Lower Abdominal Infections

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Appendicitis
Obstruction of the appendiceal lumen by a fecalith, a hyperplastic lymph node, or a foreign body is typically the inciting event.

Luminal obstruction with continued secretion results in progressive distention, proliferation of luminal microorganisms, ischemia, gangrene, and subsequent perforation.
Presentation

- Diffuse epigastric pain with anorexia, nausea, and vomiting
- Pain typically progresses first to the periumbilical region and then to the RLQ
- Characterized by a low-grade fever and exhibit direct tenderness at MBP
- May also manifest rebound tenderness, guarding, rigidity, and marked temperature elevation
Diagnosis

- Classically, the Dx has been made primarily through clinical examination, with laboratory tests consistent with inflammation (an elevated leukocyte count with a left shift and an elevated CRP) serving as confirmation.
- In up to 20% of patients with appendicitis, however, the incorrect diagnosis is made.
- Incidence of removal of a normal appendix can approach 40%.
Diagnosis

- Early Dx can decrease the risk of post-op complications from 39% to 8%

- CT findings enlargement and dilation of the appendix (to > 6 mm), non-filling of the appendix, and peri-appendiceal inflammation (fat stranding, abscess, phlegmon, and dependent fluid collections)
CT

- Current evidence supports the role of CT in the evaluation of suspected appendicitis.
- Decreases the incidence of normal appendicitis and prolonged, unnecessary observations.
- Pre-op CT assists in planning an operation, identifying a periappendiceal abscess that may delay immediate appendectomy, and recognizing other sources of intra-abdominal pathology.
Treatment

• Initial management consists of fluid resuscitation, appropriate prophylactic antibiotics, and preparation for surgery

• Currently, acute nonperforated appendicitis, gangrenous appendicitis, and perforated appendicitis without an associated abscess are managed with urgent appendectomy
Treatment

- The main dilemmas in management center on the appropriate use of laparoscopic appendectomy and the role of conservative management for periappendiceal masses with interval appendectomy
Lap vs Open
Abscess

- The mainstays of conservative management have been parenteral ABx, supportive fluid resuscitation, and percutaneous drainage.

- The recurrence rate after conservative management ranges from 10 to 20%.
  - Risk is greatest after the 6-month point in the clinical progression.
Abscess

- Interval appy has been typically performed between 6 weeks and 3 months after perc intervention and clinical resolution.
- Historically, 20 to 40% of patients treated medically for perforated appendicitis with abscess had recurrent appendicitis.
Abscess

- More recent literature challenges this practice
- Only 5 to 7% of patients will have recurrent appendicitis, most within 6 months
- Interval appendectomy, however, especially in the elderly may be of diagnostic benefit, as >1% of patients with perforated appendicitis harbor CA diagnosed at interval appendectomy
Diverticular Disease
Small out-pouchings of the colon

Occur at sites of vascular penetration between the single mesenteric tenia and one of the anti-mesenteric tenia

Muscular layer is absent

Diverticulitis – 10 to 25%
Incidence of DD increases with age

Diverticula are present in >80% of pts >85

Diet containing refined CHO and low fiber substances

Decreased physical activity, obesity, NSAIDs, smoking and constipation
Clinical Evaluation
History

• Uncomplicated (simple) Diverticulitis
  - LLQ pain, low-grade temp, irregular bowel habits, + GU Sx
  - Diarrhea or constipation may occur, rectal urgency

• Complicated Diverticulitis
  - Obstruction, abscess, fistula, free perforation
  - LGIB – 30 to 50% - usually assoc with osis
  - 50% originates in right colon
Complicated Diverticulitis

- Most common form involves the development of a pericolonic abscess
- May be categorized according to Hinchey classification
- Can be retroperitoneal
Stage I – localized pericolonic
Stage II – large mesenteric
Stage III – free perforation
Stage IV – fecal peritonitis
Fistulas

- Colovesical
  - Most common – 50 to 65%
  - Pneumaturia, hematuria, frequency, fecaluria
  - Less common in females

- Colovaginal
  - Usually seen after hysterectomy
  - Foul vaginal discharge, stool per vagina
  - Less common in males
Obstruction

- Account for 10% colonic obstruction
- Acute diverticulitis – colonic edema and functional obstruction
- Resolves with Abx and bowel rest
- Stricture formation is more common – follows repeated attacks
Malignant Diverticulitis

- Extreme form of sigmoid diverticulitis
- Characterized by an extensive phlegmon and inflammatory reaction extending below peritoneal reflection
- Obstruction and fistula formation
Physical examination

- Uncomplicated (simple) Diverticulitis
  - LLQ tenderness with varying degrees of guarding and rebound
  - ± mass

- Complicated Diverticulitis
  - Findings depend on underlying process
Investigative Studies
Imaging

- CT with oral and rectal contrast
- Bowel wall thickening, fat stranding, diverticula – most frequent
- Small abscesses may not be detected
- Contrast studies may be helpful if CA is suspected
Contrast Studies

- Water soluble contrast
- Abrupt transition to abnormal mucosa over short segment = CA
- Gradual transition into diseased colon over a longer segment = diverticulitis
Management
Medical

- Uncomplicated managed as outpatient
- Liquid or low-residue diet
- Oral Abx over 7 to 10 days
- Colon may be evaluated several weeks later provided Sx resolution
- If Sx worsen - hospitalization
Medical

- Hospitalization for significant physical findings or Sx of toxicity
- NPO, IVF, IV Abx until pain and tenderness have resolved and bowel function returns
- Should occur within several days
- If fever and leukocytosis persist despite Abx - reevaluate
Surgical

• Approximately 20% of patients with acute diverticulitis require surgical treatment

• Most are reserved for recurrent attacks or complicated diverticulitis

• Most common indication for elective resection = recurrent attacks
Recommendations

- Elective resection after uncomplicated diverticulitis should be made on case by case basis
- Depends on age and medical condition of patient, frequency and severity of attacks, presence of Sx after acute attack
- Elective resection following complicated episode
Elective resection usually follows percutaneous drainage of pelvic collection.

