Management of Clostridium Difficile: Total Colectomy versus Colon Sparing Surgery

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No Disclosure
Clostridium Difficile Colitis: Treatments, Guidelines, and Challenges

- Up to 3 million cases per year in US
- Estimated $3.2 billion/year in expenditures
- Mortality estimated to be ~4-8%
Pathophysiology

• C. difficile colonizes the colon after the normal gut microflora is disrupted by antibiotics or other host factors.

• Kyne et al demonstrated that 31% of patients who received antibiotics in the hospital were colonized with C. difficile and 56% of these developed symptomatic disease.
Issues

- Who to operate on?
- What are the indications for operative management?
- When to operate?
- What operation?
- What can we improve upon?
Prevention!

- Infection Control
- Isolation precautions
- Handwashing
- Barrier precautions
- Cleaning with bleach
- Antibiotic stewardship
Severity Scoring and Treatment

<table>
<thead>
<tr>
<th>Severity</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild or Moderate:</td>
<td>WBC of 15K or lower &amp; Serum creatinine</td>
</tr>
<tr>
<td>Severe:</td>
<td>WBC of 15K or higher or Serum creatinine &gt;1.5 times the premorbid level</td>
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<tr>
<td>Severe, Complicated:</td>
<td>Hypotension or shock, ileus, megacolon</td>
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Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA) Clinical Practice Guidelines 2010
# ACG Severity Scoring and Treatment

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<tr>
<td>Mild:</td>
<td>Diarrhea</td>
</tr>
<tr>
<td>Moderate:</td>
<td>Diarrhea plus any additional signs or symptoms not meeting severe or complicated criteria</td>
</tr>
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| Severe:   | Any two of the following:  
- WBC ≥ 15000 cells/mm³  
- Serum albumin           |
Abdominal CT Findings in Fulminant CDI

- Ascites
- Thickened Colonic Wall
Dilated Loops of Colon in a Patient with CDI
Normal Colon and Pseudomembranous Colitis (PMC) as seen at Colonoscopy

Normal Colon

Colon with PMC due to *Clostridium difficile* Infection
Factors that have been associated with a poor prognosis from CDAD.

- **Non-modifiable patient factors:**
  - Age >65
  - Immunosuppression
  - Pre-existing renal or pulmonary disease
  - High ASA class

- **Physical exam/clinical findings:**
  - Fever
  - Ileus/distention
  - Hypotension/shock requiring vasopressors
  - Mental status changes
  - Need for intubation/mechanical ventilation

- **Laboratory values:**
  - High White Blood Cell count
  - Increasing lactate
  - Increased creatinine/renal dysfunction
  - Low Albumin

- **CT scan findings:**
  - Pancolitis/ascites
Fulminant CDI: Severe and Rapidly Fatal Disease

- 51 yo male underwent coronary artery bypass grafting and received cefazolin pre-surgery.

- Rapidly progressive 4-day course from diarrhea to shock and death. WBC elevated throughout course and rose precipitously near the time of death.
### Severity Scoring and Treatment

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<td>Complicated:</td>
<td>Any one of the following:</td>
<td>Metronidazole 500 mg IV tid</td>
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<td>- Admission to ICU for CDI</td>
<td>+ Vancomycin 125 mg PO qid</td>
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<tr>
<td></td>
<td>- Hypotension with or without required use of vasopressors</td>
<td>+ Vancomycin 500 mg in 500 mL saline as enema qid (if ileus or distended)</td>
</tr>
<tr>
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<td>- End organ failure (Mechanical ventilation, Renal failure, etc)</td>
<td>+ SURGICAL CONSULTATION</td>
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<td>- Mental status changes</td>
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<td>- Fever ≥38.5°</td>
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<td>- Ileus or significant abdominal distention/tender</td>
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<td>- WBC ≥ 35,000 cells/mm³</td>
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<td>- Serum lactate levels greater than 2.2 mmol/Liter</td>
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Surgery and CDAD

- Colectomy associated with a 35-85% mortality.

