Small Bowel Obstruction

Small bowel obstruction (SBO) is a blockage in the small intestine that prevents the normal passage of intestinal contents, leading to a buildup of fluid, gas, and stool. It is a common surgical emergency that requires prompt hospital management to prevent serious complications, especially in acutely ill patients.

Causes of Small Bowel Obstruction

- **Adhesions (60-70%):** Scar tissue from prior abdominal surgery (e.g., appendectomy, hysterectomy); most common cause.
- **Hernias (15-20%):** Incarcerated inguinal, femoral, or ventral hernias trapping bowel loops.
- **Malignancy (5-10%):** Tumors causing obstruction, either primary (e.g., small bowel adenocarcinoma) or metastatic (e.g., colorectal cancer).
- **Volvulus (5%):** Twisting of the small bowel around its mesentery; often associated with malrotation or adhesions.
- **Intussusception (Rare):** Telescoping of bowel segments; more common in children but can occur in adults (often with a lead point like a tumor).
- **Other Causes:** Crohn's disease (strictures), gallstone ileus (stone obstructing ileocecal valve), foreign bodies, bezoars.

Clinical Presentation

Symptoms:

- Crampy abdominal pain (often periumbilical, intermittent due to peristalsis).
- Nausea and vomiting (more severe in proximal obstruction; vomitus may be bilious).
- Abdominal distension (more pronounced in distal obstruction).
- Obstipation (inability to pass gas/stool); constipation may precede complete obstruction.
- Fever, tachycardia (late signs, suggest complications like perforation or sepsis).
- Physical Exam:
    - Distended abdomen, tympanic on percussion.
    - High-pitched bowel sounds (early); absent sounds (late, indicating ileus or perforation).
    - Tenderness to palpation; rebound tenderness, guarding if peritonitis develops.
    - **Hernia exam:** Check for incarcerated hernias (e.g., inguinal, umbilical).

Pathophysiology

- **Obstruction:** Blockage leads to accumulation of fluid, gas, and intestinal contents proximal to the obstruction, causing distension.
- **Increased Intraluminal Pressure:** Distension compresses mucosal vessels, reducing blood flow and causing ischemia.
- **Third-Spacing:** Fluid shifts into the bowel lumen and peritoneal cavity, leading to dehydration and hypovolemia.
- **Bacterial Overgrowth:** Stagnation promotes bacterial translocation, increasing the risk of sepsis.
- **Ischemia and Necrosis:** Prolonged obstruction causes bowel wall edema, ischemia, and eventual perforation if untreated.

Diagnosis

Labs:

CBC: Leukocytosis (infection, stress), anemia (GI bleed from malignancy).

Metabolic Panel: Hypokalemia, hypochloremia (vomiting), elevated BUN/Cr (dehydration), lactic acidosis (ischemia).

Lactate: Elevated (>2 mmol/L) indicates bowel ischemia.

Imaging:

Abdominal X-Ray: Air-fluid levels, dilated small bowel loops (>3 cm), absence of distal gas; limited sensitivity (50-60%).

CT Abdomen/Pelvis with IV Contrast: Gold standard; sensitivity >90%. Shows transition point, dilated loops, air-fluid levels, bowel wall thickening, pneumatosis (ischemia), free air (perforation).

Ultrasound: Useful in children (e.g., intussusception); limited in adults due to gas interference.

Hospital Management of Small Bowel Obstruction

Hospital management of SBO focuses on stabilizing the patient, relieving the obstruction, and addressing complications, particularly in sick patients with signs of ischemia, perforation, or sepsis.

Initial Stabilization:

- **NPO:** Bowel rest to reduce intraluminal pressure and prevent further distension.
- **IV Fluids:** Aggressive resuscitation (e.g., 2-3 L normal saline bolus, then 150 mL/h maintenance) to correct hypovolemia and third-spacing losses; monitor urine output (>0.5 mL/kg/h).
- **Nasogastric Tube (NGT):** Decompression to relieve vomiting and reduce pressure (e.g., 1-2 L output initially); continuous suction.
- **Electrolyte Correction:** Replace potassium, magnesium (e.g., KCl 20-40 mEq IV, MgSO4 2 g IV) to address losses from vomiting; monitor for arrhythmias.
- **Pain Control:** Opioids (e.g., morphine 2-4 mg IV q4h) for pain; avoid NSAIDs (risk of GI irritation and bleeding).

