



## How to Treat Quiz

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### NEED TO KNOW

Consider diverticulitis in any patient with left iliac fossa pain.

CT abdomen and pelvis is recommended to both confirm the diagnosis and check for any evidence of complications, such as abscess or perforation.

Recurrent imaging for a patient known to have diverticulitis is not always necessary, but warrants consideration if an episode is not resolving.

Antibiotics are not always required for treatment of uncomplicated diverticulitis in the otherwise-well patient with no evidence of sepsis.

Surgery is considered in patients whose quality of life is significantly impacted by diverticulitis or those who have developed complications, such as fistulae or stricture.

A colonoscopy is indicated in patients with complicated diverticulitis to rule out malignancy.

# Diverticulitis



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## BACKGROUND

THE word 'diverticulum' refers to an abnormal sac or outpouching from a hollow organ. Strangely enough, a diverticulum of the colon is not considered a true diverticulum as it does not involve the entire wall of the colon. Colonic diverticula are penetrations of submucosa and mucosa, without any muscle layers. They were first described by Littré in 1700, who thought they were the result of the wall being pulled out, hence their name (*diverto* is Latin for 'to turn aside').<sup>1</sup>

Research largely stagnated over the next 250 years, although some studies into intestinal-wall pressures were conducted and showed that the mesenteric border was the weakest point and that the diverticula were associated with the entrance of blood vessels into the colonic wall.

It was only in 1964 that studies were published establishing the link between resting intraluminal pressures and patients with diverticular disease.<sup>2</sup> Further pathological studies demonstrated that there was significant muscle-wall thickening in colon specimens resected for diverticular

disease, and this led to the current theories that these diverticula form because of excessive intraluminal pressure.

Painter postulated that diverticular disease was linked to a lack of dietary fibre after observing that Pacific Islanders had very low rates of diverticular disease and high-fibre diets.<sup>2</sup> Unfortunately, despite this message, Western diets have continued in their predominantly low-fibre form, and diverticulitis is an increasingly common disease. Although exact rates of prevalence are not known, approximately 65% of patients over 65 have diverticular disease – 80% of whom are asymptomatic.<sup>3</sup> As patients age, the incidence of diverticulitis also increases, with a male preponderance.<sup>4</sup>

Management of diverticular disease and diverticulitis has evolved dramatically. Improvements in quality and access to CT scanning have allowed advances in the accuracy of diagnosis of diverticulitis and its various complications. The use of interventional radiology to drain abscesses percutaneously has allowed patients to avoid the need for a colostomy and,

sometimes, any operation at all. We have also seen the pendulum swing away from colonic resection, although that has probably started to reverse in the past decade or so.

This How to Treat discusses the current management of diverticular disease and diverticulitis, as well as covering the current controversies regarding this condition.

## ANATOMY AND PATHOPHYSIOLOGY

THE colon is approximately 1.5m long and tends to lengthen with age, although there is enormous variation between individuals. It is typically divided anatomically into five main segments: caecum, ascending colon, transverse colon, descending colon and sigmoid colon. Strictly speaking, the rectum is not considered part of the colon. The sigmoid colon (see figure 1) is most susceptible to diverticular disease in Western populations, although, for reasons yet to be explained, Asian populations have a much higher incidence of right-sided (caecum and ascending colon) disease.<sup>5</sup>

There are many proposed

aetiological mechanisms for diverticular disease, and it is likely the condition results from an interplay between genetic, lifestyle and environmental factors. One theory is that the ratio of types of collagen deposition in the colon is altered with age.<sup>6</sup> Type III collagen is usually laid down as part of the early phases of wound healing and is typically weaker than type I collagen, which is generally found in mature tissues. Patients with diverticular disease have greater amounts of type III collagen than type I, although the cause is not known. Patients with inherited collagen disorders – for example, Ehlers-Danlos syndrome (see figure 2) – also develop diverticular disease at much a younger age. Another theory is that there is an increase in colon pressure. However, measurements of colonic pressures in patients with and without diverticular disease do not differ significantly.<sup>7</sup>

Closely related is the concept of enteric neuropathy. There is some evidence that there are fewer enteric neurons in patients with diverticular disease, although the cause of their loss is not known.<sup>8</sup>

Finally, although diverticular

« disease is commonly associated with a reduced fibre intake, the evidence for this is quite mixed. There is some low-level evidence to support the use of fibre supplementation to reduce the risk of developing both asymptomatic and symptomatic diverticular disease.<sup>9</sup>

Much like asymptomatic disease, the exact cause of diverticulitis is not known. Proposed theories include obstruction of faecal matter within the diverticulum (much like the theory for appendicitis); specific gut microbiome causing an altered immune response in the colon, leading to colitis and diverticulitis; and microperforation from either obstruction or erosion. None of these theories currently have strong supporting evidence.

The literature separates uncomplicated and complicated diverticulitis. Uncomplicated diverticulitis is the presence of inflammation without any complications. The latter includes perforation, obstruction, stricture, fistula or peritonitis, and constitutes complicated diverticulitis (see box1).

Microperforation (the presence of a one or two locules of gas) is not well defined and is placed midway between these two definitions.

## NATURAL HISTORY AND RISK FACTORS

THE long-term natural history of diverticular disease is poorly understood, with few longitudinal studies looking at its course over a lifetime. There is a wide range in the literature as to quoted recurrence rates

**Diverticulitis typically presents with the gradual onset of sharp left iliac fossa pain, often accompanied by nausea, vomiting and fever.**

after a single episode of diverticulitis, from as low as 7% to as high as 62%.<sup>10</sup> Although diverticulitis is relatively rare before age 40 (2-5%), its incidence is increasing.<sup>10</sup> Younger patients were initially thought to have higher rates of recurrence and a more severe disease course, but this has been disproven in later studies.<sup>10</sup> Younger patients, of course, do live longer and therefore have a higher accumulated risk of complications.

As stated earlier, a low-fibre diet possibly leads to increased rates of diverticular disease and diverticulitis. Obesity also appears to be associated with higher rates of complicated and recurrent disease.<sup>11</sup> Patients who are immunosuppressed, such as transplant patients or those on long-term steroids, also have higher risks of complicated disease, with poorer outcomes. Although the incidence is still low (around 1%), the risks of mortality are high and quoted at 25%.<sup>12</sup> Nonetheless, there is little evidence to support pre-emptive colectomy in these patients.

