PSEUDOMEMBRANOUS COLITIS: A POSTOPERATIVE NIGHTMARE!!

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OBJECTIVES

OUTLINE

- Organism
- Spores
- toxin-mediated pathogenesis with pseudomembrane formation.

IDENTIFY

- pre-op/operative risk
- factors (IBD, diverticular
- disease, cancer, age, diabetes, cachexia).

RECOGNIZE

- Early postoperative clues (fever, leukocytosis, diarrhea) and use correct tests.

REVIEW imaging hallmarks and severity classification

Treat By

Severity

Know Surgical Thresholds

Prevent recurrence and transmission

Introduction

Organism and Spores

- Clostridioides difficile: Gram-positive, spore-forming anaerobe.
- Spores persist on surfaces for months; resist alcohol hand rubs → need soap & water + sporicidal cleaning.
- Transmission: fecal–oral, mostly healthcare-associated.
- Trigger: overgrowth after disruption of normal gut flora (e.g., antibiotics).

Pathogenesis

Toxins & Pseudomembranes

- Antibiotics → disrupt gut microbiota (↓ colonization resistance).
- C. difficile overgrowth → production of Toxins A & B.
- Toxin effects: inactivate Rho GTPases → cytoskeletal injury, apoptosis, inflammation.
- Result: mucosal ulceration + fibrin/mucin/neutrophil exudate = pseudomembranes.
- Clinical spectrum: asymptomatic carriage → diarrhea → fulminant colitis / toxic megacolon.

Causes & Transmission

Causes (Triggers)

- **Broad-spectrum** antibiotics: fluoroquinolones, cephalosporins, clindamycin, carbapenems.
- **Prolonged hospitalization**

PPI exposure, chemotherapy immunosuppression.

Transmission (Spread)

- **Nosocomial**: patients, healthcare workers' hands, equipment, ward environment.
- **Spores**: survive for months, resist alcohol — require soap + sporicidal cleaning.
- **Route**: fecal–oral; outbreaks common in surgical wards.

Symptoms & Early Post-Op Clues

- Watery diarrhea (≥3 unformed stools/24 h), abdominal pain/cramps, fever, malaise.
- Leukocytosis, ↑ creatinine; may present with ileus (little stool) in severe disease.

Post-op red flags
New Fever + leukocytosis after antibiotics, ± diarrhea
especially with primary anastomosis

• Consider CDI in IBD/CRC/elderly or recent broad-spectrum antibiotic exposure.

Operative & Pre-Operative Risk Factors

Patient-Related Risks

- Age >65, frailty, hypoalbuminemia/cachexia.
- Diabetes, renal disease.

Disease-Related Risks

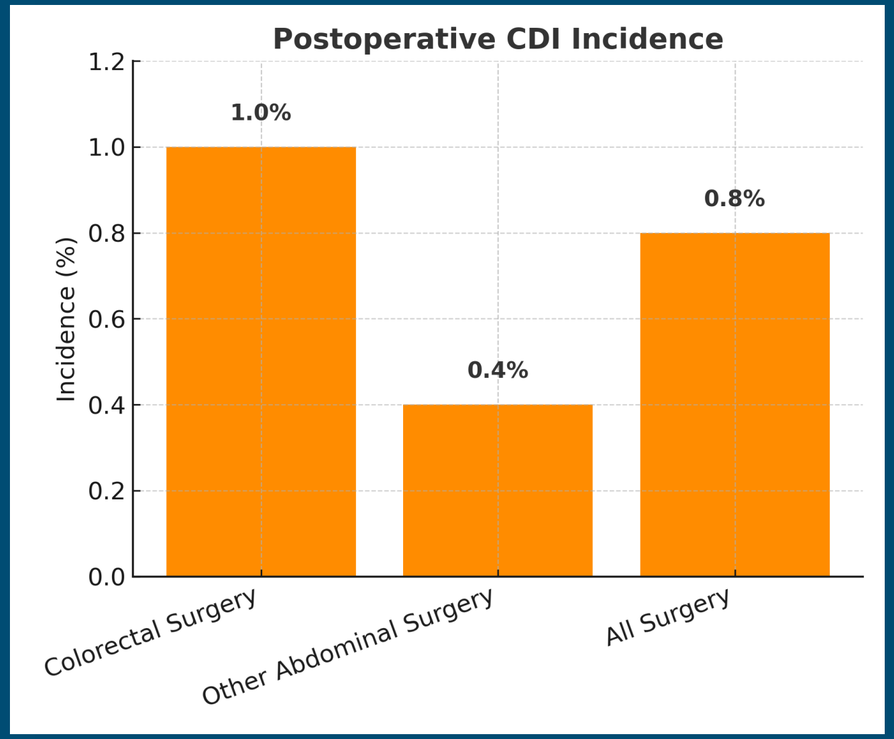
- IBD, diverticular disease, colorectal cancer.
- Chemotherapy, immunosuppression.

