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Diverticulitis: How Many Attacks are Too Many?

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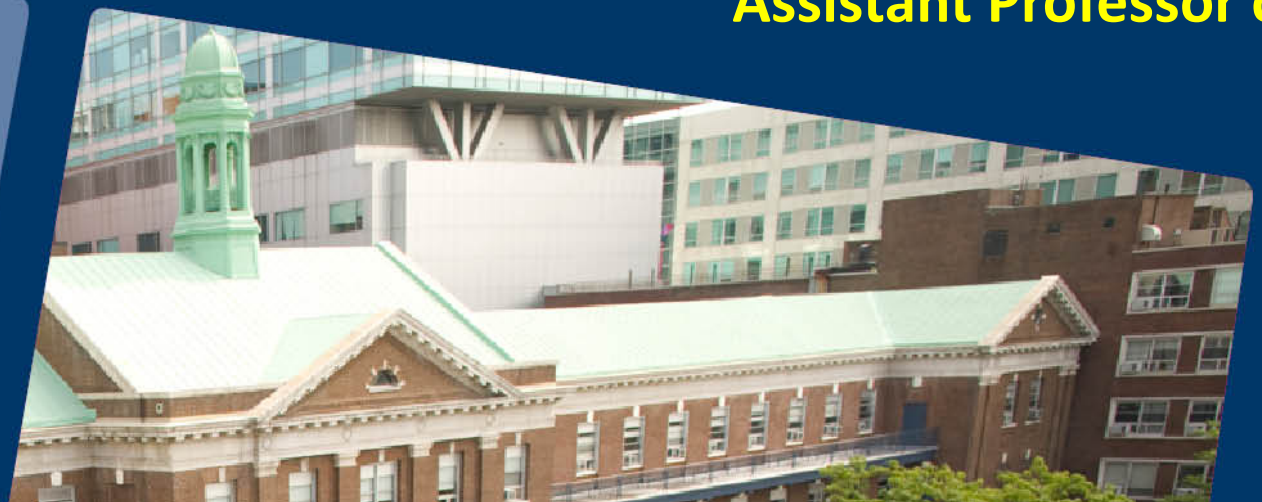

