MANAGING COMPLICATED DIVERTICULAR DISEASE IN 2014

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ABSTRACT

Complicated diverticular disease refers to patients who present with abscess, peritonitis, bleeding, fistula, or bowel obstruction. Management paradigms for these complications have changed enormously in the last 20 years. Surgical options include primary resection with or without anastomosis, exteriorisation of the perforation as the site of diversion, and more and more in recent years, simple lavage and drainage. The different classifications, the indications and techniques of interventional radiology, and endoscopy, as well as other minimally invasive or traditional surgical treatment of these complications are covered in this review.

Keywords: Diverticular disease, complicated diverticular disease, abscess, peritonitis, primary resection, primary anastomosis, colostomy, Hartmann procedure, lavage, drainage.

INTRODUCTION

Diverticular disease (DD) may be defined as the presence of diverticula, in fact, pseudodiverticulosis,[1,2] saclike mucosal outpouchings that protrude the colon through the muscular layer; when inflammation ensues (microperforations), the inflamed diverticula (called 'diverticulitis') can subside, either spontaneously or with minimal medical treatment, or become 'complicated' (approximately one-fourth of patients), characterised by an intensive inflammatory infiltrate with macrophages. 'Complicated' DD refers to patients who present with abscess, peritonitis, bleeding, fistula, or bowel obstruction.

Whether an inflamed diverticula proceeds toward a more serious complication or not depends on the magnitude of the (micro or macro) perforation, the amount, nature, and location of spillage of intestinal contents, and the local mechanisms with which the body defences react. According to a recent review,[3] 15-20% of diverticulitis cases develop complications.[1,2] Abscesses are in fact considered as the result of microperforation and/or walled-off micro or macroperforations. Infection can also spread locally to neighbouring structures such as the ovary, the scrotum, or even the hip joint, or travel via the portal vein to cause pylephlebitis and, ultimately, hepatic abscess formation. Uncontained perforations result in peritonitis, classically subdivided into purulent and faecal peritonitis. Obstruction can be caused by pseudotumoural formation of the colonic wall, compression from abscess, inflammatory adhesions to nearby bowel, responsible for early obstruction, or more rarely, strictures or bands created by any of the above, leading to progressive fibrosis and late obstruction. Fistulas most commonly involve the bladder,[4] but also include colovaginal (typically in the hysterectomised woman),[5] coloenteric, and colocutaneous fistulas. Management paradigms for complications, such as localised abscess, generalised peritonitis, and bleeding, have changed enormously in the last 20 years; interventional

radiology, endoscopy, as well as other minimally invasive treatments of these complications, form the basis for this review.

COMPLICATIONS AND CLASSIFICATIONS

Several classifications have been developed to describe and guide the management of the range of complications in DD. One of the best known and most widely used was published in Canada by Hinchey in 1978[6] (Table 1). Based on progressively increasing degrees of infective complications, found intraoperatively, the Hinchey classification does not take into account any preoperative information (no sonography or computed tomography [CT] findings), and cannot be used in the absence of interventional or surgical therapy, which limits its use today and has led to several modifications.[2,7,8,9,10,11]

Wasvary et al.[11] added a Stage 0 in order to define uncomplicated DD and subdivided Hinchey 1 into confined pericolic inflammation or phlegmon and colonic wall thickening with pericolic soft tissue modifications (Stage 1A), different from pericolic or mesocolic disease abscess. Sher et al.[10] modified Hinchey's Stage 2 (deep pelvic abscess) to individualise distant abscesses amenable to percutaneous drainage (2a) from complex abscesses associated with fistula (2b), usually requiring surgery. The European Association for Endoscopic Surgery consensus conference[2] introduced complications other than perforation, including bleeding, strictures, fistula with other organs, and obstruction. Ambrosetti et al.[7] and Kaiser et al.[9] used CT scan to provide more precise preoperative evaluation and to scale severity.

Table 1: Stages of complicated diverticular disease.

Stage	Classification
1	Phlegmon, pericolic, or mesenteric abscess
2	Diverticulitis with walled-off pelvic abscess
3	Diverticulitis with generalised purulent peritonitis
4	Diverticulitis with generalised faecal peritonitis

According to Hinchey et al.[6]

Finally, in view of the modern concepts in therapy, Klarenbeck et al.,[12] in a complex but complete classification combining clinical, radiological, and treatment characteristics, propose to divide DD into three categories: Stage A is uncomplicated DD, Stage B, chronic complicated disease, and Stage C, acute complicated disease. While the diversity of classifications reflects the need to include either other preoperative diagnostic modalities (Hinchey's classification was intraoperative) or therapeutic modalities (not all require surgical intervention), it is difficult to recommend any one classification. The Hinchey classification is certainly the most well-known and is still used extensively. The Wasvery et al.[11] and Sher et al.[10] modifications warrant consideration for their sub-classifications of Hinchey 1 and 2. The Ambrosetti et al.[7] classification is radiologic only. Ideally the Klarenbeck et al.[12] classfication would be the best to combine clinical, radiological, and operative findings but it has not yet been met with universal use.

