Tech Coloproctol
DOI 10.1007/s10151-011-0675-7

SHORT COMMUNICATION

Perforated left-sided diverticulitis with faecal peritonitis: is the Hinchey classification the best guide for surgical decision making?

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Received: 9 November 2010 / Accepted: 9 January 2011
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Abstract
Background Although the Hinchey scoring system has guided surgical decision making for perforated diverticulitis, what constitutes optimal surgical management is controversial. We report our experience of selective primary closure of the perforation without use of a transverse colostomy and the specific circumstances in which this may be safe.
Methods All cases of perforated diverticular disease of the sigmoid colon with Hinchey grade IV (faecal) peritonitis seen over a 4-year period from one surgical unit were reviewed.
Results Primary closure without a diverting stoma was performed in six of the eight patients studied since the bowel was deemed healthy, and resection and primary end-to-end anastomosis were performed in the other two patients because there was associated scarring and stricture formation distally. In the primary closure patients, the site of the perforation was dissected and closed with attendant omentoplasty and a meticulous peritoneal toilet. In one of these cases, a diverting stoma was later fashioned after the patient developed a short-lived faecal fistula.
Conclusion The status of the underlying bowel, not the degree of peritoneal soiling, is the most significant consideration in defining the role of minimally invasive surgical treatment options for perforated diverticulitis. A new classification system that remains to be validated, taking into account the degree of colonic scarring and stricture formation, is proposed as a guide for surgical decision making in patients with perforated left-sided diverticulitis with faecal peritonitis.

Keywords Perforated diverticulitis · Primary suture · Omentoplasty · Hinchey classification · Hinchey grade IV · Faecal peritonitis

Introduction

The prevalence of perforated sigmoid diverticulitis appears to be increasing [1]. Management of the disease is evolving and, where appropriate, selectively incorporates image-guided drainage [2], laparoscopic peritoneal lavage and debridement [3], laparoscopic or laparoscopic-assisted resection [4] and conventional open resection with or without primary anastomosis [5]. Surgical survival appears to be dependent upon age, attendant comorbidities, nutritional status, anaesthetic risk and the peritonitis index score [6–9]. These factors also have a major influence on post-operative morbidity [10] and quality of life [11]. In a prospective, randomized trial comparing transverse colostomy plus suturing of the perforation with omentoplasty plus resection without primary anastomosis in Hinchey grades III and IV perforated left-sided diverticulitis, Kronborg showed that proximal diversion and simple suturing resulted in lower mortality rates than resection, although in his series of 62 cases, 16% of patients retained long-term stomas [12]. We present a short paper on our experience with suturing of primary perforation without colostomy for Hinchey grade IV peritonitis due to left-sided perforated diverticulitis and surgical recommendations for its selective use.

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Published online: 27 January 2011

Materials and methods

All cases of perforated diverticular disease with faeculent peritonitis (Hinchey grade IV) seen in a tertiary referral Hospital in Trinidad over a 4-year period (2006–2009) were reviewed. Perforations with a localized paracolic abscess were excluded from analysis. Our unit has adopted a policy minimizing colostomy use as we have previously reported in a paper on colonic trauma and obstruction [13, 14], since in Trinidad, there is limited public stoma acceptance and limited availability of stoma appliances. Patients were identified using the International Classification of Disease 9th Revision Clinical Modification (ICD-9 CM) admissions and discharge code 562.11. Demographic data, degree of peritoneal contamination (Hinchey classification), site of perforation, surgical procedure and morbidity and mortality were recorded.