## CLINICAL HISTORY AND EXAMINATION

DIVERTICULITIS typically presents with the gradual onset of sharp left iliac fossa pain. The pain is a result of worsening of the acute inflammatory process and peritoneal irritation, causing



**Figure 1.** Sigmoid colon showing multiple diverticula. Note how the diverticula appear on either side of the longitudinal muscle bundle (taenium). The scale is shown in cms.



**Figure 2.** Ehlers-Danlos syndrome.

### Box 1. Complications of diverticulitis

- Obstruction if there is a stricture.
- Urinary faecal matter or a UTI if there is a colovesical fistula.
- Bleeding from diverticular disease (but rarely from diverticulitis).
- Vaginal faeculent material from a colovaginal fistula.
- Global abdominal pain.
- Symptoms of systemic sepsis from colonic perforation.

localised pain. However, as the sigmoid colon is a semi-mobile structure, the pain may present in other locations, such as the right iliac fossa, midline or even in the upper abdomen if the sigmoid is particularly redundant. Pain location will vary depending on involvement of other colonic segments. The pain is often accompanied by nausea, vomiting and fever. Mucus in the stool is also classically described, but in practice, this is uncommon.

### Box 2. Common differential diagnoses

- Colorectal cancer.
- Inflammatory bowel disease.
- Renal colic.
- Appendicitis epiploicae (torsion of the fatty appendages of the colon).
- UTI.
- Enterocolitis or gastroenteritis.
- Pancreatitis.
- Meckel's disease.
- Endometriosis.
- Appendicitis.
- Ruptured ovarian cyst or cyst torsion.
- PID.
- Pancreatitis.

On examination, the patient may have signs of sepsis, such as a fever and tachycardia. The abdominal examination usually reveals left iliac fossa tenderness, although as stated previously, this depends on the location of the colonic segment involved. Signs of generalised perforation

– such as rigidity, involuntary guarding and percussion tenderness – may be present. A PR examination may show mucus on the glove and, rarely, some dark-red PR bleeding. Differential diagnoses are listed in box 2.

## LABORATORY STUDIES AND SCORING SYSTEMS

ORDER an FBC, EUC, LFTs, lipase and CRP. Clinical guidelines strongly recommend the use of imaging to confirm the diagnosis. This is because the typical patient with diverticulitis is over 40 and the broad differential diagnosis may not be easily distinguished on clinical history, examination or laboratory testing.

CRP has a role in predicting the risk of recurrence, with one study showing that a CRP greater than 240 on admission indicated a hazard ratio of 1.75 for recurrence within six months.<sup>13</sup> A prospective review of presentations to an ED for abdominal pain found a 40% change in diagnosis on imaging.<sup>14</sup> However, management only changed in 7% of patients.<sup>14</sup> Therefore, for initial

presentations of abdominal pain, the author recommends the use of imaging to confirm the diagnosis; this is less important in repeat presentations where a clear history of diverticulitis has already been established, especially if there are recent imaging studies.

The most commonly used scoring system for diverticulitis is the modified Hinchey classification (see table 1).<sup>15</sup> This was originally developed as an operative rating at the time of laparotomy. However, the modified version includes CT imaging findings. Radiological differentiation between stages III and IV is extremely challenging and often is only confirmed at surgery. The classification rarely makes a difference in clinical practice beyond what is already apparent but is useful in discussions about diverticulitis in the literature.

## IMAGING CT

CT scans have excellent sensitivity (94%) and specificity (99%) for diverticulitis.<sup>16,17</sup> The features of diverticular disease are usually small

◀PAGE 12 outpouchings from the colonic wall completely surrounded by a thin layer of tissue (see figure 3). This is reflective of the disease process where only the submucosa, mucosa and serosa are present in the wall of the diverticula. Care must be taken to differentiate these outpouchings as diverticula, rather than free gas from perforation. The features of inflammation, such as pericolic stranding and enhancement of the bowel wall, can help with this (see figure 4) and can also identify an acute episode of diverticulitis.

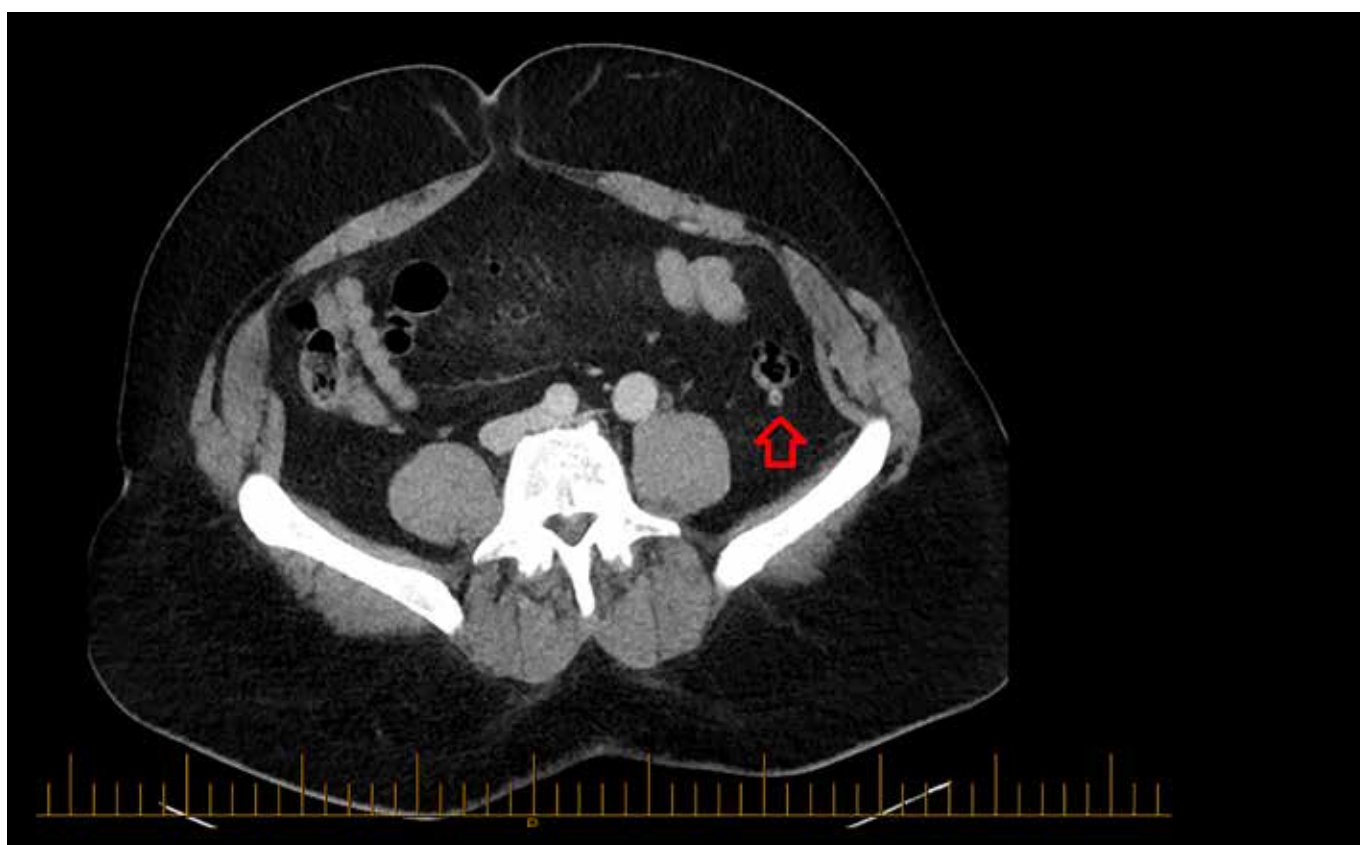
Complications from diverticulitis can also be readily identified. Free gas and fluid may be seen, indicating perforation. A contained fluid collection, which may have gas within it, indicates an abscess. Fistula formation may also be seen, with gas or contrast in the bladder (see figure 5), and large bowel obstruction may be seen in stricturing disease. In the author's clinical practice, CT is not used to assess resolution, and if the patient has typical symptoms of diverticulitis and has diverticulitis recently confirmed on imaging, a repeat CT scan is generally not ordered. However, where there is any diagnostic uncertainty or where a patient's symptoms are not resolving within five days, a repeat CT is performed to look for an

