

Small Bowel Obstruction (SBO)

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Definitions and Classification

Definitions

- *Small Bowel Obstruction (SBO)*: Interruption of the Normal Flow of Intraluminal Contents
- *Functional SBO*: Obstruction Due to Dysfunctional Peristalsis – Also Referred to as an “Ileus”
 - ***See Ileus**
- *Mechanical SBO*: Obstruction Due to Intraluminal or Extraluminal Compression
 - In Practice, The Term “Small Bowel Obstruction” Typically Refers to a “Mechanical Small Bowel Obstruction”

Classification

- *Partial SBO*: Some Gas or Liquid Stool is Able to Pass the Obstruction
- *Complete SBO*: Nothing is Able to Pass the Site of Obstruction
- *Closed Loop Obstruction*: Both the Proximal and Distal Ends are Obstructed
 - No Outlets are Available for Decompression
 - Rapid Progression with High Risk for Strangulation and Perforation

Grading

- *Low-Grade SBO*: Generally Describes Partial SBO without a Discrete Transition Point
- *High-Grade SBO*: Generally Describes Complete SBO with a Discrete Transition Point
- ***Definitions are Varied**

AAST Grade ¹

- Grade I: Partial SBO
- Grade II: Complete SBO; Bowel Viable and Not Compromised
- Grade III: Complete SBO; Bowel Viable but Compromised
- Grade IV: Complete SBO; Bowel Nonviable or Perforation with Local Spillage
- Grade V: SBO with Perforation and Diffuse Peritoneal Contamination

Etiology and Presentation

Common Causes (90%) ³⁻⁴

MN

- Postoperative Adhesions
 - Most Common Cause in United States (> 70%)
- Abdominal Wall Hernia
 - Most Common Cause in “Virgin Abdomens” (No Past Surgery)
 - Most Common Cause Worldwide
- Neoplasm/Cancer
 - Most Common Cause of Large Intestine Obstruction (Regardless of Surgical History)

Less Common Causes ³⁻⁹

- Intussusception
- Midgut Volvulus
 - Risk Factors for “Primary Volvulus”: Long Mesentery, Deficient Mesenteric Fat, or Narrow Mesenteric Base ¹⁰
 - “Secondary Volvulus” is More Common (Due to Other Pathology Such as Adhesions or Malrotation)
- Stricture
- Sclerosing Encapsulating Peritonitis (SEP)/Chronic Fibrosa Incapsulata
- Inflammatory Bowel Disease (Crohn’s Disease or Ulcerative Colitis)
- Abscess
- Endometriosis
- Pelvic Inflammatory Disease
- Internal Hernia
- Meckel’s Diverticulum
- Gallstone Ileus
- Bezoar
- Foreign Body
- Fecalith
- Tuberculosis
- Parasites

Presentation

- Nausea and Vomiting
 - More Severe with Proximal Obstructions than Distal Obstructions
 - Risk for Aspiration
- Abdominal Pain
 - Starts as Intermittent Periumbilical Cramping
 - Pain Becomes Constant and Sharp as the Bowel Dilates and Intraluminal Pressure Exceeds Capillary Pressure Causing Wall Ischemia and Peritonitis
- Abdominal Distention
- Obstipation (Unable to Pass Flatus or Stool)
- Presentation is Generally Similar to an Ileus
 - *See Ileus
- *Colon Obstruction More Often Has Constant Pain with Feculent Emesis and More Significant Distention

Diagnosis

Diagnosis ¹¹⁻¹⁵

- Diagnosis is Generally Made by Abdominal Imaging
- *Computed Tomography (CT)*
 - Generally the Preferred Diagnostic Study
 - Greater Sensitivity than Plain Films (91% vs 67%)
 - Better at Characterizing the Obstruction and Evaluating for Bowel Compromise
- *Abdominal Plain Film*
 - Preferred Initial Testing is Controversial – Although Some Recommend Starting with an Abdominal Plain Film and then Proceeding with CT, Plain Film is Inferior in Evaluating for Mechanical Obstruction and CT is Often Preferred
- *Abdominal Ultrasound (US)*
 - Use is Evolving and Sensitivity/Specificity are Often Comparable to CT
 - Benefit of Being Able to Visualize Peristalsis in Vivo



