of electrolyte abnormalities. Water-soluble contrast medium can be useful adjunct in this approach; it has both diagnostic and therapeutic purposes. Furthermore, water-soluble contrast medium is safe and reduces the need for surgery, time to resolution and hospital stay. Non-operative management can be prolonged up to 72 hours in the absence of strangulation or peritonitis. In contrast, ambulatory patients presenting with ominous clinical signs and symptoms should be considered for immediate surgical intervention. Indications for surgery include strangulation, peritonitis, intractable vomiting, complete or closed loop bowel obstruction, or failure to improve after 72 hours of conservative management.

INTRODUCTION

Small bowel obstruction occurs when the movement of intraluminal contents within the intestine is restricted, leading to a partial or complete obstruction. The factors that lead to obstruction originate from either a mechanical or a functional pathophysiology. Mechanical obstructions can occur outside of the intestine (extrinsic), within the intestinal wall (intrinsic), or within the lumen. The most common causes of mechanical small bowel obstruction are postoperative adhesions and hernias. Postoperative intra-abdominal adhesions are the etiology in up to 75% of cases of small bowel obstruction.¹ Although tumors, strictures, gallstones and foreign bodies are also possible causes, they are less common. Functional small bowel obstruction, or adynamic ileus, can manifest with symptoms similar to mechanical obstruction and may be difficult to differentiate without appropriate clinical evaluation. Since adhesions are the most common cause of small bowel obstruction, we will review the proper diagnostic evaluation & initial management of AMSBO, and subsequently discuss the indications for surgical referral.

DIAGNOSTIC EVALUATION

Early diagnosis of small bowel obstruction is essential for successful medical management. This is especially important for AMSBO which may lead to intestinal strangulation, a

surgical emergency that can result in bowel ischemia, necrosis and perforation. Ischemia complicates 7 to 42 percent of bowel obstruction and significantly increases mortality.² Diagnostic evaluation should focus on differentiating mechanical from functional obstruction (*Table 1*), determining if the obstruction is partial or complete, and discriminating simple from strangulating obstruction. An appropriate assessment will guide the clinician in determining whether AMSBO should be treated with conservative medical management or surgery.

TABLE 1:

Differential Diagnosis of Bowel Obstruction

Mechanical	Functional
Adhesion	Ileus
Hernia	Pseudo-obstruction
Tumor	Intra-abdominal Sepsis
Bowel Inflammation	Pneumonia
Gallstone	Electrolyte Imbalance
Volvulus	
Intussusception	

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Initial assessment should begin with elicitation of pertinent history, such as prior abdominal operations, which may suggest the presence of adhesions. The most important risk factors for adhesions are type of previous surgery and the extent of peritoneal damage obtained during surgery. For example, surgeries of the rectum and colon are associated with a higher risk of adhesion-related problems.³ Total colectomy with ileal anal pouch anastomosis has the highest incidence of adhesion-related problems, followed by gynecological surgeries and open colectomies.³ Other risk factors for small bowel obstruction include age younger than 60, previous laparotomy within 5 years, and history of peritonitis, multiple laparotomies, emergency surgery, omental resection, or penetrating abdominal trauma.⁴ In addition, identification of prescription medications, such as narcotics, and recreational drugs, that have the potential for disrupting bowel function, could prove insightful.

Bowel obstruction usually presents with abdominal pain, nausea and vomiting, absence of flatulence or stool, abdominal distention, and dehydration.⁵ Abdominal distention is more pronounced if the obstruction localizes to the proximal jejunum or beyond. Proximal obstructions tend to present with more frequent cramps compared to distal obstructions, which present with cramps of longer duration and usually with less severity.⁶ Important clinical signs and symptoms, including tachycardia, fever, localized pain or peritonitis, and leukocytosis, may indicate strangulation of the bowel. Physical examination must include a thorough inspection for any external or internal hernias. External hernias that often obstruct bowel include hernias in the inguinal canal, femoral canal, and previous sites of incision. Internal hernias are related to congenital mesenteric defects, obturator foramen hernia, and improper closing of mesentery created by previous surgeries.⁷ The presence of gross or occult blood rectally may be suggestive of intestinal strangulation.