**Patients requiring admission and IV antibiotics include those with systemic signs of sepsis, uncontrolled pain or complications of diverticulitis.**

alternative diagnosis or possible complications of diverticulitis.

Interestingly, ultrasound has also been described as an accurate imaging modality for diverticulitis.<sup>17</sup> This is mainly used in Europe and has a reported sensitivity of 92%, with a specificity of 90%.<sup>17</sup> Only the European guidelines acknowledge its use, with ultrasound not found in other international guidelines.<sup>18</sup> As with other uses of ultrasound, it is operator dependent and requires local expertise. Typical findings include bright bowel outpouchings, which characterise the diverticular disease; echogenic and non-compressible fat, suggesting inflammation and therefore diverticulitis; as well as a thickened bowel wall. The author is not aware of any centres within Australia who provide this particular service, and the use of ultrasound is very limited in the local context.

MRI also quite sensitive (94%) and specific (92%), although it is less well studied than CT.<sup>19</sup> Its use is limited to situations where ionising radiation is unsuitable. Unlike in appendicitis, there are very few situations where CT cannot be used, as children and pregnant women typically do not develop diverticulitis. MRI may have a role in limiting the amount of ionising radiation; however, this is fairly uncommon in the management of this disease, it does not generally attract a Medicare rebate and is not included in the list of indications for which a GP may order a funded MRI.



**Figure 3. CT abdomen and pelvis. A sigmoid diverticulum is indicated (red arrow).**



**Figure 4. Acute diverticulitis on CT. Pericolic stranding (red arrow), and thickened colon (green arrow) are demonstrated.**

**Table 1. Modified Hinchey classification**

Stage	Features
Ia	Colonic reaction plus confined pericolic inflammation or phlegmon
Ib	Pericolic or mesocolic abscess
II	Pelvic, distant intra-abdominal or retroperitoneal abscess
III	Generalised purulent peritonitis
IV	Generalised faecal peritonitis

Source: Wasvary H et al 1999<sup>5</sup>

**MANAGEMENT Initial management**

MILD cases of diverticulitis can usually be managed in the outpatient setting. This includes symptomatic relief with dietary restriction to fluids and broad-spectrum antibiotics, such as amoxicillin-clavulanate. However, as discussed later, the indication for antibiotics is contentious.

Patients requiring admission and IV antibiotics include those with systemic signs of sepsis, such as fever; pain not controlled in the outpatient setting; or the presence of any

complication of diverticulitis, such as abscess or perforation.

Restricted diet targets relief of symptoms, such as nausea and pain, rather than the prevention of complications or progression of disease.

Where admission is required due to symptomatic relief, those with uncomplicated diverticulitis are typically discharged within 2-3 days of admission.

Patients with complicated diverticulitis typically require inpatient management. An abscess can be managed with IV antibiotics alone if it is smaller

than 3-4cm in diameter or with CT-guided percutaneous drainage. Perforation, especially if it is localised in the pericolic or pelvic regions, can be managed expectantly with IV antibiotics. Other complications, like fistulae, are usually temporised with the use of IV antibiotics initially and then dealt with in a semi-elective fashion once the initial sepsis has resolved.

Surgical intervention is only required when the patient is not improving or where they have ongoing signs of systemic sepsis or instability.

Stricturing disease causing large bowel obstruction usually requires resection and is discussed later.

Note that the management of diverticular bleeding, as opposed to diverticulitis, is quite different. Bleeding can often be managed with supportive measures only. If the bleeding does not stop, percutaneous embolisation of the colonic vessels is the mainstay of care.<sup>20</sup> Colonoscopy in the acute bleeding setting is typically not helpful, as the bleeding comes from the base of the diverticulum and therefore cannot be accessed for

intervention. If the bleeding cannot be stopped via a percutaneous means, or embolisation causes perforation, a resection is usually required. This is, fortunately, rare.

**Surgical indications**

The role of surgery has changed in diverticulitis. Historically, after two episodes of diverticulitis, patients were offered the option of resection as there were fears regarding recurrent disease and complications during an episode of recurrence.

It is now clear that the first episode of diverticulitis has the greatest risk of a complicated presentation and subsequent episodes tend to be uncomplicated.<sup>21</sup> Consequently, the number of patients requiring resection for diverticular disease has fallen in recent years.

The author typically counsels patients that there are only two reasons to proceed with surgery: the development of any complication, or where the patient's quality of life is adversely impacted by repeated episodes of diverticulitis.