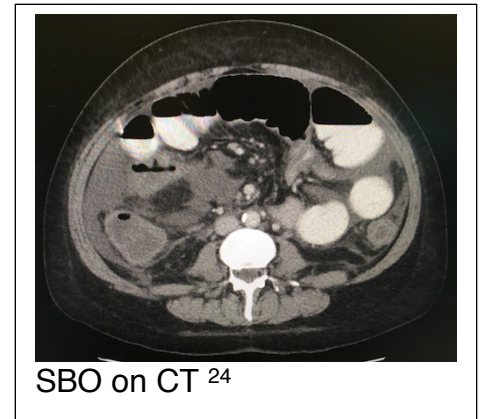
General Radiographic Findings

- Proximal Dilated Loops (> 3 cm) and Distal Decompressed Loops
- Air-Fluid Levels
 - Air from Swallowed Nitrogen
 - “Gasless Abdomen” without Air-Fluid Levels Can Be Seen When Obstruction Causes Fluid Sequestration

- Paucity of Gas in the Colon
- Transition Point
- “Swirling” of Mesentery Suggests a Closed-Loop Obstruction

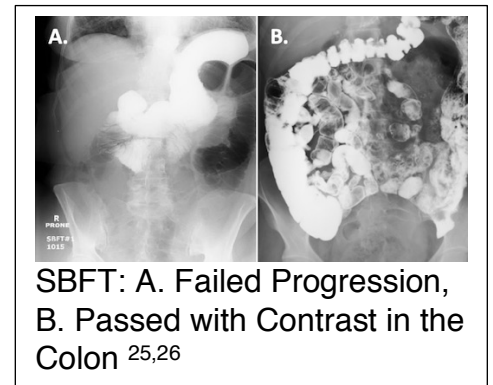
Radiographic Findings that Predict the Need for Operative Exploration ^{16,17}

- **Absence of Fecalization of the Small Bowel** – Fecalization is an Abnormal Sign But is a **Reassuring Finding** in the Setting of SBO (Indicates that the Obstruction has Been Present Long Enough for the Stasis to Allow Fecalization to Occur)
- Mesenteric Edema
- Bowel Wall Thickening
- Free Intrapertitoneal Fluid



Small-Bowel Follow Through (SBFT) ¹⁸⁻²⁰

- Procedure: Patient is Given Oral Water-Soluble Contrast (Gastrografin) and Sequential Plain Films are Taken After a Period of Time
 - Imaging May Be Done at Periodic Intervals or a Single Image After a Few Hours
 - Generally No Benefit Extending Past 8 Hours
 - “Pass” if Patient Has a Bowel Movement or if Contrast is Seen in the Colon
- Provides Functional Information on How Contrast Passes Through the Bowel
 - Should Not Be Used as the Primary Diagnostic Imaging Test
- Bowel Must First Be Decompressed and Not Actively Vomiting
- Helps Identify Patients Unlikely to Resolve by Nonoperative Management
- May Also Be Therapeutic as a Cathartic Agent – Hyperosmolar Agent to Reduce Bowel Edema and Acts as a Laxative
- Use of SBFT Decreases the Time to Nonoperative Resolution and Decreases Time to Identifying the Need for Surgical Intervention



Enteroclysis ²¹⁻²³

- Procedure: An Enteroclysis Catheter is Advanced into the Proximal Small Bowel (Duodenum or Proximal Jejunum) and Barium is Injected into the Bowel
 - Plain Film Imaging is Then Done at Periodic Intervals to Evaluate Passage of Contrast Through the Bowel (Similar to SBFT)
 - Alternatively, CT Enteroclysis (CTE) Can Be Performed Once
- Enteroclysis is Superior to SBFT in Detecting Certain Small Bowel Pathology but it is More Invasive with Drawbacks Preventing More Universal Use

