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SMALL BOWEL OBSTRUCTION
Evidence Based Medicine Guideline

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SUMMARY
Small bowel obstruction (SBO) accounts for 12-16% of surgical admissions and >300,000 operations annually in the U.S (1,2) with overall mortality ranging between 2-8% and as high as 25% when associated with bowel ischemia (2). Recommendations for evaluation and management of these patients continue to evolve due to advancements in imaging and surgical techniques. This guideline presents the most updated literature on acute adhesive small bowel obstructions (ASBO) in adults, and provides an algorithm for nonoperative management of patients with suspected low-grade ASBOs.

RECOMMENDATIONS

- **Level 1**
  - **CT scan of the abdomen and pelvis with IV contrast should be considered in all patients with suspected small bowel obstruction (SBO)**
  - **Patients with generalized peritonitis, signs of strangulation or with other evidence of clinical deterioration due to SBO should undergo timely surgical exploration**
  - **Non-operative management is acceptable as initial management in stable patients, despite the grade of obstruction**
  - **Water soluble contrast (Gastrografin) study should be initiated within 48 hours**

- **Level 2**
  - **CT findings suggestive of ischemia should prompt a low threshold to operate**
  - **Early nasogastric tube decompression may be beneficial**
  - **Laparoscopic treatment of SBO is a viable alternative to laparotomy**
  - **Patients experience better outcomes with early versus late (>72 hrs) surgery**

- **Level 3**
  - **Patients without resolution of the SBO by days 3-5 of nonoperative management should undergo a water-soluble contrast study or surgery**
  - **If available, multidetector CT and multiplanar reconstruction should be utilized**
  - **MRI and ultrasound are potential alternatives to CT**
  - **Patients with SBO should be admitted to a surgical service due to improved outcomes and decreased cost**

INTRODUCTION
Small bowel obstructions (SBO) most commonly occur due to adhesions (~70%) in industrialized countries, followed by malignancy, inflammatory bowel disease, and hernias (1). SBO management depends on the etiology, severity, and location of the obstruction. Most patients with adhesive SBO (ASBO) are candidates for a trial of nonoperative management and 60-85% of these obstructions will resolve without surgery (1,3). Bowel compromise (ischemia, necrosis, or perforation) or a surgically correctable cause of obstruction not secondary to adhesive disease (eg,

LEVEL OF RECOMMENDATION DEFINITIONS
- **Level 1:** Supported by multiple, prospective randomized clinical trials or strong prospective, non-randomized evidence if randomized testing is inappropriate.
- **Level 2:** Supported by prospective data or a preponderance of strong retrospective evidence.
- **Level 3:** Supported by retrospective data or expert opinion.

incarcerated hernia) require upfront surgical exploration (1). It remains a clinical challenge to predict which patients will fail nonoperative management, but institutional guidelines for SBO management can help improve outcomes by decreasing time to surgical intervention (if needed) and hospital length of stay (4, 5).

LITERATURE REVIEW

Imaging Modalities

Radiographic imaging plays a key role in the diagnosis and management of SBO. Plain abdominal radiography has traditionally been the starting point for evaluation of suspected SBO, however, level 1 evidence now supports the use of CT over plain films. CT not only diagnoses the presence of SBO but also can aid in the differentiation of high-grade from low-grade obstruction, serves to localize the site of obstruction, serves to evaluate possible etiologies, and can help identify bowel compromise or other findings that would warrant prompt surgical intervention (1,2).

According to the American College of Radiology, the accuracy of CT scans is >90% in detecting acute SBOs and should be performed with IV contrast. Oral contrast may be considered depending on the patient's presenting symptoms, though oral contrast does not add to the diagnostic accuracy and can increase patient discomfort and potentially risk of aspiration. Additionally, the use of oral contrast may limit the ability to detect abnormal bowel wall enhancement (2)

Findings consistent with SBO on CT scan include a clear transition point with dilation of bowel proximally and decompression distally, a decompressed colon, and failure of intraluminal contrast to pass beyond the transition point. CT findings suggestive of bowel ischemia include pneumatosis, mesenteric venous gas, increased or decreased bowel wall enhancement on contrasted CT, intramural hyperdensity on noncontrasted CT, bowel wall thickening, mesenteric edema, and ascites (1,2)