In the acute setting, systemic sepsis, instability that is not improving or large bowel obstruction secondary to a stricture are typical indications for a resection. In the semi-elective setting, the presence of fistulous disease or stricturing causing subacute obstruction requires definitive resection. Widespread free gas and fluid indicate generalised peritonitis, also an indication for surgery. Figure 6 demonstrates a colonic specimen after resection.

There is some controversy as to whether patients who have had a previous abscess or microperforation require definitive resection. Not all these patients will develop a recurrence; however, studies indicate the recurrence rate is anywhere between 30% and 60%, so a discussion of the option of resection is required in these patients.<sup>22,23</sup>

More difficult are situations where patients have recurrent diverticulitis or 'smouldering' diverticulitis, where the symptoms do not completely resolve. As can be appreciated, there are significant risks to resection, including anastomotic leak (5%).<sup>24</sup>

In some ways, the pendulum has swung too far towards non-operative management, and there are many patients with chronic symptoms of pain, bloating, obstruction and the avoidance of foods that appear to trigger their symptoms. These patients often comment after resection that they had become so used to their previous way of life and have noticed a dramatic difference in the postoperative setting.

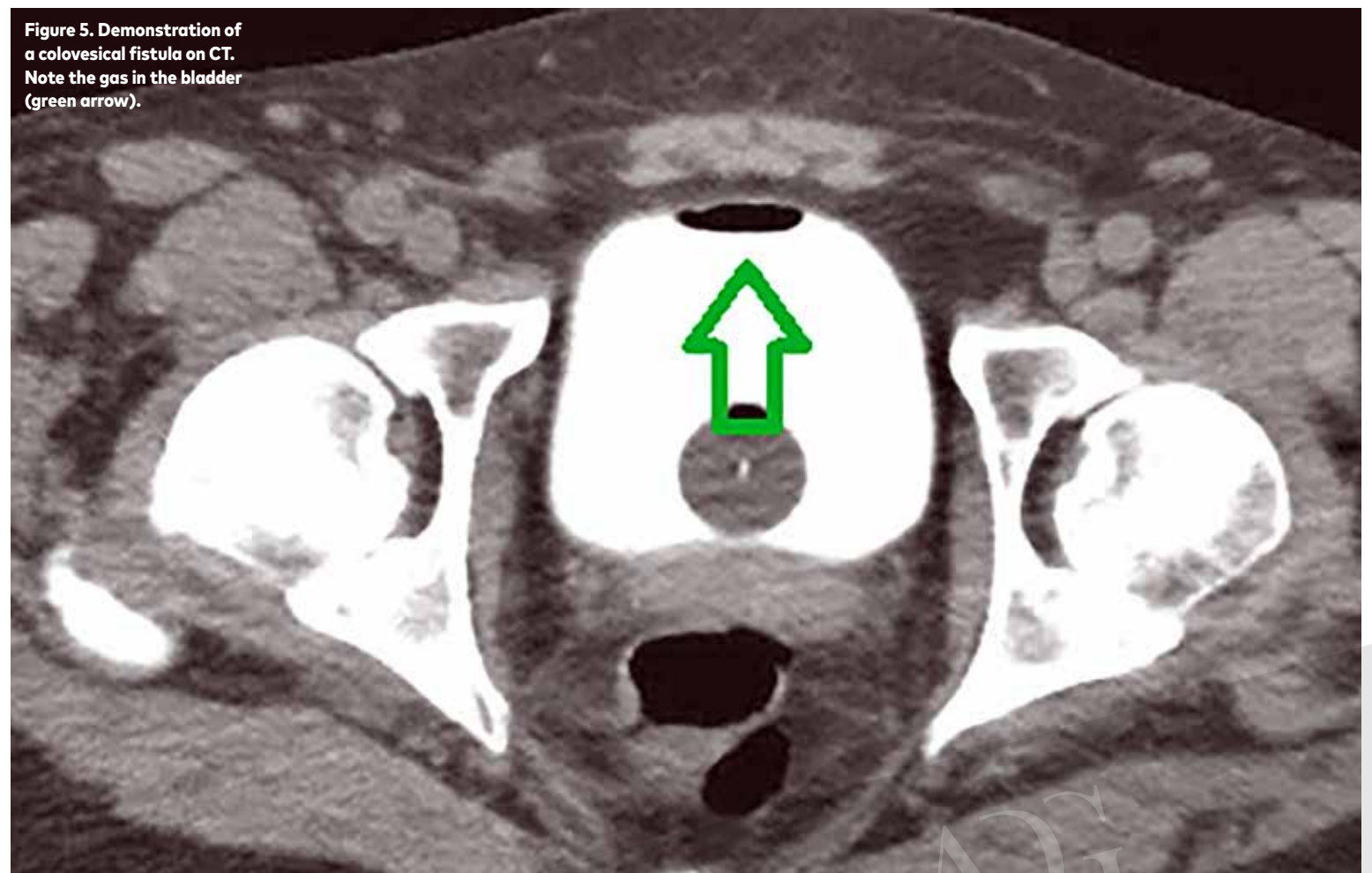
Careful discussion is needed between the patient, their GP and surgeon to decide whether resection offers a benefit. There is now randomised controlled trial data to support the improvement in quality of life in patients with recurrent diverticulitis or 'smouldering' diverticulitis, and referral to a colorectal surgeon to discuss these issues is recommended.<sup>25</sup>

## There have been questions about the utility of antibiotics in mild-to-moderate episodes of acute diverticulitis.

### TYPE OF SURGERY

If surgery is required (see figure 7), this usually involves the resection of the affected colon and the remainder of the sigmoid to reduce the risk of recurrence. Whether an anastomosis can be performed at the time is dependent on the clinical and patient setting. It is the author's strong preference to perform an anastomosis at the time of surgery. This allows for the continuity of bowel function and prevents the need for a second large operation to reverse the colostomy. Therefore, unless the patient is clinically unstable, immunosuppressed or malnourished, or there is significant bowel obstruction or widespread intraperitoneal contamination, most patients will undergo a resection and anastomosis.

Where there are risk factors for an anastomotic leak, such as concerns regarding blood supply or tension, or the aforementioned patient factors, a diverting loop ileostomy is created to protect the anastomosis. Although a second operation is required to reverse this, it is often a much smaller procedure. This approach is certainly supported by the evidence from multiple randomised control trials.<sup>26</sup> Most



**Figure 5. Demonstration of a colovesical fistula on CT. Note the gas in the bladder (green arrow).**

colorectal surgeons in Australia would attempt this laparoscopically, but there are situations where this would not be possible.

