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## Colonic diverticula and diverticular disease: Ten Facts A Clinician Should Know

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### Abstract

Diverticular disease accounts for substantial health care utilization and costs. Despite this public health burden, clinical practice has been largely based on poor-quality evidence. Fortunately, there is growing interest in this neglected disease. Based on recent work, clinicians should be familiar with the following 10 facts about diverticula and diverticular disease.

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Diverticular disease accounts for substantial health care utilization and cost in the United States. There are more than 2,500,000 clinic visits, 330,000 emergency department visits and 200,000 hospital admissions for diverticular disease each year in the U.S.<sup>1</sup> Consequently, diverticular disease is associated with significant economic burden in direct health care expenditures and in indirect costs to society (estimated at \$4 billion dollars per year).<sup>2</sup> In the last twenty years, the incidence of diverticulitis has increased by 50%.<sup>3</sup>

Colonic diverticula are the precursor to diverticular disease. Colonic diverticula form when colonic mucosa and submucosa herniate through the muscularis propria. Diverticular disease is a broad spectrum of conditions that can complicate diverticula. These possible complications include hemorrhage, inflammation, pericolic abscesses with or without perforation, strictures, fistulas and even free rupture. The most common manifestation of diverticular disease is acute uncomplicated diverticulitis, which is characterized by inflammation of one or more colonic diverticula without abscess or gross perforation.

Despite the extensive public health burden of diverticular disease, many clinical reviews and guidelines have been based on dated hypotheses and low quality evidence. Fortunately, there is resurgent interest in this long neglected disease. Several high quality studies have been published in the last decade and this new work is changing clinical practice. Given these recent advances, the up to date clinician will want to be familiar with the following ten facts about diverticula and diverticular disease.

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## 1. The low fiber diet and diverticulosis hypothesis was unfounded

A low fiber “Western” diet was long hypothesized to be the etiology of colonic diverticula.<sup>4</sup> The original authors argued that a low fiber diet resulted in small-caliber hard stool. To move this material the colon had to generate excessively high pressures which in turn caused mucosal herniation and formation of diverticula. Despite limited evidence, this hypothesis was widely accepted. Two cross-sectional studies<sup>5, 6</sup> have examined the relationship between dietary fiber intake and the risk of colonic diverticulosis among participants enrolled in colonoscopy-based studies that included a detailed assessment of diet. Low fiber intake was not associated with an increased risk of diverticulosis.

## 2. Colonic diverticula are common; complications are not

Colonic diverticula are common in Americans. Almost a third of adults in their twenties and thirties have colonic diverticula on colonoscopy.<sup>7</sup> The prevalence of diverticula increases with age. Over the age of eighty, 70% of adults in the United States will have colonic diverticula.<sup>7</sup>

While many Americans have colonic diverticula, few will develop diverticular disease. In a large retrospective cohort of patients with diverticulosis, only 1–4% developed acute diverticulitis over 11-years of follow up.<sup>8</sup> Notably, the risk of developing acute diverticulitis was higher in younger individuals compared with older individuals.

## 3. Treatment of acute uncomplicated diverticulitis is controversial

The universal standard of care for acute uncomplicated diverticulitis has long been treatment with a course of antibiotics.<sup>9</sup> However, two randomized clinical trials of antibiotics in acute uncomplicated diverticulitis failed to show any benefit of antibiotic therapy.<sup>10, 11</sup> While these trials were determined to be “low” quality in a recent technical review,<sup>12</sup> several national health systems in Europe (Denmark, Germany, Italy, Netherlands) have changed clinical practice and now recommend selectively withholding antibiotics.<sup>13–16</sup> In contrast, a recent Cochrane review cautioned that further trials are needed before changing clinical guidelines.<sup>17</sup>

Not surprisingly, there is genuine uncertainty in the U.S. as to whether antibiotics improve outcomes for patients with acute uncomplicated diverticulitis.<sup>18, 19</sup> Clinicians do not want to harm their patients by withholding treatment that has always been the standard of care, but they also want to avoid unhelpful treatments that may only contribute to the growing problem of antibiotic resistance. Further research is needed to definitively establish whether patients with acute uncomplicated diverticulitis benefit from treatment with antibiotics. There is no question that antibiotics should continue to be used in patients with complicated diverticular disease, signs of infection, those who are immunosuppressed or who have other significant comorbid diseases.