CT's sensitivity in detecting bowel ischemia is more variably reported in the literature, with some studies reporting 14.8-51.9% and others reporting 85-100% sensitivity (1,2). A prospective study by Zalcman et al. found that helical CT scans had a 96% sensitivity and 93% specificity in diagnosing bowel ischemia, with a negative predictive value of 99% (6). Reduced enhancement of the bowel wall had a sensitivity of 48% and specificity of 100%, mural thickening had a sensitivity of 38% and specificity of 78%, mesenteric fluid had a sensitivity of 88% and specificity of 90%, congestion of mesenteric veins had a sensitivity of 58% and specificity of 79%, and ascites had a sensitivity of 75% and specificity of 76%.

Intraperitoneal free fluid is present on CT in over one-third of patients with acute SBO, though free fluid is not necessarily predictive of the need for operative intervention. Fluid with a Hounsfield unit (HU) density >10 has a positive predictive value and negative predictive value of >75% for requiring an operation (7).

Plain radiographs of the abdomen and pelvis are neither sensitive nor specific for obstruction, though they can assist with triaging these patients. Concerning X-ray findings include dilated loops of bowel with air-fluid levels, particularly if there is a differential in height (>5mm) in the same loop of bowel or with a "string-of pearls" appearance. The presence of a mean air-fluid level width of > 25mm on upright film has been reported to strongly correlate with complete or high-grade obstruction (8).

Initial presentation and management

Initial symptoms associated with SBO include colicky abdominal pain, nausea +/- vomiting, and obstipation. Initial management should include bowel rest, correction of acid-base disturbances, electrolyte replacement, and possible nasogastric decompression based on the clinical presentation. The role of empiric antibiotics is controversial, but should be administered in patients with suspected bowel compromise. Konishi et al. found in a large cohort study that there was no benefit in the use of preventative antibiotics in the treatment on nonoperative ASBO management, and was actually associated with a longer hospital stay (9).

Admission to a surgical service or early surgical consultation is also recomended. In a large, retrospective study, Aquina et al. found that management of patients with ASBO primarily by a medical service was associated with higher healthcare utilization and worse outcomes (10). In both those managed nonoperatively and operatively, they observed longer hospital lengths of stay, greater inpatient costs, and higher 30-day readmission in those managed by medical verses surgical teams. In those managed operatively, they also found that there was a delay in time to surgical intervention and higher rates of 30-day mortality.

Operative versus non-operative management

To better predict which patients will fail non-operative management, several prospective and retrospective studies have looked at the use of a small bowel follow through (SBFT) study where soluble contrast, Gastrograffin, is administered enterally and a series of abdominal radiographs are performed to assess for the passage of contrast into the colon. Patients in which contrast reaches the colon by 24 hours rarely require surgery (2). The optimal timing of Gastrografin administration and duration of radiographic studies after its administration is still debated.

Ceresoli et al. and Branco et al. published the two largest systematic reviews and meta-analyses looking at the utility of Gastrograffin in ASBO, for which both included multiple randomized controlled trials and observational studies (11, 12). Ceresoli et al. demonstrated a sensitivity of 92% and specificity of 93% in predicting the resolution of ASBO when water-soluble contrast was in the colon by 2-36 hours (11). Branco et al. demonstrated a sensitivity of 96% and specificity of 98% in predicting resolution of ASBO when water-soluble contrast was present in the colon within 24 hours (12). Time to resolution of the SBO and the overall need for surgery was decreased in both studies, suggesting a possible therapeutic effect of Gastrograffin as postulated by its osmotic and pro-motility properties.

Another large Cochrane review demonstrated similar diagnostic effects of Gastrografin, but did not reveal a therapeutic benefit through multiple randomized trails (13). All three meta-analyses, however, revealed a significantly shorter hospital length of stay with the use of a SBFT study. None of these studies showed a significant difference in overall complication rates or mortality (11-13).

Several studies advocate for the implementation of hospital-wide protocols where abdominal x-rays are taken at set intervals after the administration of Gastrografin, termed an Abbreviated Small Bowel Follow-Through (SBFT) study, which has been found to decrease time to surgical consultation, time to operative intervention (if needed) and leads to shorter hospital length of stay (3,4,14).

