



Management of Hinchey II diverticulitis

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Abstract

Colonic diverticulosis can either be asymptomatic or present with complications resulting in significant morbidity and mortality. A key presentation of complicated disease is abscess formation (Hinchey type II). The natural course of this is unclear and therefore treatments range from conservative approach with antibiotics and percutaneous guided drainage (PCD) to surgery. There is no clear consensus on the exact management strategy. A Medline based literature search specifically looking at studies dealing with Hinchey type II diverticulitis and its management was carried out. For comparison, five-year retrospective data of diverticular abscesses from our institution was collected and the outcome analysed. Various studies have looked into this aspect of the disease, elaborating on the significance of the size and location of the abscesses, the role of PCD, recurrence rates and the controversies regarding the need for elective surgery. Conservative treatment with antibiotics alone is effective in a majority of cases with a role for PCD in large safely accessible abscesses. Variable recurrence rates have been reported in literature and elective surgery should be planned for selected groups of patients.

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Key words: Diverticulosis; Diverticular abscess; Hinchey classification; Percutaneous drainage; Recurrent diverticulitis

INTRODUCTION

The prevalence of colonic diverticulosis has gradually yet steadily increased in the western world and ranges from 30%-50% of population over the age of 50 and more than two thirds over the age of 80^[1]. The sigmoid colon is the most common site to be involved. These diverticulae are primarily pulsion type of pseudo-diverticulae characterised by outpouching of mucosa and peritoneum through the sites of penetration of blood vessels in the colonic wall^[2]. Though the exact aetiology is not known, abnormal colonic structure and motility along with genetic, dietary and changes in intestinal flora are considered to play a role in its patho-physiology^[3].

There is lack of clarity about the natural course of the disease. Its different manifestations ranging from being completely asymptomatic to an array of complicated diverticular disease makes it vital to acquire a good understanding of this condition. Complicated diverticulitis (CD), accounting for 20%-30% of total prevalence of diverticulosis, causes significant morbidity and mortality in patients in addition to considerable healthcare costs in the western world^[4]. This includes the gamut of diverticulitis either with or without phlegmon, abscess, fistula, obstruction, bleeding and perforation with purulent/faecal peritonitis^[5,6].

The clinical presentation usually comprises of a triad of primarily left lower quadrant pain, fever and leucocytosis, although other associated features like nausea, vomiting, change in bowel habits, rectal bleeding and dysuria may be present. The clinical classification scheme^[7] by the European association for endoscopic surgeons is based on the clinical severity and is detailed in Table 1. Other classifications do additionally incorporate the clinical and pathological aspects with the computerized tomography (CT) findings and aid in the planning of treatment strategies for this condition. The universally accepted is the Hinchey classification^[8],

which descriptively characterises the various stages of diverticulitis and its acute complications. Type I and Type II refer to inflammatory phlegmon and paracolic abscesses while type III and IV refer to purulent and faeculent peritonitis respectively. This classification has been further modified as given in Table 2.

The sequence of pathological changes complicating a colonic diverticulum starts from a microperforation in its structure^[9]. However the progression beyond this can be unpredictable either leading to a phlegmon or to frank faeculent peritonitis. The management is dictated by the stage of the disease at the time of its presentation and by the observed response to the initiated treatment^[10]. Conservative measures characterised by bowel rest, antibiotics and clinical monitoring are usually effective in the treatment of early stages of diverticulitis especially modified Hinchey stage 0 and stage I a. There is also a clear consensus on open or laparoscopic surgical management of type III and IV as these stages are unlikely to respond to conservative measures. However the exact management strategy for type I b and II (specifically diverticular abscesses i.e. paracolic or pelvic) needs more clarity.

The general treatment option for these stages (I a & II) starts from conservative management to CT guided percutaneous drainage (PCD) and then on to surgery based on progression of the disease with reliance on clinical and laboratory parameters. It is important to understand that this severe condition has an overall mortality of 5%-10% and higher rates in emergency surgery (> 25%)^[13].

The problems associated with management of these stages relate to the difficulty in gauging if the condition will respond to conservative treatment, the exact indications for PCD and identifying the cohort of patients who will need early emergency surgery. Additional hurdles to management include problems with PCD, primarily the difficulty in access, documented failure rate and its associated complications. Most of the studies in literature have dealt with the different stages of CD and the main impetus has been on the various surgical approaches to the management of this condition and its impact on morbidity and mortality. This article has specifically reviewed the management of Hinchey II diverticulitis associated with pericolic and pelvic abscesses.

