# Acute Abdomen: A Hospital Medicine Guide

## Overview of Acute Abdomen

Acute abdomen refers to the sudden onset of severe abdominal pain requiring urgent evaluation and often emergency intervention. It is a common presentation in hospital medicine, with causes ranging from benign (e.g., gastroenteritis) to life-threatening (e.g., perforated bowel, ruptured abdominal aortic aneurysm). Acute abdomen accounts for ~5-10% of emergency department visits, and delayed diagnosis can lead to significant morbidity and mortality (e.g., 30-50% mortality in perforated bowel with peritonitis). Hospitalists play a critical role in early recognition, diagnostic workup, and coordination of care with surgical and specialty teams. This guide provides a comprehensive overview of acute abdomen, including pathophysiology, causes, clinical presentation, diagnostic studies, treatment strategies, complications, hospitalist implications, and includes tables and clinical scenarios for practical application.

## Pathophysiology

- **Inflammation/Irritation:** Conditions like appendicitis or cholecystitis cause localized inflammation, leading to visceral pain (dull, poorly localized) and parietal pain (sharp, localized) as the peritoneum becomes irritated.
- **Perforation:** A perforated viscus (e.g., perforated bowel, peptic ulcer) releases contents (e.g., stool, gastric acid) into the peritoneal cavity, causing chemical or bacterial peritonitis, systemic inflammatory response syndrome (SIRS), and sepsis.
- **Obstruction:** Bowel obstruction (e.g., adhesions, volvulus) or ureteral obstruction (e.g., kidney stones) causes distension, ischemia, and potential perforation if untreated.
- **Ischemia:** Vascular events (e.g., mesenteric ischemia, ruptured AAA) lead to tissue hypoxia, infarction, and peritonitis.
- **Systemic Response:** Severe cases trigger SIRS, sepsis, or septic shock, with multi-organ failure (MOF) if untreated.

# Causes of Acute Abdomen

## Surgical Causes:

- **Appendicitis:** Inflammation of the appendix, often due to obstruction (e.g., fecalith).
- **Perforated Bowel:** Perforation of a hollow viscus (e.g., diverticulitis, peptic ulcer, ischemic colitis).
- **Bowel Obstruction:** Small bowel (adhesions, hernias), large bowel (volvulus, cancer).
- **Cholecystitis:** Gallbladder inflammation, often due to gallstones (90% of cases).
- **Mesenteric Ischemia:** Arterial embolism/thrombosis (acute), venous thrombosis (subacute).
- **Ruptured Abdominal Aortic Aneurysm (AAA):** Aortic rupture, often in elderly males with AAA history.
- **Ectopic Pregnancy:** Ruptured ectopic, causing hemoperitoneum (females of reproductive age).

## Medical Causes:

- **Pancreatitis:** Inflammation of the pancreas, often due to gallstones or alcohol.
- **Gastroenteritis:** Viral/bacterial infection causing diffuse pain, diarrhea.
- **Kidney Stones:** Ureteral obstruction, causing colicky flank pain radiating to groin.
- **Diabetic Ketoacidosis (DKA):** Metabolic acidosis mimicking surgical abdomen.
- **Lower Lobe Pneumonia:** Referred pain to upper abdomen (common in elderly).

## Other Causes:

- **Peptic Ulcer Disease (PUD):** Perforation or bleeding (e.g., duodenal ulcer).
- **Diverticulitis:** Inflammation of diverticula, often left-sided, can perforate.
- **Ovarian Torsion:** Twisting of the ovary, causing sudden pelvic pain (females).

# Clinical Presentation

## Symptoms:

- **Pain:**
  - **Visceral:** Dull, poorly localized (e.g., early appendicitis: periumbilical).
  - **Parietal:** Sharp, localized (e.g., appendicitis: RLQ, McBurney's point).
  - **Referred:** Shoulder (diaphragmatic irritation, e.g., perforated ulcer), flank-to-groin (kidney stone).

- **Associated Symptoms:**
  - Nausea/vomiting (obstruction, peritonitis).
  - Fever (infection, e.g., appendicitis, diverticulitis).
  - Anorexia (common in appendicitis, cholecystitis).
  - Diarrhea (gastroenteritis, CDI), constipation (obstruction).
  - Dysuria/hematuria (kidney stone, UTI).