Another option that is sometimes considered is laparoscopic lavage. The concept behind this is to drain and wash out the sepsis and not expose the patient to the increased risk associated with a resection. There have been three randomised controlled trials regarding this. Of these, one showed that lavage was associated with a significantly increased rate of reoperation (30% vs 5%), the second demonstrated no difference (although there were issues

with randomisation and patient selection), while the third was stopped because of safety concerns in the lavage group.<sup>27-29</sup> Therefore, without clear data showing the superiority of lavage and real concerns regarding its safety, the author does not employ this technique in his practice. In the author's opinion, the only role for laparoscopic lavage is as a replacement for percutaneous drainage where it is not possible for the radiologist to place a CT-guided drain.

### CONTROVERSIES The role of antibiotics

TRADITIONALLY, the use of broad-spectrum antibiotics has been the mainstay of treatment of diverticulitis. A third-generation cephalosporin, such as ceftriaxone, as well as metronidazole, has generally been recommended to provide cover against gram-positive, gram-negative and anaerobic bacteria.<sup>18</sup> Amoxicillin-clavulanate is often used as an oral agent because of its broad coverage and simple dosing. Other IV antibiotics, such as amoxicillin-gentamicin-metronidazole or piperacillin-tazobactam may be used when there are concerns about



**Figure 6. Colonic specimen after anterior resection for colovesical fistula secondary to diverticulitis. The green arrow indicates the fistulous connection with the bladder.**

antibiotic resistance.<sup>18</sup>

However, there have been questions about the utility of antibiotics in mild-to-moderate episodes of acute diverticulitis. The AVOD trial (Antibiotic Therapy of Acute Uncomplicated

Colonic Diverticulitis) that assessed inpatient treatment with or without antibiotics showed no difference between the groups in terms of complications or length of stay.<sup>30</sup> Long-term (more than 10 years) data from this

trial showed no difference in complications, recurrence, cancer rates, operation rates or quality of life between the antibiotic and non-antibiotic arms.<sup>31</sup> However, concern about significant selection bias, a lack of blinding,

« exclusion of 'sepsis' without clear definitions, no placebo arm and the low rate of complicated disease in both arms may limit the generalisability of the results.

A trial published in 2017 supported these results and found no differences between the two groups for recovery or complication rates. But again, this trial did not have a placebo group.<sup>32</sup>

A 2020 Australasian trial, with a placebo group, found no differences between the groups in terms of length of stay, complications or readmission within 30 days, albeit with short initial follow-up.<sup>33</sup> Patients were selected if they had CT-proven mild diverticulitis (Hinchey 1a), no evidence of systemic inflammatory response syndrome, no immunosuppression and were not pregnant.

In 2020, the American Society of Colon and Rectal Surgeons (ASCRS) updated their guidelines to recommend that patients with mild acute sigmoid diverticulitis could be treated without antibiotics.<sup>34</sup>

The author's recommendation on this is to consider withholding antibiotics where the diagnosis has been made on imaging, the patient has no symptoms of sepsis, there is only mild disease on imaging and there are no risk factors, such as pregnancy, diabetes or immunosuppression.

### Colonoscopy

Colonoscopy 6-8 weeks after an episode has been a mainstay of surveillance as there is always concern regarding misdiagnosis of diverticulitis and the possibility of colorectal cancer. Diverticula are easily seen on colonoscopy (see figure 8), although may not always be noted on colonoscopy reports.

A 2019 meta-analysis found that the risk of colorectal cancer in those with diverticulitis was 2.1%, which is approximately four times the population rate.<sup>35</sup> However, subgroup analysis showed that this became 11% in acute diverticulitis and 0.7% in uncomplicated disease. Therefore, the rates of colorectal cancer after uncomplicated disease are low and comparable to the background population.