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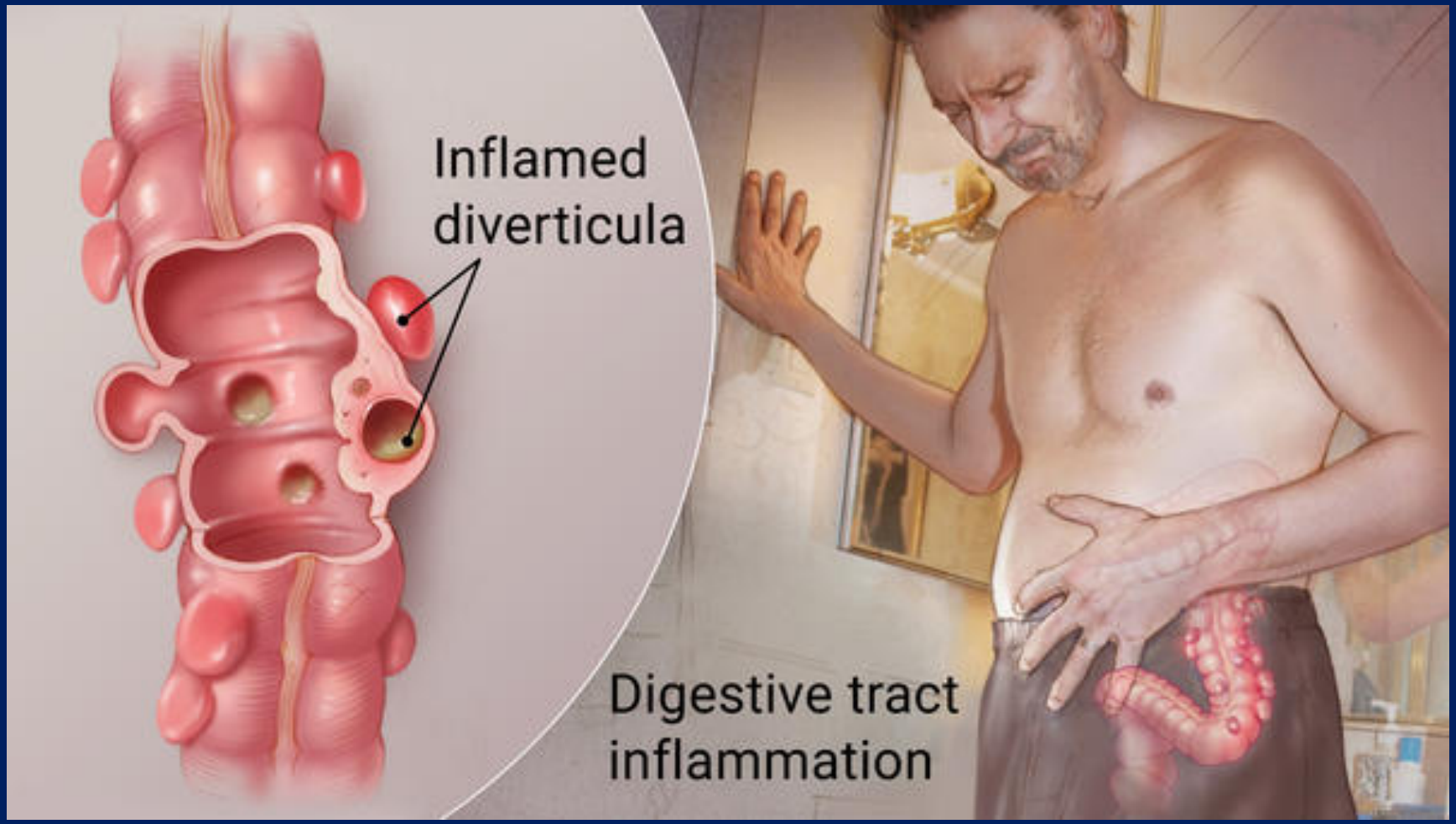
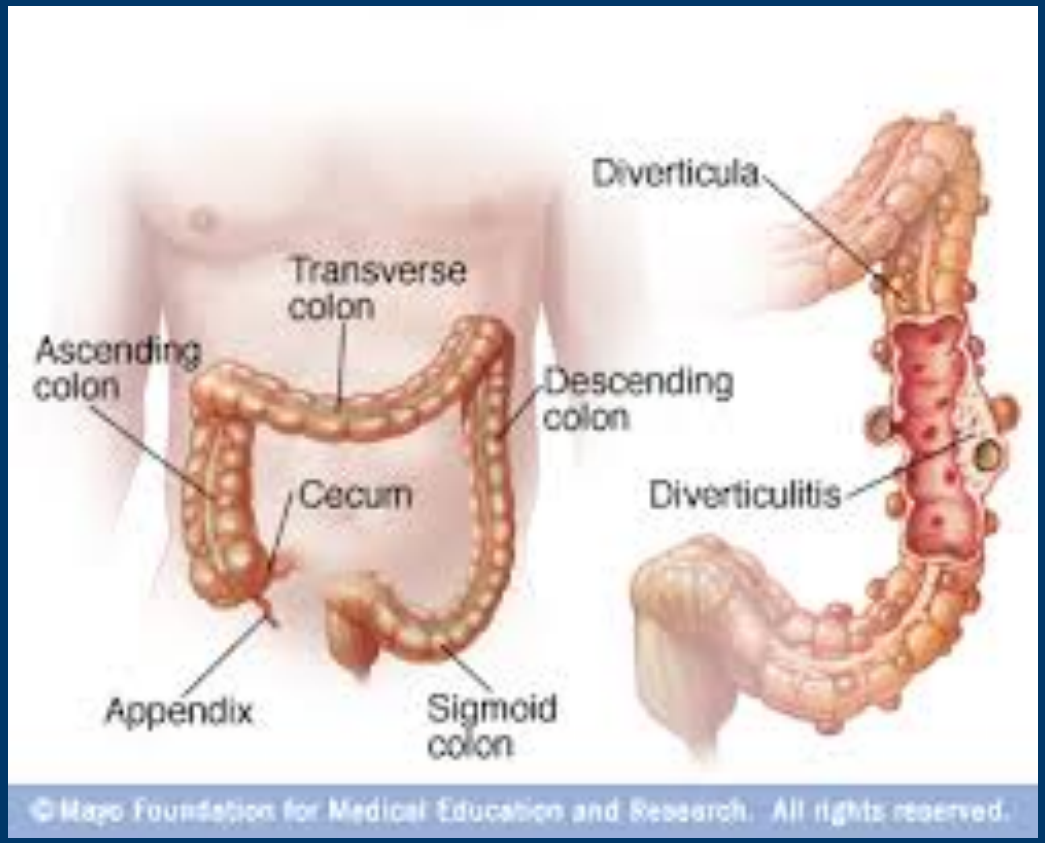
BASICS