### Physical Exam:

- **Vitals:** Fever (>38°C), tachycardia (>90 bpm), hypotension (SBP <90 mmHg, shock).
- **Abdomen:**
  - **Tenderness:** Localized (e.g., RLQ in appendicitis), diffuse (peritonitis).
  - **Guarding/Rebound:** Peritoneal irritation (e.g., perforated bowel).
  - **Distension:** Obstruction, ileus.
  - **Murphy's Sign:** RUQ tenderness on inspiration (cholecystitis).
  - **Rovsing's Sign:** RLQ pain on LLQ palpation (appendicitis).
- **Other:**
  - Flank tenderness (kidney stone, pyelonephritis).
  - Pulsatile mass (ruptured AAA, elderly males).
  - Adnexal tenderness (ovarian torsion, ectopic pregnancy).

## Diagnostic Studies

- Labs:
  - **CBC:** Leukocytosis (>12,000/µL, infection), leukopenia (<4,000/µL, severe sepsis), anemia (Hgb <10 g/dL, bleeding).
  - **CMP:** Cr rise (AKI), elevated bilirubin (cholecystitis), amylase/lipase (pancreatitis: >3x ULN).
  - **Lactate:** >2 mmol/L (sepsis), >4 mmol/L (shock).
  - **Urinalysis:** Hematuria, pyuria (kidney stone, UTI).
  - **Beta-hCG:** Rule out ectopic pregnancy (females of reproductive age).
  - **Blood Cultures:** If sepsis suspected (2 sets, before antibiotics).
  - **Coagulation:** INR, D-dimer (DIC, mesenteric ischemia).
- Imaging:
  - **Abdominal X-Ray:** Air-fluid levels, dilated loops (obstruction). Free air under diaphragm (perforated bowel).
  - **Ultrasound:** *RUQ*: Gallstones, thickened gallbladder wall (cholecystitis). *Pelvis*: Adnexal mass (ovarian torsion, ectopic pregnancy). Kidneys: Hydronephrosis (kidney stone).

    - **CT Abdomen/Pelvis:** *Appendicitis*: Appendiceal thickening, fat stranding. *Perforated Bowel:* Free air, fluid collections. *Mesenteric Ischemia*: Bowel wall thickening, pneumatosis. *Obstruction*: Dilated loops, transition point.
    - **CT Angiography:** Ruptured AAA, mesenteric ischemia (arterial occlusion).
    - **MRI:** Limited role, used in pregnancy (e.g., appendicitis).
- Other Tests:
    - **Endoscopy:** EGD for suspected perforated ulcer, colonoscopy (avoid in acute setting).
    - **Surgical Exploration:** Diagnostic laparoscopy/laparotomy if imaging inconclusive (e.g., suspected perforation).

## Treatment Strategies

- **Stabilization:** Address ABCs (airway, breathing, circulation), fluids (NS 1-2 L bolus), pain control (morphine 2-4 mg IV, avoid NSAIDs in perforation risk).
- **Source Control:** Surgical intervention for perforation, obstruction, or ischemia.
- **Antibiotics:** Broad-spectrum for suspected infection/perforation, de-escalate based on cultures.

### ***Specific Treatments:***

- **Appendicitis:**
    - **Treatment:** Appendectomy (laparoscopic preferred).
    - **Antibiotics:** Ceftriaxone 1 g IV daily + metronidazole 500 mg IV q8h (pre-op, continue 24h post-op if uncomplicated).
    - **Duration:** 4-7 days if perforated.
- **Perforated Bowel (e.g., Diverticulitis, Peptic Ulcer):**
    - **Treatment:** Emergent surgery (e.g., primary closure for ulcer, Hartmann's procedure for diverticulitis).
    - **Antibiotics:** Piperacillin-tazobactam 3.375 g IV q6h or meropenem 1 g IV q8h (if MDR risk) -*Please check local antiobiogram for abx guidance*.
    - **Duration:** 4-7 days post-source control, 10-14 days if peritonitis.
- **Bowel Obstruction:**
    - **Treatment:** NG tube decompression, NPO, fluids; surgery if strangulation/perforation (e.g., adhesiolysis, resection).
    - **Antibiotics:** Only if perforation (piperacillin-tazobactam as above).
    - **Duration:** 4-7 days if surgery needed.
- **Cholecystitis:**
    - **Treatment:** Cholecystectomy (within 24-48h), percutaneous drainage if high-risk.
    - **Antibiotics:** Ceftriaxone 1 g IV daily + metronidazole 500 mg IV q8h.

