Diverticulitis Update

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Dr. Bailey loves any and all procedures. In his current position, his focus is teaching full-spectrum medicine and helping family physicians gain all the tools they need to provide exceptional care for their patients. He loves exploring and understanding evidence-based mainstream and alternative treatments that benefit patients, and he has refined a hands-on system for treating musculoskeletal disorders to dramatically diminish opioid dependence in his practice. In addition, he trains family physicians in endoscopy, skin surgeries, hospitalist procedures, and point-of-care ultrasound. In national and local settings, he lectures on primary care endoscopy, musculoskeletal medicine, procedural medicine, and the health benefits of relationships. The author of multiple textbook chapters, journal articles, and Family Physicians Inquiries Network (FPIN) Clinical Inquiries, he currently acts as a local editor for FPIN. Dr. Bailey earned his medical degree from the Medical College of Wisconsin. He completed residency at Eglin Air Force Base Family Medicine Residency, Fort Walton Beach, Florida, and a faculty development fellowship at the University of North Carolina at Chapel Hill. While active-duty Air Force, he taught full-spectrum family medicine and was deployed to Iraq during the Gulf War and to Haiti after the 2010 earthquake.
Learning Objectives

1. Provide patients with the appropriate tools and resources to create a healthful high-fiber diet to prevent diverticular disease.

2. Determine the appropriate imaging study based on current recommendations, the patient’s symptoms, and suspected diagnosis.

3. Formulate a treatment plan based on the severity of the diverticulitis.

Audience Engagement System

Step 1

Step 2

Step 3
Question Based Diverticulitis?

- Does fiber work, help, cure or prevent new diverticulitis?
- Is history and physical exam enough for diagnosis?
- Does everyone need a CT to confirm?
- Who has to be admitted and who can be outpatient?
- Do I have to use antibiotics to treat, and if so, which are the best choice?
- Should patients get a colectomy after a severe case of diverticulitis?
- Does colonoscopy have any role in diverticulitis?
- Is there such a thing as chronic diverticulitis?

Definitions

- Diverticula - out pouching of colonic lumen
  - True Herniation - all layers (Mekels)
  - False herniation or pseudodiverticula - mucosa and submucosa through muscular layer at vascular perforation
- Diverticulosis - Presence of diverticula without inflammation
- Diverticulitis - localized inflammation of colonic diverticula
Prevalence

- US, Europe, Australia > Africa, Asia

- 180/100,000 Diverticulitis (130,000 hospitalized cases a yr in US)

- Diverticula - 10% <40 yr old, 50-70% >85 (Clin Colon Rectal Surg 2018 Jul 31(4):209)

- 1-4% of patients with diverticula will develop diverticulitis. 20% will have a reoccurrence in 10 years. (Ann Int Med 2018 May 1;168)

- Incidence is going up from 115/100,000 (1980-1989) up to 188/100,000 (2000-2007) (Am J GastroEnt 2015 Nov;110 (11):1589)

Risk Factors

- Increasing age
- Constipation ? (arguable)
- Low dietary fiber ? (arguable)
- Smoking (RR 1.89 95% CI1.14-3.1 for diverticula developing diverticular abscess)
- Red meat consumption (RR 1.55 95% CI 1.36-2)
- Obesity (BMI <22.5 vs >35 HR 1.42 95% CI 1.08-1.85)
- Weight Gain (maintain vs gain >20kg over 20 yrs HR 1.73 95% CI 1.27-2.36)
- Lack of exercise
- NSAID (Diverticulitis HR 1.72 95% CI 1.4-2.11, Diverticular Bleed 1.7 95% CI 1.21-2.6)
- ASA use (Diverticulitis HR 1.25 95% CI 1.05-1.47, Diverticular Bleed 1.7 95% CI 1.21-2.4)
Skip the Popcorn and Nuts?

- N= 47,288, prospective cohort - men w/o GI diverticula, cancer, or IBD. F/u every 2-4 years x 18 year. No pre-study colonoscopy

- 801 (1.7%) developed Diverticulitis, 383 (0.8%) had diverticular bleeding.

