Acute Diverticulitis

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Focus today: when to operate

- Recurrent, uncomplicated diverticulitis; after how many episodes?
- Younger pts ??, immunosuppressed pts
- Complicated diverticulitis
- What operation:
  - Hartman resection: open or laparoscopic
  - Resection and anastomosis: open or lap.
  - Laparoscopic lavage and drainage

Epidemiology

Diverticulosis of the Colon:

- 10% in people younger than 40 years
- 50-65% in people older than 80 years
- Asymptomatic : 80%
- Symptoms : 20%
  - **Diverticulitis 15%**
    - Uncomplicated (80%)
    - Complicated (20%)
      - **Perforation**
      - Fistula
      - Obstruction
  - Hemorrhage 5%

Stollman N, Raskin JB: Diverticular disease of the colon Lancet 2004; 363

Diverticulitis in the US: 1998-2005 Changing patterns and disease treatment

(Etzioini DA, et al. Ann Surg 249: 210, 2009)

- Incidence of diverticulitis requiring hospital admission increased 26% in the US
  - 82% increase for patients <45 yo
  - 36% increase for pts 45-74 yo
- Elective operations for diverticulitis increased by 29%
  - 73% increase for pts <45 yo

Uncomplicated Diverticulitis

- Defined as inflammatory process limited to sigmoid colon
- Management with wide spectrum antibiotics either orally or intravenously depending on patient comorbidities

Mueller et al *Eur J Gastroenterol* Hepatol 2005

Complicated Diverticulitis

- Spectrum of disease with myriad complications
  - Phlegmon
  - Fistula
  - Stricture
  - Abscess
  - Free perforation

Major complications of diverticulitis

- Of patients who present with major complications of diverticulitis,

  70-80% have no previous episodes of diverticulitis
- Average age on presentation, 62-67 yrs
- Morbidity up to 30%
- Mortality 10-23%

  Risk factors: ASA class, septic shock, fecal peritonitis, comorbid diseases, age

Hartman resection

- High morbidity and mortality
- Average age 62-65 yo
- Comorbid disease
- Morbidity of the takedown of the colostomy
- Resect only when is necessary to deal with the perforation
- One-third of pts never have the colostomy reversed

The facts

- The risk of recurrent diverticulitis after an uncomplicated episode is 2% per year
- Average age on presentation is 62-67 yo, thus ~ 18-25% lifetime risk of recurrence in the typical pt
  (Broderick-Villa, Arch Surg, 2005)
- The risk of free perforation decreases with each bout of diverticulitis
  (Holmer, Langenbecks Arch Surg, 2011;
  Guzzo, Dis Colon Rectum, 2004; Anaya, Arch Surg, 2005)

Important principle:
major change in approach

- So, when we operate for repeated bouts of uncomplicated diverticulitis we are generally operating to eliminate symptoms ----------
  NOT to prevent an episode of diverticulitis with perforation

Important principle

- You need to perform elective resections on 13 patients to prevent that one pt who is destined to perforate
- The morbidity and mortality of the 13 operations is too high to justify such an approach

When to operate after uncomplicated diverticulitis?

American Society of Colon and Rectal Surgeons (ASCRS)

- 2000: “following two episodes of acute diverticulitis, patients should be offered an elective sigmoid resection.”
- Patients younger than 50 yo should undergo elective resection after the first bout of diverticulitis