Inflamed
diverticula
Digestive tract
inflammation

Pathophysiology Diverticular Disease



- Increased intraluminal pressure
- Sigmoid colon most commonly involved (95%)
  - Smallest diameter
  - Laplace's law: generates highest pressure
- Incidence of diverticular disease increases with age:
  - 30% at age 60
  - 60-80% at age 80

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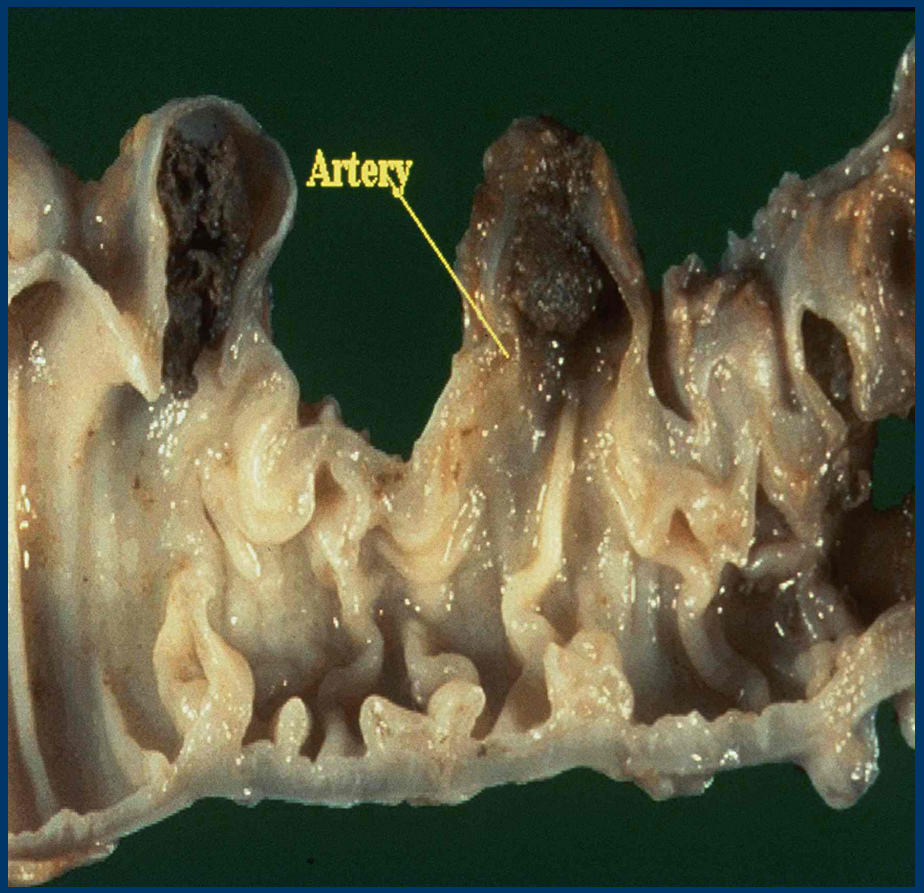
Risk Factors

- Low fiber Diet
- Smoking
- Constipation
- Obesity
- NSAIDS

Complications

- Obstruction
- Bleeding
- Fistula
- Sepsis, Perforation
- May co-exist with IBD



Specimen showing blood in diverticulae

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Clinical Classification

- Uncomplicated vs. Complicated
- Uncomplicated
  - Pericolic soft-tissue stranding, colonic wall thickening, phlegmon
- Complicated: Acute diverticulitis +
  - Abscess
  - Obstruction
  - Perforation
  - Fistula