- Popcorn helped! (HR 0.72 95%CI 0.56-0.92)

- Nuts might help (HR 0.8 95% CI 0.63-1.01)

- No association between diverticular bleed and intake of nuts, corn, popcorn (Except to help, maybe) No significant association of seeded berries, (strawberries, blueberries) and diverticulitis and diverticular bleeding

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Diverticulosis: Cause

- Abnormal colonic motility
- Alterations in colonic wall resistance
- Increased intraluminal pressure
- Dietary deficiencies (fiber)
- Colonic defect

- Things that might affect development of diverticulitis
  - Obstruction of diverticula
  - Stasis
  - Alterations of local bacteria flora
  - Ischemia
Case #1

• 67 y/o female with known diverticulosis on colonoscopy 5 years ago. Presents with left lower quadrant ab pain 7/10, mildly distended abdomen but still passing gas, able to take po

• PE T-100.0 F, HR 95, RR 12 BP 145/63, Pox 99% RA

• LLQ tenderness, no rebound, no palpable mass, otherwise exam normal
Poll Question 1

Most likely diagnosis?
1. Acute diverticulitis
2. Complicated acute diverticulitis
3. Symptomatic Uncomplicated Diverticular Disease
4. Rectal abscess
5. Stercoral ulcer

Most Likely Diagnosis

• No fever, able to take po, vitals stable, known diverticulosis, isolated LLQ pain, so not complex
• nothing to suggest complicated
• SUDD more chronic in nature
• Stercoral ulcers caused by long term constipation in elderly, may be asymptomatic
History

• Do you have diverticulosis? (colonoscopy or CT Exam)

• Left sided tenderness (76-98% specific, 22%-65 sensitive (Asian descent with much higher right sided diverticulitis so symptoms may present on right side))

• Fever +/-, N/V, diarrhea, constipation, poor po intake, illness, dysuria, anorexia, abdominal distention, decreased bowel sounds, dysuria

Complicated Diverticulitis

• Tender or palpable rectal mass, rebound tenderness, rigidity, absence of bowel sounds


Physical Exam

• Vitals- Tachycardia? Hypotension?

• Mucous membranes dry? Moist?

• Tachycardia, tachypnea?

• Ab exam: **Isolated LLQ tenderness**, rebound tenderness, bowel sounds

• Rectal exam- tenderness, mass?, blood?
Differential Diagnosis

- **GI**: appendicitis, inflammatory bowel, colorectal cancer, colonic spasm, gastroenteritis, hernia, ischemic colitis, acute or chronic pancreatitis, peritonitis from other cause, small bowel obstruction, IBS

- **Gynecologic**: ectopic pregnancy, ovarian abscess, cyst, cancer, torsion, pelvic inflammatory disease

- **Urologic**: cystitis, nephrolithiasis, UTI
Poll Question 2

Next step workup?

1. It’s a clinical diagnosis, no further workup needed
2. CBC, UA, Plain Ab Xray
3. CT Abdomen Pelvis
4. Colonoscopy

So Are Your Symptoms Mild?

• Able to tolerate PO, no signs or Peritonitis, or other complications. You may be ok to clinically diagnose. Test that may be useful: CBC, UA, Ab X-rays Grade 1C

• If you have more severe symptoms, a CT is warranted.

• Colonoscopy- immediately increases risk of perforation. Potentially helpful 6 weeks later

Severe Symptoms

- Peritonitis
- Rebound tenderness, rigidity, lack of bowel sounds
- Tachycardia & Hypotension (sepsis), lactic acidosis
- Fever
- Illeus
- Worsening abdominal pain
- Rectal bleeding, rectal mass

What Labs are Helpful?

- CBC-infections, blood loss
- UA- rule out UTI as a cause
- CRP (>50 +LR 2.2, - LR 0.4)/ESR higher correlates with more severe diseases-inflammation
- Lactate
- CMP- electrolyte abnormalities, renal
- Fecal calprotectin?
Poll Question 3

Have you heard of Fecal Calprotectin?