Operative Risks

- Colorectal or small-bowel surgery (esp. ileocolic resections).
- Primary anastomosis.
- Prolonged hospitalization, multiple/prolonged antibiotic courses.
- Prior CDI.

Postoperative CDI Incidence & Risk

- Incidence ~0.3–1.6% overall; highest in colorectal surgery.
- Patient factors: Age >65, diabetes, renal disease, cachexia/hypoalbuminemia.
- Disease factors: IBD, diverticulosis, colorectal cancer, chemotherapy.
- Operative factors: colectomy, small bowel resections, primary anastomosis.
- Prolonged peri-op antibiotics, PPIs, long hospital stay.
- Nosocomial transmission from spores on hands, equipment, ward environment.



Mechanism & Outcome

Normal Healing

•Epithelial regeneration + collagen deposition along suture line.

CDI Effect

•**Toxins A & B** → apoptosis of enterocytes & fibroblasts.

•Impaired collagen synthesis → weak anastomotic line.

•Local ischemia + intraluminal pressure worsen defect.

Result

•Anastomosis fails to seal → leakage of enteric contents → peritonitis/sepsis.

Mechanism & Outcome

Leak Progression

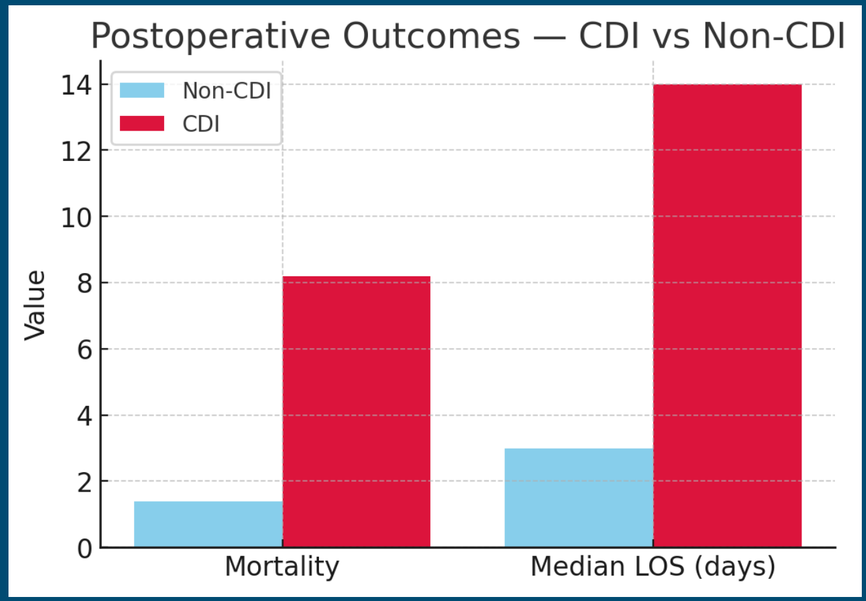
1. **Early** → subtle fever, leukocytosis, ileus.
2. **Localized** → peritonitis, abscess formation.
3. **Advanced** → diffuse peritonitis, overwhelming sepsis.
4. **End-stage** → multi-organ failure.

Impact in CDI

- Toxin-mediated inflammation worsens leak severity.
- Mortality can reach **30–40%** in severe cases.

Postoperative CDI Outcomes 1/2

Early Indicators Fever, leukocytosis, diarrhea/ileus	**Surgical Impact** Anastomotic leak ↑, SSI ↑
System Impact ↑ LOS, readmissions, cost	**Oncologic Surgery** Higher leak risk in HA-CDI, not in colonization



Postoperative CDI Outcomes 2/2

Anastomotic Leak (CDI-related)

- Leak at primary anastomosis → peritonitis, sepsis, mortality.
- Toxins A & B → apoptosis of enterocytes, mucosal barrier loss.
- Collagenase/proteases → impaired extracellular matrix healing.
- Microthrombosis & ischemia → poor perfusion.
- Spores & bacterial overgrowth → delayed mucosal repair.