Eight patients were included in the assessment (mean age 52 years; range 38–71 years). All patients were American Society of Anesthesiologists (ASA) grade II preoperatively. During the same period, 21 other patients with complicated diverticular disease, 19 of whom had bleeding and 2 with a localized perforation and pericolic abscess formation, were admitted. All the patients (except those presenting with rectal bleeding) underwent preoperative computed tomography (CT) scanning. The mean time from perforation to surgery was 11 h (range 5–32 h). In six patients, whose colon was deemed healthy, perforations were closed primarily with interrupted 3-0 polydioxanone sutures (PDS) after careful dissection of adherent mesenteric fat to display the perforation point (Fig. 1) and supplementation of the closure with an omentoplasty (Fig. 2). In one case, the bowel was oedematous with adhesions to the pelvic side wall. The perforation was extended from 3 to 15 mm to admit the index finger in order to assess for stricture. Although there was thickening of the bowel wall, the lumen appeared adequate and it was also closed primarily with 3-0 PDS. In two cases, the perforated sigmoid colon was fibrotic with stricture formation, and therefore, resection of the affected segment and primary anastomosis were performed. A meticulous peritoneal toilet was performed in all cases (using a minimum of 5L warm normal saline), with suction of all liquid material and removal of all particulate matter where possible. All underwent chest tube drainage with a 36Fr chest tube that was left in situ until minimal drainage was observed over a 24-h period and were treated with intravenous amoxicillin/clavulinic acid, gentamicin and metronidazole for 5 days. Length of hospital stay ranged from 5 to 9 days (median 6 days). One patient was readmitted on postoperative day 8 with faecal seepage from the lower end of the incision with normal passage of stool per rectum and no signs of peritonitis. Because of increasing wound leakage, the patient underwent a transverse loop colostomy with complete fistula healing in a further 8 days and colostomy closure at 10 weeks. It was this patient in whom an extension of the perforation had been made to assess the luminal calibre of the thickened distal colon. All patients underwent clinical and endoscopic follow-up without any adverse diverticular-related morbidity during the study.

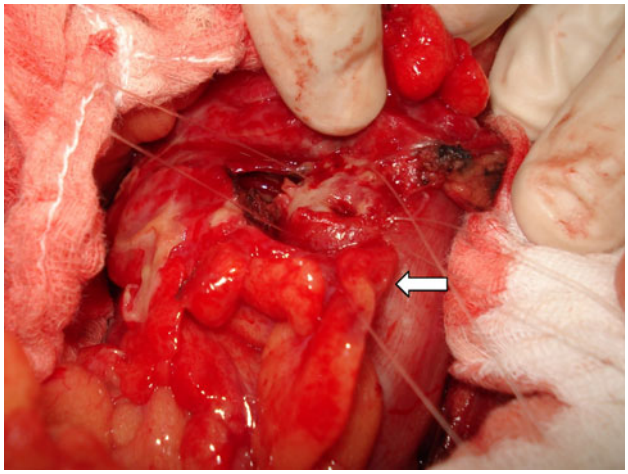

Fig. 1 Primary closure of perforation with interrupted sutures. Note infected fat (*arrow*) dissected off to reveal the precise site of perforation

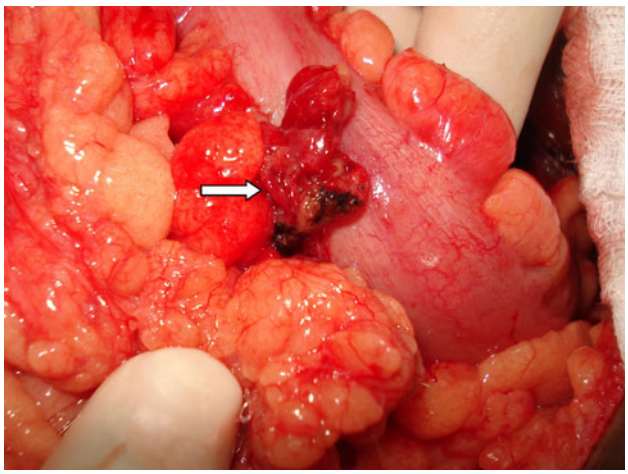

Fig. 2 Omentum sutured over closed perforation (*arrow*) around healthy colon

Discussion

The optimal treatment for perforated diverticulitis has changed over time, and the gold standard has not yet been defined. So far, both the Hinchey scoring system and the Mannheim Peritonitis Index that are based on the locoregional degree of peritoneal contamination have guided the surgical decision making process [6, 7, 15, 16].

Approximately 15% of patients with diverticular disease become symptomatic, and almost 80% of patients with a perforation have no prior symptoms [17]. The use of newer, more effective antimicrobial agents along with improvements in anaesthesia and in both intraoperative and postoperative care has resulted in a trend towards more aggressive surgical therapy (which has in many centres replaced the two-stage Hartmann's procedure), in which a primary anastomosis is fashioned using either an open surgery or a laparoscopic procedure. This approach has been favoured since many patients failed to undergo Hartmann's reversal because of the intraoperative and patient-related challenges involved and because of the substantial postoperative complication rate of the reversal procedure [5, 18].