MEDLINE BASED LITERATURE SEARCH

A Medline based review of the literature was performed specifically looking at studies which dealt with diverticular abscesses (Hinchey type II diverticulitis) and its outcome. A five-year retrospective analysis of data of patients admitted with diverticular abscess (Hinchey type II) admitted to our institution was also collected and analysed for comparison.

OUTCOME ANALYSIS

The rationale behind the use of antibiotics and PCD in

Table 1 Clinical classification of diverticulitis (adapted from Köhler *et al*^[7])

Grade	Clinical features	Symptoms
I	Symptomatic uncomplicated disease	Fever, abd pain, CT evidence of diverticulitis
II	Recurrent symptomatic disease	Recurrence of above symptoms
III	Complicated disease	GI bleeding Phlegmon Abscess Peforation-purulent/faecal peritonitis Stricture Fistula Obstruction

Table 2 Modified hinchey classification (adapted from Wasvery *et al*^[11,12])

Modified Hinchey classification	
0	Mild clinical diverticulitis
I a	Confined pericolic inflammation-phlegmon
I b	Confined pericolic abscess
II	Pelvic, intrabdominal or retrocolic abscess
III	Generalized purulent peritonitis
IV	Faecal peritonitis
Fistula	Colo-vesical/-vaginal/-enteric/-cutaneous
Obstruction	Large/small bowel obstruction

the management of diverticular abscesses is based on the treatment of intra-abdominal sepsis and the reduction of the abdomino-pelvic inflammatory milieu to facilitate single stage operations. CT has revolutionised the approach to diverticulitis due to its high sensitivity and specificity in the diagnosis^[14] planning of management and also a therapeutic role in guided drainage of abscesses. Before the advent of PCD, 10%-15% of operations for diverticulitis was for drainage of abscesses^[15] and multistage surgical procedures were being performed for diverticular abscesses^[16,17]. The diagnostic findings on CT include inflammation of pericolic fat, colonic wall thickening, mesocolic and pelvic abscesses, perforation with free intraperitoneal air and bowel obstruction (Figure 1).

CT in addition enables to exclude other causes of acute abdomen, however, the reliable differentiation of acute diverticulitis from colonic malignancy can be difficult^[18]. It has been reported that the findings such as pericolic stranding, involvement of more than 10 cm of the colon or the absence of pericolic nodes associated with colonic thickening and pericolic inflammatory changes are likely to point to diverticulitis rather than cancer^[18]. The CT classification by Ambrosetti^[19] as shown in Table 3 is valuable in assessing the severity of the disease and planning optimal management.

The preferred approach is usually transabdominal, either anterior or lateral taking precautions to avoid the inferior epigastric and the deep circumflex iliac vessels, respectively^[20]. Alternative approaches include transgluteal^[21,22], transperineal^[23,24], transvaginal and

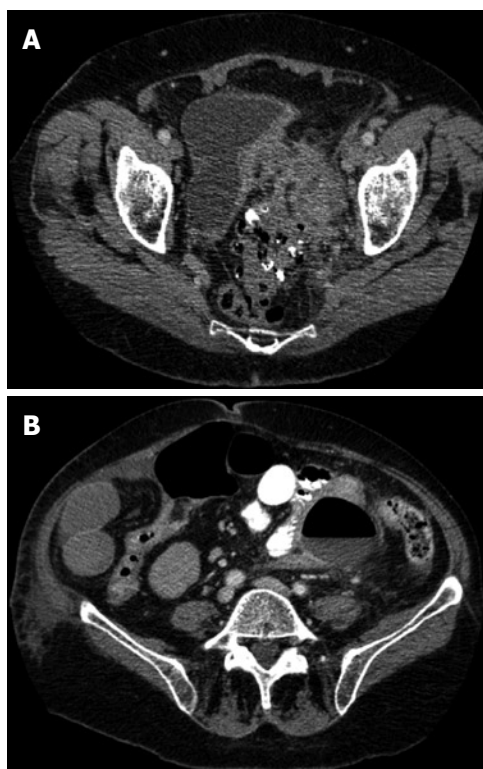


Figure 1 Abdomen and pelvis CT. A: Pelvic abscess secondary to complicated diverticulitis; B: Paracolic abscess secondary to complicated diverticulitis.

transrectal^[25] for access. PCD primarily was used as a temporary measure and bridge to surgery though recent suggestions questioning the necessity of surgery after conservative treatment have generated further debates. Although it is presently acknowledged that CT plays a pivotal role in guided PCD, operator skill and the location of the abscess are paramount in determining success of the intervention. Guided PCD is the choice of intervention for simple uninoculated abscesses with success rate of more than 80%, but is known to have a high failure rate in cases of complex abscesses which are defined as abscesses with loculations, associated with fistulae and infected fluid collections whose drainage route traverses normal organs^[20].