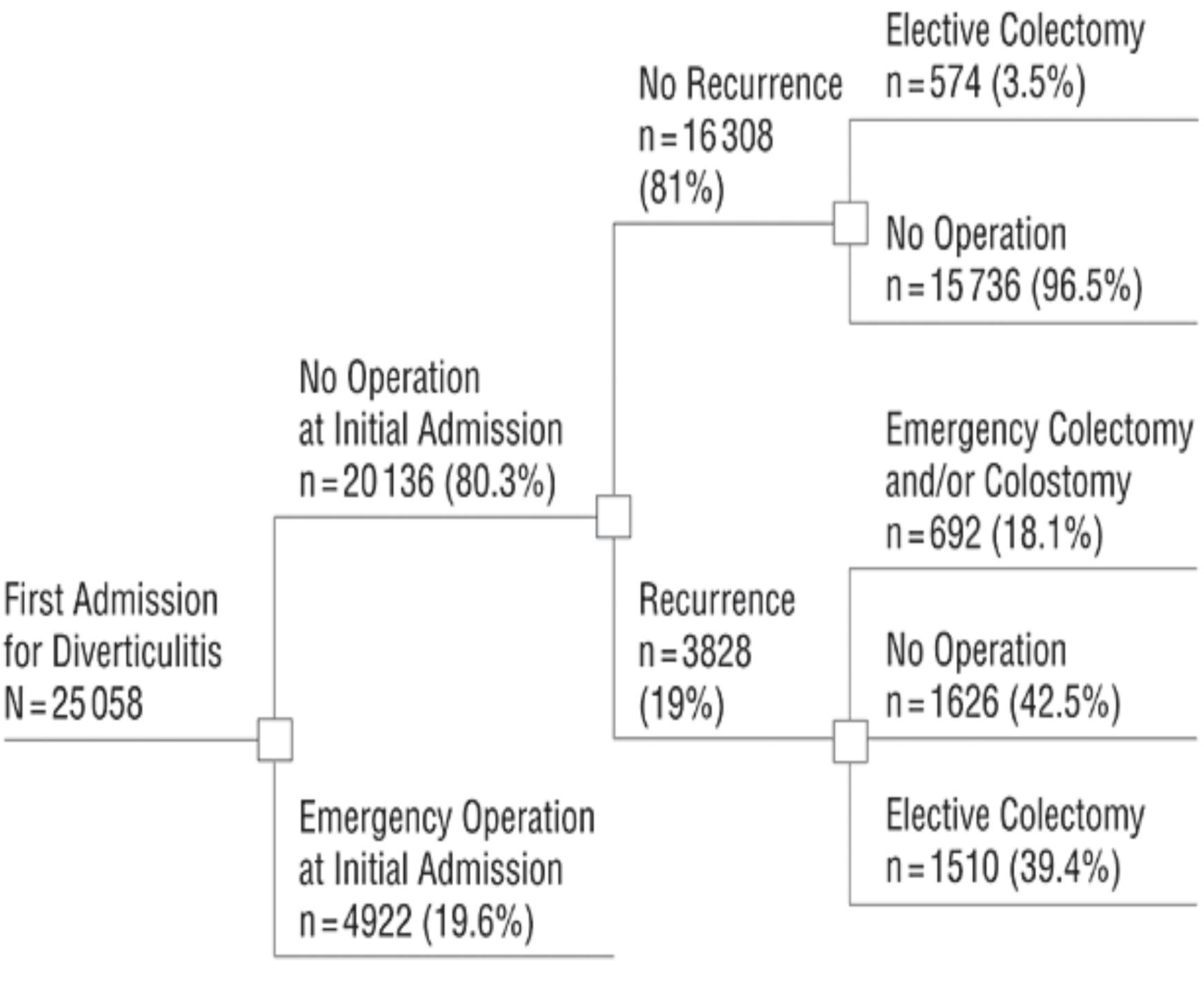
Natural history of diverticular disease of the colon (Parks TG. BMY 4: 639, 1969)

- Followed 455 pts over 1-16 yrs, 100% followup
- Mortality for 1st admission for diverticulitis was 4.7%
- Mortality increased to 7.8% during each subsequent admission
- 70% respond to medical therapy during first episode
- 6% respond to medical therapy during the 3rd admission

Risk of emergency colectomy and colostomy in patients with diverticular disease

(Anaya, Flum. Arch Surg, 2005)

- Statewide database, Washington state
- Patients admitted nonelectively for diverticulitis, 1987-2001
- Important because this is population-based study
- 25, 058 patients
- 60 % female, average age, 69 years


