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# Diverticular Disease of the Colon

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# Nomenclature

- Diverticulum = sac-like protrusion of the colonic wall
  - Diverticulosis = describes the presence of diverticuli
  - Diverticulitis = inflammation of diverticuli
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# Epidemiology

- Increases with age

- Age 40 <5%

- Age 60 30%

- Age 85 65%

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# Epidemiology

- Gender prevalence depends on age
  - $M \gg F$       Age less than 40
  - $M > F$       Age 40-50
  - $F > M$       Ages 50-70
  - $F \gg M$       Ages  $> 70$



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# Anatomic location of diverticuli varies with the geographic location

- “Westernized” nations (North America, Europe, Australia) have predominantly left sided diverticulosis
    - 95% diverticuli are in sigmoid colon
    - 35% can also have proximal diverticuli
    - 4% have only right sided diverticuli
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# Anatomic location of diverticuli varies with the geographic location

- Asia and Africa diverticulosis in general is rare and usually right sided
    - Prevalence < 0.2%
    - 70% diverticuli in right colon in Japan
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# What exactly is a diverticulum?

- True diverticulum contains all layers of the GI wall (mucosa to serosa)
  - Colonic pseudo-diverticulum more like a local hernia
    - Mucosa-submucosa herniates through the muscle layer (muscularis propria) and then is only covered by serosa
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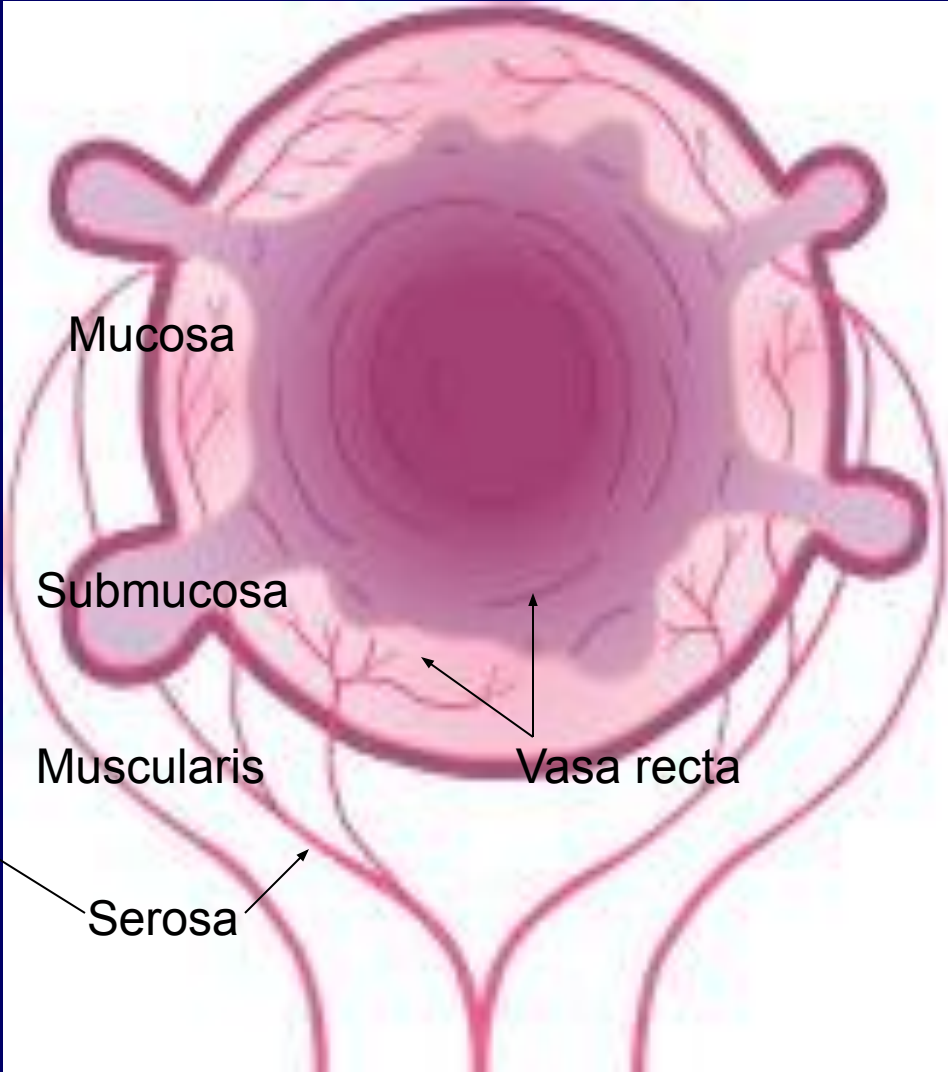
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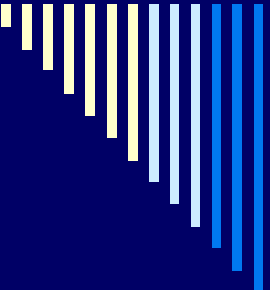