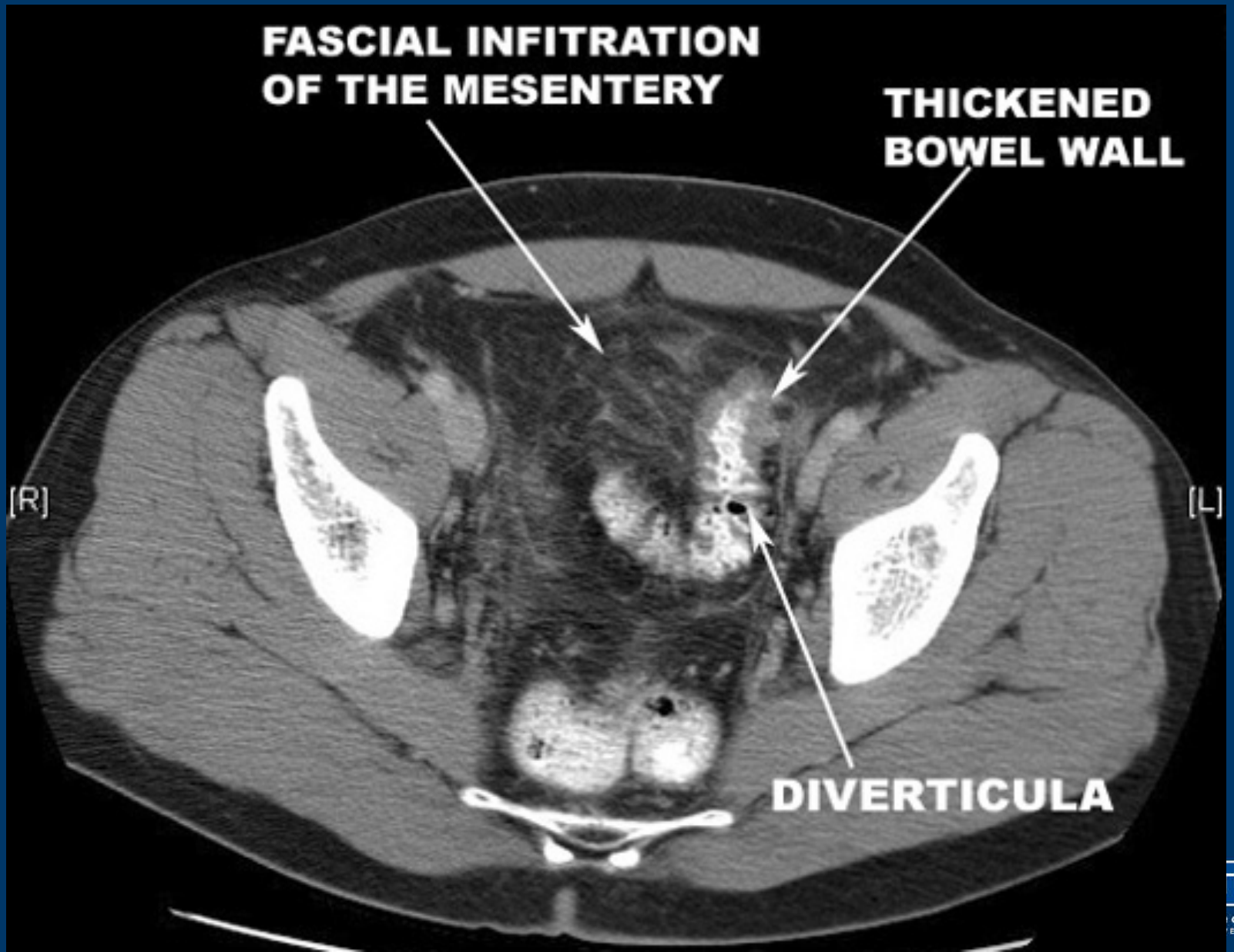
Significance of Diverticulitis

- Significant problem in Western Countries
- One of the most common causes of acute surgical admission
- 152,000 yearly hospitalizations
- Annual costs of diverticular disease estimated at $2.7 billion per year

Sandler RS et al. The burden of selected digestive diseases in the United States. Gastroenterology. 2002;122:1500-1511.