First Admission
for Diverticulitis
N = 25 058
No Operation
at Initial Admission
n = 20 136 (80.3%)
Emergency Operation
at Initial Admission
n = 4922 (19.6%)
No Recurrence
n = 16 308
(81%)
Recurrence
n = 3828
(19%)
Elective Colectomy
n = 574 (3.5%)
No Operation
n = 15 736 (96.5%)
Emergency Colectomy
and/or Colostomy
n = 692 (18.1%)
No Operation
n = 1626 (42.5%)
Elective Colectomy
n = 1510 (39.4%)

Washington state study

- Of the 20,136 pts initially treated without operation, 19% had recurrences. Only 5.5% of all pts had recurrent hospitalization where emergency colostomy/colon resection was performed
- Hazard ratio for emergency colostomy/ colectomy 2.2 times higher with each subsequent admission

Washington state study: younger pts??

- Recurrences more common in pts < 50 yo (27%) vs older pts (17%)*
- Emergency colostomy/colectomy with recurrence in 7.5% of younger (<50 yo) vs older (5.0%)*
- Adjusted hazard ratio for emergency colostomy/colectomy 39% higher (1.39) in younger than older pts

Timing of prophylactic surgery in prevention of **diverticulitis** recurrence: a cost-effectiveness analysis.

- Between 1991-2005, proportion of patients who underwent surgery for uncomplicated diverticulitis declined from 17.9% to 13.7%.
- However, free perforation from diverticular disease remained unchanged at 1.5%.
- Decrease in surgical intervention did not result in increase in free perforation
- Based on decision analysis models, preferred timing is after 3rd or 4th attack

[1]Richards RJ et al *Dig Dis Sci* 2002

Diverticulitis in Younger Patients

- Defined as 50 years or younger
  - Older studies report that younger patients more frequently require surgery or are more prone to recurrent disease
  - More virulent form of disease
- Prospective data examining 259 younger patients did not have significant differences in severity of disease[1]
- Literature review of 6560 younger pts [2]
- "At present, there is little evidence supporting operation after a single index episode of diverticulitis in younger patients." [2]

1 Vignati PV et al Dis Colon Rectum 1995
2 Janes S et al. Dis Colon Rectum 2009

Older patients with diverticulitis have low recurrence rates and rarely need surgery (Lidor, Surgery, 2011)

- Retrospective, longitudinal cohort study from the 5% Medicare Provider Analysis and Review
- 2003-2007
- 16,048 pts with dx of diverticulitis; followed for 19 months
- Included only pts ≥ 67 yo, no episodes of diverticulitis in previous 18 months

Older patients….

- Mean age, 78 yo
- 55% were hospitalized for diverticulitis
- 14% of the inpatients underwent operation for diverticulitis during index admission—55% had a stoma
- 83% had no recurrent bouts
- Recurrent bouts uncommon, operation rare

Immunosuppressed Patients

- Transplant recipients or immunocompromised patients are at increased risk of more aggressive and complicated diverticulitis[1]
- Recommendation: elective sigmoidectomy after first documented episode of uncomplicated diverticulitis
- *Carson et al* suggests prophylactic sigmoidectomy after one episode of uncomplicated diverticulitis for renal transplant candidates

J Heart Lung Transplant 2004

American Society of Colon and Rectal Surgeons

- 2006: “the decision to recommend elective sigmoid colectomy after recovery from acute diverticulitis should be made on a case by case basis as the number of attacks is not necessarily the overriding factor in defining the appropriateness of surgery.”
- Complicated diverticulitis should be followed by elective resection

Elective surgery for diverticulitis

- We have agreed on the indications
- What operation?
  - All colon involved with diverticuli?
  - Sigmoid colectomy?
    - How far proximal and how far distal?