Supine and erect abdominal plain films should be obtained in the diagnostic work up of suspected small bowel obstruction. A complete abdominal series can be as sensitive as a Computed Tomography (CT) scan in detecting high grade bowel obstruction (86% vs 82%).⁸ However, plain films are less useful for detecting low grade or partial bowel obstruction, with a sensitivity ranging from 70 to 86%.⁹ Despite limitations in sensitivity, plain films should be considered as they are widely available and less costly.

When plain films are inconclusive, CT scan can be highly diagnostic, with a sensitivity of 80% to 90% and specificity of 70% to 90%.⁹ Findings of small bowel obstruction on a CT scan often include a proximally dilated bowel with a discrete transition zone leading to decompressed bowel distally; contrast will often not pass through the transition zone. A CT

scan can confirm the presence of complete obstruction and identify the cause. Furthermore, it can confirm the presence of strangulation with a sensitivity & specificity higher than 90% and a negative predictive value of nearly 100%.¹⁰ A CT scan should be considered when clinical history, physical examination, and plain films are inconclusive in making the diagnosis of AMSBO obstruction.⁴

Small bowel obstructions that are partial or low grade are less likely to be detected with CT scan. In particular, subtle transition zones as well as unsuspected closed loop obstructions can be difficult to diagnose. In such cases, small bowel follow through studies coupled with CT has a much higher diagnostic yield, with sensitivity and specificity each approaching 100%.¹¹ These studies are often more labor intensive but provide greater sensitivity in detecting luminal and mural etiologies of obstruction.

Water-soluble contrast medium, such as Gastrografin, can also be useful in evaluating AMSBO. In particular, radiographs utilizing water-soluble contrast medium can be predictive of the need for surgery in patients with adhesive small bowel obstruction.¹² Partial bowel obstruction is likely to resolve with conservative treatment if water-soluble contrast medium is detected radiographically in the colon. In contrast, absence of contrast medium in the colon after 24 hours is indicative of complete bowel obstruction and surgical treatment will likely be required. Water-soluble contrast medium administration has both diagnostic and therapeutic value.¹²