Timing may be guided by extent of inflammation and patient's clinical course.

Most can be operated upon within 6 weeks.

Elective resection is preferred for fistulas.
Surgical Options

- Open or laparoscopic resection

- Obese patients with severe colonic inflammation are poorer lap candidates

- Hand-assisted procedures associated with lower conversion rates and shorter OR times
Surgical Options

- Resection and immed anastomosis for Hinchey I and II
- Resection with diversion for Hinchey III and IV
- Three stage procedure
Additional Option

• Resection and immed anastomosis with proximal diversion for Hinchey III and IV

• Intraoperative decision individualized on the basis of the patient’s condition
Special Types
Cecal

- Rare – 15%
- Graded – I - IV
- Majority are pseudodiverticuli
- Younger with less generalized peritonitis
- Easily confused with appendicitis
- CT
Cecal

- Medical treatment if suspected
- Appears toxic or Dx unclear - explore
- Surgical options
- Based on intraoperative findings
Young Patients

- < 40 years old
- 2 to 5%
- Fewer co-morbidities
- More advanced disease
- Less repeat attacks
Immunocompromised

- No increased incidence
- Higher rate of operative interventions
- Elective surgical resection following symptomatic episode
Giant Diverticula

- Giant gas cyst or pneumocyst
- Can reach diameters of 40 cm
- Treatment = resection of colon and cyst
Recurrent Diverticulitis

• Rare after resection – 1 to 10%
• 3% will require repeat resection
• Level of the anastomosis = only significant determinant of recurrence
• Risk is 4x greater in pts with colosigmoid vs colorectal anastomosis
Hemorrhage

• Most often massive, associated with hematochezia and varying degrees of hemorrhagic shock

• Classically, patients present with a sudden occurrence of mild lower abdominal discomfort, rectal urgency, and the subsequent passage of a large maroon or melanic stool
Hemorrhage

• Because the colon can contain large volumes of blood, neither the volume nor the frequency of bloody stools is a reliable guide to the rate of hemorrhage.

• Despite the massive nature of hemorrhage, most patients with diverticular disease stop bleeding spontaneously.
Pathophysiology

- Arises from a perforated vasa recta located at the neck or apex of a diverticulum.
- The vasa recta penetrates the colonic wall from the serosa to the submucosa through obliquely oriented connective tissue septa.
- Protrusion of colonic mucosa through this connective tissue plane causes apposition of the diverticulum and the vasa recta.
Ulceration of the mucosa within the neck of the diverticulum and disruption of the arterial wall produces hemorrhage into the lumen of the bowel.

Although diverticular disease is more prevalent in the left colon, right-sided lesions account for half or more episodes of bleeding.
Diagnosis

- The massive nature of the bleeding caused by colonic diverticula limits the diagnostic usefulness of colonoscopy.
- Rarely is a bleeding vessel seen within a diverticulum.
- Presence of blood or clot within a diverticulum is of no diagnostic benefit.
Options

• Given the relatively low risk of recurrent hemorrhage, patients who stop bleeding should be treated expectantly.

• About 10% of patients bleeding from colonic diverticula continue to bleed and ultimately require operative intervention.
Embolization has been reported to be safe and effective in the majority of patients.

- Associated risk of ischemic complications
Operative Procedures
Preoperative Evaluation

- **Emergency**
  - Pneumoperitoneum
  - Massive LGIB
  - Obstruction

- **Elective**
  - Detailed evaluation
  - Not necessary to demonstrate fistula with strong history
Operative Planning

• One-stage
  - Elective
  - Resect to normal colon when possible

• Two-stage
  - Emergency
  - Hartmann procedure
  - Resection with anastomosis + proximal diversion
Technical Points

- Consider ureteral stents
- Fully mobilize left colon including splenic flexure
- Colon and rectum should be divided through non-inflammed tissue
- Use stay sutures on rectal stump prior to division if re-anastomosis planned
- Mark rectal stump with non-absorbable suture
Complications
Anastomotic Leakage

- Most serious and potentially life-threatening
- Multifactorial
- Risk is 4x higher for emergent resections
- Must resect to non-inflamed tissue
- Preserve superior rectal vessels
Recurrent Disease

- Unusual for recurrent fistula to develop
- More likely = secondary to anastomotic leak with drainage through the point of least resistance
- Resection of all diverticuli – not necessary
- Remaining diverticulosis influences recurrence
- r/o misdiagnosis
Ureteral Injury

- Occur in 1% of pts undergoing resection
- Easier to identify ureter proximally
- Should be repaired at the time of injury
Anastomotic Stricture

• Incomplete evacuation, tenesmus, bloating

• Confirmed with gastrograaffin enema or flexible endoscopy

• Treatment ranges from dilatation or division with electrocautery to resection of the stricture with new anastomosis