Elective surgery for diverticulitis

- We have agreed on the indications
- What operation?
  - All colon involved with diverticuli? NO.
  - Sigmoid colectomy? Yes
    - How far proximal and how far distal?
    - Distal—must get to upper rectum
    - Proximal to soft, compliant bowel
    - Generally need to mobilize splenic flexure to accomplish above.
    - Avoid diverticuli within the anastomosis

Elective sigmoid colectomy

- Laparoscopic sigmoid colectomy is the operation of choice
- Morbidity
- Leak rate
- Mortality

The sigma trial: prospective, double-blind multicenter trial of laparoscopic vs open elective sigmoidectomy for diverticulitis

- Randomized prospective study
  - Multicenter, double-blinded accrued 104 patients in 5 centers from 2002-2006.
  - Double-blinding was achieved by covering abdomen with large dressings
- Including earlier benefits
  - Decrease in major complications (25% in open vs 10% laparoscopic) including intra-abdominal abscess, anastomotic leak, PE and MI[1]

[1]Klarenbeek BR *Ann Surg* 2009

Elective laparoscopic sigmoid resection for diverticular disease has fewer complications than conventional surgery: a meta-analysis

(Siddiqui. Am J Surg, 2010)

- 19 studies, 2383 pts were analyzed
- 1014 laparoscopic; 1369 open
- Wound infection odds ratio, lap vs open, .54
- Blood transfusion OR, lap vs open, .25
- Ileus OR, lap vs open, .37
- Incisional hernia OR, lap vs open, .27
- No difference in leak rates

Utilization of laparoscopic colectomy in the US before and after the Clinical Outcomes of Surgery Trial (Rea. Ann Surg, 2011)

- Nationwide inpatient sample
- Compared 2001-2003 to 2005-2007
- 741,817 elective colectomies
- 684,969 (92.3%)open and 56,848 (7.7%) laparoscopic
- Percentage of elective laparoscopic colectomies for benign disease increased from 6.2 to 11.8%
- Percentage of elective laparoscopic

colectomies for cancer increased from 4.4 to 10.5%

???????

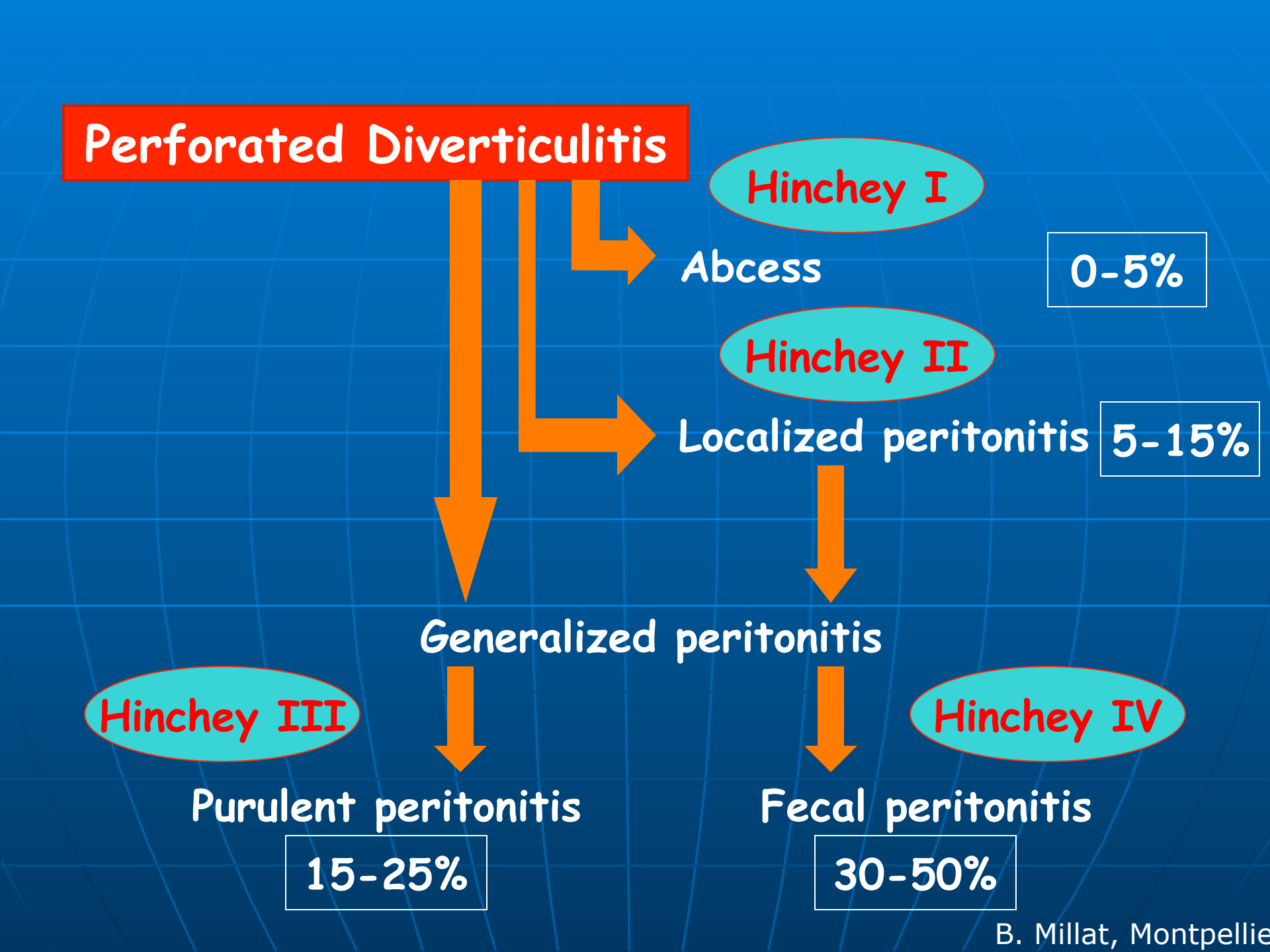
- So, despite the advantages of laparoscopic sigmoid colectomy for diverticular disease, only 11.8% of colectomies are performed laparoscopically in the US
- Lower than other countries