- **Nationwide Inpatient Sample during the period 1991-2005:**
  - **Ratio of hospital discharges for diverticulitis increased from 5.1 to 7.6 cases per 1000 inpatients.**
  - **Patients underwent surgery for uncomplicated diverticulitis declined from 17.9% to 13.7% ($P < 0.001$).**

- Imaging: CT Scan



Management: Acute Uncomplicated Diverticulitis

- Conservative Management
  - Nonoperative: Bowel rest, Antibiotics
    - PO or IV depending on severity: Anaerobic/GN coverage
  - Outpatient or Inpatient

- Successful in > 70% pts

Rafferty J, et al. Standards Committee of American Society of Colon and Rectal Surgeons. Practice Parameters for Sigmoid Diverticulitis. Dis Colon Rectum. 2006 Jul;49(7):939-44.

ANTIBIOITICS AND FAILURES REQUIRING EMERGENCY SURGERY

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Long-term outcome in 445 Patients after Diagnosis of Diverticular Disease.

- Retrospective cohort study, Danish Patient Register and National Register
- M/F = 30/70, median age 75 years

Moreno AM et al. Colorectal Dis 2007

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Long-term outcome in 445 Patients after Diagnosis of Diverticular Disease.

- 73% received conservative treatment primarily
- 35.3% had suffered clinical recurrence of DD, of these 15.9% were subsequently operated.
- 3.6% of the patients died of causes related to diverticulitis.
  - Possible high-risk groups for recurrence were males and their age above 70 years.

Moreno AM et al. Colorectal Dis 2007

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- DIVER Trial: Multicenter RCT
- 132 Patients, 5 Hospitals in Spain
- Outpatient vs. Hospital Treatment of Uncomplicated Diverticulitis (CT Confirmed) + Abx
- Same rate of treatment failure
- Overall health care cost per episode was 3 times lower in outpatient group
- No difference in QOL
- Important costs saving without negative influence on QOL

Blondo S, Ann Surg 2014

Risk of Emergency Colectomy and Colostomy in Patients with Diverticular Disease.

- Retrospective cohort study
- 25,058 patients
- Only 5.5% of patients had recurrent hospitalizations during which an emergency colectomy/colostomy was performed

Anaya, D et al. Ann Surg 2005

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SO HOW MANY ATTACKS IS TOO MANY?

Elective Surgery for the Treatment of Acute Uncomplicated Diverticulitis

- **In 1999 Practice Parameters of the ASCRS and EAES recommended elective surgery**
  - **After 2 episodes of uncomplicated acute diverticulitis**
  - **After 1 episode in young patients**

ASCRS = American Society of Colon and rectal Surgeons
EAES = European Association for Endoscopic Surgery

Stollman NH. *Am J Gastroenterol.* 1999;94(11):3110-3121; Kohler L. *Surg Endosc.* 1999;13: 430-436; Rafferty J. *Dis Colon Rectum.* 2006; 49: 939–944

Elective Surgery for the Treatment of Acute Uncomplicated Diverticulitis

- **In 2006 the ASCRS recommended that elective surgery should be made on an individual basis after a favorable response to conservative treatment**

ASCRS = American Society of Colon and rectal Surgeons
EAES = European Association for Endoscopic Surgery

Stollman NH. *Am J Gastroenterol.* 1999;94(11):3110-3121; Kohler L. *Surg Endosc.* 1999;13: 430-436; Rafferty J. *Dis Colon Rectum.* 2006; 49: 939–944

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- **Clinical Practice Guideline Task Force of ASCRS (2014):**

“The decision to recommend elective sigmoid colectomy after recovery from uncomplicated acute diverticulitis should be individualized. “

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- **Uncomplicated diverticulitis treated nonoperatively**
  - report lower recurrence rates ranging from 13% to 23%
  - low rates of subsequent complicated disease
  - need for emergency operation (<6%)

Hall JF, Dis Colon Rectum 2011
Eglinton, Br J Surg 2005
Broderick – Villa G, Arch Surg 2005
Anaya DA, Arch Surg 2005

- **After recovering from an initial episode of diverticulitis, the estimated risk of needing emergency surgery with stoma formation:**
  - 1 in 2000 patient-years of follow-up.
  - Which means - 18 pts would undergo elective colectomy to prevent 1 emergency surgery for recurrent diverticulitis.

