Diverticular Disease: Dispelling the Myths

ACG Postgraduate Course
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University of Washington, Seattle, WA

Diverticular Complications: Leading GI Indication for Hospital Admission

Table 3. Gastrointestinal and Hepatology Principal Discharge Diagnoses from Hospital Admissions, 2009

<table>
<thead>
<tr>
<th>Rank among</th>
<th>Rank among</th>
<th>ICD-9-CM codes</th>
<th>Principal diagnosis name</th>
<th>Total No. discharged</th>
<th>% Change 2000-2009</th>
<th>Median LOS (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24</td>
<td>577.9</td>
<td>Acute appendicitis</td>
<td>274,119</td>
<td>-2.0</td>
<td>4.0</td>
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<tr>
<td>2</td>
<td>43.79</td>
<td>574.0, 574.1</td>
<td>Diverticular hemorrhage</td>
<td>226,216</td>
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<td>3</td>
<td>25</td>
<td>580.11</td>
<td>Diverticular without hemorrhage</td>
<td>218,723</td>
<td>0.4</td>
<td>4.0</td>
</tr>
</tbody>
</table>

- Peery, et al. Gastroenterol 2012
### Diverticular Complications: Leading GI Indication for Hospital Admission

#### Table 3. Gastrointestinal and Hepatology Principal Discharge Diagnoses from Hospital Admissions, 2009

<table>
<thead>
<tr>
<th>Rank among</th>
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<th>ICD-9-CM code</th>
<th>Principal diagnosis name</th>
<th>Total No. discharged</th>
<th>% Change from 2000</th>
<th>Median LOS (days)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>21</td>
<td>577.9</td>
<td>Acute appendicitis</td>
<td>274,119</td>
<td>+3.0</td>
<td>4.8</td>
</tr>
<tr>
<td>1</td>
<td>21</td>
<td>574.0</td>
<td>Acute appendicitis</td>
<td>226,318</td>
<td>+4.0</td>
<td>3.0</td>
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<td>2</td>
<td>22</td>
<td>573.0</td>
<td>Acute appendicitis</td>
<td>219,133</td>
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<td>4.0</td>
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<td>3</td>
<td>29</td>
<td>540.0</td>
<td>Acute appendicitis</td>
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<td>3.0</td>
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<tr>
<td>4</td>
<td>30</td>
<td>507.0</td>
<td>Acute appendicitis</td>
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<td>3.0</td>
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<td>5</td>
<td>31</td>
<td>569.0</td>
<td>Nontuberculous pneumonia</td>
<td>155,866</td>
<td>+26.0</td>
<td>5.0</td>
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<tr>
<td>6</td>
<td>32</td>
<td>575.9</td>
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<tr>
<td>7</td>
<td>44</td>
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<td>Nontuberculous pneumonia</td>
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<tr>
<td>8</td>
<td>44</td>
<td>576.0</td>
<td>Nontuberculous pneumonia</td>
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<td>9</td>
<td>45</td>
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<tr>
<td>10</td>
<td>47</td>
<td>578.0</td>
<td>Nontuberculous pneumonia</td>
<td>110,520</td>
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<td>5.0</td>
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<tr>
<td>11</td>
<td>49</td>
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<td>Nontuberculous pneumonia</td>
<td>99,383</td>
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<td>7.0</td>
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<td>51</td>
<td>88.0</td>
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<td>56</td>
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<td>14</td>
<td>100</td>
<td>572.0</td>
<td>Nontuberculous pneumonia</td>
<td>46,392</td>
<td>-32.1</td>
<td>3.0</td>
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</tbody>
</table>

*Peery, et al. Gastroenterol 2012*

#3 Diverticulitis
#14 Diverticular bleeding

Together #1 GI Indication for Hospitalization
### Outline: 10 Myths Revisited

1. 25% of patients with diverticulosis will develop diverticulitis
2. Diverticulitis is a disease of older people
3. Low fiber diet and constipation lead to diverticulosis
4. Patients with diverticular disease should avoid nuts and seeds
5. Nonsteroidal anti-inflammatories are only a problem in the upper GI tract

### Outline (continued)

6. Diverticular disease is purely environmental
7. Antibiotics are necessary to treat uncomplicated diverticulitis
8. Surgery should be performed after 2 episodes of recurrent diverticulitis
9. Diverticular disease has no long-term implications
10. We know everything there is to know about diverticular disease
Myth #1

25% of patients with diverticulosis will develop diverticulitis

Diverticulosis
30-50% of Americans > 60 yrs

Uncomplicated
75%

Asymptomatic

Symptomatic

Complicated
25%

Diverticulitis
15-25%

Bleeding
5%

Diverticular Colitis

Based on barium enema data from 1950's;
Subjective diagnosis of diverticulitis;
many patients had functional symptoms
Progression to Diverticulitis is Uncommon