Perforated diverticulitis

Hinchey Classification

Grade	*Definition*
I	Diverticulitis with a phlegmonous or a pericolic abscess
2	Diverticulitis with a pelvic abscess or a retroperitoneal abscess
3	Diverticulitis with diffuse/generalized purulent peritonitis
4	Diverticulitis with fecal peritonitis

Hinchey EJ, Schaal PG, Richards GK. Treatment of perforated diverticular disease of the colon. Adv Surg 1978;12:85–109.



B. Millat, Montpellie

Two areas where we are pushing the envelope…..

- **Primary anastomosis vs Hartman procedure for perforated diverticulitis**

- **Laparoscopic lavage and drainage for Hinchey III diverticulitis**

Primary resection with anastomosis vs Hartmann's Procedure for Acute Colonic Diverticulitis: a systematic review

(Constantinides et al. Dis Colon Rectum 2006)

- 15 studies reviewed, 1984-2004
- 963 pts
- Overall mortality reduced with PA (7.6 vs 15%)
- No significant difference in mortality when matched for Hinchey >II

- Studies are primarily retrospective, selection bias, etc
- Leak rates in these settings 5.5% (up to 13%)

Colorectal Disease, 2010, **12,** 54–60

Original article

Primary anastomosis *vs* Hartmann's procedure in patients undergoing emergency left colectomy for perforated diverticulitis

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Conclusion The theory that PA is generally superior to HP cannot be supported. HP remains a safe technique for emergency colectomy in perforated diverticulitis, especially in elderly patients with multiple comorbidities. If PA is performed, a protective ileostomy must be considered.

Case--- a paradigm shift ??

- Healthy 50 yo male presents with 72 hours of lower abdominal pain. He has no past medical history. Takes only a multivitamin a day.
- On exam, he does not appear ill, BP130/85, HR 84. Diffuse abdominal tenderness. WBC 13000
- CT shows free air and fluid intraperitoneally with a diverticular phlegmon

Case

- So, you go to the OR and……..

Case

- So, you go to the OR and……..