    - **Duration:** 4-7 days post-cholecystectomy, 10-14 days if drainage only.
- **Mesenteric Ischemia:**
    - **Treatment:** Revascularization (e.g., embolectomy, stenting), resection of necrotic bowel.
    - **Antibiotics:** Piperacillin-tazobactam 3.375 g IV q6h.
    - **Duration:** 7-14 days, longer if peritonitis.
- **Ruptured AAA:**
    - **Treatment:** Emergent endovascular repair (EVAR) or open surgery.
    - **Antibiotics:** Not typically needed unless infection suspected.
- **Pancreatitis:**
    - Supportive (NPO, fluids, pain control), treat underlying cause (e.g., ERCP for gallstone pancreatitis).
- **Gastroenteritis:**
    - Supportive (fluids, antiemetics), antibiotics only if bacterial (e.g., ciprofloxacin for Salmonella).
- **Kidney Stones:**
    - Pain control (ketorolac 15-30 mg IV), fluids, urology consult (stent if obstruction).

***Complications:***

- **Perforated Bowel:**
    - **Peritonitis:** Diffuse pain, sepsis (mortality 30-50%).
    - **Abscess:** Intra-abdominal collections, persistent fever.
    - **Sepsis/Septic Shock:** Lactate >4 mmol/L, MOF.
- **Appendicitis:**
    - **Perforation:** 20-30% incidence if delayed, peritonitis.
    - **Abscess:** Post-appendectomy, requires drainage.
- **Bowel Obstruction:**
    - **Strangulation:** Ischemia, perforation (mortality 10-30%).
    - **Sepsis:** Bacterial translocation, shock.
- **Cholecystitis:**
    - **Gangrene/Perforation:** 5-10% incidence, peritonitis.
    - **Cholangitis:** Fever, jaundice, sepsis (Charcot's triad).
- **Mesenteric Ischemia:**
    - **Bowel Infarction:** 50-70% mortality if delayed.
    - **MOF:** Kidney, liver failure.
- **General:**
    - **AKI:** Hypoperfusion, sepsis (Cr rise >1.5x baseline).
    - **ARDS:** Sepsis-related, PaO2/FiO2 <300 mmHg.
    - **DIC:** INR >1.5, D-dimer >2,000 ng/mL (severe sepsis).

## Hospital Medicine Implications

- **Early Recognition:**
  - **Triage pain:** Visceral (medical) vs. parietal (surgical), systemic symptoms (sepsis).
  - **Use scoring systems:** Alvarado score (appendicitis), LRINEC (necrotizing infection).
- **Consultations:**
  - **Surgery:** Urgent for perforation, obstruction, ischemia (e.g., appendectomy, colectomy).
  - **ID:** For peritonitis, MDR pathogens.
  - **Vascular Surgery:** Ruptured AAA, mesenteric ischemia.
  - **OB/GYN:** Ectopic pregnancy, ovarian torsion.
- **Monitoring:**
  - Vitals q1-2h (fever, tachycardia, hypotension).
  - Labs q6-12h (WBC, lactate, Cr, INR).
  - Imaging q24h if worsening (e.g., X-ray for free air).'
- **Discharge Planning:**
  - **Antibiotics:** Complete PO course (e.g., ciprofloxacin for IAI).
  - **Follow-Up:** Surgery, ID, primary care within 1 week.
  - **Education:** Recurrence signs (e.g., fever, pain), wound care.

### Table: Common Causes of Acute Abdomen and Key Features

| Cause | Presentation | Diagnostic Findings | Treatment | Complications |
|---|---|---|---|---|
| Appendicitis | RLQ pain, fever, nausea | CT: Appendiceal thickening, WBC >15,000/µL | Appendectomy, ceftriaxone + metronidazole | Perforation, abscess |
| Perforated Bowel | Diffuse pain, guarding, shock | X-ray/CT: Free air, lactate >2 mmol/L | Surgery, piperacillin-tazobactam | Peritonitis, sepsis |
| Bowel Obstruction | Distension, vomiting, constipation | X-ray/CT: Air-fluid levels, dilated loops | NG tube, surgery if strangulated | Strangulation, perforation |
| Cholecystitis | RUQ pain, Murphy's sign, fever | US: Gallstones, thickened wall | Cholecystectomy, ceftriaxone + metronidazole | Gangrene, cholangitis |
| Mesenteric Ischemia | Severe pain, bloody stools, shock | CT: Bowel wall thickening, lactate >4 mmol/L | Revascularization, antibiotics | Infarction, MOF |
| Ruptured AAA | Pulsatile mass, hypotension, back pain | CT: Aortic rupture, hematoma | Emergent EVAR/open repair | Hemorrhagic shock, death |

| Cause | Presentation | Diagnostic Findings | Treatment | Complications |
|---|---|---|---|---|
| Pancreatitis | Epigastric pain, nausea, vomiting | Amylase/lipase >3x ULN, CT: Edema | Supportive, fluids, pain control | Necrosis, ARDS |