COMPLICATIONS AND MANAGEMENT

Although almost all international guidelines recommend antibiotic therapy for acute uncomplicated diverticulitis, (inflammation) either alone or combined with anti-inflammatory drugs, bed rest, and hygienic measures,[13,14] a recent Cochrane review[15] and a systematic review[16] found that the best available data do not support use of antibiotics in this setting. Probiotics and anti-inflammatory drugs also have their proponents.[3] The management of complicated DD varies with the type of complication (infection, perforation, bleeding, or obstruction), patient status, and local surgical expertise.

Treatment of diverticular abscesses (Hinchey Grades 1, 2) depends on the size of the abscess. Abscesses <4 cm can most often be treated with antibiotics alone, under strict clinical observation, while those >4 cm are best managed by percutaneous drainage,[17-19] usually combined with antibiotics. Drains should be flushed several times daily and may be discontinued after a radiological control or when purulent production has ceased. However, percutaneous drainage is not always successful[19] – up to 81% success rate (95% CI: 73.7-89.1)[20] – and the level of evidence and grade of recommendations[21] for this therapeutic modality is not high (Grade C).[19] In cases of continuing purulent production or suspicion of faecal content in the drain, injection of contrast

material through the drain is recommended. Intestinal fistula or drainage failures (persistent drainage) should be dealt with surgically (Grade of recommendation C).[3,22]

Surgical Management

Several options are open to the surgeon undertaking surgical management: primary resection with or without (colostomy) anastomosis, exteriorisation of the perforation as the site of diversion, and in recent years, simple lavage and drainage. The best treatment for generalised peritonitis by perforation has been debated for years. Classically, anastomosis was not advised in peritonitis and the Hartmann procedure (HP; colectomy with proximal end stoma and distal stump closure) was the procedure of choice.

Before the laparoscopic era, two randomised trials had compared primary anastomosis (PA) with HP and can be seen as precursors to damage control surgery in this setting. Kronberg et al.[23] conducted a small prospective randomised trial (62 patients) with diffuse peritonitis from perforated left colonic diverticulitis, comparing acute transverse colostomy, suture, and omental covering of a visible perforation with acute resection without PA, and concluded that suture and transverse colostomy was superior to resection for purulent (Hinchey 3) peritonitis because of lower postoperative mortality rate. Zeitoun et al.[24] and the French ARC study[24] included 105 patients in their randomised trial, comparing primary or secondary resection, and came to quite different conclusions. These authors concluded that primary resection was superior to secondary resection in the treatment of generalised peritonitis complicating sigmoid diverticulitis because of significantly less postoperative peritonitis, fewer reoperations, and shorter hospital stay.

Constantinides et al.[25] compared PA and anastomosis with and without defunctioning stoma to HP in patients presenting with Hinchey Stage 3-4, perforated diverticulitis, looking at quality-adjusted life-years gained from each strategy; they concluded that PA with defunctioning stoma might be the optimal strategy for selected patients with diverticular peritonitis - a good compromise between postoperative adverse events, long-term quality of life (QoL), and risk of permanent stoma (in 27% of HP and in 8% of PA). Several population-based studies[26] and systematic reviews[27] have found that PA with anastomosis had a statistically significant advantage over HP in terms of mortality and postoperative duration of hospital stay. However, because of the heterogeneity of the literature on the topic, they cautioned against any strong conclusions in this direction, calling for further randomised controlled trials (RCTs). Moore et al.[28] also reviewed the literature on the same topic and found that, in spite of the high morbidity and permanent stoma rate after HP, and the promotion by colorectal surgeons to perform PA, this operation continued to have a high mortality (10-15%). Two RCTs compared PA with HP. One, a European multicentre study,[29] showed that PA was better than HP, mainly because of lesser morbidity in re-establishing intestinal continuity. The other was stopped prematurely because of insufficient referrals, so no conclusions can be drawn.[30]

Surgical management of complicated diverticulitis (perforation) certainly has undergone profound modifications in the last two decades, essentially by raising the number of flares before surgery[31] (not the topic herein) and the advent of laparoscopic surgery, leading first to the possibility of colonic resection followed or not (Hartmann's procedure) by restoration of intestinal continuity, with less morbidity and mortality;[12-32] and second, to proposing simple laparoscopic lavage for peritonitis, and not necessarily followed by resection.[33,34] Heralded by the late Gerry O'Sullivan and his group from Dublin,[33,34] laparoscopic lavage without resection has taken the spotlight. Several systematic reviews[35,36] concluded that, while the laparoscopic approach with simple lavage appears feasible, the indications for simple lavage and drainage should be limited to haemodynamically stable patients with generalised peritonitis. At least four randomised trials started in the past years to compare laparoscopic lavage without resection for generalised peritonitis originating from perforation: the LAPLAND (Ireland)[37] trial, the LADIES (the Netherlands)[38] trial, and the DILALA (Scandinavia)[39] and SCANDIV trials.[40] The LADIES study was stopped prematurely, both the LAPLAND and the two Scandinavian studies are planned to terminate in 2014;[39,40] the results have not been published to date.

