# DIVERTICULAR DISEASE

D J Jones

**Cardinal clinical features of diverticular disease**

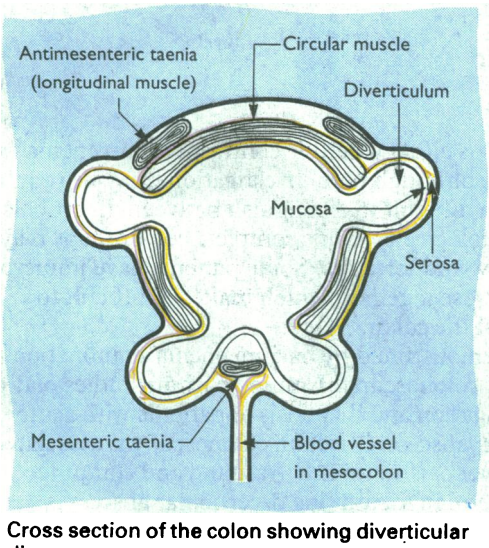
Diverticulosis:
- None
- Colicky pain
- Altered bowel habit

Acute diverticulitis:
- Constant pain
- Fever
- Nausea and vomiting
- Bleeding
- Altered bowel habit
- Localised or generalised tenderness

Diverticula are acquired herniations of mucosa through the muscular wall of the colon. Diverticulosis indicates asymptomatic diverticular disease and diverticulitis the presence of associated inflammation.

Diverticular disease is very common in developed countries. It is associated with increasing age: it affects about a third of those over the age of 65 and half of those over 80. In 1989 in England and Wales 1480 deaths were attributed to complications of diverticular disease.

## Aetiology and pathology




Cross section of the colon showing diverticular disease.

Diverticula are thought to arise as a pulsion phenomenon secondary to raised intraluminal pressure, which weakens the bowel wall. Constipation secondary to a low fibre diet has been implicated in this process. Muscular hypertrophy, spasm, and irregular contraction are purported to represent attempts to propel the stools in constipated patients. However, only a half of patients are constipated, so other unidentified factors must be equally important.

Diverticula are found throughout the colon but in most cases (over 90%) occur in the descending and sigmoid colon. A diverticulum consists of a pouch of mucosa covered with serosa. It herniates through the wall of the bowel at a point of natural weakness where it is penetrated by a colonic artery.

The diverticula may be large and obvious or inconspicuous, being obscured by appendices epiploicae. Viewed from within the colon they appear as slit-like openings. The circular muscle coat of the bowel is thickened and the taeniae coli shortened, causing hypersegmentation of the colon.

**Complications of diverticular disease**

Acute inflammation:
- Localised peritonitis
- Abscess formation
- Generalised peritonitis

Perforation:
- Local faecal peritonitis
- Generalised faecal peritonitis

Fistulas:
- Colovesical
- Colovaginal

Stricture

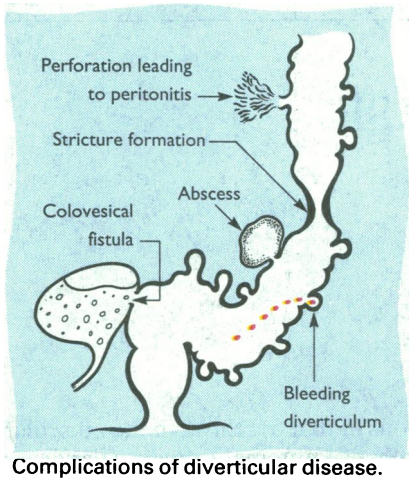
Haemorrhage

In diverticulitis there is evidence of extramural pericolic inflammation, localised peritonitis, and, in some cases abscess formation. Abscesses may extend to affect adjacent structures, resulting in fistulas, colovesical fistulas being the most common. Inflammation is followed by fibrosis, which occasionally causes stricturing and large bowel obstruction.

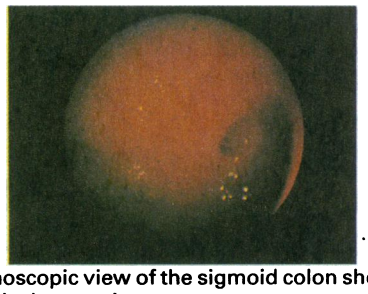
Bleeding arises when the weakened wall of a blood vessel ruptures as it passes through the wall of a diverticulum in a submucous plane. Haemorrhage may be brisk but usually stops spontaneously owing to vessel thrombosis. Traditional teaching is that diverticular disease is a common cause of lower gastrointestinal haemorrhage, but many such cases are now recognised to be due to colonic angiodysplasia.

Diverticular disease is not a premalignant condition, but, as it is so common, it often coexists with colorectal cancers.

