

Surgical Management of Acute Diverticulitis

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Abstract

Introduction: Acute diverticulitis is a critical condition in medical encounters that leads to hospital admissions with subsequent health care cost. Surgical management is indicated in small proportion of patients when diverticulitis is refractory to medical therapy. Surgical candidate may presents with perforation, obstruction, fistula and/or bleeding. The choice of techniques depends on many factors as hemodynamic stability, peritoneal contamination, and surgeon experience and/or preference.

Aim of Work: In this review, we will discuss surgical managements of patients with acute diverticulitis, effectiveness of operations, and important consideration.

Methodology: A comprehensive and systematic search was conducted acute diverticular disease, diverticulitis, diverticular complication and surgical management. PubMed search engine and Google Scholar search were the mainly used database for search process. All relevant available and accessible articles of all types were reviewed and included.

Conclusion: Most patients with freely perforated diverticulitis need surgery. However, the choice of surgical techniques depends mainly upon Hinchey staging system that assess the extent of peritoneal contamination. The primary goal of surgery is resection of the affected segment, however, the feasibility to achieve that depends greatly upon patient's hemodynamic stability. The secondary goal of surgery is reconstruction and anastomosis to achieve intestinal continuity. Hartmann's procedure is the most common two-stage feasible procedure in patients with excessive peritoneal involvement and critical presentation. Primary anastomosis with protective ostomy is another widely acknowledge surgical approach. The ASCRS recommend elective surgery for patient with history of complicated diverticulitis and in immunosuppressed patients regardless of disease status.

Keywords: Acute Diverticulitis; Fistula; Bleeding

Introduction

Acute diverticulitis is critical condition in medical encounters that leads to hospital admissions with subsequent health care cost [1,2]. The majority of colonic diverticular disease presents in form of sigmoid diverticulitis [3,4]. Medical management is appropriate for most cases of acute sigmoid diverticulitis; surgical management, on the other hand, is indicated in small proportion of patients when

diverticulitis is refractory to medical therapy [5-8]. It is estimated that 15 percent of all sigmoid diverticulitis require surgical management [7]. In spite of that, acute diverticulitis continues to be among most common gastrointestinal conditions that require hospitalization and a leading cause of elective colon surgery in the United State [9,10]. Surgical candidate may presents with perforation, obstruction, fistula and/or bleeding. The choice of techniques depends on many factors as hemodynamic stability, peritoneal contamination, and surgeon experience and/or preference [11].

In this review, we will discuss surgical managements of patients with acute diverticulitis, effectiveness of operations, and important consideration.

Methodology

A comprehensive and systematic search was conducted acute diverticular disease, diverticulitis, diverticular complication and surgical management. PubMed search engine and Google Scholar search were the mainly used database for search process. All The terms used in search were: acute diverticular disease, diverticular complication, complicated diverticulitis, surgical management of diverticulitis, operative procedures, and elective surgery.

Perioperative considerations

When the surgical intervention is decided, surgeon should bear in mind some principles prior to operation. Emergency or urgent surgery for acute diverticulitis should be preceded by antibiotics. The choice of antibiotic agents depends on the suspected source of infections as low- or high- risk community acquired or healthcare acquired intraabdominal infection. Single agent as ertapenem or first-generation cefazolin in combination with metronidazole is adequate for low-risk community-acquired infection. For elective surgery, prophylactic antibiotics should be used within 1 hour of skin incision. Cefazolin plus metronidazole is adequate option prior to elective colorectal surgery.

Bowel preparation is advised prior to all colorectal elective surgery. Selected cases undergoing urgent surgery may also need bowel preparation as for Hinchey stage I or II diverticulitis. Fast-track recovery protocols have been shown to improve outcomes of elective colon surgery for diverticular disease. In a retrospective study, fast-track recovery protocol resulted in fewer complication and shorter time to first solid meal, first bowel movement, and hospital discharge, compared with traditional care [12].

Perforation

Most patients with freely perforated diverticulitis need surgery. However, the choice of surgical techniques depends mainly upon Hinchey staging system that assess the extent of peritoneal contamination. The system includes 4 stages as the following (from stage I to IV): Pericolic or mesenteric abscess; Walled-off pelvic abscess; Generalized purulent peritonitis; Generalized fecal peritonitis [13].

Acute diverticulitis with free (frank) perforation (Hinchey stage III or IV) is a critical condition that requires emergency surgical intervention [7,8,14,15]. The primary goal of surgery is resection of the affected segment, however, the feasibility to achieve that depends greatly upon patient's hemodynamic stability. Patient with perforated acute diverticulitis may present in critical condition with shock. In such case, the optimal colon resection and anastomosis will not be tolerated for being more complex and longer operation. Instead, life-saving limited resection of the diseased segment with or without reconstruction should be performed [16,17]. On the other hand, elective surgery for diverticular disease or urgent surgery in stable patients should be definitive [18-20]. The secondary goal of surgery is reconstruction and anastomosis to achieve intestinal continuity. Patients presenting with Hinchey Stage III or IV diverticulitis usually have generalized purulent or fecal peritonitis. One-stage resection would be contraindicated in such case. Hence, surgical options include either a two-stage procedure as Hartmann's procedure, or laparoscopic lavage for drainage is more feasible. Drainage procedures are rarely performed alone because they do not address the main problem. However, in critically ill patient who cannot even tolerate the limited resection, such procedure could offer a life-saving temporary measure until septic status resolves.