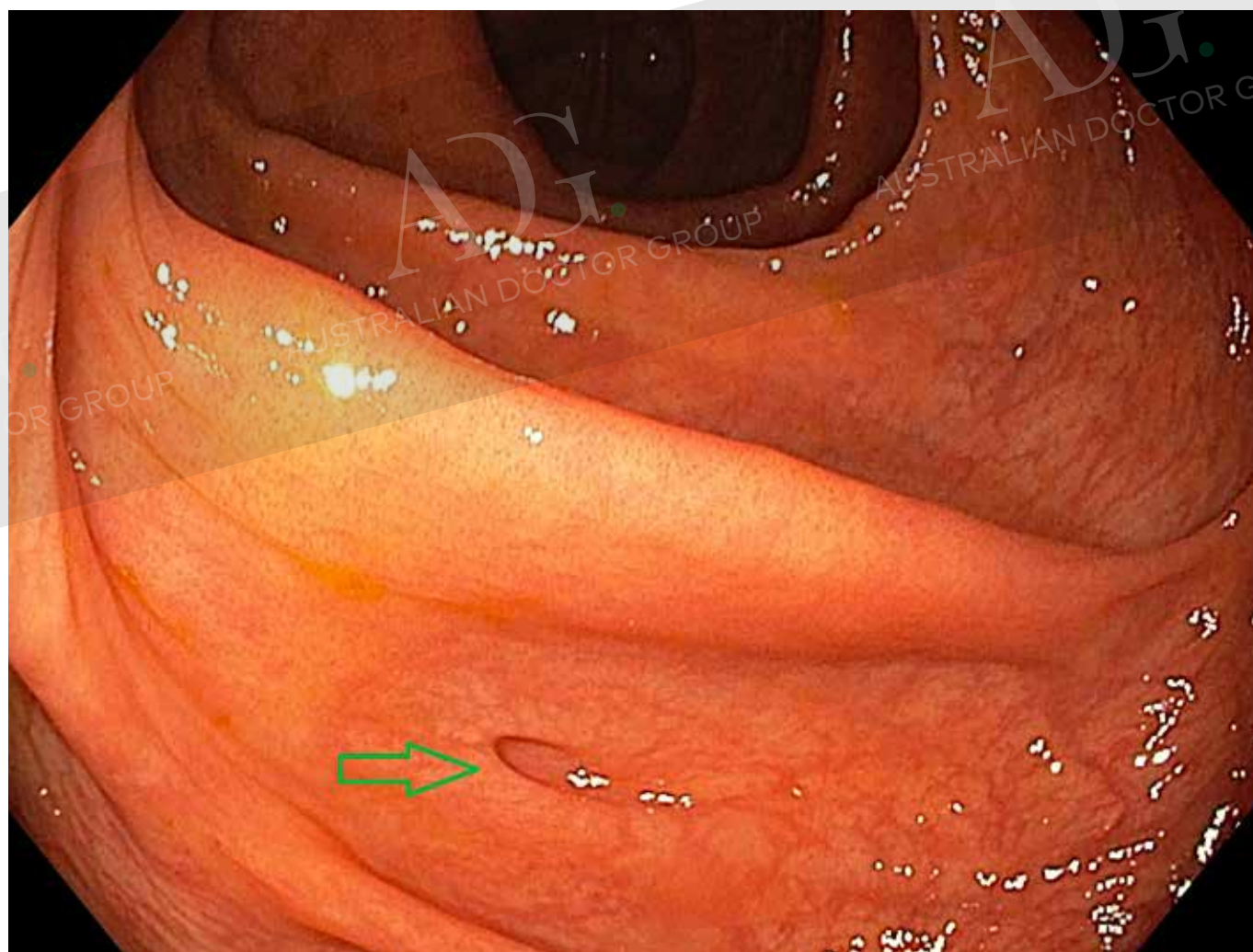
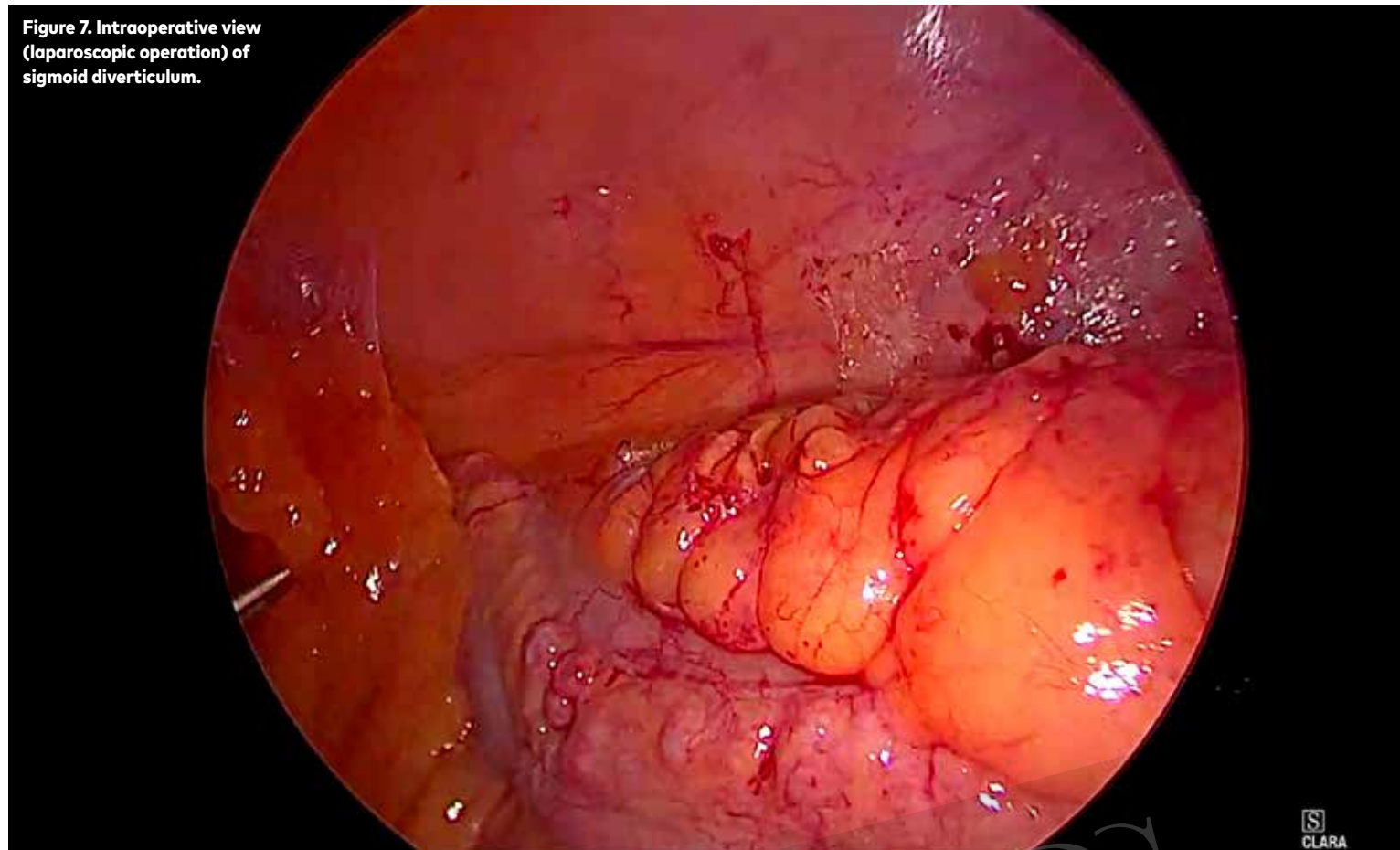
However, the ASCRS guidelines note that the studies on which the meta-analysis is based are small and the overall number of patients is low; therefore, they still recommend colonoscopy after uncomplicated diverticulitis.<sup>34</sup> Older guidelines have mixed opinions, with the US guidelines recommending colonoscopy, while the European societies guidelines do not.<sup>18</sup>

Because of the uncertainty in the literature, the author still routinely offers colonoscopy for uncomplicated diverticulitis if one has not been performed within 12-24 months but always discusses this further with the patients. Patients with complicated diverticulitis require a colonoscopy because of the increased risk of cancer associated with complicated disease. In addition, if there are any suspicious features on clinical history – for example, weight loss, PR bleeding, tenesmus – or on CT – short segment, absence of diverticulum, lymphadenopathy, shouldering, suspicious liver/lung lesions, obstruction – then a colonoscopy should be performed.

