Diverticular disease

Peter E Coyne

MR Kalbassi

Abstract

Diverticular disease is a common problem affecting the colon in developed countries. It causes significant cost to healthcare systems and leads to significant morbidity and mortality associated with its complications which include abscess formation, perforation, bleeding and colonic obstruction. The management of acute diverticular sepsis has evolved to include both radiological and surgical options of drainage as well as resectional surgery for more widespread sepsis. The developing use of laparoscopic surgery has further use within the management of the emergency patient as well as the elective setting including in diverticular surgery. The role of surgery in the elective setting is controversial and varied. We examine the evidence behind the management of this common and complex pathology.

Keywords Diverticular disease; diverticulitis; Hartmann's procedure; Hinchey; laparoscopic surgery; lavage

Introduction

Diverticulosis is a common condition prevalent in western society. It is increasing in developed countries with a prevalence rising to 3.8/100,000 in 2000.[1] Roughly 75% of people over 70 years old will have diverticulosis on flexible sigmoidoscopy.[2] Most patients will remain asymptomatic but historically studies have shown that symptoms develop in 10–25% patients.[3] Complications in the form of haemorrhage, sepsis and perforation, stricture and obstruction can occur and leads to 200,000 hospitalizations annually in the USA at a cost of $300 million.[4] In western populations it typically affects the left colon with right-sided diverticula seen as part of a pan-colonic condition. In the Asian population however it mainly affects the right side of the colon.[5]

Pathophysiology

Diverticulae are the herniation of the colonic mucosa through weak points in the bowel muscular tube due to high intraluminal pressure (Laplace's law). The rectum has complete layers of longitudinal muscle and is larger in diameter, which is why it is usually spared from diverticulosis and its complications. The sigmoid colon with its narrower lumen, lack of a complete longitudinal muscle layer and higher pressure to allow expulsion of faeces is thus the commonest place affected by the condition. The diverticula occur at the weakest point where the arterial branches pierce the circular muscle layer to vascularize the bowel. The main predisposing factor for formation of diverticulosis is lack of dietary vegetable fibre.[6] Hyperelastosis and the collagen structure within the colon contribute along with associated risk factors including obesity, lack of exercise, smoking and immunosuppression.

Presentation and complications

Diverticular disease is often asymptomatic. Patients can have incidental diverticulosis detected on investigation for other pathology on CT, endoscopy or contrast studies (e.g. barium enema). There is also an overlap between irritable bowel syndrome (IBS) and diverticular disease. Symptomatic management with stool softeners, anti-spasmodics and dietary advice is required for treatment. Indeed subsequent resection can lead to continuing symptoms. The term diverticulitis should be reserved for clinical, radiological or endoscopic proven inflammation to avoid over-treatment with resection.

Most patients requiring intervention will do so as an emergency. Typically they present with lower abdominal pain (usually in the left iliac fossa) which can be linked with diarrhoea and/or passage of blood per rectum. There can be associated systemic symptoms including fever, nausea, vomiting and anorexia. Clinical signs that may be elicited include tenderness and/or peritonism and these can be associated with the presence of an inflammatory mass within the abdomen (phlegmon).

Blockage of the inlet to the diverticulum leads to subsequent infection with bacterial organisms from the colonic tract. This can lead to perforation either with abscess formation or free perforation leading to subsequent sepsis. The degree of containment will often determine the course of presentation (diverticula on the anti-mesenteric border are less confined and thus lead to more systemic presentations e.g. free perforation and faecal contamination). The slower development of sepsis leads to inflammatory infiltration of adjacent organs including, bladder, small intestine, uterus, vagina and subsequent fistulation.

If successfully treated or self-limiting attacks of inflammatory change can lead to fibrosis and thickening and stricture formation which can then present with large bowel obstruction. Inflammation of the diverticulum can lead to haemorrhage and present with rectal colonic bleeding. It is important that in investigation and management other pathologies are excluded including carcinoma and colitis. However there is also a distinct but under-recognized diverticular colitis with patchy inflammation sparing the diverticular orifices. It can be pathologically similar to Crohn's and indeed respond to similar therapy for inflammatory bowel disease.

Classification

Common classifications to assess the degree of complication and help stratify treatment include those of Killingback and Hinchey (Table 1). The easy use and stratification of operative and radiological signs mean that the Hinchey system is the most widely used to describe and stratify treatment of diverticular disease.

Investigation and management

Patients presenting acutely as an emergency with suspected diverticulitis should have basic investigations including blood samples taken which may likely demonstrate a leucocytosis,

Peter E Coyne *MB BS (Hons) FRCSEd (GenSurg) PGCertMedEd (Newcastle) is a Specialist Registrar in Colorectal Surgery at Northumbria Healthcare NHS Foundation Trust, Northumberland, UK. Conflicts of interest: none declared.*

MR Kalbassi *MB BCh BAO LRCPI & LRCSI M. Phil FRCS (Gen Surg) is a Consultant Colorectal and Laparoscopic Surgeon, Northumbria Healthcare NHS Foundation Trust and Nuffield Health, Newcastle upon Tyne Hospital, Newcastle upon Tyne, UK. Conflicts of interest: none declared.*

Modified Hinchey classification of diverticulitis[7]

Level 0	Diverticulitis
Level 1	• Confined pericolic inflammation • Pericolic abscess
Level 2	Pelvic, distant intra-abdominal or retroperitoneal abscess
Level 3	Generalized purulent peritonitis
Level 4	Faecal peritonitis

Table 1

elevated C-reactive protein and in cases of sepsis may demonstrate a metabolic/lactic acidosis, acute renal impairment and deranged liver function tests. In cases of simple diverticulitis plain chest X-ray will help exclude free perforation, but it should be borne in mind that pneumoperitoneum does not mandate laparotomy.