- **The practice of recommending elective colectomy to prevent a future recurrence requiring stoma formation is not supported should be discouraged**

Janes S, Br J Surg 2005
Anaya DA, Arch Surg 2005

2 or more attacks?

- Patients with more than 2 episodes are not at an increased risk for morbidity and mortality in comparison with patients who have had fewer episodes

- **The impact of decline in elective surgery for diverticular disease demonstrated**
  - **Increase in abscess formation**
  - **No rise in the rate of emergency colectomy**

Chapman JR, Ann Surg 2006
Ricciardi R Dis Colon Rectum 2009

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Special Considerations

- **Transplant patients, patients maintained on chronic corticosteroid therapy, immunosuppressed patients, patients with chronic renal failure or collagen-vascular disease**
  - More likely to have failure of medical management
  - Greater risk of recurrence disease
  - High mortality rate with medical therapy alone

- **Surgeons should maintain a low threshold to recommend operative intervention as definitive treatment with the first hospitalization for acute diverticulitis in these patients**

Hwang SS, Dis Colon Rectum 2010
Klarenbeek BR, Ann Surg 2010

Complicated Diverticulitis

- Elective colectomy should typically be considered after the patient recovers from an episode of complicated diverticulitis

Complicated Diverticulitis

- Neither phlegmon nor extraluminal gas alone seen on imaging is considered complicated disease

- Mesocolic abscesses of ≥5 cm or pelvic abscesses with or without percutaneous drainage → elective colectomy should typically be advised
  - retrospective data (small numbers) have shows recurrence rates as high as 40%

Ambrosetti P, Dis Colon Rectum 2000
Kaiser AM, Ann J Gastroenterol 2005

Complicated Diverticulitis

- Diverticulitis is complicated by stricture or fistula formation → elective or semi-elective resection is generally necessary to provide symptomatic relief

Klarenbeek BR, Ann Surg 2010

Diverticulitis in Young Patients

- < Age 50

- No clear consensus

Nelson et al. Management of Diverticulitis in Younger Patients. Dis Colon Rectum 2006; 49:1341-45.

Guzzo J, Hyman N. Diverticulitis in young patients: is resection after a single attack always warranted? Dis Colon Rectum 2004;47:1187-91.

Diverticulitis in Young Patients

- Longer lifespan – higher cumulative risk for recurrent attacks
  - However, overall rate of recurrence remained relatively low →27%
  - After 1st attack in young patients → only 7.5% required subsequent emergency surgery
    - Anaya DA, Arch Surg 2005
  - Retrospective data collected on young patients with CT-confirmed initial episodes of diverticulitis demonstrated
    - Low 2.1% rate of emergency surgery at subsequent attacks
      - Nelson RS, Dis Colon Rectum 2006

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Treatment

FIBER

- **High fiber intake used to treat increased spasm and increased segmental contractions by British in 1970s**
- Dietary Allowances now recommend 22-28 g of dietary fiber as correct intake in women and 28 to 34 g in men –varies with size
- **But western dietary fiber study reveals intake varies between averages of 8-10 g in most**
- **In vegan diets as much as 40-50 g/day**

Burkitt DP, Phil. Dietary Guidelines2010.

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Overview of Probiotics for Diverticulitis (Cont'd)

Probiotic Study/Year	Stage	N Follow-Up	Outcome
L. casei, 5-ASA, or both 2006[1]	Symptomatic uncomplicated	90 12 months	Increased remission rate
L. casei + 5-ASA 2008[2]	Symptomatic uncomplicated	75 24 months	Increased remission rate
VSL#3 + balsalazide 2007[3]	Uncomplicated	30 12 months	Improved symptoms
L. acidophilus + *L. helveticus* + *Bifidobacterium* 2010[4]	Symptomatic uncomplicated	45 6 months	Prevented recurrence, improved symptoms

In summary …

5 different probiotic protocols tested in various stages of diverticulitis (no placebo-controlled studies)	With up to 40 months follow-up in 334 pts	Have produced suggestive but inconclusive results

Indication for Elective Surgery

- 291 patients 111 (38%) treated conservatively, 180 (62%) underwent surgery (108 acute and 72 elective)

- Conservatively group diverticulitis recurrence rate 48% (88 patients).