Result

➡ Catastrophic failure of anastomotic healing.

Early Diagnosis

Test only symptomatic patients (avoid formed stool).

Algorithm: GDH antigen + toxin EIA → discordant resolved by NAAT (PCR).

Alternatives: NAAT + toxin two-step; toxigenic culture as reference when needed.

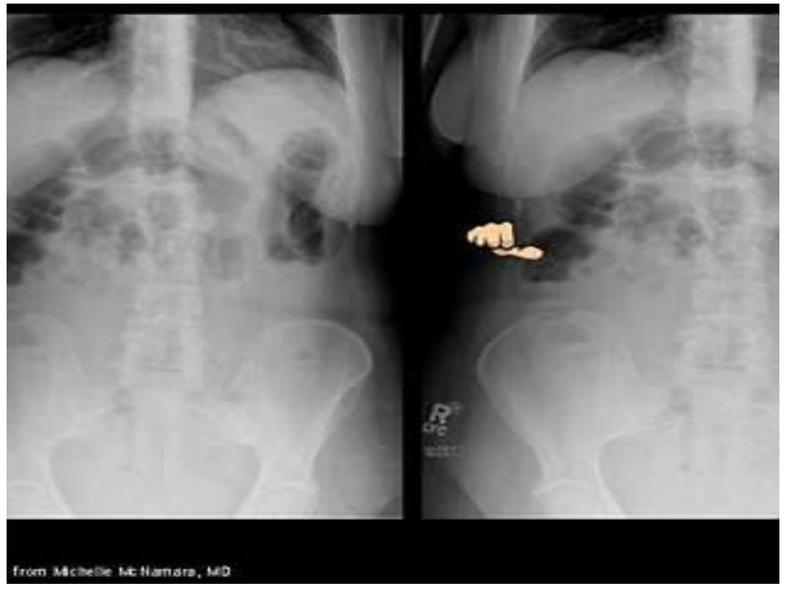
• Serum toxin assays: niche/limited role; not routine.

• Avoid repeat testing within 7 days;
Do not test cure.