## Clinical features



Complications of diverticular disease.


Colonoscopic view of the sigmoid colon showing a diverticular opening.

*Asymptomatic diverticular disease*

Many patients have incidental asymptomatic diverticular disease on endoscopy, on barium enema examination, or at operation. Probably less than a quarter of those with diverticular disease actually develop related symptoms.

*Symptomatic diverticular disease*

Patients with uncomplicated diverticular disease have symptoms of an irritable colon, owing to spasm and disordered motility. They experience colicky pain, usually in the lower or central abdomen, associated with flatulence, distension, and altered bowel habit.

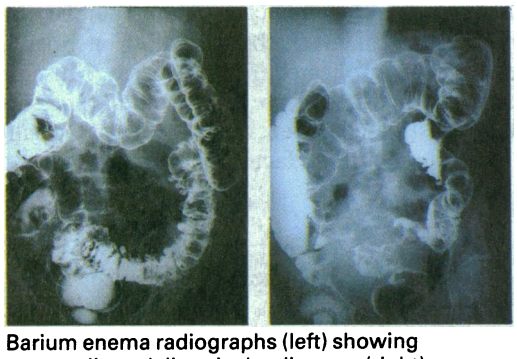
*Complicated diverticular disease*

Patients with acute diverticulitis experience constant pain localised to the left iliac fossa, which lasts for several days and is associated with fever and signs of local or, occasionally, diffuse peritonitis. A small proportion of patients suffer perforation and present with severe, diffuse peritonitis. Large bowel obstruction may arise secondary to a fibrous diverticular stricture or occlusion of the lumen secondary to an acute infective complication. The symptoms are rarely as severe as those of malignant large bowel obstruction.

Patients with bleeding in diverticular disease experience a sudden urge to defecate followed by the passage of a large bloody stool. This may be repeated, but bleeding usually stops spontaneously.

The most common fistula in patients with diverticular disease is between the colon and bladder. Patients with colovesical fistulas experience pneumaturia, have recurrent urinary tract infections, and pass varying amounts of faeces in the urine. Fistulas to the uterus and vagina cause a faeculant vaginal discharge.

## Investigation


Barium enema radiographs (left) showing uncomplicated diverticular disease; (right) showing a diverticular stricture. This is difficult to distinguish from cancer; colonoscopy is essential.

The mainstay of diagnosis is either a double contrast barium enema examination or colonoscopy, although both investigations may be required for full evaluation. It is often difficult to distinguish between diverticular and malignant strictures radiologically, while complete colonoscopy may be difficult if the colon is narrow and tortuous. Some patients have numerous large diverticular openings close together, which makes it difficult to distinguish the true lumen of the colon.

Fistulas are most easily demonstrated by barium enema examination as the site is rarely identified at colonoscopy. Limited barium studies play an important part in the investigation and diagnosis of patients with acute diverticulitis and diverticular abscess, in whom colonoscopy is associated with a significant risk of bowel perforation. Ultrasound and computed tomographic imaging are useful in identifying diverticular abscesses.

## Treatment

**Treatment of diverticular disease**

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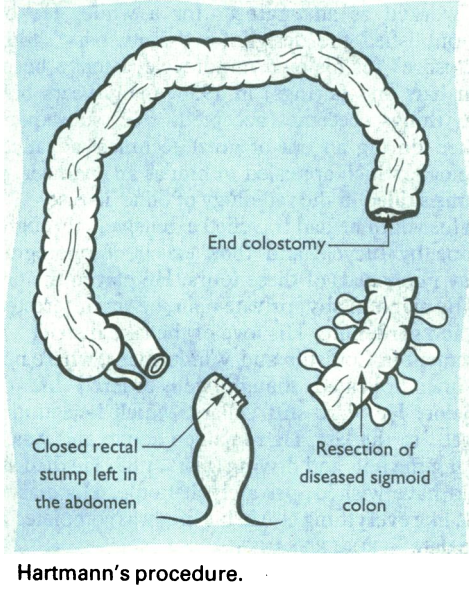
|---|---|---|---|
| *Uncomplicated* | —High fibre diet<br>—Bulk laxative<br>—Antispasmodics | *Perforation* | —Laparotomy<br>—Peritoneal lavage<br>—Antibiotics<br>—Resection<br>—Delayed anastamosis |
| *Severe uncomplicated* | —Sigmoid myotomy<br>—Colectomy | | |
| *Diverticulitis* | —Fluid support<br>—Broad spectrum antibiotics | *Fistula* | —Elective resection<br>—Primary anastamosis |
| *Abscess* | —Percutaneous drainage | *Haemorrhage* | —Resuscitation<br>—Colectomy (if life threatening) |
| | | *Obstruction* | —Resection (Hartmann's procedure)<br>—Delayed reanastamosis |