Despite innovative improvements in modalities, the response to conservative treatment of Hinchey II is not consistently successful, as various unexplained factors seem to modify the clinical course. Based on deterioration in clinical parameters, patients undergo surgery preferably receiving a single stage colectomy or in some cases two stage procedures, a colectomy with diversion stoma. Attempts to identify the exact indications surrounding the modality of approach are currently ongoing and can be appreciated from the interesting literature on this issue. Tables 4 and 5 feature some of the important publications and their findings dealing specifically with diverticular abscesses.

Stabile *et al*^[26] in his series of 19 patients with a follow up of 17.4 mo showed that PCD was successful in 14 patients who subsequently had elective single stage operations. The average size of the abscesses in this series

Table 3 CT staging of diverticulitis (adapted from Ambrosetti *et al*^[19])

Ambrosetti's CT staging of diverticulitis	
Moderate diverticulitis	Severe diverticulitis
Localised sigmoid wall thickening (5 mm or more)	Abscess
Inflammation of pericolic fat	Extraluminal air/contrast

Table 4 Results of a retrospective audit from our institution over a five-year period

Series of diverticulitis case	n
CT confirmed diverticulitis (n)	69
Hinchey type II (n)	28
Average size of abscesses (cm)	5
Average size of abscess for PCD (cm)	7
Rate of surgical intervention (%)	46

was quite large at 8.7 cm. Meuller *et al*^[27] also reported successful results with PCD and on retrospective chart review of 87 patients with diverticulitis prior to the use of PCD found that more than 50% of those who underwent two stage surgical procedures would have benefited from PCD. Similar studies by Neff *et al*^[28] and Saini *et al*^[29] have reinforced the contribution of PCD in facilitating single stage surgical procedures.

Ambrosetti *et al*^[30] from his study of 73 cases of diverticular abscesses with a follow up of 43 mo found that 59% of total cases eventually needed surgery either during the acute admission or as an elective procedure. The rest of the group did not need any form of surgical intervention after conservative treatment either with or without PCD. In his study, antibiotics alone without PCD was effective in 30 patients and 19 out of 73 patients underwent PCD. The study also compared the prognosis of mesocolic abscesses with pelvic ones and revealed that pelvic abscesses exhibited an aggressive behaviour and therefore needed to be rapidly drained percutaneously and were likely to require surgery. In addition, it was stated that the indication for secondary colectomy after successful treatment of mesocolic abscess with or without drainage was not preeminent.

In a 10-year study and a mean follow up of 46.5 mo by Kaiser *et al*^[11] CT guided PCD was found to be successful in 93% of cases. In this series of 99 cases, 16 (16.2%) of them were amenable for PCD. Out of 99 patients, 23 patients failed conservative treatment with antibiotics \pm PCD and needed emergency surgery during the same admission. Overall recurrence rate for the entire group was 18.2 % with especially high rates for early stages (40% for stage I b + PCD, and stage II \pm PCD). Interestingly, the recurrence in the stage I b group after CT guided PCD was high at 40% when compared to the overall stage I b recurrence of 12.7%. The exact reason for this was not clear although the size of the abscesses in the drained group was significantly larger thus making the possibility of more severe disease in the drained group likely. The key finding of a high

Table 5 Results showing the total number, numbers drained, age, site and size (average for PCD) of abscesses from studies in literature

Name	Total	Drained	Mean age yr (/range)	Site of abscess			Size for PCD (cm)
				Paracolic	Pelvic	Others	
Kumar <i>et al</i> ^[31]	30	12	39	15	5	10	6.5
Stabile <i>et al</i> ^[26]	19	19	63.8	8	9	2	8.7
Kaiser <i>et al</i> ^[11]	99	16	-	74	25	-	7.1
Ambrosetti <i>et al</i> ^[30]	73	19	66.9	45	28	-	6.7
Brandt <i>et al</i> ^[13]	66	34	71	-	-	-	6
Bahadursingh <i>et al</i> ^[32]	25	10	61	9	9	7	-
Siewert <i>et al</i> ^[33]	30	4	54.2	-	-	-	5.9
Neff <i>et al</i> ^[28]	16	16	42-86	2	13	1	> 5
Alvarez <i>et al</i> ^[34]	59	-	64	37	22	-	-