When to initiate a SBFT study is still debated, but newer studies are showing better outcomes if initiated within 48 hours of admission. Ali et al. found in a single center retrospective review that SBFT administered within 24 hours decreases LOS, overall costs, and time to operating room in patients who fail nonoperative management (15). Soult et al. found similar outcomes when a SBFT was performed within 48 hours, as well as decreased readmission rates and decreased rates of surgical intervention suggesting a possible therapeutic benefit if performed early (14). Some studies even support the initiation of Gastrograffin immediately upon admission (16).

The conclusion that can be made from the current literature is that a SBFT study can aid in the assessment of whether an ASBO will resolve on its own or if operative intervention will be necessary. The use of SBFT for ASBO has been associated with improved outcomes, especially if performed early (< 48 hrs.).

Surgical Management

It has been generally accepted that in the absence of strangulation or peritonitis nonoperative management can be pursued for up to 3-5 days (3). More recent studies, however, have shown a benefit to early surgery within 3 days, when needed (17). Immediate surgery is indicated for those that develop peritonitis, signs of bowel ischemia or clinical deterioration as a result of the obstruction (1,3,9-13,17-18).

Cox et al. concluded in a retrospective study that surgery should be strongly considered at the 48-hour mark, if no evidence of clinical or radiographical resolution of the SBO (3). A more recent and large retrospective review of NSQIP data by Teixeira et al. looked at mortality and overall complication rates in 24-hour increments for patients treated surgically, and found a statistically significant upward trend for both (17). For example, they observed a 3-fold increase in mortality and 2-fold increase in systemic infectious complications in patients who underwent surgery more than 72 hours compared with those who had surgery within 24 hours of admission.

In a retrospective, propensity-score-matched administrative database study by Behman et al., in 2 of over 27,000 patients with their first episode of adhesive small bowel obstruction, operative management was associated with a lower risk of recurrence (13 versus 21%) and a lower risk of death (18). The five-year probability of recurrence increased with each episode until surgical intervention, at which point the rate of subsequent recurrence decreased by approximately 50%.

PROPOSED MANAGEMENT ALGORITHM

Proposed algorithm for managemnet of ASBOs in the noncritical patient:

- Initial management should include NPO, IVF resuscitation, electrolyte repletion, NGT if significant distension, nausea or vomiting
- If initial CT was performed with oral contrast, obtain KUB in 6 to 24 hours
- Administer Gastrografin (100 cc PO or per NGT) as soon as decompression has been achieved (as early as 2 hours)
    - KUB in 6 to 24 hours
        - If contrast in colon, advance to clear liquid diet
        - If no contrast in colon at 24 hours, consider operative intervention vs. continued observation if stable
            - Observation in these patients should include continued radiographic monitoring for progression of contrast with low threshold to operate
            - If no progression of contrast in ~3-5 days despite clinical stability, then proceed to surgery
- If Gastrografin is contraindicated, i.e. pregnancy, recent abdominal surgery), then proceed with bowel rest, decompression, serial exams, and low threshold to operate if any signs of clinical deterioration or failure to progress in 3-5 days