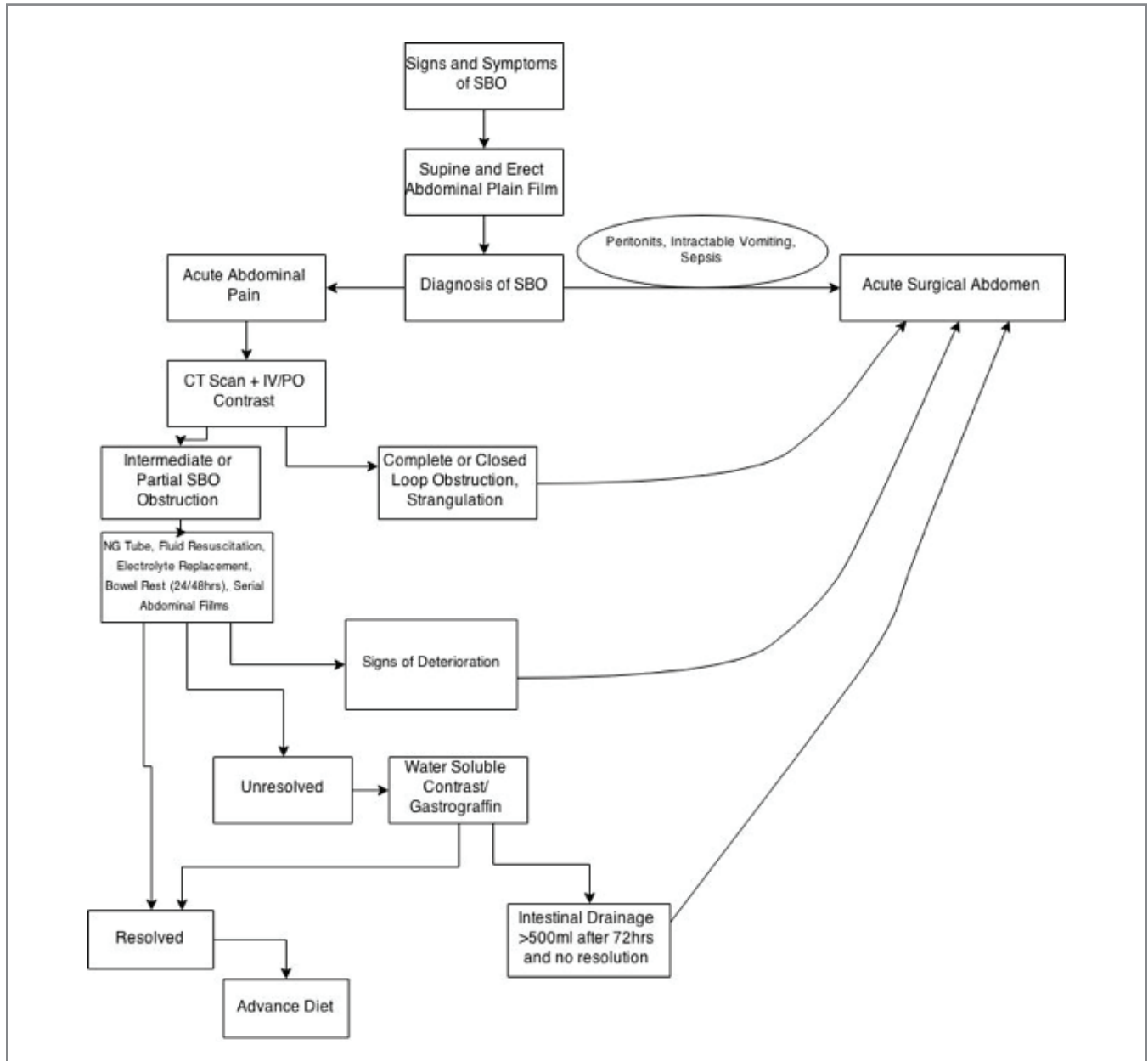
CONSERVATIVE MEDICAL MANAGEMENT VERSUS SURGICAL INTERVENTION

Treatment of AMSBO requires familiarity with conservative medical management and the indications for surgical intervention (*Figure 1, page 24*). Surgical intervention is controversial because of the potential for inducing adhesions. On the other hand, conservative treatment is often ineffective in eliminating the cause of obstruction. In a study conducted by William et al. showed that patients treated non-operatively have shorter hospital stay (4.9 vs 12.0 days), but higher frequency of recurrence (40.5% recurrence non-operatively vs 26.8% recurrence operatively). They were also found to have a shorter time to re-admission (153 days non-operatively vs 411 operatively).¹³ Despite this, initial therapy with conservative management is recommended before surgical intervention in the absence of ominous clinical signs.⁴

Conservative medical management of AMSBO includes bowel rest with early decompression, fluid resuscitation, and correction of electrolyte abnormalities.¹⁴ Early management is important to retard the extent of intravascular volume depletion caused by vomiting and sequestration of volume within the bowel lumen. Factors that lead to this intraluminal

FIGURE 1:

Clinical Management of Mechanical Small Bowel Obstruction



fluid accumulation include decreased reabsorption, increased fluid secretion, associated with rising intraluminal pressure, and a concomitant increase of vasoactive agents, such as prostaglandins and vasoactive intestinal peptide. Blood flow to the bowel may become compromised when intraluminal pressure exceeds intramural capillary and venous pressure.⁷ Decompression can be performed using either a naso-gastric tube or a long intestinal tube, neither being more advantageous than the other.¹⁵ Patients without evidence of peritonitis or strangulation can be managed safely with non-operative therapy for up to 72 hours.⁴ However, a retrospective study of 123 patients conducted by Cox et al. demonstrated that 31 out of the 38 patients who required surgical intervention did so after 48 hours of conservative management. Most cases of adhesive small bowel obstruction that resolve do so within 48 hours of admission.¹⁶ Persistent ileus or intestinal drainage exceeding 500 mL after 3 days of hospitalization indicate failure of conservative management and warrant the need for surgery.¹⁴ If there is no improvement within 3 to 5 days and surgery is anticipated, parenteral nutrition should be provided and intravenous antibiotics should be initiated.⁷

As mentioned previously, water-soluble contrast medium can be effective in the conservative management of AMSBO. Doses of 50-150 mls, administered either orally or through naso-gastric tube, can be given for up to 48 hours from the time of initiating conservative management.⁴ Water soluble contrast medium's mechanism of action is an osmotic shift of fluid into the intestinal lumen which increases the pressure gradient across the site of the obstruction. In general, adverse side effects are rare. Water soluble contrast medium reduces the need for surgery, accelerates the resolution of AMSBO, and shortens hospitalization.⁴ However, it does not reduce the likelihood of AMSBO recurrence or obviate the need for surgery with future AMSBO recurrences.¹⁷ Even so, water-soluble contrast medium should be considered in AMSBO patients that warrant conservative management.