Faeculent peritonitis is a traditional indication for Hartmann's procedure, but reports of primary resection followed by anastomosis, with or without diversion, are accumulating even in this indication.[27-29] However, there are accumulating data[3,28] that the surgical treatment of acute

perforated diverticulitis may be performed laparoscopically (Hartmann's procedure[40] and primary anastomosis).[38] Peritoneal lavage and drainage is a non-invasive alternative, in case of Hinchey Stage 3 (purulent peritonitis) (level of evidence 3), while resection of the sigmoid (laparoscopically) is recommended for Hinchey Stage 4 (faecal peritonitis) (level of evidence 3). While one multicentre RCT seems to indicate that PA is better than HP,[29] the latter is still widely practiced, especially in faeculent peritonitis. Of note, simple fluid collections or pneumoperitoneum can be managed conservatively in haemodynamically stable patients.[41]

OTHER COMPLICATIONS

Haemorrhage

DD remains one of the most common causes of massive lower gastrointestinal bleeding, accounting for 30–50% of cases, enhanced by non-steroidal anti-inflammatory drugs in nearly 50% of patients. Bleeding from DD is usually painless, of sudden onset, and can require either transfusion or operation in up to one-third of patients.[42] About three cases out of four are self-limiting, but recurrence of bleeding occurs frequently. Ideally, the exact site of bleeding should be located to propose minimally invasive therapy (endoscopic or embolisation)[43-45] without having to resort to surgery and resection. Diagnosis can be made with nuclear scintigraphy, angiography coupled with interventional radiology, and/or colonoscopy. Sensitivity is highest for nuclear scintigraphy but only interventional radiology and/or colonoscopy can be therapeutic. 99m technetium-labelled sulphur colloid radioisotope scanning can detect bleeding rates as low as 0.1 mL/min. Another advantage is that this scan can be repeated within 24–36 hours. Emergency angiography and/or colonoscopy constitute the first-line diagnostic/treatment options. Selective emergency angiography can detect bleeding only when the bleeding rate is at least 1.0–1.3 mL/min; interventional haemostatic therapy includes injection of vasopressin and/or somatostatin (successful in >90% of cases). Embolisation for diverticular bleeding can be successful in 85-96% of patients.[43-45] Of note, however, the risk of post-embolisation ischaemia exists and can be fatal.[45]

Colonoscopy performs best when bleeding is minor or has stopped, usually within 12–24 hours after bleeding has ceased. Additionally, colonoscopy can help exclude neoplasms and carcinoma as the source of bleeding (one-third and one-fourth of cases, respectively).[13] Emergency therapeutic colonoscopy consists of local injection of epinephrine, sclerosant, or thermo-coagulation; colonoscopy allows landmarking the neoplasm by tattooing in view of future surgery. Recent endoscopic techniques include haemostatic clipping and rubber band ligation.[45] Surgery should be considered to treat bleeding either after successful but recurrent bleeding (after one or more of the above mentioned methods) or as an urgent procedure. Successful definitive surgery for diverticulum-related bleeding is directly related to whether the site of bleeding has been found. In most cases, however, surgery is performed as a last resort when the surgeon is faced with haemodynamic instability, unresponsiveness to conventional resuscitation techniques, necessity of massive transfusion, and recurrent substantial haemorrhage. Most often, however, precise localisation of the exact bleeding source is difficult. Thus, emergency surgery for diverticular bleeding often results in (blind) resection. As a consequence, recurrence is frequent and can lead to repeated operations and, not infrequently, total or near total colectomy.

Obstruction

Obstruction can be acute (inflammation) or chronic, usually due to pseudotumoural formation. Management depends essentially on whether the cause of obstruction (nearby inflammation, or adhesions) is amenable to treatment without resection or is manageable by resection only. Patient status, the degree of distension of the bowel proximal to the obstacle, and upstream faecal loading are other factors to consider. When the patient is extremely ill, or in the elderly or immuno-compromised patient, or when the grossly dilated colon is deemed unsuitable for anastomosis, a loop transverse colostomy,[46] Hartmann's procedure, or endoscopically-placed endoluminal stents are the possible options. However, the latter is fraught with potential re-obstruction and perforation.[47] Excessive faecal load may be reduced by on-table colonic lavage (via appendicostomy or terminal enterotomy).

CONCLUSION

In conclusion, complicated DD has many different aspects: each lead to varied but specific indications. Minimal invasive therapy, combined with less aggressive indications for radical surgery, should lead to fewer resections and/or stomas, reduced attendant morbidity and mortality, improved patient QoL, and cost-containment. Minimal invasive treatment of perforated diverticulitis with peritonitis might also be an option, but we will have to wait for the results of the three on-going trials.

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