Three-stage procedure is an old approach to manage colon perforation due to diverticular disease. The first stage involves draining without colon segment and construction of a proximal diverting stoma. In the second stage, the surgeon resect the affected segment with primary anastomosis under the protection of diverting stoma. In the third stage, diverted stoma is closed and complete GIT continuity is achieved. The three-stage procedure was considered the safest approach to manage perforated diverticulitis until the eighties. After that, other procedures replaced the third-stage approach with lower postoperative mortality rates [21,22]. Nowadays, the three-stage procedure is only performed when safe dissection of the colon is not feasible either due to excessive inflammation or patients' instability.

Hartmann's procedure is the most common two-stage feasible procedure in patients with excessive peritoneal involvement and critical presentation (Hinchey III or IV). The procedure involves two separated steps. In the first step, a resection of the involved colonic segments is performed with colostomy and rectal stump. Second step constitutes attempt to restore continuity of GI tract by reversal of the colostomy by reconstruction later on [19]. Bringing the distal end of the transected colon to make a mucous fistula in abdominal wall is not always possible especially when the diverticular resection occurs in sigmoid colon leaving a short rectal stump. Alternatively, for identifying the stump in the second stage, surgeons could mark it with a long non-absorbable suture and tack it to the anterior abdominal wall or sacral.

The second-step operation to restore continuity by closing the colostomy and reconstruction is difficult and carries high morbidity and mortality rates [23,24]. Hence, attempt for reconstruction is performed in about 50 percent of all patients underwent Hartmann's procedure [25,26]. There is no consensus on the optimal time for colostomy reversal. A retrospective study of 1660 patients underwent Hartmann's procedure for diverticular resection, only 28.3 percent underwent subsequent reconstruction in the first year; the time of reconstruction does not appear to be critical factor [27]. Some experts attempt to colostomy reversal after 1 year if the patient had presented with fecal contamination or in 3 - 4 months if patient's presentation were milder without contamination. Colostomy reversal is not advised for obese patients with a short rectal stump due to technically difficult operation and poorer functional outcomes.

Another approach is primary anastomosis with protective ostomy. As the primary anastomosis is usually not feasible for Hinchey III or IV perforated diverticulitis, a primary anastomosis protected by a diverting colostomy or ileostomy has been attempted in such patients. The idea is to allow GIT content to come through proximal end to a collecting bag, and then venting through distal efferent end. One randomized trial involving 62 patients with left-sided diverticular perforation and Hinchey III or IV peritoneal contamination have found similar mortality (9 versus 13 percent an) and morbidity (75 versus 67) in patients underwent primary anastomosis with diverting ileostomy or managed with a Hartmann's procedure respectively [28]. However, 90 percent of patients underwent primary anastomosis with protective ostomy were fit for colostomy reversal compared with only 57 percent of reversal following Hartmann's procedure. Shorter operation time, faster hospital discharge, and fewer complication were present in colostomy reversal following primary anastomosis with diverting ileostomy compared with reversal following Hartmann's procedure.

In the 1990s, laparoscopic lavage and drainage were introduced to avoid laparotomy and fecal diversion in patients with perforated diverticular disease [29-32]. Earlier retrospective studies has suggested 2 percent of mortality rate without need for permanent stoma in the majority of patients underwent laparoscopic lavage [33]. However, contradictory results have been reported from subsequent randomized trials. In SCANDIV randomized trial on patient suspected to have perforated diverticulitis, non-significant slightly higher mortality rate occurs in patient underwent emergency laparoscopic lavage compared with emergency resection [34]. In addition, patients who were treated with laparoscopic lavage were more likely to require further operation for complications. Another randomized trial (LOLA) including 90 patients concluded that laparoscopic lavage was associated with higher major morbidity and mortality rate within 30 days compared with sigmoidectomy. Similar results were found at 3 month follow-up [35]. This results were supported by meta-analysis that found more frequent major complication after laparoscopic lavage compared with sigmoidectomy [36].

Localized perforations present acutely as Hinchey stage I or II with mesocolic or pelvic localized abscess. In contemporary practice, diverticular abscesses are typically treated with percutaneous image-guided drainage and intravenous antibiotics. When the abscess is too small or inaccessible through percutaneous drainage, IV antibiotic is justifiable. Surgery may be indicated for deteriorating or unresponsive patients within two to three days of percutaneous intervention or antibiotic therapy. Patients with a Hinchey I or II can tolerate preoperative bowel preparation, hence, resected abscess with colon segment could be followed by primary anastomosis in the same setting. When the abscess is large, and there is a fear of contamination but the bowel is not edematous, a primary anastomosis can be performed with protective proximal ostomy [37,38].