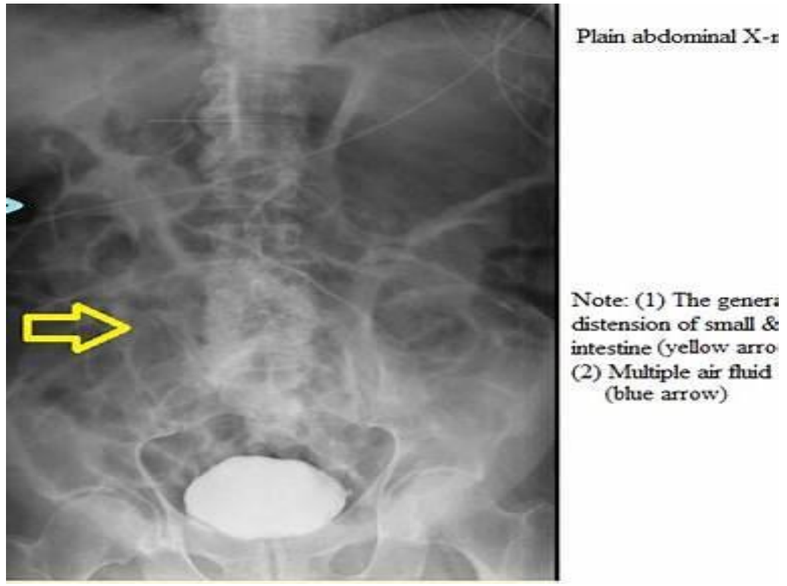
Imaging — XRAY Findings

Diffuse colonic dilatation

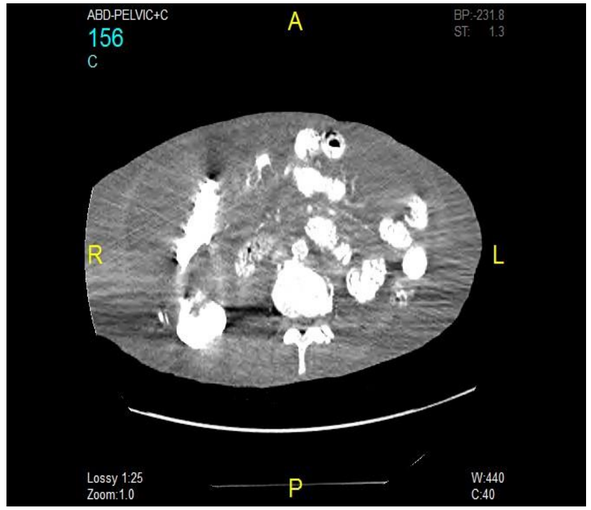
Toxic megacolon



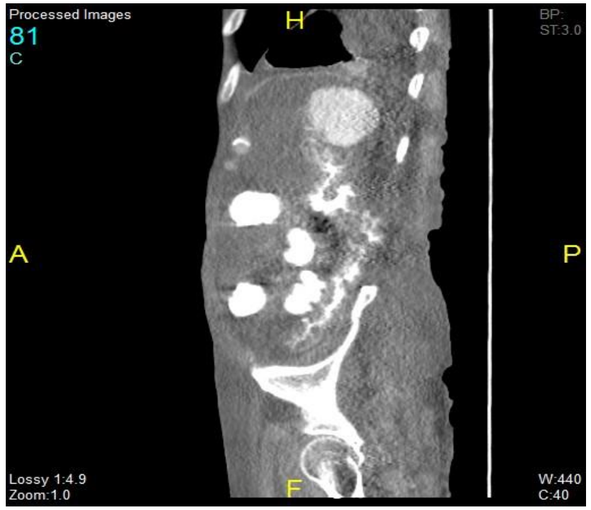
Thumbprinting sign



Air-fluid levels / ileus

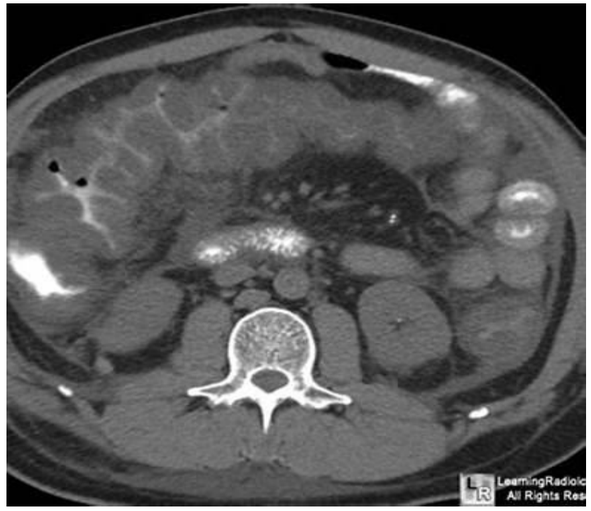


Accordion sign (axial)



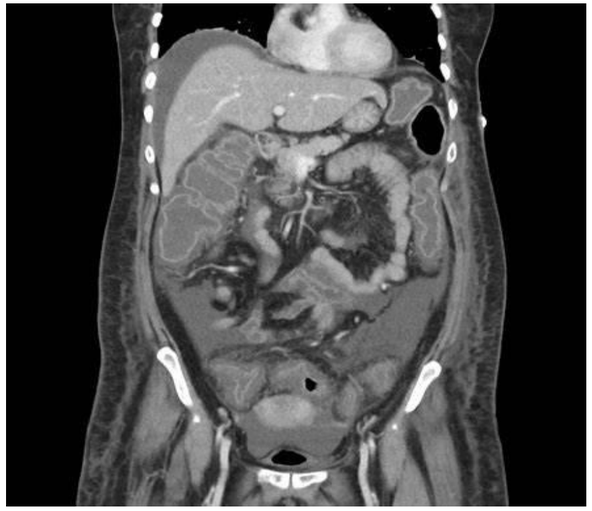
Mural thickening (sagittal)

Diffuse edema (coronal)