# Pathophysiology

- Diverticuli develop in 'weak' regions of the colon. Specifically, local hernias develop where the vasa recta penetrate the bowel wall
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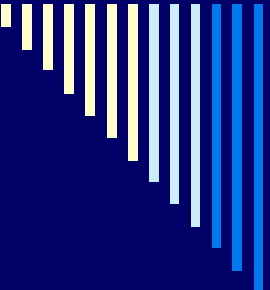


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# Lifestyle factors associated with diverticular disease

- Low fiber □ diverticular disease
    - Not absolutely proven in all studies but strongly suggested
    - Western diet is low in fiber with high prevalence of diverticulosis
    - In contrast, African diet is high in fiber with a low prevalence of diverticulosis
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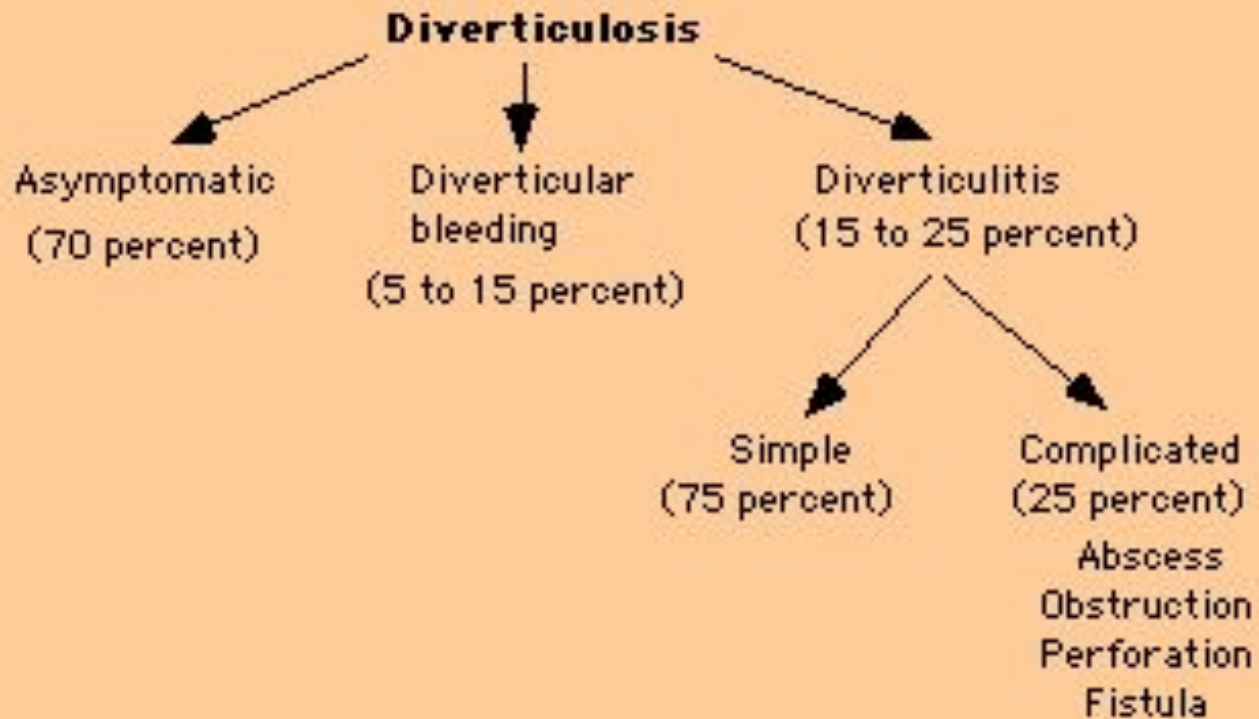
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# Lifestyle factors associated with diverticular disease