The most recognized complication related to the use of water-soluble contrast medium is aspiration pneumonia. This often occurs in patients with delayed gastric emptying or intractable vomiting.¹⁸ Renal failure or anaphylaxis, although rare, can also occur through venous intravasation.¹⁹ Complications can be avoided by ensuring proper placement of the nasogastric tube in the stomach and adequate gastric drainage before administration of water soluble contrast medium.

Indications for immediate surgical intervention include strangulation, peritonitis, intractable vomiting, and complete or closed loop bowel obstruction.¹² Failure to recognize an early indication for surgery may result in serious morbidity or death. For example, strangulation can lead to lethal complications such as endotoxic shock, sepsis, and multiple organ failure accounting for nearly fifty percent of all deaths from small bowel obstruction.²⁰ Therefore, management of patients with a high index of suspicion for complicated or severe AMSBO requires a low threshold to operate.

Radiographic evaluation can sometimes be helpful in identifying patients that would benefit from immediate surgical intervention. Radiographic evidence of bowel wall thickening, pneumatosis intestinalis, ascites, or mesenteric hematoma can be suggestive of bowel strangulation in the proper clinical context. Closed loop bowel obstruction on CT is characterized by a C or U shaped section of bowel that is dilated along the proximal end but decompressed at the corresponding distal end.⁷ Free fluid in the peritoneal space, a frequent finding in patients with AMSBO, could be diagnostic and should be further characterized by volume, density, and location. Focal mesenteric fluid or large amounts of highly attenuated fluid in multiple spaces are suggestive of underlying bowel injury.²¹ Mesenteric edema and devascularized bowel may be present in patients with findings of bowel wall thickening, hypoattenuation, bowel dilation, bowel wall hemorrhage, mesenteric fat stranding, or portal venous gas on CT scan.

PREVENTION

There are no current definitive pharmacotherapies or osteopathic manipulative techniques that can prevent the development of mechanical small bowel obstruction in high-risk patients. However, promising results have been demonstrated with the use of statins and sodium hyaluronate carboxymethyl cellulose bioresorbable membrane (Seprafilm) in reducing postoperative adhesion in abdominal surgeries. A retrospective study conducted by S. Srinivasa et al. demonstrated that patients who presented with adhesive small bowel obstruction and were on a statin had a decreased need for therapeutic surgery in order to relieve the obstruction.²² Statins have been shown to increase peritoneal fibrinolytic activity, decrease post-surgical inflammatory response, and reduce intestinal ischemia and reperfusion injury, all of which are risk factors associated with ASBO and subsequent operative management. Seprafilm membranes have been demonstrated in numerous studies to reduce the risk of abdominal adhesion following abdominal surgery.²³ These therapeutic measures are most beneficial following surgery and are often out of the hands of a primary care physician. Therefore, the best preventative measure a primary care physician can implement is to properly manage the underlying disease associated with the increased risk, such as Crohn's Disease. Dietary modifications have been shown to decrease the risk of developing complete obstruction in such patients. Dietary modifications should be implemented to avoid fiber-rich foods that increase gas and bulk within the bowel.²⁴ PCPs should advise such patients to eat vegetables that are cooked, canned, and free of skin and seeds. Avoidance of fatty and greasy foods as well as lactose containing drinks should also be advised.

CONCLUSION

Acute mechanical small bowel obstruction is a common emergency and can present initially in the outpatient setting. PCPs should consider pertinent medical history and physical exam findings when conducting a clinical evaluation of AMSBO. All patients with suspected AMSBO should be hospitalized and treated initially with conservative management. This includes bowel rest with early decompression, fluid resuscitation, and correction of electrolyte abnormalities. Water-soluble contrast medium can be useful adjunct in this approach; it has both diagnostic and therapeutic purposes. Furthermore, water-soluble contrast medium is safe and reduces the need for surgery, time to resolution and hospital stay. Non-operative management can be provided safely, in the absence of strangulation or peritonitis, for up to 72 hours. In contrast, ambulatory patients presenting with ominous clinical signs and symptoms should be considered for immediate surgical intervention. Indications for surgery include strangulation,

peritonitis, intractable vomiting, complete or closed loop bowel obstruction, or failure to improve after 72 hours of conservative management.

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