### Table: Hospitalist Management Checklist for Acute Abdomen

| Task | Surgical Causes | Medical Causes | Monitoring | Consults |
|---|---|---|---|---|
| Initial Stabilization | Fluids, pain control, NPO | Fluids, pain control, treat cause | Vitals q1-2h, lactate q6h | Surgery, ID |
| Diagnostics | CT abdomen, X-ray, labs | Labs (amylase, UA), imaging | Labs q12h, exam qshift | OB/GYN, vascular |
| Treatment | Antibiotics, surgery (e.g., appendectomy) | Supportive (e.g., pancreatitis: fluids) | Imaging q24h if worsening | Surgery for source control |
| Follow-Up | PO antibiotics, surgical follow-up | Monitor for recurrence | Labs q24h, vitals q4h | Primary care, ID |

## Clinical Scenarios

- ***Scenario 1: Young Male with Acute Appendicitis***
- **Presentation:** A 25-year-old male presents with 12h of periumbilical pain migrating to the RLQ, nausea, and fever. Exam shows T 38°C, BP 120/80 mmHg, HR 100 bpm, RR 18/min, RLQ tenderness, Rovsing's sign positive.
- **Diagnostic Workup:** Labs: WBC 16,000/µL, Cr 0.9 mg/dL, lactate 1.5 mmol/L, CT: Appendiceal thickening, fat stranding, no perforation.
- **Diagnosis:** Acute appendicitis → RLQ pain, fever, CT findings.
- **Management:** Admit to surgery (appendicitis). NPO, fluids (NS 1 L), morphine 2 mg IV q2h. Start ceftriaxone 1 g IV daily + metronidazole 500 mg IV q8h. Consult surgery: Laparoscopic appendectomy performed. Antibiotics continued 24h post-op (uncomplicated). Monitor vitals q4h, labs q24h. Day 2: Afebrile, tolerating PO, discharged with surgical follow-up.

- ***Scenario 2: Elderly Female with Perforated Bowel (Diverticulitis)***
- **Presentation:** A 70-year-old female presents with 2 days of LLQ pain, now diffuse, with fever and hypotension. Exam shows T 39°C, BP 90/60 mmHg, HR 120 bpm, RR 22/min, diffuse guarding, rebound tenderness.
- **Diagnostic Workup:** Labs: WBC 20,000/µL, Cr 2.0 mg/dL (baseline 1.0), lactate 4.5 mmol/L, CT: Free air, LLQ abscess, sigmoid thickening.

- **Diagnosis:** Perforated bowel (diverticulitis) → Diffuse pain, peritonitis, free air on CT.
- **Management:** Admit to ICU (sepsis). NPO, fluids (NS 2 L over 3h), norepinephrine 10 µg/min IV (MAP 70 mmHg). Start piperacillin-tazobactam 3.375 g IV q6h. Consult surgery: Emergent Hartmann's procedure (sigmoid resection, colostomy). Antibiotics continued 7 days post-op. Monitor lactate q6h (decreases to 1.8 mmol/L), Cr q12h. Day 10: Afebrile, tolerating PO, discharged with surgical/ID follow-up.

- ***Scenario 3: Middle-Aged Male with Acute Pancreatitis***
- **Presentation:** A 45-year-old male with alcohol use presents with 1 day of epigastric pain radiating to the back, nausea, and vomiting. Exam shows T 37.5°C, BP 110/70 mmHg, HR 90 bpm, RR 18/min, epigastric tenderness, no rebound.
- **Diagnostic Workup:** Labs: Amylase 500 U/L, lipase 600 U/L (>3x ULN), WBC 12,000/µL, Cr 1.1 mg/dL, lactate 1.2 mmol/L, CT: Pancreatic edema, no necrosis.
- **Diagnosis:** Acute pancreatitis → Epigastric pain, elevated amylase/lipase, CT findings.
- **Management:** Admit to medicine (pancreatitis). NPO, fluids (NS 2 L bolus, 150 mL/h), morphine 2 mg IV q2h. Monitor amylase/lipase q24h, vitals q4h. Consult GI: No gallstones, alcohol etiology confirmed. Day 3: Pain improved, tolerating PO, discharged with GI follow-up, alcohol cessation counseling.