Klarenbeek BR, Ann Surg, 2010.

- Indications for elective surgery were:
  - recurrent attacks of diverticulitis with persistent complaints (36%)
  - complaints of stenosis (40%)
  - fistula (14%)
  - persistent abscesses (3%)
  - recurrent diverticular bleeding

- Using immunosuppression therapy, chronic renal failure, collagen-vascular diseases: have 5-fold greater risk (36% vs. 7%) of a perforation in recurrent episodes of diverticulitis.

Klarenbeek BR, Ann Surg, 2010.

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Elective Sigmoid Resection

- Open, Lap, Robotic

- Sigmoid Resection
  - Proximal Margin: compliant bowel
    - Include thickened, woody or grossly diseased bowel
    - Not all diverticula bearing colon must be removed
  - Distal: upper rectum

•Open vs. Laparoscopy

Author/year	n	Lap/Open	Op time (min)	Morbidity (%)	Hospital stay (days)
Bruce/96	25 17	Lap Open	397** 115	12 1	4.2 6.8
Liberman/96	14 14	Lap Open	192 183	14 14	6.3** 9.2
Coogan/97	59 52	Lap Open	190 108	-	3.8 9.3
Kholer/98	27 34	Lap Open	165* 121	16 61.7	7.9* 14.3
Dwivedi/02	66 88	Lap Open	212* 143	18 23.8	4.8* 8.8
Senagore/02	61 71	Lap Open	109 101	1.6* 12.6	3.1* 6.8
Lawrence/03	56 215	Lap Open	170** 140	9* 27	4.1** 9.0

•*p<0.05

•**p<0.001

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Laparoscopy: Diverticulitis

	Laparoscopy	Laparotomy	p
O.R charges ($)	10,589	8,207	0.05
Hospital cost ($)	11,500	13,400	0.29
Hospital charges ($)	29,981	36,745	0.11
Morbidity (%)	14	14	0.11
Mortality	0	0	

•Liberman, Surg Endosc 1996

Emergent Surgical Intervention

- According to current ASCRS guidelines
  - Sigmoid resection, end colostomy, closure of distal stump
  - Overall Morbidity up to 29%
  - Mortality 10-20%
  - Long LOS (20+ days)
  - Colostomy closure technically difficult
  - “Temporary” colostomies often never closed (30%-75%)

- This has been challenged by European Association for Endoscopic Surgery recommendations + several studies
- Alternative to HP include: PA +/-Diversion & Lap Lavage

Rafferty J, et al. Standards Committee of American Society of Colon and Rectal Surgeons. Practice Parameters for Sigmoid Diverticulitis. Dis Colon Rectum. 2006 Jul;49(7):939-44

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•Practice Parameters for Sigmoid Diverticulitis

•The Standards Committee of The American Society of •Colon and Rectal Surgeons

•The laparoscopic approach is appropriate in selected patients. Level of Evidence III, Grade of Recommendation A

•Laparoscopic colectomy may have advantages over open laparotomy, including less pain, smaller scar, and shorter recovery. There is no increase in early or late complications.

•Cost and outcome are comparable to open resection. Laparoscopic surgery is acceptable in the elderly and seems to be safe in selected patients with complicated disease

Rafferty et al, DCR 2006

Bottom Line!

- **Most perforations and complications do not occur after recurrences, happen at first attack**

- **Conservative management of recurrent nonperforated diverticulitis associated with low rates of Morbidity & Mortality with mild course**

Chapman J, et al. Complicated diverticulitis: is it time to rethink the rules? Ann Surg. 2005;242:576–581.

Chapman JR, et al. Diverticulitis: a progressive disease? Do multiple recurrences predict less favorable outcomes? Ann Surg. 2006;243:876–880

Take Home Message

- As few patients will actually require urgent surgery, should limit discussion regarding this uncommon complication

- Instead should focus on discussion of risks and benefits of surgery, QOL implications, and the higher likelihood of similar episodes as the reason to, or not to, consider surgery

- Potential poor functional outcomes and persistent abdominal symptoms after elective sigmoid colectomy for diverticulitis should be considered as well.

Thank You