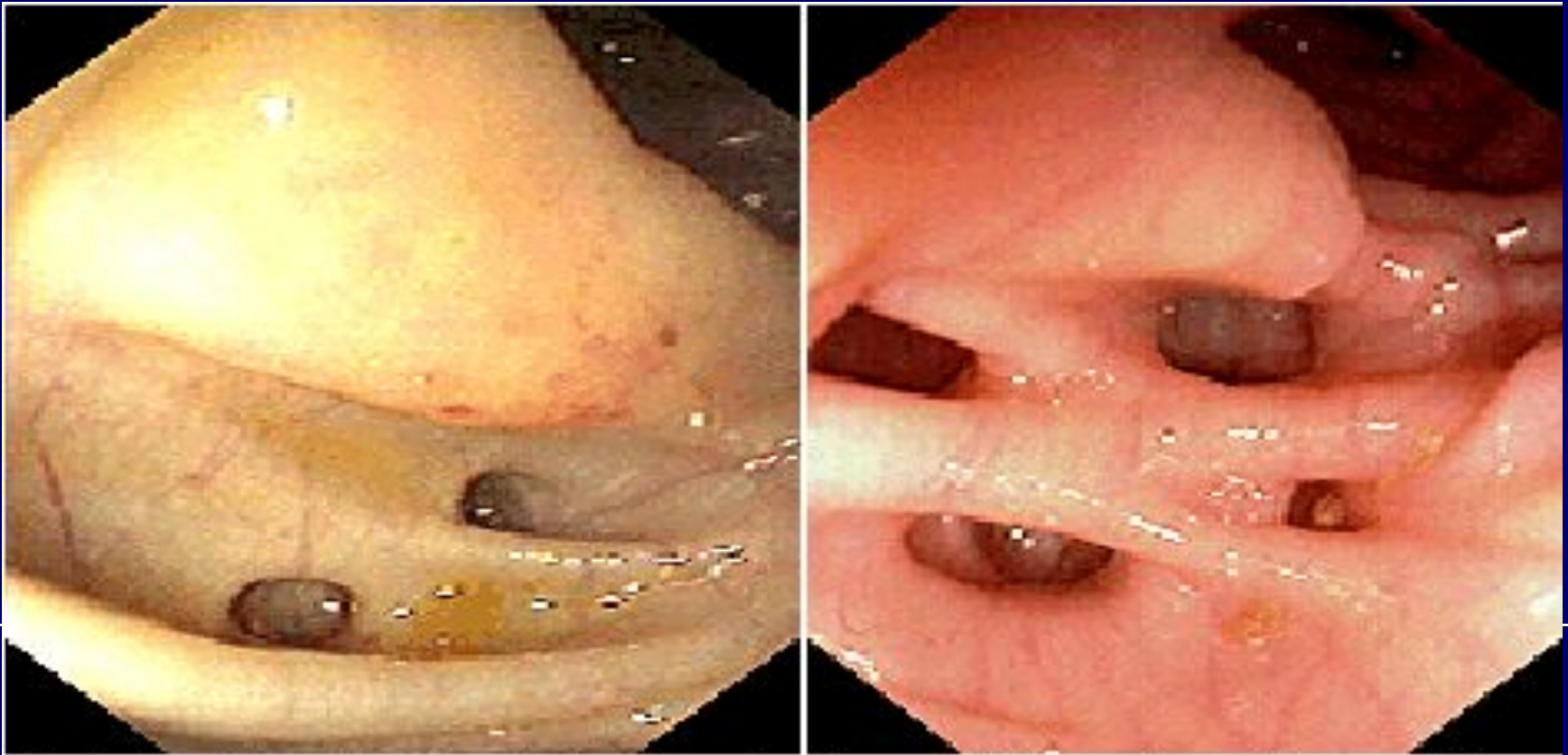
- Obesity associated with diverticulosis – particularly in men under the age of 40
  - Lack of physical activity