Antibiotics:

- **Indication:** Suspected ischemia, perforation, or sepsis (e.g., fever, leukocytosis, elevated lactate).
- **Regimen:** Broad-spectrum antibiotics (e.g., piperacillin-tazobactam 4.5 g IV q6h) to cover gram-negatives and anaerobes; add vancomycin 15 mg/kg IV q12h if MRSA risk (e.g., recent hospitalization).
- **Adjustment:** Tailor based on cultures if peritonitis develops; duration typically 4-7 days post-source control.

Monitoring:

- **Abdominal Exams:** Serial exams (q4-6h) to assess for peritoneal signs (rebound tenderness, guarding), indicating ischemia or perforation.
- **Labs:** Serial lactate (elevated >4 mmol/L suggests severe ischemia), CBC (leukocytosis/leukopenia), CMP (renal function, electrolytes).
- **Imaging:** Repeat CT if no improvement after 48 hours or worsening symptoms (e.g., new free air, abscess).
- **Vitals:** Monitor for tachycardia, hypotension (sepsis, hypovolemia); fever (infection).

Non-Operative Management:

- **Indication:** Partial SBO with no signs of ischemia (e.g., normal lactate, no peritoneal signs, improving symptoms).
    - Approach:
        - Continue NGT decompression, IV fluids, and monitoring for 48-72 hours.

- **Gastrografin Challenge:** Water-soluble contrast via NGT; if contrast reaches colon within 24 hours, predicts resolution (success rate 60-80% for adhesive SBO).
- **Failure:** If no improvement (e.g., persistent distension, worsening pain), escalate to surgical intervention.

Surgical Management:

- **Indication:** Complete obstruction, peritoneal signs, elevated lactate (>4 mmol/L), imaging signs of ischemia (e.g., pneumatosis, bowel wall thickening), or failure of conservative management after 48-72 hours.
  - Procedures:
    - **Lysis of Adhesions:** For adhesive SBO; most common surgical intervention.
    - **Bowel Resection:** If ischemia or malignancy; primary anastomosis if feasible, ostomy if unstable (e.g., peritonitis, poor tissue quality).
    - **Hernia Repair:** Reduction and repair of incarcerated hernia.
    - **Volvulus/Intussusception:** Detorsion or resection of affected segment.
    - **Source Control:** Debride necrotic tissue, drain abscesses if present.

Management of Complications:

Sepsis/Septic Shock:

Fluids/Vasopressors: Additional fluids (30 mL/kg), norepinephrine 5-20 µg/min IV to maintain MAP >65 mmHg.

Antibiotics: Continue broad-spectrum (e.g., piperacillin-tazobactam); adjust based on cultures.

Monitoring: Serial lactate, blood cultures, daily labs (CBC, CMP) to assess organ function.

Perforation/Peritonitis:

Urgent laparotomy for source control (e.g., resection of perforated segment, peritoneal lavage).

Broad-spectrum antibiotics (e.g., piperacillin-tazobactam + vancomycin), extend duration (7-14 days).

Bowel Ischemia/Necrosis:

Surgical resection of affected segment; monitor for short bowel syndrome (e.g., diarrhea, malnutrition post-resection).

Nutritional Support:

- **TPN:** Total parenteral nutrition if prolonged NPO expected (e.g., post-resection, ileus >5-7 days); monitor glucose, triglycerides.
- **Enteral Feeding:** Transition to oral or tube feeding as soon as bowel function returns (e.g., flatus, bowel sounds); start with clear liquids, advance as tolerated.