- Suggests:
  - Patients are Sick
  - Magnitude of Colectomy too Significant
  - We intervene too late
Colon Autopsy Specimen of a Patient who Died of Severe CDI: Confluent PMC is Evident
Surgery and CDAD - Dilemma

- Operate early- near total colectomy + ileostomy is a large operation with significant short-term and long-term consequences.

- Operate early- may end up operating on patients that would not need it.

- Operate once patient sick: too late
• With the goal of decreasing mortality...

• Lower the threshold for surgical consultation!

• DO NOT THINK OF SURGICAL CONSULT AND POSSIBLE SURGICAL MANAGEMENT AS SALVAGE THERAPIES!!!
• Is colectomy necessary for the treatment of severe, complicated (fulminant) CDAD?
• Can we offer a procedure that adequately treats severe, complicated CDAD that is less morbid?
Pathophysiology - C. difficile overgrows and produces exotoxins - Toxins cause mucosal damage and inflammatory cell infiltration.
Hypothesis: Therapy to decrease bacterial counts and toxin levels throughout the whole colon will adequately treat severe, complicated CDAD.
Hypothesis

- Loop ileostomy and colonic lavage followed by postoperative vancomycin flushes is an alternative to colectomy in the treatment of severe, complicated C. Diff.
1. Creation of diverting loop ileostomy.

2. Intraoperative antegrade colonic lavage with 8 L of warmed PEG3350/electrolyte solution via ileostomy.

3. Postoperative antegrade colonic enemas with vancomycin (500 mg in 500 mL x 10 days) via ileostomy.
Diverting loop ileostomy and colonic lavage: an alternative to total abdominal colectomy for the treatment of severe, complicated Clostridium difficile associated disease.

• 42 pts, Univ of Pittsburgh

• No significant difference in age, sex, pharmacologic immunosuppression, and Acute Physiology and Chronic Health Evaluation-II scores between our current cohort and historical controls

• Reduced mortality compared to our historical population (19% vs 50%; odds ratio, 0.24; P = 0.006)

• Preservation of the colon was achieved in 39 of 42 patients (93%).
Loop ileostomy/colonic lavage v. total abdominal colectomy (historical controls) for severe, complicated C. Diff.

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<th>Colectomy</th>
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<td>APACHE-II (mean±S.D.)</td>
<td>31.4±9.0</td>
<td>29.9±8.9</td>
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<tr>
<td>Post-Operative Death</td>
<td>16/81* (20%)</td>
<td>40/81 (49%)</td>
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<tr>
<td>Colectomy</td>
<td>5/81* (6%)</td>
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Loop ileostomy/colonic lavage v. total abdominal colectomy (historical controls) for severe, complicated C. Diff.

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<tr>
<td><strong>Time from presentation to surgical consultation</strong></td>
<td>11±9 hours</td>
<td>32±12 hours</td>
</tr>
<tr>
<td><strong>Time from surgical consultation to operative intervention</strong></td>
<td>9±6 hours</td>
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<td>Alive at 1 year</td>
<td>54/65 (83%)</td>
<td>30/41 (73%)</td>
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<tr>
<td>Restoration of GI continuity</td>
<td>46/54 (85%)</td>
<td>7/30 (23%)</td>
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Loop ileostomy/colonic lavage v. total abdominal colectomy

- Is there a patient that is better off with TAC?