### The role of immune modulation

It became fashionable to consider diverticulitis as a form of immune disease, in the same vein as inflammatory

**Figure 7. Intraoperative view (laparoscopic operation) of sigmoid diverticulum.**



**Figure 8. Diverticulum (green arrow) seen at the time of colonoscopy.**

bowel disease, although it is only another possible pathogenic theory. Because of this, medications such as mesalamine and rifaximin were trialled to see if they would reduce recurrence or symptoms. However, most trials and a recent Cochrane review have shown no difference the reduction of acute recurrence with mesalamine, but it may reduce symptoms.<sup>36</sup> The trials were small and had issues with heterogeneity and bias. The data for rifaximin are significantly weaker.<sup>37</sup>

Probiotics have also been studied, although the only randomised control trial was small, only used symptoms as a marker of recurrence and was therefore quite subjective.<sup>38</sup>

The author generally discusses these options with patients, and they are worth a trial in patients who have had chronic diverticulitis.

Note that the success rates appear variable in the literature, and therefore, patients should be kept under close surveillance while undertaking these trials.

## Patients with complicated diverticulitis require a colonoscopy because of the increased risk of cancer associated with complicated disease.

### PREVENTION

THE literature on prevention is unfortunately sparse. Traditionally, a high-fibre diet has been recommended to prevent diverticular disease and diverticulitis, although the literature on this is lacking. There have been some population cohort studies

that have shown that weight reduction, exercise and smoking cessation may reduce the risk of both the formation of diverticula as well as diverticulitis.<sup>39,40</sup> These studies did not

produce trial data and show only that there is a correlation between these possible risk factors and diverticular disease. Similarly, there is no data showing that nuts, corn or seeds cause acute diverticulitis or precipitate its recurrence.<sup>41</sup> Nonetheless, because reducing weight, increasing physical

activity and reducing smoking have other health benefits, these should still be encouraged.

### CASE STUDIES

#### Case study one

ERIK, 55, presents with a 24-hour history of left iliac fossa pain, nausea and vomiting. He has not noticed any change in his bowel motions and has never had surgery.

He is obese, has hypertension and is a pack-a-day smoker. There is no family history of colorectal cancer, and Erik has not had a colonoscopy.

On examination, he has tachycardia (110bpm) and a temperature of 38.0°C. He is tender in the left iliac fossa, but there is no generalised peritonitis. Routine blood work shows a WCC of 14x10<sup>9</sup>/L (normal: 4.0-11.0x10<sup>9</sup>/L), with raised

◀PAGE 16 neutrophils but no other abnormalities. A CT scan reveals a pericolic abscess (see figure 9).

Erik is admitted to hospital, placed on clear fluid, and started on IV ceftriaxone and metronidazole. Later that day, the radiologist places a CT-guided drain, which drains 15mL of pus.

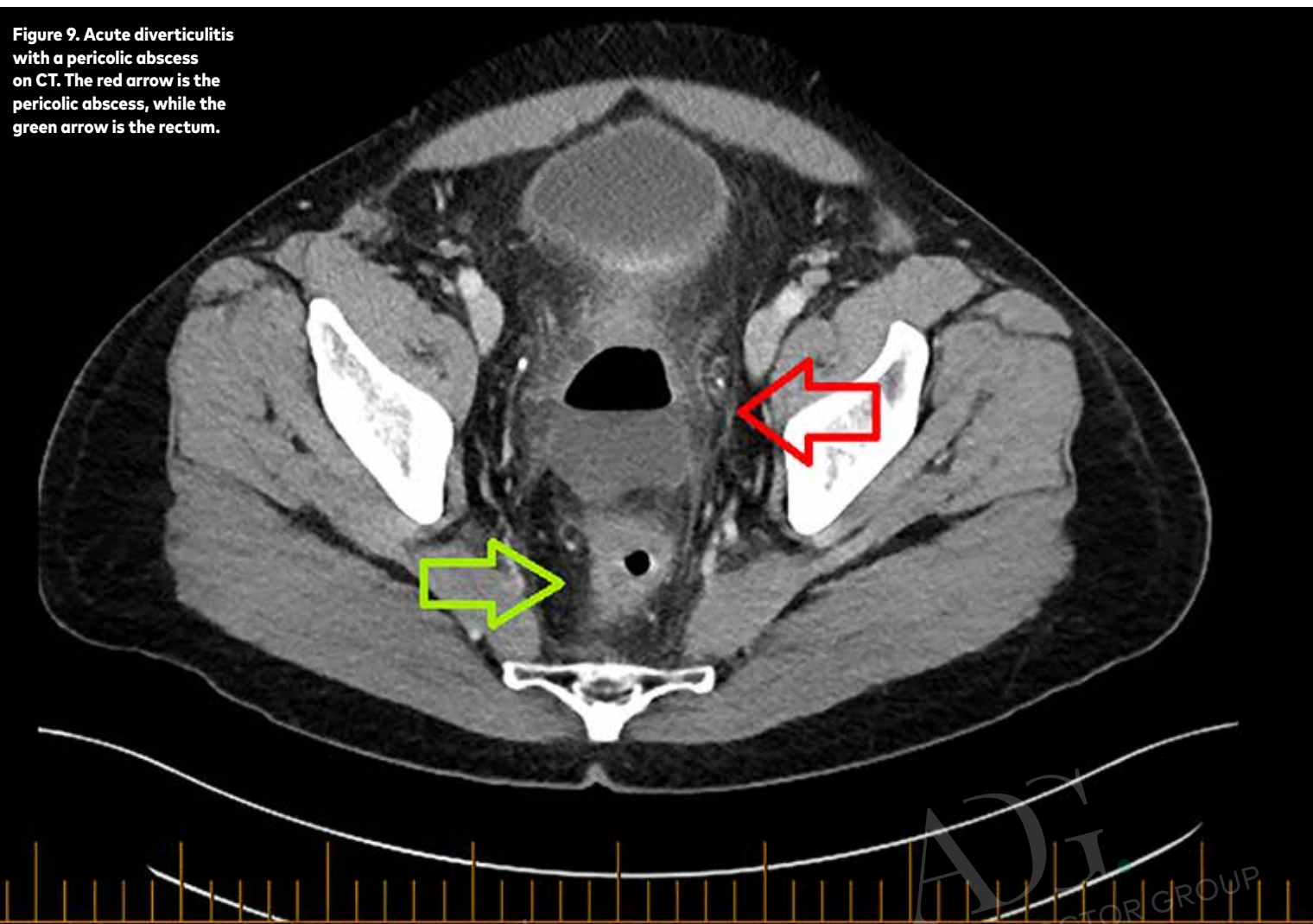
Erik makes an uneventful recovery over the next three days. There is no further drainage from the drain, so it is removed. He is discharged with 10 days of amoxicillin-clavulanic acid. Eight weeks after admission, Erik undergoes a colonoscopy. This reveals diverticular disease, as well as a small adenoma in his caecum, which later is completely removed.

