Ischemic Colitis

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Ischemic colitis (IC) represents greater than 50% of all intestinal ischemia.
IC most often affects the elderly:
- 90% of cases are in patients over 60 years old
- Boley first described this condition in 1963

Pathophysiology
- Intestinal blood flow is inadequate to meet the metabolic demands of a region of the colon
- IC can be occlusive or non-occlusive
  - is almost always non-occlusive
- Compromised blood flow may be secondary to changes in systemic circulation or local mesenteric (micro) vasculature
- Most cases involve watershed areas
- The rectum is usually spared due to dual blood supply
  - Inferior mesenteric artery
  - Internal iliac branches

Predisposing Conditions
- High blood pressure
- Cardiovascular disease
- Diabetes
- Chronic renal failure
- Chronic pulmonary disease
- Recent cardiovascular surgery
- Constipation/IBS
Risk Factors and Etiology

- Major vascular occlusion
  - Mesenteric arterial thrombosis/embolus
  - Mesenteric venous occlusion
- Micro-vascular disease
  - Diabetes
  - Rheumatoid arthritis
  - Vasculitis
  - Amyloidosis
  - Radiation injury
- Hypo-perfusion
  - CHF
  - Transient hypotension
  - Strenuous physical activities
  - Shock
    - Hypovolemia
    - Septic
    - Cardiac
- Clotting disorders
  - Protein C/S deficiency
  - Anti-thrombin III deficiency
  - Factor V Leiden
  - Sickle cell disease
  - Anti-phospholipid syndrome
- Mechanical Obstruction
  - Tumor
  - Adhesions
  - Volvuli
  - Hernia
  - Diverticulitis
  - Prolapse
  - Trauma
- Aortic Surgery 2-3%

Medications associated with IC

- Antibiotics
- Appetite suppressants
  - phentermine
- Chemotherapeutics
  - vinca alkaloids
- Decongestants
  - pseudoephedrine
- Digitalis
- Diuretics
- Ergot alkaloids
- Hormonal therapies
  - Estrogen
  - Danazol
- Statins
- Immunosuppressives
- Laxatives
- Nonsteroidal anti-inflammatory drugs
- Psychotropic medications
  - Serotonin agonist/antagonist
  - vasopressors
  - Illicit drugs
    - Cocaine

Blood Supply of the Colon

Distribution of Disease

- Left colon is involved in 75% of cases
- Splenic flexure 25%
- Isolated right colon ischemia
  - 10%-26%
  - More common in patients in shock
  - Patients tend to have:
    - Abdominal pain without bloody diarrhea
    - More severe colitis
    - 5 times more likely to need surgery
    - Associated with worse outcome
    - May be related to SMA occlusion and associated small bowel ischemia
### Classification of Ischemic Colitis

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gangrenous 15-20%</strong></td>
<td>Complete loss of arterial flow causes bowel wall infarction and gangrene, which can progress to perforation, peritonitis, and death.</td>
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<tr>
<td><strong>Non-Gangrenous 80-85%</strong></td>
<td>Transient, reversible impairment of the arterial supply, with accompanying reperfusion injury. Leads to partial mucosal sloughing that heals by mucosal regeneration in a few days.</td>
</tr>
<tr>
<td><strong>Transient 50%</strong></td>
<td>Gross impairment of the arterial supply, leading to hemorrhagic infarction of the mucosa. Heals by fibrosis, and can lead to stenosis Can lead to chronic segmental colitis</td>
</tr>
</tbody>
</table>
| **Chronic 20%** | No signs or symptoms are specific:  
Acute onset crampy abdominal pain  
Strong urge to defecate  
Bleeding: bright red or maroon diarrhea  
Profuse bleeding suggests another diagnosis  
Anorexia, nausea, or vomiting  
Elevated white blood cell count  
Dilation of the colon |
| **Stricturing 10%** | In gangrenous forms, symptoms and signs can progress rapidly  
Peritonitis  
Metabolic acidosis  
Signs of shock |