Treatment

Initial Management

- Most Initially Trial Nonoperative Management
 - Term “Conservative Management” is Generally Considered Incorrect
- Indications for Urgent Surgery:
 - Closed Loop Obstruction
 - Peritonitis
 - **Bowel Ischemia or Strangulation**
 - Perforation
 - Known Etiology that Will Not Resolve without Surgery
 - Multiple Recurrence
- *Historically Stated that All “Virgin Abdomens” (No Surgical History) with SBO Should Undergo Surgery Due to the Risk of Malignancy – “Never Let the Sun Rise or Set on a Bowel Obstruction”. This Concept Has Since Fallen Out of Favor – Improved CT Scans Allow for Better Recognition of Malignancy and Many Have Other Reasons for Scar Tissue that May Have Been Unrecognized.²⁷

Nonoperative Management

- Managements:
 - Bowel Rest/NPO
 - Goal-Directed IV Fluids
 - Nasogastric (NG) Tube for Decompression
 - SBFT Once Bowel Has Been Decompressed and Not Actively Vomiting – Decreased Time to Nonoperative Resolution and Decreased Time to Identifying the Need for Surgical Intervention^{23,24}
- Failure Duration Prior to Proceeding with Surgery: **3-5 Days** (Debated)
- Outcomes:
 - Success for Adhesive SBO Resolution: 65-80%
 - Recurrence Rate for Adhesive SBO: 16-53%
 - Overall, Adhesive SBO Treated Nonoperatively Has Higher Recurrence Rates and Shorter Time to Recurrence than Those Managed Operatively^{3,28,29}

Admitting Service

- Patients **Admitted to a Surgical Service** (Opposed to a Medical Service) Have Better Outcomes³⁰⁻³⁵
 - Shorter Length of Stay
 - Shorter Time to Surgery
 - Lower Hospital Costs
 - Lower Rate of Readmission
 - Lower Mortality

Palliative Managements for Malignant Obstruction

- Consider a Palliative Enteric Bypass if the Mass is Large and Unresectable
- Consider a Decompressive Gastrostomy if There are Multiple Points of Obstruction
- Octreotide Can Assist as a Palliative Treatment for Nausea and Vomiting due to Malignant Obstruction

Surgical Intervention (Adhesiolysis)

Surgical Approach

- Open Laparotomy Generally Preferred Over Laparoscopy
- Potential Laparoscopic Indications:
 - Mild Abdominal Distention (Bowel Diameter \leq 4 cm and Early Presentation)
 - Partial Obstruction
 - Proximal Obstruction
 - Few Operative Procedures

Adhesiolysis Technique

- Run Bowel from the Ligament of Treitz to the Ileocecal Valve
- Lysis of Adhesion (Enterolysis)
 - Address Principal Site of Obstruction and Major Adhesions
 - Total Lysis of All Adhesions is Unnecessary and Risks Damage to Healthy Bowel
- Reduce and Repair Any Hernias
- Resect Nonviable Bowel
 - Consider Leaving an Open Abdomen with Planned Reexploration in 24-48 Hours if Viability is Uncertain
- Perform an Oncologic Resection for Any Mass (5-10 cm Margin with Associated Lymph Nodes)

Surgical Management of Strictures

- Single Stricture: Strictureplasty
 - ***See Strictureplasty**
- Multiple Strictures: Bowel Resection
- Large Intestine Structure: Bowel Resection
 - High Risk of Malignancy

Surgical Management of Injuries/Perforations

- Serosal Injuries: Oversew to Imbricate Mucosa
- Circumference $<$ 50%: Primary Repair
- Circumference $>$ 50%: Bowel Resection

Manual Bowel Decompression (“Milking”)

- Consider “Milking” Dilated and Distended Bowel
 - Either Proximally to Be Decompressed Through a Nasogastric (NG) Tube or Distally into the Colon and Rectum
- Debated Effects ³⁶⁻³⁸
 - Decompresses the Abdominal Compartment with Less Tension for Closure
 - May Reduce Risk for Aspiration Pneumonia
 - May Induce a Paralytic Ileus Although Transit Time is Generally Not Affected
 - Proposed Concern for Possible Bacterial Translocation and Peritoneal Contamination

Mnemonics

General Causes of SBO

- “SHAVING”
- S: Stricture
- H: Hernia
- A: Adhesions
- V: Volvulus
- I: Intussusception or IBD
- N: Neoplasia
- G: Gallstone Ileus

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