• Yes
• No

Fecal Calprotectin

• Measures of calprotectin in stool
• Indicates a migration of neutrophils to intestinal mucosa as seen with intestinal inflammation
• So inflammatory bowel disease, colon cancer, infectious colitis, celiac, necrotizing enterocolitis and diverticulitis!
• Not IBS, not diverticulosis
• Chronic NSAID use can give false positives
The Imaging Exam

• X ray reasonable 1st step - free air, ileus, pneumoperitoneum, bowel obstruction, soft tissue density (abscess)


• CT - 94% Sensitivity (95%CI: 87%-97%)

• Ultrasound - 92% Sensitivity (95% CI: 80%-97%)

• What does ultrasound miss? = misses free air, abscess; obesity & bowel gas can obscure images
  • Good for use in pregnant women


| Table 3. Accuracy of Computed Tomography Findings for the Diagnosis of Acute Diverticulitis |
|-----------------------------------------------|-------------------|-------------------|----------------|----------------|
| Finding                               | Sensitivity (%) | Specificity (%) | LR +  | LR –  |
| Fascial thickening                    | 50               | 100              | 100   | 0.50 |
| Inflamed diverticulum                 | 43               | 100              | 86    | 0.57 |
| Free air                              | 30               | 100              | 60    | 0.70 |
| Arrowhead sign*                       | 16               | 100              | 32    | 0.84 |
| Free fluid                            | 45               | 97               | 15    | 0.57 |
| Bowel wall thickening                 | 96               | 91               | 11    | 0.04 |
| Fat stranding                         | 95               | 90               | 9.5   | 0.06 |
| Abscess                               | 8                | 99               | 8.0   | 0.93 |
| Plectomen                              | 4                | 100              | 8.0   | 0.96 |
| Intramural air                         | 4                | 99               | 4.0   | 0.97 |
| Intramural sinus tract                | 2                | 100              | 4.0   | 0.98 |
| Diverticulum                           | 91               | 67               | 2.8   | 0.13 |

LR+ = positive likelihood ratio; LR– = negative likelihood ratio.
*—Defined as focal colonic wall thickening with arrowhead-shaped lumen pointing to inflamed diverticula.
Information from reference 17.
Management: Medical Treatment

- Determine complicated vs uncomplicated
- Inpatient vs Outpatient treatment
- Mesalamine
- Antibiotics
- Probiotics
- Alternative tx
Case #2

- 65 y/o male with worsening, LLQ ab pain, rebound tenderness on exam, minimal bowel sounds, vomiting, unable to maintain po intake
- vitals T 102, HR 110, BP 150/90, RR 16, POx 98%
- WBC=18, CRP 25, lactate 3.4 improved to 1.2 with fluids
- CT- descending colon with thickened fascia and fat stranding, no free air

Poll Question 4

What’s your plan?

1. Outpatient- clear liquids, ciprofloxacin, metronidazole, f/u in 2 days
2. Inpatient- medical floor, NPO, fluids, observation
3. Inpatient- medical floor, NPO, fluids, piperacillin-tazobactam
4. Inpatient- medical floor, NPO, fluids, piperacillin-tazobactam, surgery consults for possible colectomy
5. Inpatient- ICU, NPO, fluids, pressure support, meropenem
General Principles of Treatment

• Diet- outpatient, clear liquids x 2-3 days, inpatient NPO

• Antibiotics

• Pain Management

Outpatient Antibiotics

• trimethoprim-sulfamethoxazole 160/800mg po bid + metronidazole 500mg po q6-8hr

• ciprofloxacin 750 mg po bid + metronidazole 500mg orally every 6-8 hrs

• levofloxacin 750 mg po qday + metronidazole 500 mg po q6-8 hr

• amoxicillin-clavulanate 875-125mg po q12hr

• moxifloxacin 400 mg po q12
Inpatient Abx

- piperacillin-tazobactam 3.375g IV q6hr or 4.5 q8hr
- ticarcillin-clavulanate 3.1g IV q6hr
- ertapenem 1g IV q24hr
- moxifloxacin 400mg IV q24hr

ICU/Severe Symptoms Abx

- imipenem-cilastatin 500 mg IV q 6hr
- meropenem 1 gr iv q24hrs
- doripenem 500 mg IV q8hr
How Good is Inpatient vs Outpatient Tx?