REFERENCES

1. Maung AA, Johnson DC, Piper GL, Barbosa RR, Rowell SE, Bokhari F, Collins JN, Gordon JR, Ra JH, Kerwin AJ; Eastern Association for the Surgery of Trauma. "Evaluation and Management of Small-bowel Obstruction: An Eastern Association for the Surgery of Trauma Practice Management Guideline." *National Center for Biotechnology Information*. U.S. National Library of Medicine, Nov. 2012. Web. 25 Apr. 2014.
2. Expert Panel on Gastrointestinal Imaging; Chang KJ, Marin D, Kim DH, Fowler KJ, Camacho MA, Cash BD, Garcia EM, Hatten BW, Kambadakone AR, Levy AD, Liu PS, Moreno C, Peterson CM, Pietryga JA, Siegel A, Weinstein S, Carucci LR. ACR Appropriateness Criteria® Suspected Small-Bowel Obstruction. J Coll Radiol 2020; 17(5S):S305-S314.
3. Cox MR, Gunn IF, Eastman MC, Hunt RE Heinz AW. The safety and duration of non-operative treatment for adhesive small bowel obstruction. Australian and New Zealand Journal of Surgery 1993; 63: 367-371.
4. Peterson J, Cox C, Unrue E, Steed R, Mentzer C, Currence C, Mount M. Utility of Abbreviated Small Bowel Follow Through Study in the Management of Small Bowel Obstruction. Am Surg 2023; 89(8):3444-3448.
5. Wahl WL, Wong SL, Sonnenday CJ, Hemmila MR, Dimick JB, Flanders SA, Desmond JS, Bahl V, Henke PK. Implementation of a small bowel obstruction guideline improves hospital efficiency. Surgery 2012; 152(4):626-634.
6. Zalcman M, Sy M, Donckier V, Closset J, Gansbeke DV. Helical CT signs in the diagnosis of intestinal ischemia in small-bowel obstruction. AJR Am J Roentgenol 2000; 175(6):1601-1607.
7. Nelms DW, Kann BR. Imaging Modalities for Evaluation of Intestinal Obstruction. Clin Colon Rectal Surg. 2021; 34(4):205-218.
8. Lappas JC, Reyes BL, Maglinte DD. Abdominal radiography findings in small-bowel obstruction: relevance to triage for additional diagnostic imaging. AJR Am J Roentgenol. 2001; 176(1):167-174.
9. Konishi T, Fujiogi M, Michihata N, Morita K, Matsui H, Fushimi K, Tanabe M, Seto Y, Yasunaga H. Comparing outcomes of nonoperative treatment for adhesive smallbowel obstruction with and without antibiotics. J Infect Chemother. 2021; 27(5):690-695.
10. Aquina CT, Becerra AZ, Probst CP, Xu Z, Hensley BJ, Iannuzzi JC, Noyes K, Monson JR, Fleming FJ. Patients With Adhesive Small Bowel Obstruction Should Be Primarily Managed by a Surgical Team. Ann Surg 2016; 264(3):437-47.
11. Ceresoli M, Coccolini F, Catena F, et al. Water-soluble contrast agent in adhesive small bowel obstruction: a systematic review and meta-analysis of diagnostic and therapeutic value. Am J Surg 2016; 211(6):1114-1125.
12. Branco BC, Barmparas G, Schnüriger B, Inaba K, Chan LS, Demetriades D. Systematic review and meta-analysis of the diagnostic and therapeutic role of water-soluble contrast agent in adhesive small bowel obstruction. Br J Surg 2010; 97(4):470-478.
13. Abbas S, Bissett IP, Parry BR. Oral water soluble contrast for the management of adhesive small bowel obstruction. Cochrane Database Syst Rev. 2007 Jul 18;2007(3):CD004651.

14. Soult, Alexa MD, FACS; Van Horn, Alexandra MD; Sturm, Emily BS; Sternick, Molly MD; Burgess, Jessica MD, FACS; Britt, Rebecca MD, FACS. Use of Small Bowel Follow Through in Management of Small Bowel Obstruction. JACS 2025; 240(4):703-708.
15. Ali M, Slack DR, Feinn R, Kurtzman S, Zhang ZJ. Early Use of Small Bowel Follow Through Reduces Stay and Cost in Small Bowel Obstructions. Cureus. 2021; 13(5):e15023.
16. Catena, F., Di Saverio, S., Kelly, M.D. *et al.* Bologna Guidelines for Diagnosis and Management of Adhesive Small Bowel Obstruction (ASBO): 2010 Evidence-Based Guidelines of the World Society of Emergency Surgery. *World J Emerg Surg* 2011; 6, 5.
17. Teixeira PG, Karamanos E, Talving P, Inaba K, Lam L, Demetriades D. "Early Operation Is Associated with a Survival Benefit for Patients with Adhesive Bowel Obstruction." *National Center for Biotechnology Information*. U.S. National Library of Medicine, Sept. 2013. Web. 25 Apr. 2014.
18. Behman R, Nathens AB, Mason S, Byrne JP, Hong NL, Pechlivanoglou P, Karanicolas P. Association of Surgical Intervention for Adhesive Small-Bowel Obstruction With the Risk of Recurrence. JAMA Surg 2019; 154(5):413-420.