Table 6 Results showing the total number, numbers drained, response to conservative treatment and details of emergency/elective/semi-elective surgery from studies in literature

Name	Total	Drained	Antibiotics ± PCD	Surgery same admission	Elective/semi-elective
Kumar <i>et al</i> ^[31]	30	12	17	5	-
Stabile <i>et al</i> ^[26]	19	19	-	3	14
Mueller <i>et al</i> ^[27]	24	21	1	6	12
Kaiser <i>et al</i> ^[11]	99	16	56	23	20
Ambrosetti <i>et al</i> ^[30]	73	19	30	18	25
Brandt <i>et al</i> ^[13]	66	34	21	15	28
Siewert <i>et al</i> ^[33]	30	4	17	-	13
Cinat <i>et al</i> ^[37]	13	13	-	5	-
Saini <i>et al</i> ^[29]	17	8	-	1	7
Alvarez ^[34]	59	-	33	26	-

incidence of recurrence in these groups highlighted the assertion that successful PCD should be considered as just a temporary measure rather than definitive treatment. The authors recommended that considering the high rates of recurrence, CT confirmed abscess was a strong indication for consideration of elective/semi-elective surgery.

There are several studies in literature detailing the role of PCD in diverticular abscesses but very few comparing treatment with antibiotics alone or antibiotics with PCD. Brandt *et al*^[13] retrospectively looked at this issue comparing two groups with CT confirmed abscesses, one who had antibiotics alone and the other antibiotics with PCD. Interestingly, the results show that the patients treated with antibiotics alone achieved an outcome similar to patients treated with PCD. However the average abscess size was larger in the PCD group (4 cm in the antibiotic only group compared to 6 cm in PCD group). Failure rate of PCD in this series was 33% which was comparable to other series^[35,36]. The results from this study showed that antibiotics alone were effective in more than 80% of patients presenting with Hinchey type II diverticulitis.

A similar study by Siewert *et al*^[33] reported that antibiotics alone was effective in resolving acute symptoms for abscess size less than 3 cm. In this study, the abscess size was comparatively smaller than in other studies as most patients presented early in the course of the disease and CT was performed on the day of presentation in the emergency department. Kumar *et al*^[31] in his series of 30 patients with abscesses found that patients with an average abscess diameter of 4 cm

improved on antibiotics alone.

In the series of 69 cases of CT confirmed diverticulitis (Table 4) from our institution over a period of 5 years (unpublished), we found comparable rates of abscesses to that in literature (28/69 patients with diverticular abscess). The average size of abscesses in our patients was 5.0 cm. Only a small percentage of abscesses were accessible for PCD (3/28 cases) in our series and the average size of the abscesses in these cases was 7 cm. The rate of acute surgical intervention during the initial admission was 46% in our series and was comparable to other series in literature.

As seen in Tables 5 and 6, in a majority of studies, the average size of abscesses for PCD intervention was more than 6 cm with an overall increased prevalence of paracolic abscesses over pelvic and distant abscesses. The percentage of PCD intervention ranged from about 13% to 51%, though in a few studies it was not clear whether all abscesses were taken into consideration or the only ones amenable to drainage were reported. Interestingly, conservative treatment using antibiotics with or without PCD was successful as definitive treatment in about 30% to 56% in a majority of studies while it was effective in tiding over the acute situation in a range of 56% to 76%. The collective data also suggests that more than 50% of cases may eventually need semi-elective or elective surgery due to recurrent symptoms.

Issues in management

Despite the wealth of literature detailing the management of this condition, certain aspects of decision making and

management have remained controversial, especially the indications for PCD, single stage operations and planning of elective surgery.

Size and location of abscesses

Significant parameters like the size and location of the abscesses do influence the success of conservative or PCD intervention. Most of the evidence in literature shows that the size of the abscess is directly proportional to the need for intervention. Some of the large series reported in literature are given in Table 4. It is generally observed in various studies that abscesses with a size of up to 4 cm seem to respond better to antibiotics alone^[13,31,33]. In the context of PCD, as an average, size equal to or more than 5 cm with safe access seems to be an indication^[11,30].