• RCT, N=131 acute uncomplicated diverticulitis confirmed by CT scan
  • OP amoxicillin-clavulanate 875/125q8 or ciprofloxacin 500q12+ metronidazole 500mg q8hr if penicillin allergy
  • Inpatient IV abx + fluids, x >36-48hrs and oral feeds tolerated
• OP readmitted OP 4.5% vs IP 6.2%
• No death or surgery in either group Ann Surg 2014 Jan 259(1):38 (Level 1)
• Failure of OP treatment in 6% pt (retrospective cohort n=693, tx failure return to ER or admission)

Does All Diverticulitis Need Abx?

• N=623 RCT, uncomplicated diverticulitis (no fever, no free air on CT) admitted. IV Abx vs IV saline x 5 days
• At 5 days no difference in abdominal pain, temperature, or abdominal tenderness
• At 1 year, no difference in mean hospital stay, perforation, abscess(3 abscess in no abx group vs 0 in abx p=0.8), recurrent diverticulitis, or hospital readmission
• AGA-selective and not routine abx use in uncomplicated diverticulitis (low quality evidence) ASCRC- usually recommends oral or IV abx
• Is diverticulitis just inflammatory vs infectious? Randomized clinical trial of antibiotics in acute uncomplicated diverticulitis Colorectal Dis 2011; 12(Suppl S3): 1
How Good Are Abx?

- SR of 2 RCT’s, 5 cohorts, 1 case control. (n=2469) acute uncomplicated diverticulitis
- 32% abx, 68% no abx
- Major complications 20.2% vs 17.7 essentially the same in each group
  - treatment failure 4.5% vs 2.1%
  - reoccurrence 13.3 vs 11.5
  - abscess 1% in both groups
  - perforation 1%
  - surgery 2%
  - emergent surgery 1% (Am J Surg 2108 Sep;216(3):604)

How Good are Abx?

- Antibiotics-Don’t reduce complications or reoccurrence in patients with uncomplicated left-sided diverticulitis. (Br J Surg 2012 Apr; 99(4):532)
- Antibiotics – may not decrease time to recovery in patients with acute uncomplicated left sided diverticulitis. BR J Sure 2017 Jan;104(1);52
Initial Abscess Management

- Percutaneous drainage of abscess recommended 1st line for stable patients with large diverticular abscess
- Not associated with increased risk of reoccurrence
- Avoids all the surgical risk (Am Fam Physician, 2013 May 1;87(9):612)

Who Needs Urgent Surgical Management?

- Acutely ill, septic, multi quadrant peritonitis- CT abd & consult surgery
- Consider in failed medical management, evidence of fistula, phlegmon, or fistula
- How good is your interventional radiology?
  - High risk patients - organ transplant, chronic steroid use, immunosuppression, chronic renal failure, collagen, vascular disease
Everyone is All Better, Now What?

• Fiber to prevent?
• Surgery to prevent?
• Persistent symptoms (SUDD)

Does High Fiber Help With Symptom Reduction?

• AGA recommends fiber for prevention but recommends consideration of patient preference since there is no good studies to show benefit and can have side effects of bloating
• Review of 3 RCT’s 9 (n=124) and 1 case control (n=56).
  • May reduce pain
  • 2 prospective cohorts show reduced risk of diverticular disease
    • n=47,888, 387 incident cases, increase in total dietary showed decrease diverticular disease
    • n=47,033, 812 incident cases, decreased risk of disease in vegetarian diet (RR 0.69 95% CI 0.55-0.86 vegetarian diet, higher dietary fiber (RR 0.59, 95% CI 0.46-0.78)
Does High Fiber Prevent Diverticulosis?