1---- make a lower midline incision
2---- insert a laparoscope

CURRENT STATUS

DISEASES OF THE COLON & RECTUM VOLUME 52: 7 (2009)

W. Donald Buie, M.S., *Editor*

Acute Complicated Diverticulitis Managed by Laparoscopic Lavage

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METHODS: A PubMed search was performed for publications between 1990 and May 2008. The terms acute, perforated, diverticulitis, lavage, drainage, and laparoscopy were used in combination. The EMBASE and Cochrane databases were also searched.

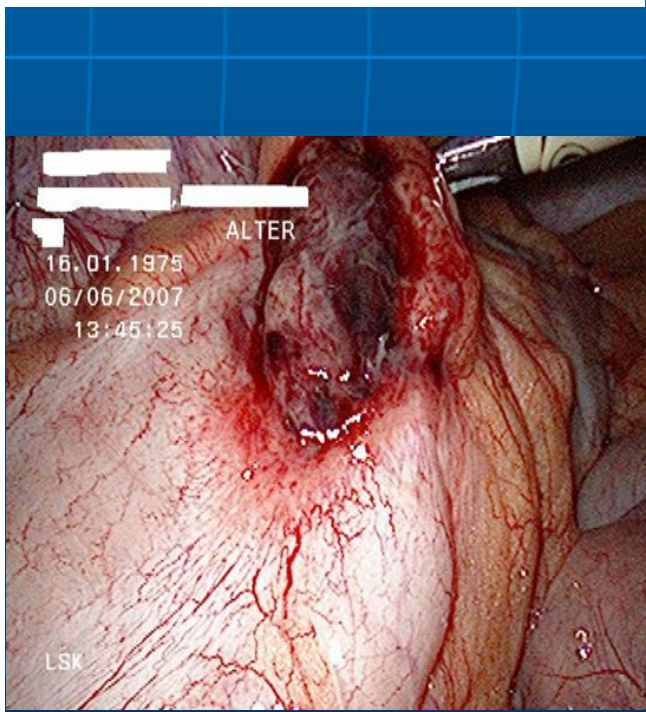


TABLE 2. Patient demographics

Authors	Year	Country	No. of patients	Age mean	Hinchey classification 2	Hinchey classification 3	Hinchey classification 4	ASA
O'Sullivan *et al.*[18]	1996	Ireland	8	57	–	8	–	–
Faranda *et al.* .[11]	2000	France	18	54	–	16	2	2–3
Da Rold *et al.*[12]	2004	Italy	7	65	1	6	–	–
Mutter *et al.*[13]	2006	France	10	60	(5)[a]	(5)[a]	–	I–3
Taylor *et al.*[14]	2006	Australia	14	57	2	10	2	3–5
Myers *et al.*[16]	2008	Ireland	92	63	25	67	–	2–5
Franklin *et al.*[15]	2008	USA	40	60	5	32	3	I–4
Bretagnol *et al.*[17]	2008	France	24	55	5	18	1	2–3
Total	–	–	213	59	43	162	8	–

ASA = American Society of Anesthesiologists' risk classification.
[a]Unspecified classification of the 10 patients in this study.