- 2222 Prevalent Diverticulosis on colonoscopy
- Median time to event: 7 years

- 95 (4%) Diverticulitis
  - 6/1000 patient years

- 23 (1%) CT-confirmed Diverticulitis
  - 1.5/1000 patient years


Myth #2

Diverticulitis is a disease of older people
Young Patients At Risk For Diverticulitis


Young Age is Associated with Recurrence

Anaya, Flum Arch Surg 2005
Myth #3

Low fiber diet and constipation lead to diverticulosis

Diverticular Disease: A Disease of the 20th Century

Industrialization

Processed grains

Fiber intake

Year

Deaths per million

1900 1920 1940 1960

UK
USA

Painter, Burkitt BMJ 1971
Fiber NOT Associated with DIVERTICULOSIS

- Cross-sectional study of 2108 patients with colonoscopy
- 539 (26%) noted to have diverticulosis
- Diet & activity via interview < 120 days after endoscopy

Adjusted Odds Ratio

Quartiles of Fiber Intake

Constipation NOT Associated with Diverticulosis

Fiber Intake and DECREASED Risk of DIVERTICULITIS

**EPIC-Oxford Study – Prospective cohort of 43,000 in UK**
812 cases of diverticular dz over mean follow-up 11.6 years

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Myth #4

Patients with diverticular disease should avoid nuts and seeds
Nuts, Seeds, Popcorn and Diverticulitis

- Nuts, corn, seeds presumed to lodge in or traumatize a diverticulum
- Relationship between particular foods and diverticular trauma is speculative

Schechter S Dis Colon Rectum 1999; Morson BC Brit J Radiol 1963

Nuts, Corn, Popcorn: No Increased Risk of Diverticular Complications

Health Professionals Follow-up Study (HPFS)
51,000 men followed since 1986 via questionnaires
800 cases of diverticulitis, 380 cases of diverticular bleeding

High to low quartile comparison

Adjusted Relative Risk

Nuts Corn Popcorn

Myth #5

Nonsteroidal anti-inflammatories are only a problem in the upper GI tract

Aspirin and NSAIDs Increase risk of Diverticular Complications

- Diverticulitis
- Diverticular bleeding

<table>
<thead>
<tr>
<th></th>
<th>Aspirin + NSAIDs</th>
<th>NSAIDs only</th>
<th>Aspirin only</th>
<th>Non-users</th>
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</thead>
<tbody>
<tr>
<td>RR</td>
<td>2.0</td>
<td>1.7</td>
<td>1.7</td>
<td>1.0, reference</td>
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<tr>
<td>All p values</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
</tbody>
</table>

Strate et al. Gastroenterology 2011
Myth #6

Diverticular disease is purely environmental in etiology

Odds of Diverticular Disease Higher in Monozygotic Co-Twins

Danish nationwide patient and twin registries 1977-2011
10,400 index siblings and 923 twins with diverticular disease

50% of liability to diverticular disease due to genetic factors

Strate, et al. Gastroenterol 2013
Relative Risk Higher in Siblings of Cases with Diverticular Disease

Strate, et al. Gastroenterol 2013

Management of Diverticulitis

Surgical Management

Medical Management

> 70% of patients

Broad spectrum antibiotics (PO / IV)
Bowel rest / low residue diet
Percutaneous drainage if abscess > 4cm

Few randomized trials

Jacobs NEJM 2007
Myth #7

Antibiotics are necessary to treat uncomplicated diverticulitis

Are Antibiotics Necessary for Acute Uncomplicated Diverticulitis?

Multicenter randomized trial in Sweden
623 patients with CT proven uncomplicated L-sided diverticulitis

<table>
<thead>
<tr>
<th></th>
<th>Antibiotics N=314</th>
<th>No Antibiotics n=309</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complication (abscess, perforation)</td>
<td>3 (1.0%)</td>
<td>6 (1.9%)</td>
<td>0.30</td>
</tr>
<tr>
<td>Length of stay</td>
<td>3 days</td>
<td>3 days</td>
<td>0.72</td>
</tr>
<tr>
<td>Recurrence in 1 year</td>
<td>46 (16%)</td>
<td>47 (16%)</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Chabok and AVOD study group BJS 2012
Myth #8

Surgery should be performed after 2 recurrences of diverticulitis

Diverticulitis

Surgical Management

- **Emergency colectomy**
  - Peritonitis / free perforation
  - Sepsis / failed medical therapy
  - Large, undrainable abscess
  - Obstruction

- **Elective surgery**
  - Fistula, chronic stricture
  - Following percutaneous drainage (?)
  - Recurrent disease (?)