- N=539 match to 1569 controls. Constipation and dietary habits collected before colonoscopy.
- Constipation was NOT associated with an increased risk of diverticulosis.
- Participants with less frequent bowel movements (<7/wk) had reduced odds of diverticulosis compared with those with regular bowel movements (7/wk) (odds ratio [OR], 0.56; 95% confidence interval [CI], 0.40–0.80).
- Those reporting hard stools also had reduced odds (OR, 0.75; 95% CI, 0.55–1.02).
- There was no association between diverticulosis and straining (OR, 0.85; 95% CI, 0.59–1.22) or incomplete bowel movement (OR, 0.85; 95% CI, 0.61–1.20).
- We found no association between dietary fiber intake and diverticulosis (OR, 0.96; 95% CI, 0.71–1.30) in comparing the highest quartile with the lowest (mean intake, 25 vs 8 g/day). Clin Gastroenterol Hepatol. 2013 Dec; 11(12): 10.1016/j.cgh.2013.04.048.

Case #3: Who Needs Surgical Management?

62 y/o male admitted with diverticulitis confirmed on CT. Initial fevers, WBC 25, never septic, abscess in pelvis drained by IR. Abx piperacillin-tazobactam 3.375g IV q6hr x 5 days, symptoms resolved.
Poll Question 5

Should this patient get surgery for prevention of possible reoccurrence?

- Yes
- No

Should We Cut to Prevent?

- After 1 uncomplicated episode, risk of 2nd episode being complicated = 5% over 8 years
- Baseline risk 13-19%, risk of recurrence over 9-16 years
- Of those 13-19%, only 4.7% had >1 episode
- Urgent surgery estimated in 1 in 2000 pt/ys

The Agnew Clinic, Thomas Eakins
Surgical Management

- Elective sigmoid colectomy should be considered on a case by case basis (ASCRS grade 1B)
- Elective sigmoid colectomy after recovery from uncomplicated acute diverticulitis is discouraged but decisions should be individualized (AGA)
- Pt's with >2 episodes don’t have increased mortality
- Factors to consider - severity of attacks, smoldering disease, potential for poor outcomes, medical needs of patient
- Elective resection may reduce risk of recurrence (level 2) n=107 RCT 26 elective resection, 81 non operative, 36 month followup
- Recurrent diverticulitis at 24 months 8% in operative group vs 32% in non operative (p=0.019, NNT 5) Br J Surg 2018 Jul; 105(8):971

I Still Hurt! Is It SUDD?

- Symptomatic Uncomplicated Diverticular Disease (SUDD)- known diverticulosis, >24 hour pain, bloating, usually in iliac fossa, not relieved with bowel movement
- IBS - generalized pain vs SUDD - left iliac fossa
- IBS - diarrhea/constipation vs SUDD - diarrhea
- IBS - pain relieved defecation or flatulence vs SUDD - pain not relieved
- Fecal calprotectin - ?
Fecal Calprotectin (FC)

- **Case control study, N=48**, Endoscopically diagnosed diverticular disease; 16 asymptomatic, 16 with SUDD, 16 acute uncomplicated diverticulitis, vs 16 IBS patient without diverticulosis and 16 healthy controls
  - <15 = neg; 16-60 = inflammation; >60 high grade inflammation
  - no significant difference in FC concentrations among IBS group (100% < 15), asymptomatic diverticulosis group (95% <15), and healthy controls (100% <15)
  - in SUDD group, FC concentrations were 15-60 mcg/g in 90%, (< 15 mcg/g in 5%, and > 60 in 5%)
  - elevated fecal calprotectin concentration appears to distinguish symptomatic diverticular disease (DD) from both asymptomatic diverticulosis and irritable bowel syndrome.
  - after 8 weeks of treatment (mesalazine/rifaximin for 10 days followed by mesalazine alone for 8 weeks), FC concentrations decreased to normal values in both SUDD (p < 0.005 compared to baseline) and acute uncomplicated diverticulitis (p < 0.0005 compared to baseline) [Int J Colorectal Dis 2009 Jan;24(1):49]

Fecal Calprotectin (FC)