### Clinical Presentation

#### Abdominal pain
- Acute onset crampy abdominal pain
- Strong urge to defecate
- Bleeding: bright red or maroon diarrhea
- Profuse bleeding suggests another diagnosis
- Anorexia, nausea, or vomiting
- Elevated white blood cell count
- Dilation of the colon

### Diagnostic Strategy

- There are no specific laboratory markers of intestinal ischemia
  - Lactate, LDH, CPK, amylase, alkaline phosphatase, etc.
- Need high index of suspicion
  - Based on history and co-morbidities
  - Physical exam
- Rule out
  - Infectious colitis
  - Pseudomembranous colitis
  - Diverticulitis
  - Colon carcinoma

### Imaging

#### Abdominal plain films
- Thumbprinting
- Submucosal hemorrhage and edema
- Air filled bowel loops
- Ileus
- Mural thickening
- Pneumatosis
- Portal venous air
- Free peritoneal air
Barium Enema

- Thumbprinting
- Ulcers
- Ridges
- Edema
- Strictures
- Eccentric mural deformity
- Contraindicated if gangrenous ischemic colitis because of the risk of perforation
- Endoscopy may be more difficult after barium enema

Computed Tomography

- Often the initial test
- Non-transmural IC
  - Mural thickening
  - Thumbprinting
  - Pericolonic fat stranding
  - Peritoneal fluid
  - Double halo or target sign
  - Submucosal edema & hemorrhage
  - Lack of bowel wall enhancement
  - Mesenteric vessel occlusion
- Transmural IC
  - Pneumatosis
  - Portal venous air
  - Free intra abdominal air

Target Sign

Pneumatosis and Portal Venous Air
**Angiography**

- Not typically part of the initial evaluation
- A treatable occlusive lesion is very rarely found
- Consider angiography if:
  - Isolated right sided involvement
  - Suggestion of SMA thrombosis

**Colonoscopy**

Most common diagnostic method for IC
- Allows for visualization and biopsy
- Except for gangrene, neither visual findings nor histology are specific
- Serial studies may be necessary
- As opposed to IBD, IC often resolves in 1-2 weeks

**Colonoscopy**

Colonoscopic findings are suggestive but are not diagnostic
- Bulging folds from submucosal hemorrhage
- Ulcerations
- Friability
- Mucosal necrosis
- Segmental distribution
- Rectal sparing

Sigmoidoscopy has a diagnostic accuracy of 92% and a negative predictive value of more than 94%

Assadian et al. Vascular 2008

**Marked Erythema and Exudate**
Mucosal Edema, Exudates, and Ulcerations

Severe IC with Pneumatosis Intestinalis

Colonoscopy

In chronic IC other findings may include:

- Strictures
- Mucosal atrophy
- Granularity

Differential Diagnosis

<table>
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<tr>
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<th>Clinical</th>
<th>Radiologic/Endoscopic</th>
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<tr>
<td>Ulcerative colitis</td>
<td>Bloody diarrhea</td>
<td>Extends proximally from rectum; fine mucosal ulceration</td>
</tr>
<tr>
<td>Crohn’s colitis</td>
<td>Perianal lesions common; frank bleeding less frequent than in ulcerative colitis</td>
<td>Segmental disease; rectal sparing; strictures, fissures, ulcers, fistulas; small bowel involvement</td>
</tr>
<tr>
<td>Ischemic colitis</td>
<td>Older age groups; vascular disease; sudden onset, often painful</td>
<td>Splenic flexure; “thumb printing”; rectal involvement rare</td>
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<tr>
<td>Infectious colitis</td>
<td>+ stool cultures or C-dif toxin</td>
<td>Diffuse colon wall thickening or toxic dilatation</td>
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Differential Considerations