Classic accordion sign

Diffuse colonic edema



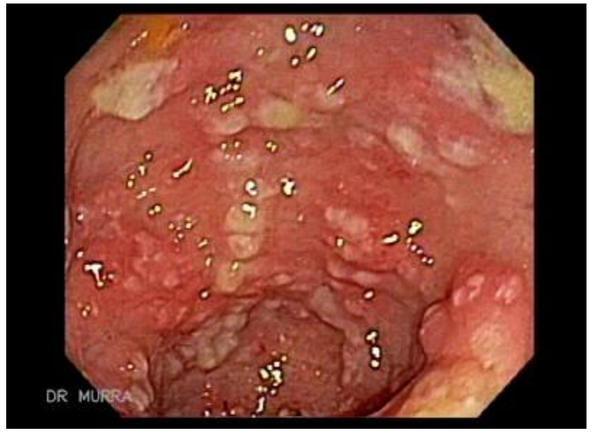
Marked wall thickening

Moderate pseudomembranous colitis

Severe pseudomembranes with edema

Mixed pseudomembranes

Confluent plaques



Diffuse mucosal disease

Advanced pseudomembranous colitis

Post-Op Complications & Outcomes

Surgical Complications

- ↑ **Anastomotic leak risk** in CDI patients.
- More **surgical site infections (SSI)**.
- ↑ Readmissions and **longer hospital stay (LOS)**.

Severe Outcomes

- **Toxic megacolon.**
- **Bowel perforation.**
- **Sepsis → multi-organ failure.**

Underlying Mechanism

- **Toxin-driven inflammation + collagenase activity → impaired anastomotic healing.**

Severity Classification (Adults)

Category	Criteria	Clinical Features
Non-severe	WBC <15,000 and Cr ≤1.5 mg/dL	CDI without organ dysfunction
Severe	WBC ≥15,000 or Cr >1.5 mg/dL	Marked leukocytosis or renal impairment
Fulminant	Hypotension/shock, ileus, toxic megacolon	Systemic toxicity, dilation, risk of perforation

Management Pathway

1. **Unstable patient** → Hartmann’s procedure.
2. **Stable + localized disease** → Segmental resection with diversion.
3. **Fulminant CDI or pancolitis** → Subtotal/total colectomy.
4. **Very select contained leak** → Repair + proximal diversion (rare in CDI).

Management — Initial

General Measures	Infection Control	First Line Therapy
➢ Stop inciting antibiotics. ➢ Supportive care: fluids, electrolytes, nutrition. ➢ Avoid routine antiperistaltics. ➢ Monitor for ileus.	**Contact precautions** immediately. **Hand hygiene:** soap + water (not alcohol). **Environment:** sporicidal cleaning, dedicated equipment.	**Fidaxomicin 200 mg PO BID × 10 days** (preferred). OR **Vancomycin 125 mg PO QID × 10 days**.

Fulminant CDI & Surgery

- Vancomycin 500 mg PO/NG QID + Metronidazole 500 mg IV q8h; add rectal vanc if ileus.

- Surgical Indications
  - toxic megacolon
  - perforation/peritonitis
  - Rising lactate or organ failure
  - refractory course.
- Operations:
  - subtotal/total colectomy + end ileostomy (standard)
  - diverting loop ileostomy + colonic lavage (selected cases).

- **ICU support and broad resuscitation.**

Recurrence Prevention & Advanced Therapies

• Recurrent CDI: vancomycin taper/pulse or fidaxomicin (standard/extended-pulsed).

• Consider bezlotoxumab IV in high-risk for recurrence (age, immunosuppression).

• Microbiota-based therapies after antibiotics: Rebyota (enema) and Vowst (oral spores).

• Review PPIs/antibiotics; reinforce isolation until diarrhea resolves.

Prevention — Peri-Op & Ward

- Stewardship: narrowest spectrum, shortest duration; avoid unnecessary post-op coverage.

- Consider combined bowel prep. protocol for CRC surgery.

- Hand hygiene (soap/water), contact isolation, sporicidal cleaning, dedicated equipment.

- Deprescribe PPIs when not clearly indicated.

Take-Home Messages

- **Suspect CDI early** in post-op patients with fever + leukocytosis ± diarrhea.
- **Test correctly, classify severity, treat promptly.**
- **Prevent** with antibiotic stewardship, hand hygiene, and strict infection control.
- **Plan for recurrence risk** in vulnerable patients.

References

1. McDonald LC et al. Clinical Practice Guidelines for CDI. Clin Infect Dis. 2018.
2. Surgical management of C. difficile colitis. UpToDate, 2024.
3. Navarro J et al. Postoperative CDI outcomes. Clin Radiol. 2006.
4. Pseudomembranous colitis — Imaging features. Radiopaedia.org, GI Atlas.
5. Debast SB et al. European Society of Clinical Microbiology & Infectious Diseases CDI Guidelines. Clin Microbiol Infect. 2014.
6. Kelly CP et al. Pathophysiology of CDI: apoptosis, toxins, mucosal injury. PMC7042015.

THANK YOU

Questions & Discussion

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