- **Cohort study, n=42 with Symptomatic Diverticular disease (SUDD) vs N=30 diverticula + abdominal pain (D+AB) suggestive of IBS based on ROME III**
  - Diverticula endoscopically conformed in all patients
  - Positive Fecal Calprotectin 64.3% SUDD vs 0% D+AB
  - Higher Fecal Calprotectin correlated with increased pain in Diverticulitis, and larger segment involvement. - [J Clin Gastroenterol 2015 Mar;49(3):218]
  - **Can Mesalamine treat Diverticulitis**
  - after 8 weeks of treatment (mesalazine/rifaximin for 10 days followed by mesalazine alone for 8 weeks), FC concentrations decreased to normal values in both SUDD (p < 0.005 compared to baseline) and acute uncomplicated diverticulitis (p < 0.0005 compared to baseline) [Int J Colorectal Dis 2009 Jan;24(1):49]
**SUDD:Tx**

- Fiber supplementation is inconsistent in benefit
- Probiotic- some studies show benefit, however systematic review unable to be done due to poor heterogeneity of strain choices. (J gastrointestinal Liver Dis. 2016 Mar, 25 (1):79-86)
- Rifaximin- Beneficial 64% vs 34% placebo showed improvement at a 1 year (29% pooled rate difference 95% CI 24.5-33.6) NNT=3 aliment Pharmacol There 2013 Apr;37(7):680
  - Dosing 400 mg po bid x 7-10days a month x 3 months
- Mesalamine- not helpful in diverticular flairs but was more helpful than Rifaximin in SUDD
  - RCT n=268, Mesalamine greater reduction in Global symptom score vs rifaximin Dig Dis Sci 2007 Nov;52(11):2934

**Should an Acute Attack Be Followed by a Colonoscopy?**

- Probably if > 1 year after last scope
- Wait 6 weeks (increased risk of perforation immediately)
  - Increased risk of colon cancer (OR 25 95% CI 17-38) diagnosed within 6 months of a bout of diverticulitis. Diverticular Disease and the risk of colon cancer- a population-based case control study. Aliment Pharmacol There 2011.;34:675-681.
Practice Recommendation: Prevention

• Nuts, seeds and popcorn do not cause diverticulitis and may help prevent it

• Fiber is of unsure benefit at preventing diverticular formation

Practice Recommendation: Diagnosis

• Don’t assume diverticulitis unless you know they have diverticula

• Isolated LLQ pain with a history of diverticula a good start to a diagnosis

• Suggested workup includes WBC, UA, CXR

• CT best study to assess severity but MRI and ultrasound can be used in the right settings
Practice Recommendation: Treatment

• Outpatient antibiotics in mild diverticulitis

• Moderate to severe cases admitted to the hospital

• IR drainage of abscess 1st choice before surgery

• Surgery reserved for severe life-threatening cases, failed antibiotics and/or IR drainage

Practice Recommendation: Follow-up

• Colectomy eval on a person to person basis, surgery for prevention no longer standard recommendation

• 5% chance of a second flare

• 6 weeks after attack consider a colonoscopy in those who haven’t been screened in the last year. Much higher risk of finding colon cancer.
Practice Recommendation: The Times Are a-Changing!

- Antibiotics may not improve outcomes in mild to moderate cases
- Fiber may not help prevent new cases
- SUDD- Symptomatic Uncomplicated Diverticular Disease
- Fecal calprotectin- newer test that can help differentiate between inflammatory and non inflammatory conditions

Question Based Diverticulitis?

- Does fiber work, help, cure or prevent new diverticulitis? Unproven
- Is history and physical exam enough for diagnosis? Maybe
- Does everyone need a CT to confirm? No
- Who has to be admitted and who can be outpatient? Mild vs Severe
- Do I have to use antibiotics to treat, and if so, which are the best choice? For right now lean yes, but this may change.
- Should patients get a colectomy after a severe case of diverticulitis? No
- Does colonoscopy have any role in diverticulitis? Yes
- Is there such a thing as chronic diverticulitis? Yes, SUDD
Other References

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Questions