The move towards more radical surgery has been extended to patients with widespread peritonitis and has had no significant effect on morbidity or mortality [16]. The data regarding this trend have been supplemented by a recent report comparing resection with primary anastomosis to resection without primary anastomosis in which the peritonitis index did not influence the overall morbidity regardless of the type of operative procedure performed [19]. However, some surgeons, instead of using more radical surgery, have adopted a more minimalist approach. Kronborg, for instance, reported the results of a randomized controlled trial comparing primary suturing of the perforation site with a proximal defunctioning stoma with Hartmann's procedure that showed that morbidity and mortality were the same in the two groups [12]. More recently, laparoscopic peritoneal lavage without resection in generalized peritonitis has been associated with a low rate of postoperative septic complications and a low incidence of recurrent diverticulitis during medium-term follow-up [20]. Stoma use is thus avoided and, those cases in which subsequent sigmoid resection is contemplated, are performed as nonemergency operations associated with lower morbidity and mortality than emergency surgery [21].

This more minimalist philosophy depends somewhat upon the knowledge of the natural history of patients admitted with acute diverticulitis, but there is very little of this sort of data available. A recent study showed that complicated disease requiring emergency admission will recur in up to 25% of cases, usually within the first 12 months [22].

Patients suffering from recurrent attacks of diverticulitis tend to have attendant scarring and adhesion formation and may present more often with localized perforations and abscesses rather than with generalized faecal peritonitis in which the underlying bowel is healthier. Under these circumstances, we believe that the worst Hinchey stage may, in many cases, be an indication for minimalist surgery in which peritonitis indices that do not take into account the degree of sigmoid scarring and stricture formation, but simply the degree of peritoneal contamination, are the primary guide for surgical management. This view is at variance with the seminal study of Krukowski and Matheson [23], in which there were higher postoperative morbidity and disease recurrence rates after less radical treatment where the colon was retained. Similarly, Zeitoun and colleagues have demonstrated in a randomized study that both postoperative sepsis and early reoperation were less common when primary (as opposed to secondary) resection was performed [24]. Neither of these studies, however, addressed the degree of bowel scarring and disease as a guide to surgical management and neither study clearly distinguished between recurrent and persistent disease.

A proposed classification system incorporating the presence of bowel wall thickening, mesenteric contracture and stricture formation that remains to be clinically validated and which differs from the Hinchey and modified Hinchey classification [25] systems is shown in Table 1. In

Table 1 Hinchey, modified Hinchey, and proposed new classification systems of acute diverticulitis

Hinchey classification [6]	Modified Hinchey classification [23]	Proposed new classification
I Pericolic abscess or phlegmon	0 Mild clinical diverticulosis	
	Ia Confined pericolic inflammation—phlegmon	
	Ib Confined pericolic abscess	
II Pelvic, intra-abdominal or retroperitoneal abscess	II Pelvic, distant intra-abdominal or retroperitoneal abscess	
III Generalized purulent peritonitis	III Generalized purulent peritonitis	
IV Generalized faecal peritonitis	IV Faecal peritonitis	IV Generalized faecal peritonitis
	Fistula colo-vesical/vaginal/enteric/cutaneous	IVa Underlying healthy bowel segment
	Obstruction Large and/or small bowel	IVb Healthy bowel with adhesions but no wall thickening
		IVc Scarring and bowel wall thickening + mesenteric contraction
		IVd Mass + stricture

the Hinchey system, patients with stage I or II disease can safely undergo primary closure, whereas patients with stage III disease could be considered for a defunctioning stoma and primary closure. Stage IV disease requires a primary resection and anastomosis and concerns regarding the potential of malignant perforation being dealt with using lesser techniques should thus be obviated. Recent data from the Netherlands have shown that overall long-term survival after surgical treatment for perforated diverticulitis is impaired significantly when compared with the age-matched population, where 5-year outcomes are affected only by age and initial ASA classification and not by the Hinchey peritonitis score, Mannheim Peritonitis Index, the number or reinterventions, surgeon experience or the type of initial surgery performed [26]. This is in keeping with a report by Mueller and colleagues that has shown that the morbidity and mortality associated with resection and primary anastomosis for perforative diverticular disease is dependent upon patient comorbidity rather than the Hinchey peritonitis grading [8] confirming our view that surgical strategy is patient related rather than peritonitis related.

Conclusion

Our approach of simple suturing of perforations plus omentoplasty has been developed in a third world environment, where facilities for advanced stoma care and public acceptance of stomas are limited. We believe that the surgical decision making process regarding resection or repair during laparotomy for perforated diverticulitis can be based on the state of the underlying bowel rather than the degree of peritoneal contamination. A much larger longitudinal, multi-institutional, randomized study is needed to assess the safety of our selective approach as well as to more accurately determine the likelihood of recurrent disease.

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