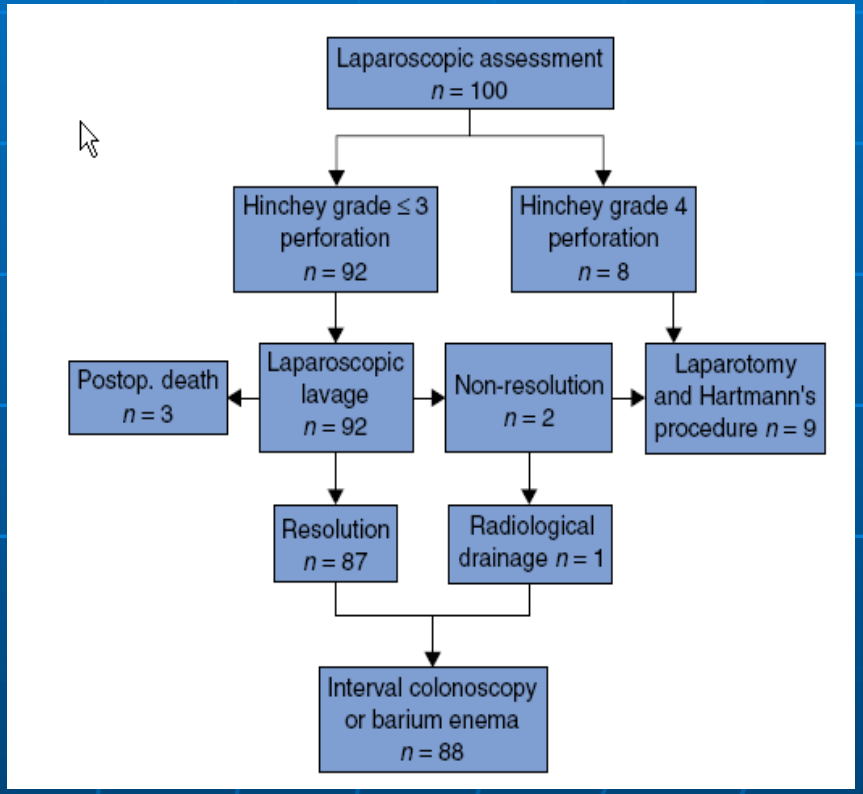
TABLE 3. The outcomes of laparoscopic lavage management in the published studies

Authors	Morbidity	Mortality	LOS Mean (range)	Conversion rate[a]	Resection rate[b]
O'Sullivan *et al.*[18]	2/8 (25%)	0/8 (0%)	10 (7–17)	0/8 (0%)	0/8 (0%)
Faranda *et al.*[11]	3/18 (17%)	0/18 (0%)	8 (7–14)	0/18 (0%)	15/18 (83%)
Da Rold *et al.*[12]	2/7 (28%)	0/7 (0%)	8 (4–12)	1/7 (14%)	0/6 (0%)
Mutter *et al.*[13]	0/10 (0%)	0/10 (0%)	9 (4–16)	1/10 (10%)	6/9 (67%)
Taylor *et al.*[14]	0/14 (0%)	0/14 (0%)	7 (5–32)	3/14 (21%)	8/11 (73%)
Myers *et al.*[16]	5/92 (5%)	3/92 (3%)	9 (7–22)	1/92 (1%)	1/91 (1%)
Franklin *et al.*[15]	8/40 (20%)	0/40 (0%)	7 (1–10)	0/40 (0%)	24/40 (60%)
Bretagnol *et al.*[17]	2/24 (8%)	0/24 (0%)	12 (7–35)	0/24 (0%)	24/24 (100%)
Total	22/213 (10.3%)	3/213 (1,4%)	–	6/213 (2,8%)	78/207 (38%)

LOS = length of hospital stay.
[a]Five of the patients had reoperations within weeks after the primary treatment because of failure of the original procedure, and the treatment of one patient was converted to laparotomy during the original procedure.
[b]Resection rate = secondary elective sigmoideum resection rate.

Laparoscopic Peritoneal Lavage

- 100 patients with peritonitis underwent 4 quadrant peritoneal lavage with 4 L of saline
- 8 underwent Hartmann's Procedure with fecal contamination
- 89% recovered fully without morbidity



Myers et al Br J Surg 2008

CONCLUSION: Primary laparoscopic lavage for complicated diverticulitis may be a promising alternative to more radical surgery in selected patients. Larger studies have to be made before clinical recommendations can be given. (Alamili)

Two prospective randomized, controlled trials currently to evaluate laparoscopic lavage

- Ladies Trial Netherlands
- DILALA trial Scandinavia

Summary

- Elective surgery considered after 3-4 episodes of uncomplicated diverticulitis; consider age, comorbidity
- Complicated diverticulitis is a challenging disease entity with a wide spectrum of presentations. Without free perforation, generally plan elective resection after first episode.

Summary

- Younger patients should be managed by severity of disease.
- Immunosuppressed patients will require surgical intervention.
- More sigmoid resections should be performed laparoscopically.
- Laparoscopic Lavage may be an alternative for Hinchey III diverticulitis.

Thank you