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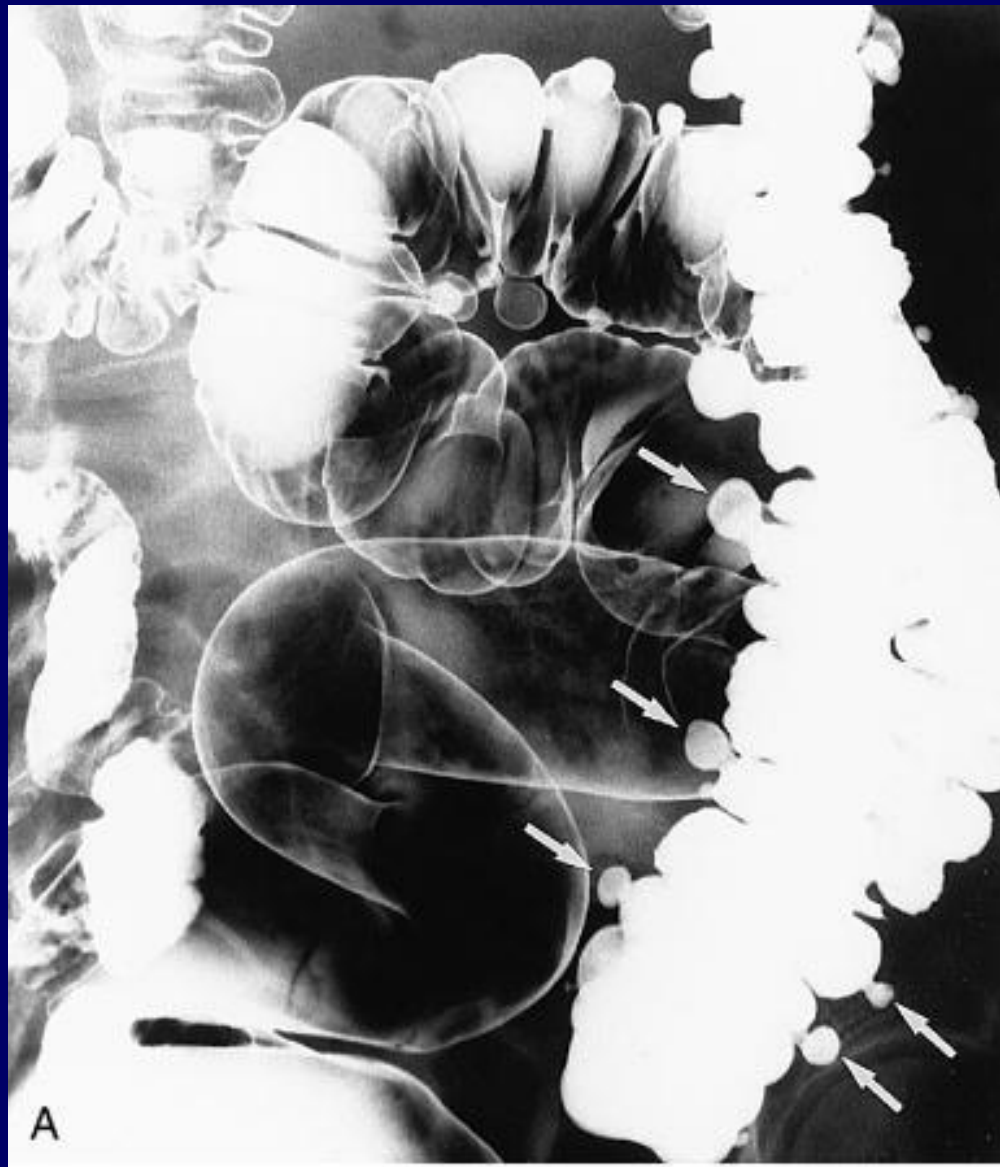
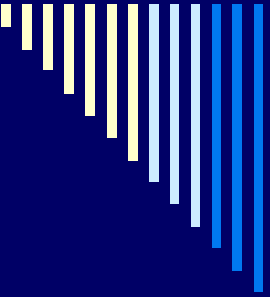
## Natural History of Diverticulosis