#### **4. Colonoscopy is recommended post episode to rule out a misdiagnosed colorectal cancer**

Cross sectional imaging is not perfectly specific for acute diverticulitis. Using data from a systematic review, 1 in 67 patients with imaging-confirmed acute diverticulitis were diagnosed with colorectal cancer on a follow up colonoscopy.<sup>12, 20</sup> Unless a colonoscopy has been recently performed, U.S. guidelines recommend a colonoscopy 6–8 weeks after an episode of acute uncomplicated diverticulitis to rule out a misdiagnosed colorectal cancer.<sup>21</sup>

#### **5. Chronic gastrointestinal symptoms and worries are common after the acute episode of diverticulitis has resolved**

While an acute episode typically lasts days, many patients report symptoms for months to years after the acute inflammation has resolved. At 1-year follow up in a trial of CT scan confirmed acute uncomplicated diverticulitis, 45% of participants reported abdominal pain and 30% had altered bowel habits.<sup>11</sup> Another study found a 5-fold increased risk of chronic gastrointestinal symptoms several years after an episode of acute diverticulitis.<sup>22</sup> Chronic abdominal pain and altered bowel habits after an episode of acute diverticulitis in the absence of overt inflammation has been termed post diverticulitis irritable bowel syndrome.<sup>22</sup> Beyond gastrointestinal symptoms, the chronic sequela of acute diverticulitis also include fear of having a recurrent episode while traveling, fear of needing a colectomy or colostomy, fear of a misdiagnosis, and fear of a recurrent episode or a complication such as perforation.<sup>23</sup>

#### **6. After a first episode of medically managed acute diverticulitis, there is some risk of recurrence**

In the decade after a first occurrence of medically managed acute diverticulitis, one in five individuals will have a recurrence of acute diverticulitis.<sup>3, 12</sup> The risk of recurrence is higher (closer to one in four individuals) in adults under the age of fifty.<sup>3, 12</sup> After a first recurrence, the risk of further episodes is estimated at ~50% over 5–10 years.<sup>3</sup> A proportion of individuals will pursue elective colectomy after an episode of acute diverticulitis to reduce the risk of recurrence. The risk of recurrence is very low in individuals who had complicated diverticular disease that was managed surgically.<sup>3</sup>

#### **7. The severity of the recurrent episode will likely resemble the first occurrence**

Abscesses, perforation, obstruction, fistulas, and strictures can complicate acute diverticulitis. These complications most commonly occur with the *first occurrence* of diverticular disease and not with recurrent episodes.<sup>3, 24</sup> Compared to those who have never had an episode of acute diverticulitis, individuals with a history of acute uncomplicated diverticulitis have a reduced risk of developing complicated diverticular disease.<sup>3</sup> This said, there is one exception to this rule worth noting. Recurrent episodes of acute diverticulitis are

associated with an increased risk of fistulizing disease, which is a less common complication of diverticulitis.<sup>24</sup>

## **8. The decision to pursue elective prophylactic colon surgery to reduce the risk of recurrent diverticulitis should be considered on a case-by-case basis**

The hard and fast recommendations for prophylactic colon surgery resection after two episodes of acute diverticulitis (and one episode in young adults) are gone. With a better understanding of the natural history of acute diverticulitis, guidelines now recommend consideration of elective colon resection on a case-by-case basis after an individualized discussion of the potential risks and benefits.

## **9. Other than surgery, there is little patients can do to prevent a recurrence**

After an episode of acute diverticulitis, patients often seek recommendations on how they can modify their diet or lifestyle to reduce the risk of recurrent disease. Unfortunately, there are no studies of risk factors for *recurrent* episodes of diverticulitis. Several risk factors for a *first* occurrence of acute diverticulitis have been identified. Regular use of nonsteroidal anti-inflammatory drugs increases the risk of a first occurrence of acute diverticulitis by 70% compared with nonusers.<sup>25</sup> Regular use of aspirin increases this risk by 25%.<sup>25</sup> Smoking is a risk factor for diverticular disease in a dose-response relationship.<sup>26</sup> Obesity increases the risk of incident diverticulitis by 80%<sup>27</sup> while physical activity reduces the risk of diverticulitis by 25%.<sup>28</sup> A high fiber diet is associated with reduced risk of hospital admission for diverticular disease.<sup>29</sup> Nuts, corn and popcorn intake are not associated with an increased risk of diverticulitis.<sup>30</sup>

Unfortunately, risk factors for recurrent diverticulitis may not be the same as factors associated with a first occurrence. Extrapolating from what we know about risk factors for a first occurrence some guidelines<sup>21</sup> suggest patients avoid the use of nonsteroidal anti-inflammatory drugs and aspirin, consume a fiber rich diet and pursue vigorous physical activity.<sup>21</sup> While there have been several trials of medical therapy to reduce the risk of recurrence, trials of probiotics, rifaximin and mesalamine did not reduce the risk of recurrent diverticulitis.<sup>21</sup>

## **10. Genetic factors contribute to the development of diverticular disease**

A population-based study in Denmark found that diverticular disease aggregates in families.<sup>31</sup> Individuals with a sibling with diverticular disease were three times more likely to develop diverticular disease compared with the general population. Genetic factors were estimated to contribute to 53% of the susceptibility to diverticular disease.

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