Microperforation in diverticular disease could be diagnosed by one or a few extra-luminal air bubbles on computed tomography (CT) images. Microperforation is not considered complicated diverticulitis and medical management with intravenous antibiotics and bowel rest seems acceptable [11].

Obstruction, fistula and bleeding

Colonic obstruction caused by diverticular disease rise the need for surgical resection of involved segment. If resection is not feasible, proximal fecal diversion is alternative option. It is not reliable to distinguish obstruction caused by acute diverticulitis from that caused by colon cancer by abdominopelvic computed tomography. Surgical intervention is the best option to rule out cancer and relieve obstruction. Endoluminal stenting may not be helpful for diverticular obstruction. In a systematic review, treating diverticular obstruction with self-expanding stents resulted in more cases of perforation, stent migration, and recurrent obstruction compared with stenting malignant colorectal obstructions [39].

Fistula is another complication that may present in acute diverticulitis. Most of diverticular fistula occurs between the colon and the bladder (65 percent). Other less common site include vagina, small bowel, and uterus in 25, 7 and 3 percent respectively. Diverticular fistulas rarely close spontaneously and therefore require surgical correction.

Bleeding attributed to diverticular disease is the most common cause of overt lower gastrointestinal bleeding in adults. In most cases, the bleeding will stop spontaneously. However, if the bleeding persists, endoscopic, radiologic, or surgical intervention may be required. Segmental resection could be performed after identifying the source of bleeding. If the bleeding continues and the source could not be localized, subtotal colectomy is the best next option. Blind segmental resection should be avoided as bleeding will continue in 40 percent of cases.

Elective surgery for diverticular disease

Many studies suggest that patients with prior history of acute diverticulitis are at a greater risk of complications or mortality from a recurrent attack [40,41]. A retrospective analysis of over 200,000 hospitalized cases of diverticulitis, of whom 16 percent suffered a recurrent attack [40]. Surviving diverticular complications as bowel obstruction, abscess, peritonitis, sepsis, and fistula has been associated with increased risk of mortality in the subsequent attack. The mortality rate with elective surgery after the initial episode was substantially lower than the mortality rate with emergency surgery during the recurrent episode. Accordingly, the American Society of Colorectal Surgeons (ASCRS) recommended in 2014 an elective surgery for patient with positive history of complicated diverticulitis, following medically managed acute diverticulitis, and in immunosuppressed patients regardless of disease status for the fear of mortality caused by recurrent attacks of diverticulitis [11]. The adequate time for elective surgery should be after insuring that all the inflammation and infection have been resolved; usually six more weeks after acute episode of diverticulitis. Bowel preparation and one-stage operation with primary anastomosis is the standard approach.

Whereas elective surgery is almost always supported following complications, the Best approach to manage a healed diverticular abscess is less certain [42]. Some evidence suggest no significant association with future recurrence nor complication. Less than 50 percent of healed diverticular abscess have recurrent episode of diverticulitis, and among these with recurrence, medical management was effective [43,44]. Hence, experts tend to individualize decision of surgery in these patients based on the persistence of symptoms and effect on quality of life, rather than to avoid recurrent attacks.

Most surgeons would offer elective surgery to immunocompromised patients after a single attack of diverticulitis because they often require emergency surgery due to an atypical and delayed presentation. Elective surgery is associated with lower morbidity and mortality rates compared with emergency surgery in these and other patients.

Conclusion

Acute diverticulitis is a critical condition in medical encounters that leads to hospital admissions with subsequent health care cost. Surgical management is indicated in small proportion of patients when diverticulitis is refractory to medical therapy. Surgical candidate may presents with perforation, obstruction, fistula and/or bleeding. The choice of techniques depends on many factors as hemodynamic stability, peritoneal contamination, and surgeon experience and/or preference. Most patients with freely perforated diverticulitis need surgery. However, the choice of surgical techniques depends mainly upon Hinchey staging system that assess the extent of peritoneal contamination. The primary goal of surgery is resection of the affected segment, however, the feasibility to achieve that depends greatly upon patient's hemodynamic stability. The secondary goal of surgery is reconstruction and anastomosis to achieve intestinal continuity.

Hartmann's procedure is the most common two-stage feasible procedure in patients with excessive peritoneal involvement and critical presentation. Primary anastomosis with protective ostomy is another widely acknowledge surgical approach. The idea is to allow GIT content to come through proximal end to a collecting bag, and then venting through distal efferent end.

The ASCRS recommended in 2014 an elective surgery for patient with positive history of complicated diverticulitis, following medically managed acute diverticulitis, and in immunosuppressed patients regardless of disease status for the fear of mortality caused by recurrent attacks of diverticulitis.

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