# Uncomplicated diverticulosis

- Usually an incidental finding at time of colonoscopy











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# Uncomplicated diverticulosis

- Considered 'asymptomatic'
  - However, a significant minority of patients will complain of cramping, bloating, irregular BMs, narrow caliber stools
    - IBS?
    - Recent studies demonstrate motility abnormalities in pts with 'symptomatic' uncomplicated diverticulosis
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# Uncomplicated diverticulosis

- Treatment: Fiber
  - Bulk content reduces colonic pressure preventing underlying pathophysiology that lead to diverticulosis
  - 20 to 30 g fiber per day is needed; difficult to get with diet alone





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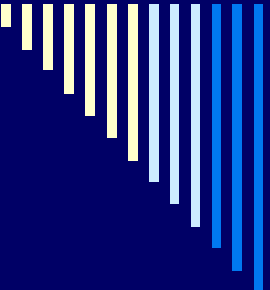
# Diverticulitis

- Diverticulitis = inflammation of diverticuli
  - Most common complication of diverticulosis
  - Occurs in 10-25% of patients with diverticulosis
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# Pathophysiology of Diverticulitis

- Micro or macroscopic perforation of the diverticulum □ subclinical inflammation to generalized peritonitis
- Previously thought to be due to fecaliths causing increased diverticular pressure; this is really rare





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# Pathophysiology of Diverticulitis

- Erosion of diverticular wall from increased intraluminal pressure □ inflammation □ focal necrosis □ perforation
  - Usually inflammation is mild and microperforation is walled off by pericolonic fat and mesentery
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# Diagnosis of Diverticulitis

- Classic history: increasing, constant, LLQ abdominal pain over several days prior to presentation with fever
    - Crescendo quality – each day is worse
    - Constant – not colicky
    - Fever occurs in 57-100% of cases
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# Diagnosis of Diverticulitis

- Previous of episodes of similar pain
  
  - Associated symptoms
    - Nausea/vomiting 20-62%
    - Constipation 50%
    - Diarrhea 25-35%
    - Urinary symptoms (dysuria, urgency, frequency) 10-15%
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# Diagnosis of Diverticulitis

Right sided diverticulitis tends to cause  
RLQ abdominal pain; can be difficult to  
distinguish from appendicitis

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# Diagnosis of Diverticulitis

- Physical examination
    - Low grade fever
    - LLQ abdominal tenderness
      - Usually moderate with no peritoneal signs
      - Painful pseudo-mass in 20% of cases
      - Rebound tenderness suggests free perforation and peritonitis
  
  - Labs : Mild leukocytosis
    - 45% of patients will have a normal WBC
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# Diagnosis of Diverticulitis

- Clinically, diagnosis can be made with typical history and examination
  - Radiographic confirmation is often performed
  - Abdominal CT is analysis of choice
  - Barium enema is contraindicated due to risk of perforation.
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# Treatment of Diverticulitis

- Complicated diverticulitis = Presence of macroperforation, obstruction, abscess, or fistula
  - Uncomplicated diverticulitis = Absence of the above complications
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# Uncomplicated diverticulitis

- Bowel rest or restriction
    - Clear liquids or NPO for 2-3 days
    - Then advance diet
  
  - Antibiotics
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# Uncomplicated diverticulitis

- Antibiotics
    - Coverage of fecal flora
      - Gram negative rods, anaerobes
    - Common regimens
      - Cipro + Flagyl x 10 days
      - Augmentin x 10 days
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# Uncomplicated diverticulitis

- Monitoring clinical course
    - Pain should gradually improve several days (decrescendo)
    - Normalization of temperature
    - Tolerance of po intake
  
  - If symptoms deteriorate or fail to improve with 3 days, then Surgery consult
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# Uncomplicated diverticulitis

- After resolution of attack □ high fiber diet with supplemental fiber
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# Uncomplicated diverticulitis

- Follow-up: Colonoscopy in 4-6 weeks
  - Purpose
    - Exclude neoplasm
    - Evaluate extent of the diverticulosis
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# Prognosis after resolution