- Atypical features in inflammatory bowel diseases
  - Segmental distribution of the disease, infrequent rectal involvement
  - High rate of spontaneous recovery, low rate of recurrence
  - Lack of adequate response to usual inflammatory bowel disease therapy
  - Frequent progression to fibrotic stenosis with delayed obstruction
- Now recognized as characteristic of colonic ischemia
- Always consider the diagnosis of ischemic colitis whenever contemplating the diagnosis of inflammatory bowel disease in an elderly patient

Management

- Depends on clinical severity
- Most cases are transient and resolve spontaneously
- Mild cases require only supportive care
  - NPO
  - Broad spectrum antibiotics
  - TPN if prolonged NPO
  - Optimize cardiac function and oxygen delivery
  - Serial abdominal exams

Avoid vasopressors if possible
- Discontinue medications associated with colonic ischemia
- No bowel prep
- Avoid steroids
- Use volume aggressively treat low blood-flow states
- Most cases of non-occlusive ischemic colitis resolve in 2 to 4 weeks and do not recur

Indications for Surgery

- Acute Ischemia
  - Pneumoperitoneum
  - Significant gangrenous IC on endoscopy
  - Clinical deterioration despite conservative measures
    - Peritonitis
    - Sepsis without other source
    - Persistent fever or leukocytes
  - Persistent diarrhea, rectal bleeding or protein-losing colopathy for more than 14 days
Surgery

- The goal is to remove all affected bowel with normal bowel at the margins
- Preoperative studies may help to guide the resection
- Looks for ischemia in the mucosa at the margin, not the serosa
- Find pulsating vasa recta
- External appearance of the bowel may be normal at laparotomy

Intraoperative Assessment

- Doppler vessels on the anti-mesenteric border
- Fluorescein
  - 500mg of IV intra-operatively to evaluate colon viability with a woods lamp
  - Look for uniform, patchy or absent illumination

Chronic Ischemia
Indications for Surgery

- Chronic segmental colitis with recurrent sepsis
- Symptomatic colonic strictures
- Suspicion of neoplasia

Surgery

- Patient with acute ischemia:
  - 33% had chronic renal failure
  - 57% were receiving vasoactive drugs
  - 56% had atherosclerosis
  - 33% had an acute abdomen
  - 51% of those died
  - 54% were treated non-operatively initially
  - 24% subsequently required surgery
- The overall mortality rate was 29%
IC after Heart Surgery

3,724 pts with cardiac surgery
- 11 patients developed IC
- Risk factors:
  - Lower ejection fraction; 45.1 vs. 49.7%, p < .01
  - Urgent cardiac operation; 3.49 times more likely to develop IC
- Mortality for pts with IC was 18%

Predictors of Postoperative Mortality

- 85 pt undergoing surgery for IC
- 50% had subtotal or total colectomy
- 80% had stoma formation

<table>
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<tr>
<th>Predictor</th>
<th>OR</th>
<th>95% CI</th>
<th>P value</th>
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<tr>
<td>ASA (II,III) vs. (IV,V)</td>
<td>0.13</td>
<td>0.02-.5</td>
<td>0.006</td>
</tr>
<tr>
<td>Elective/Emergency surgery</td>
<td>0.2</td>
<td>0.06-0.87</td>
<td>0.04</td>
</tr>
<tr>
<td>EBL (300-1000) vs. (&lt;300)</td>
<td>4.3</td>
<td>1.16-18.5</td>
<td>0.04</td>
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</tbody>
</table>

Neither type of colectomy nor stoma formation impacted survival

Factors Associated with Worse Prognosis

- Age
- Absence of hematochezia
- Tachycardia
- Peritonitis
- Anemia
- Hyponatremia
- Colonic stenosis

Conclusion

- IC has diverse etiology and presentation
- Gangrenous forms required urgent operation
- Right sided IC is associated with worse outcome
- Surgical resection is needed in a minority of cases but is associated with high mortality
- Operative planning based on both preoperative studies and intra-operative findings
- Normal serosa does not rule out IC
- Consider chronic IC in elderly patients with colitis