Regarding the significance of the abscess location, there has been emphasis on better prognosis with mesocolic and paracolic abscesses^[30,34] though this has been disputed by some studies^[31]. It is feasible that mesocolic abscesses are the result of early disease resulting in local colonic inflammatory changes with pus collection contiguous with the mesentery and therefore respond better to conservative treatment. Single stage surgical procedures are also sufficient in these circumstances as these abscesses can be removed en bloc with the specimen^[27]. Pelvic abscesses are probably the result of a slightly larger perforation with potential to complicate further by exceeding the confines of the mesentery onto the surrounding pelvis and peritoneum. This may benefit by PCD but could further deteriorate to necessitate surgery or on resolution of the acute episode need elective surgery^[30]. Therefore, the pelvic location of the abscess could be a potential indicator for further elective surgery.

Failure of conservative treatment with or without PCD

The early Hinchey stages like stage 0 or I a can also fail conservative treatment and progress to emergency surgery. Kaiser *et al*^[11] in his series found that 6.8% of these stages needed surgical intervention during the first admission. In his series, 22.2% of stage I b and II failed conservative treatment and PCD. The failure rate of PCD ranges from 15%-30% in different series^[11,38,39]. Although there are no clear early indicators to potential failure of conservative treatment, large sized abscesses with systemic features of inflammation could predict failure. In this context, Kumar *et al*^[31] found in his series that an abscess size more than 6.75 cm associated with leucocytosis of more than $14.8 \times 10^9/L$ and fever more than 102°F could predict a failure in conservative treatment.

Complications

Complications with PCD have been reported in the range of about 5% in most series^[31] and they include bleeding, perforation of viscus, solid organ injury and fistulation. High rates of mortality as much as 75% were seen in earlier series due to complications of PCD^[40].

Although faeculent drainage from the catheters were reported in some series^[26], a majority did show response to conservative treatment and did not cause any secondary problems^[27]. Recurrent abscesses after PCD have been reported which can interfere with elective operation^[6].

Recurrence and elective surgery

It is known that recurrence is a problem after conservative management of diverticulitis. The manifestations of recurrence may range from episodic cramps without CT evidence to complicated disease and about 30% are likely to develop recurrent diverticulitis^[2,41,42]. Variable recurrence rates ranging from about 7% to 35% have been reported in literature^[42]. The potential to recurrence is high in these early Hinchey stages as the later stages would have had emergency surgery as definitive treatment^[11]. Recurrent symptoms of diverticulitis have also been linked to the initial size of the abscesses^[33] though there is no clear pattern in its presentation. High relative recurrence rates of 53.8% were seen in non-operated cases in some series^[11,32]. Considering the high rates of recurrence and the low complication rates for elective surgery, it has been suggested that elective surgery should be undertaken to achieve relief of symptoms^[43].

Questions regarding the indications for elective colectomy after conservative treatment remain unanswered. Resection is commonly recommended after two attacks of uncomplicated diverticulitis^[44] in order to reduce the morbidity and mortality of complicated disease. However, the pattern of the first presentation of complicated disease can be very variable. Although pericolic abscesses and inflammatory phlegmon were found to be significantly associated with at least one prior episode of diverticulitis^[5], studies have shown that previous history of diverticulitis was present in less than 20% of acute diverticulitis admissions^[34]. Interestingly, Chapman *et al*^[5] in her series on CD found that 53.4% of patients presented with CD as their first episode and 89.5% of patients who died due to diverticular perforation had no previous history of diverticulitis. Therefore, prophylactic colectomy to reduce morbidity and mortality from CD may not serve its intended purpose.

Studies have also shown that about 40%-50% of patients admitted with abscesses responded well to conservative treatment and eventually did not need surgery^[30]. Therefore, elective surgery should be considered for patients who develop persistent or recurrent symptoms. Although there is no consensus on this issue, it is acknowledged that some subgroups may be at high risk and should be offered surgery especially young patients and patients with co morbidities such as diabetes, collagenous disorders and immunosuppressed^[45-47].

CONCLUSION

Interpreting the results of various studies, the essential consistent finding is that about 20%-30% of the CD

cases present with abscesses out of which about a similar percentage (20%-30%) are amenable to PCD. In addition, the failure rate in PCD is about 20%-30%. Considering the whole spectrum of the Hinchey type II diverticulitis, primary broad-spectrum antibiotics alone will remain the choice of primary therapy and interventions like PCD should be planned based on the abscess size and feasibility of drainage and also depend on the local expertise available to undertake the procedure. The role of PCD, though beneficial, will still be nominal. However, considering the large and increasing numbers of hospital admissions with this pathology, the contribution of PCD will remain paramount in terms of ameliorating the clinical picture. Considering the high rates of recurrent diverticulitis and its morbidity, assessment for elective surgery should be done on a case-by-case basis.

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