At the subsequent consultation, Erik and the gastroenterologist have a lengthy discussion about the future risk of further recurrence in the setting of complicated diverticulitis versus the risks of a resection. However, because of his obesity and smoking, it is felt that the risks of resection are too high.

Erik is motivated by this episode to stop smoking and lose weight. A year later, he has lost 15kg, stopped smoking and has had no further episodes of diverticulitis. Considering his good progress, Erik is returned to his GP for ongoing care and is advised to be alert for further episodes of diverticulitis.

#### Case study two

Nola, 60, presents to her GP with mild left iliac fossa pain but no other symptoms. She has no previous medical history but had a normal screening colonoscopy six months previously. Examination reveals left iliac fossa tenderness. Urinalysis is normal. In the absence of a previous history, Nola is referred for a CT scan. This shows



**Figure 9. Acute diverticulitis with a pericolic abscess on CT. The red arrow is the pericolic abscess, while the green arrow is the rectum.**

features consistent with mild diverticulitis in the left iliac fossa and no complicated features. Routine blood work is normal.

Because the episode is mild, Nola is not given any antibiotics and is asked to return in a week for review. On subsequent review, she has completely

recovered. As Nola had a normal colonoscopy recently, further colonoscopy is not indicated.

Over the next year, Nola has three further episodes of diverticulitis. The first two resolve much like her initial presentation and do not require antibiotics. However, the third episode does

not resolve, and the GP prescribes amoxicillin-clavulanic acid and orders a CT scan. The CT demonstrates only uncomplicated diverticulitis. Nonetheless, the pain does not resolve with oral therapy. Nola's symptoms finally settle after an admission for IV antibiotics and bowel rest.

At follow-up with the surgeon, Nola's history of recurrent episodes is discussed. Particular attention is paid to a discussion of the risks and benefits of resection, but Nola is in favour of more watchful waiting.

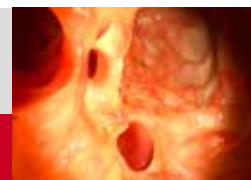
There are three further episodes of diverticulitis over the next three months.

Nola feels the condition is having a significant impact on her quality of life and elects to undergo a laparoscopic anterior resection.

She makes an excellent recovery and does not have further episodes of pain. The histopathology shows evidence of chronic diverticulitis with thickening of the bowel.

## How to Treat Quiz.

### DIVERTICULITIS



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#### 1. Which THREE statements regarding diverticulitis are correct?

- a The condition is more common in men.
- b Approximately 65% of patients over 65 have diverticular disease.
- c Diverticular disease increases with age.
- d Diverticula are associated with the entrance of nerve fibres into the colonic wall.

#### 2. Which ONE segment of the colon is most susceptible to diverticular disease in Western populations?

- a The rectum.
- b The sigmoid colon.
- c The caecum and ascending colon.
- d The descending colon.

#### 3. Which THREE are unequivocal features of complicated diverticulitis?

- a Microperforation.
- b Obstruction.
- c Peritonitis.
- d Stricture.

#### 4. Which TWO statements regarding the natural history and risk factors for diverticulitis are

#### correct?

- a A low-fibre diet possibly leads to increased rates of diverticular disease and diverticulitis.
- b A first episode of diverticulitis is common before 40.
- c Pre-emptive colectomy is recommended in obese and immunosuppressed patients.
- d Recurrence rates after a single episode of diverticulitis are quoted between 7% and 62%.

#### 5. Which THREE are common differential diagnoses of diverticulitis?

- a Inflammatory bowel disease.
- b Fibroids.
- c UTI.
- d Ruptured ovarian cyst or cyst torsion.

#### 6. Which TWO are common features on presentation?

- a Mucus in the stool.
- b Jaundice.
- c Left iliac fossa pain.

#### 9. Which TWO statements regarding the management of diverticulitis are correct?

- a Indications for surgery in the

- d Nausea and vomiting.

#### 7. Which ONE imaging modality is recommended for the diagnosis of diverticular disease/diverticulitis?

- a MRI.
- b Ultrasound.
- c CT.
- d X-ray with oral contrast.

#### 8. Which THREE are appropriate in the initial management of diverticulitis?

- a Outpatient management for mild cases.
- b Admission and IV antibiotics for those with systemic signs of sepsis.
- c Colonoscopy to cauterise vessels in diverticular bleeding.
- d IV antibiotics for localised perforation.

acute setting include systemic sepsis, instability that is not improving or large bowel obstruction from stricture.

- b The second and subsequent episodes of diverticulitis have the greatest risk of a complicated presentation.
- c Unless contraindicated, most patients requiring surgery will undergo a resection and anastomosis in a single procedure.
- d A 'watch and wait' option is recommended in all patients with recurrent diverticulitis.

#### 10. Which THREE statements regarding diverticulitis are correct?

- a Mesalazine has been shown both to reduce acute recurrences and reduce symptoms.
- b The role of antibiotics in management is controversial.
- c Colonoscopy is recommended after an episode of uncomplicated diverticulitis if not recently performed.
- d There are no data showing that nuts, corn or seeds cause acute diverticulitis or precipitate its recurrence.

## PROGNOSIS AND CONCLUSION

MOST patients who develop uncomplicated diverticulitis will have only a single episode, which will resolve and not need further treatment.

Take care to rule out malignancy, although this is uncommon in cases of uncomplicated diverticulitis. Carefully evaluate patients with complicated diverticulitis to rule out malignancy and to determine whether surgery is required.

It is worth having a detailed discussion regarding the risks and benefits of resectional surgery in patients whose quality of life is impacted by diverticulitis.

## RESOURCES

- **Colorectal Surgical Society of Australia and New Zealand, patient handout on diverticular disease:** [bit.ly/38593sJ](https://bit.ly/38593sJ)
- **The American Society of Colon and Rectal Surgeons clinical practice guidelines for the treatment of left-sided colonic diverticulitis:** [bit.ly/3498TPL](https://bit.ly/3498TPL)

References on request from [howtotreat@adg.com.au](mailto:howtotreat@adg.com.au)



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