Complications

- **Bowel Ischemia/Necrosis:** Prolonged obstruction leads to infarction; requires resection, risk of short bowel syndrome if extensive.
- **Perforation:** Leads to peritonitis, sepsis; mortality 20-30% if untreated.
- **Sepsis/Multi-Organ Failure (MOF):** Bacterial translocation causes systemic infection, MOF (e.g., renal failure, ARDS).
- **Short Bowel Syndrome:** After extensive resection; causes malabsorption, diarrhea, electrolyte imbalances.
- **Recurrence:** 20-30% risk in adhesive SBO; higher with malignancy or Crohn's.

Key Pearls

- **Causes:** Adhesions (most common), hernias, malignancy, volvulus, intussusception.
- **Presentation:** Crampy pain, vomiting, distension, obstipation; late signs (fever, peritoneal signs) indicate complications.
- **Pathophysiology:** Obstruction → distension → ischemia → necrosis; third-spacing causes hypovolemia.
- **Diagnosis:** CT abdomen (transition point, air-fluid levels); lactate for ischemia.
- **Hospital Management:** NPO, IV fluids, NGT; antibiotics for ischemia/sepsis; surgery for complete obstruction, ischemia, or failure of conservative management.
- **Complications:** Ischemia, perforation, sepsis, short bowel syndrome, recurrence.

Table: Complications of Small Bowel Obstruction and Hospital Management

Complication	Presentation	Hospital Management
Bowel Ischemia/ Necrosis	Elevated lactate, peritoneal signs, pneumatosis on CT	Urgent laparotomy, bowel resection, monitor for short bowel syndrome
Perforation/ Peritonitis	Free air on imaging, rebound tenderness, fever	Emergency laparotomy, peritoneal lavage, broad-spectrum antibiotics (e.g., piperacillin-tazobactam 4.5 g IV q6h)
Sepsis/MOF	Fever, tachycardia, hypotension, lactate >4 mmol/L	Fluids (30 mL/kg), norepinephrine (5-20 µg/min IV), antibiotics, source control (surgery)
Short Bowel Syndrome	Diarrhea, malnutrition post-resection	TPN, electrolyte replacement (e.g., MgSO4 2 g IV), monitor for dehydration
Recurrence	Repeat obstruction symptoms	Identify underlying cause (e.g., malignancy, Crohn's), surgical consult, risk modification

References

UpToDate: "Small Bowel Obstruction: Diagnosis and Management" (2025). UpToDate SBO

ACG: "Guidelines for the Management of Small Bowel Obstruction" (2024). ACG Guidelines

EAST: "Surgical Management of Bowel Obstruction" (2023). EAST Guidelines

NEJM: "Advances in the Management of Small Bowel Obstruction" (2024). NEJM SBO

Case Scenario

Case: A 55-Year-Old Female with Abdominal Pain and Sepsis

Presentation: A 55-year-old female with a history of appendectomy 10 years ago presents with 2 days of crampy abdominal pain, vomiting, and no bowel movements. Exam shows T 38.5°C, HR 110 bpm, BP 90/55 mmHg, distended abdomen, high-pitched bowel sounds, diffuse tenderness, rebound tenderness.

Labs/Imaging: WBC 18,000/µL, lactate 4.5 mmol/L, K 3.0 mEq/L, Cr 1.8 mg/dL (baseline 1.0). CT abdomen shows dilated small bowel loops, air-fluid levels, transition point in the right lower quadrant, pneumatosis, free air.

Diagnosis: Small Bowel Obstruction (Adhesions, Ischemia, Perforation) → Pain, vomiting, distension, CT findings, sepsis.

Management: Admit to ICU. NPO, NGT (1.5 L output), IV fluids (NS 3 L bolus, then 150 mL/h). Correct hypokalemia (KCl 40 mEq IV). Start piperacillin-tazobactam 4.5 g IV q6h + vancomycin 15 mg/kg IV q12h (sepsis, perforation). Norepinephrine 5 µg/min IV (MAP <65 mmHg). Urgent laparotomy: Adhesions lysed, 30 cm of perforated jejunum resected, ostomy created (due to peritonitis). Post-op: TPN initiated, lactate decreases to 2.0 mmol/L, antibiotics x 10 days. Transition to enteral feeding on day 7. Discharge with surgical follow-up.