- 30-40% of patients will remain asymptomatic
  - 30-40% of pts will have episodic abdominal cramps without frank diverticulitis
  - 20-30% of pts will have a second attack
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# Prognosis after resolution

- Second attack
    - Risk of recurrent attacks is high (>50%)
    - Some studies suggest a higher rate (60%) of complications (abscess, fistulas, etc) in a second attack and a higher mortality rate (2x compared to initial attack)
  
  - After a second attack □ elective surgery
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# Prognosis after resolution

- Some argue in the elderly recurrent attacks can be managed with medications
  - Some argue elective surgery should be considered after a first attack in
    - Young patients under 40-50 years of age
    - Immunosuppressed
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# Complicated Diverticulitis

- Peritonitis
    - Resuscitation
    - Antibiotics
      - Ampicillin + Gentamycin + Metronidazole
      - Imipenem/cilastin
    - Emergency exploration
    - Mortality 6% purulent peritonitis and 35% fecal peritonitis
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# Complicated Diverticulitis: Abscess

- Occurs in 16% of patients with acute diverticulitis
  - Percutaneous drainage followed by single stage surgery in 60-80% of patients
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# Complicated Diverticulitis: Abscess

- Small abscesses too small to drain percutaneously (< 1cm) can be treated with antibiotics alone
  - These pts behave like uncomplicated diverticulitis and may not require surgery
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# Complicated Diverticulitis: Fistulas

- Occurs in up to 80% of cases requiring surgery
  - Major types
    - Colovesical fistula           65%
    - Colovaginal                25%
    - Coloenteric, colouterine 10%
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# Complicated Diverticulitis: Fistulas - Symptoms

- Passage of gas and stool from the affected organ
  
  - Colovesical fistula:
    - pneumaturia, dysuria, fecaluria
  
    - 50% of patients can have diarrhea and passage of urine per rectum
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# Complicated Diverticulitis: Fistulas

## □ Diagnosis

- CT: thickened bladder with associated colonic diverticuli adjacent and air in the bladder
  - BE: direct visualization of fistula track only occurs in 20-26% of cases
  - Flexible sigmoidoscopy is low yield (0-3%)
  - Some argue cystoscopy helpful
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# Complicated Diverticulitis: Treatment of Fistulas

## □ Surgery

- Resection of affected colon (origin of the fistula)
  - Fistula tract can be “pinched off” most of the time
  - Suture closure for larger defects
  - Foley left in 7-10 days
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# Surgical Treatment of Diverticulitis

- Elective single stage resection is ideal, ~6 weeks after episode
  - Two stage procedure (Hartmann procedure)
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# Diverticular bleeding

- Most common cause of brisk hematochezia (30-50% of cases)
  - 15% of patients with diverticulosis will bleed
  - 75% of diverticular bleeding stops without need for intervention
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# Diverticular bleeding

Patients requiring less than 4 units of PRBC/ day □ 99% will stop bleeding

Risk of rebleeding □ 14-38%

After second episode of bleeding, risk of rebleeding □ 21-50%

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# Diverticular bleeding: Localization

- Right colon is the source of diverticular bleeding in 50-90% of patients
  
  - Possible reasons
    - Right colon diverticuli have wider necks and domes exposing vasa recta over a great length of injury
    - Thinner wall of the right colon
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# Diverticular bleeding: Localization

## Colonoscopy after rapid prep

- Can localize site of bleeding
  - Offers possible therapeutic intervention (cautery, clip, etc)
  - Often limited by either brisk bleeding obscuring lumen OR no active bleeding with clots in every diverticuli
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# Diverticular bleeding: Localization

- Tagged red blood cell scan
    - Can localize bleeding source
      - 97% sensitivity
      - 83% specificity
      - 94% PPV
    - Can detect bleeding as slow as 0.1 mL/min
    - Often not particularly helpful
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# Diverticular bleeding: Localization

- Angiography
    - Accurate localization
      - 30-47% sensitive
      - 100% specific
    - Need brisk active bleeding: 0.5-1 mL/min
    - Offers therapy: embolization, vasopressin
      - 20% risk of intestinal infarction
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