*Diverticular disease*

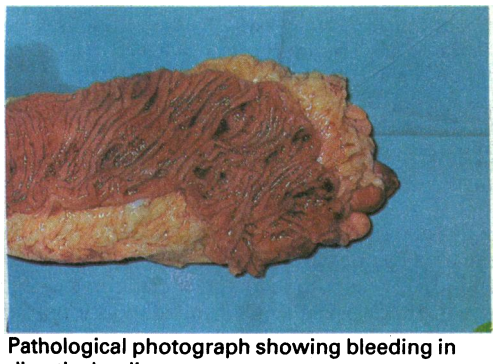
Dietary manipulation is the mainstay of treatment for uncomplicated diverticular disease. Patients should be advised to take a high fibre diet supplemented with a bulking agent such as bran or ispaghula to ease constipation. Pain due to muscular spasm is relieved with an antispasmodic drug such as mebeverine. The role of surgery in uncomplicated diverticular disease is small and controversial, but some patients with intractable symptoms benefit from colonic resection. Sigmoid myotomy, which involves division of the circular muscle coat of the affected colon, was once popular but carries the risk of missed perforation and has largely been abandoned.

Operative photograph of diverticular disease in the sigmoid colon.

Barium enema radiograph showing indentation of the ascending colon due to an abscess secondary to diverticular disease.




Hartmann's procedure.



Pathological photograph showing bleeding in diverticular disease.

*Acute diverticulitis*

The mainstay of treatment for acute diverticulitis is rest, analgesia, broad spectrum antibiotics, and either oral or intravenous fluids depending on the patient's general condition. Most patients settle on this treatment and surgery is not necessary. After recovery from an acute attack of diverticulitis patients are treated as for uncomplicated diverticular disease. If a patient is subjected to laparotomy and discovered to have acute diverticulitis antibiotics should be administered, the peritoneal cavity lavaged with tetracycline solution, and the abdomen closed. Colonic resection or the creation of a transverse loop colostomy are not necessary for localised diverticulitis. A minority of patients with acute diverticulitis do not respond to conservative treatment and develop diffuse peritonitis or local abscesses requiring surgical intervention.

*Diverticular abscess*

Most diverticular abscesses are now confirmed by ultrasonography or computed tomography and can be drained percutaneously. Abscesses can also be drained at open operation, but care is essential to avoid diffuse contamination of the peritoneal cavity with pus and faeces. A defunctioning colostomy is not necessary. Many patients will develop a faecal fistula via the drain site, but the discharge is usually slight and most close spontaneously in the absence of distal obstruction.

*Generalised peritonitis*

A laparotomy is performed for generalised peritonitis, pus and faeces removed, and the peritoneal cavity thoroughly lavaged with tetracycline solution. Further progression of sepsis is prevented by resection of the diseased segment of colon.

A transverse loop colostomy without resection was once popular, but this does not effectively defunction the diseased segment, as faeces tend to spill over into the distal colon, preventing resolution of the sepsis. Resection removes the diseased bowel and provides an opportunity for histological confirmation of the diagnosis as confident distinction between diverticular disease and malignancy is often difficult at operation.

Primary anastomosis in the unprepared colon, which may be loaded with faeces, in the presence of sepsis carries a risk of anastomotic leakage and breakdown. The preferred operation is to resect the diseased bowel, exteriorising the proximal colon as an end colostomy and either closing over the distal large bowel with sutures (Hartmann's procedure) or exteriorising it as a non-functioning mucus fistula. Continuity of the large bowel is restored at a later date when the patient has fully recovered. Resection of complicated diverticular disease and reversal of a Hartmann's procedure are often technically demanding and should be performed by an experienced surgeon.

*Diverticular fistulas*

Traditionally, diverticular fistulas were defunctioned by a proximal transverse loop colostomy, allowing resolution of inflammation at the site of the fistula, hence facilitating subsequent staged resection and closure. With adequate bowel preparation and prophylactic antibiotics it is often possible to perform a single operation with resection of the diseased colon and repair of the fistula.

*Diverticular haemorrhage*

Most patients with bleeding in association with diverticular disease settle on conservative management, but resection is occasionally necessary for life threatening haemorrhage. Radionucleide imaging and arteriography may help in localising the source of haemorrhage and identifying bleeding due to angiodysplasias. If the site of bleeding is identified a segmental resection is performed. If the site can not be determined preoperatively or during surgery subtotal colectomy and ileorectal anastomosis may be necessary.

The photographs were produced by the department of medical illustration, Salford Health Authority, and the line drawings were prepared by Paul Somerset, medical illustration department, Wythenshawe Hospital.

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