Medical Management
Recurrence Diverticulitis Is Not So Bad

- **Traditional dogma**
  - Recurrent “attacks” very common
  - Recurrent attacks more serious
  - Operate early especially in young patients

- **Recent population-based data**
  - Recurrent attacks <20%
  - Higher recurrence in young patients (< 40 yrs)
  - Recurrent events not more serious

Parks BMJ 1969; Anaya, Flum Arch Surg 2005
Kawatkar DDW 2012 abstract

Timing of Elective Colectomy

Decision analysis based on data from the population-based CHARS study

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Age (y)</th>
<th>Cost per patient ($)</th>
<th>QALYs per patient</th>
<th>Cost/DALY ($)</th>
<th>Coelostomy (%)</th>
<th>Deaths (%)</th>
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</thead>
<tbody>
<tr>
<td>Elective colectomy after first episode</td>
<td>50</td>
<td>10,829</td>
<td>18.3</td>
<td>591.9</td>
<td>5.7</td>
<td>2.93</td>
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<tr>
<td>Elective colectomy after second episode</td>
<td>50</td>
<td>5,230</td>
<td>18.7</td>
<td>279.6</td>
<td>3.1</td>
<td>2.09</td>
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<tr>
<td>Elective colectomy after third episode</td>
<td>50</td>
<td>4,272</td>
<td>18.8</td>
<td>227.4</td>
<td>2.4</td>
<td>1.85</td>
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<td>Elective colectomy after fourth episode</td>
<td>50</td>
<td>4,195</td>
<td>18.8</td>
<td>223.3</td>
<td>2.4</td>
<td>1.57</td>
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<tr>
<td>Elective colectomy after first episode</td>
<td>35</td>
<td>10,124</td>
<td>23.1</td>
<td>437.8</td>
<td>5.9</td>
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<td>35</td>
<td>6,113</td>
<td>23.4</td>
<td>360.7</td>
<td>4.8</td>
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<td>Elective colectomy after third episode</td>
<td>35</td>
<td>4,866</td>
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<td>207.0</td>
<td>4.0</td>
<td>0.74</td>
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<td>Elective colectomy after fourth episode</td>
<td>35</td>
<td>4,695</td>
<td>23.5</td>
<td>199.6</td>
<td>3.9</td>
<td>0.70</td>
</tr>
</tbody>
</table>

DALY: quality-adjusted life-years
Recent American Society of Colon and Rectum Surgeons Practice Guideline

- The decision to recommend elective sigmoid colectomy after recovery from uncomplicated acute diverticulitis should be individualized.
- Routine elective resection based on young age (< 50 years) is no longer recommended.

Evolving Pathophysiologic Mechanisms Diverticular Disease

- Altered Microbiota
- Low-grade inflammation
- Diverticular Disease
- Altered motility
- Visceral hypersensitivity

Feingold, et al. Dis Colon Rectum 57(3); 2014: 284
Strate et al Am J Gastroenterol 2012
Mesalamine Decreases GI Symptoms after Diverticulitis but NOT Recurrence

* DIVA Study – double blind placebo controlled randomized trial at 34 US sites
* Mesalamine 2.4 g/d vs. mesalamine + probiotic (Align) vs placebo x 12 weeks
* 117 patients with CT confirmed uncomplicated diverticulitis

Myth #9

Diverticular disease has no long-term implications
Is Diverticular Disease a Chronic Illness?

- Altered Microbiota
- Inflammatory state

Diverticulosis

Diverticulitis

Other disorders

Diverticular Disease and Increased Risk of Vascular Disease

Danish Nationwide Cohort Study of 77,000 patients with diverticular disease compared to 300,000 general population members

<table>
<thead>
<tr>
<th>Incidence Rate Ratio</th>
<th>Acute MI</th>
<th>Stroke</th>
<th>VTE</th>
<th>SAH</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1.6</td>
<td>1.2</td>
<td>1.4</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Strate et al. DDW 2013
Diverticulitis Increases Risk of IBS and Depression

Post Diverticulitis IBS

Post Diverticulitis Mood Disorder

Myth #10
We know everything there is to know about diverticular disease

Not Yet!
Conclusions: Diverticular Disease

1. < 5% with diverticulosis develop diverticulitis
2. Young individuals develop diverticular disease
3. Fiber intake not associated with diverticulosis but may decrease risk of diverticulitis
4. Nuts, corn and popcorn are okay
5. NSAIDS increase risk of diverticular complications
6. 50% of diverticular disease related to genetic factors

Conclusions (cont)

7. Antibiotics may not be necessary in uncomplicated diverticulitis
8. Surgery for recurrence should not be based on number of prior attacks or age
   – Consider mesalamine to prevent recurrence but unproven
9. Diverticular disease may impact global health
   – Cardiovascular disease
   – IBS
   – Depression
10. Stay tuned...we’ll know more next year!