- Who is not a candidate for this operation?
  - Patients with colonic compromise.
  - Abdominal compartment syndrome.
  - Patient population that has done the worse
  - Patients with acute renal failure (anuric, ongoing fluid resusc, requiring hemodialysis.)
Loop ileostomy versus total colectomy as surgical treatment for Clostridium difficile–associated disease: An Eastern Association for the Surgery of Trauma multicenter trial

- Retrospective multicenter study

- 10 centers of patients who presented with CDAD requiring surgery between July 1, 2010 and July 30, 2014

- 98 patients

- Median age was 64.5 years; 59% were male. Concerning preoperative patient conditions, 54% were on pressors, 47% had renal failure, and 36% had respiratory failure. When comparing TC and LI, there was no statistical difference regarding these conditions

Paula et al. Journal for Trauma and ACS, 2017
Loop ileostomy versus total colectomy as surgical treatment for Clostridium difficile–associated disease: An Eastern Association for the Surgery of Trauma multicenter trial

• Adjusted mortality (controlled for preprocedure confounders) was significantly lower in the LI group (17.2% vs 39.7%; \( p = 0.002 \))

• **Conclusion:**
  – First multicenter study comparing TC with LI for the treatment of CDAD. In this study, LI carried less mortality than TC. In patients without contraindications, LI should be considered for the surgical treatment of CDAD
Diverting Loop Ileostomy Sounds Great in a Tough CDAD Patient!
69 year old man developed fulminant and fatal CDI several days after ileostomy closure in an ileostomy formed for reasons unrelated to CDI – Abe et al., J Med Case Rep, 2012

77 yo M who had Ciprofloxacin for prostatitis, Overwhelming Recurrent *Clostridium difficile* Infection after Reversal of Diverting Loop Ileostomy Created for Prior Fulminant *C. difficile* Colitis – POD 3 – hypotenstive, on pressors, exlap – subtotal colectomy – pod 5, expired. – Fashandi et al., Am Surg 2017
CDI after ileostomy closure and one series found a statistically significant association of postoperative CDI with delayed ileostomy closure (>6 months from index procedure, p=0.003) – Rubio-Perez, et al. World J Gastrointest Surg 2014

- 93 patients, who had undergone elective ileostomy closure between 2009 and 2013 was performed

- Pseudomembranous colitis appeared in 4%
In the works...

- Less May be More: Loop Ileostomy With Colonic Lavage for Fulminant Clostridium Difficile Colitis A Prospective National Multi-Center Cohort Study

- Dr. Marylise Boutros, Jewish General Hospital (Quebec, CA)
• Patient diagnosed with fulminant colitis → he/she will be asked by the surgeon on-call if they would like to participate in this research study.
  - If they agree to be in this study → maybe asked by the surgeon to enroll in either the investigational arm (loop ileostomy) or the standard of care arm

• Start Date - January 2015, Estimated End date - December 2018
Bet Perhaps:

An Acceptable Pathway at this time!
Diarrhea and confirmed or suspected CDI

Fluid and electrolyte resuscitation as necessary/Infection control measures/stop inciting antibiotics if possible

Mild/moderate Disease

Metronidazole 500 mg PO tid for 10 days

Daily assessment

Severe Disease

Vancomycin 125 mg PO qid For 10 days

Severe, Complicated Disease

Surgical consultation/CT scan abdomen/pelvis

vasopressors, intubation, mental status changes, peritonitis, or end organ failure?

If symptoms not resolving within 6 days:
Surgical consultation, CT scan

If worsening clinical symptoms or deterioration, worsening WBC, cardiopulmonary compromise, or end organ failure

Metronidazole 500 mg IV tid Plus
Vancomycin 125 mg PO qid Plus
Vancomycin 500 mg in 500 mL enema

Operative Management

Napolintano et al. Surgery, 2017
OPERATIVE MANAGEMENT STRATEGY FOR CDAD

Does the patient have abdominal compartment syndrome?

(~5% incidence) yes

Exploratory laparotomy, Subtotal abdominal colectomy with end ileostomy.

No

Exploratory laparoscopy (convert to laparotomy as necessary)

Colonic perforation/ necrosis?

Yes (rare)

Loop ileostomy/intraoperative colonic lavage

No

Development of abdominal compartment syndrome post-op?

Yes (~7% incidence; Usually within 48 hours)

No

Monitor for continued improvement

Napolintano et al. Surgery, 2017
Thank You