Options in definitive imaging include ultrasound (USS), water-soluble contrast study and CT. Whilst evidence in favour of CT is lacking its easy accessibility, reliability and ability to plan further management make it the gold standard. CT has the advantage of helping the clinician decide on the degree of contamination or size of abscess and also the potential for percutaneous drainage when required.

CT will also help exclude obstruction and may detect co-existent malignancy. Following an acute attack current standards state that luminal endoscopy should be performed with a view to excluding a cancer/polyp. However it is recognized that endoscopy in patients with diverticular disease can be difficult and CT–colonography (CTC) has been proposed as a viable alternative. The Special Interest Group in Gastrointestinal and Abdominal Radiology (SIGGAR) trial and has shown it to be comparable to endoscopy and barium enema.[8]

Emergency presentation

Sepsis

Conservative management: for patients with localized signs, or who are systematically well a thorough trial of conservative management is appropriate. Initial imaging may show Hinchey 0/1 diverticulitis. CT is still useful as a diagnostic test but also in case of subsequent deterioration. Most abscesses smaller than 5 cm will resolve with conservative management. Regular review and re-assessment is required and deterioration or failure to thrive should mandate re-imaging and further treatment stratification. The use of antibiotics in treatment has also come under scrutiny in recent years, however no true meta-analysis was possible and further studies are required before antibiotics are no longer used or required in the management of diverticular disease.

Radiological drainage: percutaneous drainage remains an option for confirmed collections around a diverticular phlegmon. It should be remembered that small collections (<5 cm) usually resolve with conservative management and rarely require intervention. Drainage can be done as a bridge to elective surgery and is feasible and safe providing a safe passage to the collection is seen on imaging. This is a particularly appealing therapeutic option in those patients for whom predicted mortality from surgery is high and who remain stable.

Laparoscopy and drainage: in 2008 Myers et al.[9] proposed laparoscopic washout and drainage as a viable emergency option for perforated diverticulitis (Hinchey 2/3). With the explosion of laparoscopic surgery, laparoscopic drainage has perhaps superseded radiological drainage in management of patients with abscess formation. However there has been controversy at these results and the success has been difficult to replicate nationwide. However laparoscopic lavage remains an option in the armoury of the colorectal surgeon in selected cases and can lead to lower morbidity and mortality. Should it fail it does not mean further surgery cannot be performed. It is also possible laparoscopically to suture a small (<1 cm) defect or use an omental patch to cover the defect.

The main advantage of lavage however is the ability to turn the emergency resection into an elective procedure where conversion rates are lower, with reduction in morbidity.

Definitive surgery: in those with Hinchey 4 perforated diverticulitis or those in whom a large perforation or systemic signs are present definitive surgery is required. The options remain: open drainage ± diversion (colostomy), resection ± anastomosis (± defunctioning ileostomy). Anastomosis is preferable for patients and avoids the need for a second major procedure to re-anastomose should a patient wish this. However in the presence of sepsis and an acutely unwell patient a leak can prove fatal.

A Hartmann's procedure – resection of the sigmoid loop plus exteriorization of the proximal colon as an end colostomy and closure of the rectal stump remains a safe emergency procedure. There remains morbidity associated with the formation of a stoma – retraction (especially in the obese patient), separation, obstruction as well as the potential for pelvic sepsis related to blowout from the rectal stump. Most colorectal surgeons would suture and divide the stump at a convenient site usually close to the pelvic brim (it can be marked with long non-absorbable sutures) allowing easy identification of the rectal stump when performing future reversal.

There is evidence that primary resection and anastomosis leads to lower mortality (7.4% vs. 15.6% for Hartmann's procedure).[10] However these trials are both heterogeneous and at levels Hinchey 2 and above no difference existed. Further work is still required. The decision to anastomosis remains a personal one with experience, status of the patient (pre-morbid and disease related state taken into account). Improvements in post-operative care, nutrition and perioperative management with intensive care means that the decision to anastomose can be taken in those patients undergoing resection. Where Hinchey 4 peritonitis is present, or in an unstable or frail patient, a Hartmann's procedure remains the best option. Both of these options in experienced hands can be performed laparoscopically where possible; however conversion to open procedure is often required. The Sigma trial showed that in the elective setting laparoscopy is feasible,[11] and advocates have advanced this to the emergency setting as well.

The issue of providing a covering ileostomy when anastomosing again remains a personal choice. The anastomosis is usually high and the proximal colon unprepared. If an ileostomy is proposed it may be prudent to lavage the proximal colon (either using the appendix or caecum or milking from the distal end.