

Surgical management of acute sigmoid diverticulitis



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INTRODUCTION: Medical therapy is usually indicated for uncomplicated diverticulitis. Indications for surgery include recurrent attacks and complications of the disease. This study describes our experience in the surgical treatment of acute sigmoid diverticulitis.

METHODS: Between 2001 and 2006, 82 patients were operated for acute sigmoid diverticulitis.

RESULTS: The indications for surgery included recurrent diverticulitis (7 patients), Hinchey stages I or II (28 patients), Hinchey stages III or IV (34 patients), diverticular colonic stricture (8 patients), diverticular bleeding (3 patients) and colovesical fistulae (2 patients). Of our 82 patients with surgical treatment, 77 with acute inflammatory complications have been analysed. 43 of them (55.9%) were treated by the Hartmann's procedures, and 34 (44.1%) by primary colonic resection-anastomosis. Hartmann's operation was performed in 5 of 28 (17.9%) patients with Hinchey stages I or II with elevated comorbidity, in all 34 patients with Hinchey stages III or IV, and in 4 of 8 patients (50%) with diverticular stricture. Primary colonic resections-anastomosis was performed in all 7 patients with recurrence of diverticulitis, in 23 of 28 patients (82.1%) with Hinchey stages I or II, and in 4 of 8 (50%) patients with diverticular stricture. The overall perioperative mortality rate was 7.8%. The overall perioperative morbidity rate was 18.2%.

CONCLUSION: According to the data obtained from our experience and considering the current literature on the topic, the primary colonic resection-anastomosis represents the first choice intervention in stages I-II. The Hartmann's procedure confirms its effectiveness in stages III-IV.

KEY WORDS: Diverticulitis, Hartmann's procedure, Primary colonic resection-anastomosis.

Introduction

Diverticular disease is a common benign condition that is more frequent in the Western population. The incidence of diverticular disease increases with age; approximately one-third of the population is affected by the sixth decade and two thirds by the eighth decade¹. Fortunately, it is admitted that in 70 percent of patients, diverticulosis remains asymptomatic and one-third of patients develop symptomatic disease³⁻¹¹.

Although the terms diverticular disease, diverticulosis, and diverticulitis are often used interchangeably, their respective meaning are quite different. Diverticulosis refers to presence of diverticula in the colon, without associated inflammation. Diverticulitis refers to the presence of inflammation and infection. Symptomatic disease refers to the full spectrum of signs and symptoms associated with diverticulosis, ranging from mild left lower quadrant pain to the complications of diverticulitis. Diverticulitis results from inflammation of a colonic diverticulum.

The diverticular inflammation may evolve in colonic perforation with local or distant abscess, or diffuse or purulent peritonitis. Uncomplicated diverticulitis refers to diverticulitis with peridiverticulitis.

Although most patients with uncomplicated diverticulitis have relief with medical treatment, 20 percent of them

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TABLE I - Indications for surgery

Indications for surgery	No. of patients (%)	Emergency operation (N)	Elective or semielective operation (N)
Recurrence of uncomplicated diverticulitis (> 2 attacks)	7 (8.5%)	–	7
Local or diffuse peritonitis:	62 (75.6%)	60	2
– Hinchey stages II or III	28 (34.1%)	26	2
– Hinchey stages III or IV	34 (41.5%)	34	–
Diverticular obstruction/stricture	8 (9.8%)	6	2
Bleeding	3 (3.7%)	–	3
Fistula	2 (2.4%)	–	2
TOTAL	82	66 (80.5%)	16 (19.5%)

develop complications including obstruction, abscess, fistula, bleeding, and perforation¹².

The indications for surgery when complications occur are absolute. The most commonly performed procedures in the complicated disease are either the primary colonic resection-anastomosis or the Hartmann's operation, depending on the severity and the stage of the disease, patient's overall condition and comorbidities¹³⁻¹⁷.

Less well defined are the indications for elective surgery after successful medical treatment of diverticulitis^{2,4,18-25}. The risk of recurrent diverticulitis ranges from 7 to 45 percent^{3, 26-30}. The literature is various and published series are not always comparable. Practice parameters for sigmoid diverticulitis of the American Society of Colon and Rectal Surgeons (ASCRS), initially published in 1995 and revised in 2000, emphasize that prophylactic sigmoid colectomy was justified after two attacks of uncomplicated diverticulitis, and after one attack in young patients^{2,18}. Elective colectomy in good-risk patients carries a low mortality rate and has been the promulgation of prophylactic resection to prevent recurrent episodes of diverticulitis and its associated complications^{11, 31-34}.

This study describes our experience in the surgical treatment of acute sigmoid diverticulitis.

Methods

We collected data on 82 patients that underwent surgical treatment for acute sigmoid diverticulitis at our Unit of Emergency Surgery from January 2001 to December 2006. Patients were identified from diagnosis of clinical records and operating records. The records of all patients were analyzed with regard to age, gender, presentation and significant past clinical history of diverticulitis, comorbidities, radiological and laboratory findings, grading of complicated diverticulitis, type of surgical procedure, postoperative morbidity and mortality. The classification of Hinchey was used to determine the

grading of the complicated diverticulitis: stage I, pericolic abscess; stage II, pelvic abscess; stage III generalized purulent peritonitis; stage IV, faecal peritonitis³⁵. Characteristics of patients and their outcome were determined using statistical analysis; parameters were analyzed using chi-squared test or Fisher's exact tests when necessary or appropriate. The threshold of statistical significance was set at $P < 0.05$.

Results

The mean age of all patients was 66 years with a median of 67. The range was 39 to 93 years (Fig. 1). Five patients (6%) were equal to or under the age 50. There were 45 females, average age 66 years, and 37 males, average age 64 years.

The indications for surgery included recurrent diverticulitis without septic complications ($n = 7$ patients; 8.5%), local peritonitis or Hinchey stages I or II ($n = 28$ patients; 34.1%), generalized peritonitis or Hinchey stages III or IV ($n = 34$ patients; 41.5%), diverticular obstruction/stricture of the colon ($n = 8$ patients; 9.8%), diverticular bleeding ($n = 3$ patients; 3.7%) and colovesical fistulae ($n = 2$ patients; 2.4%) (Tab. I).

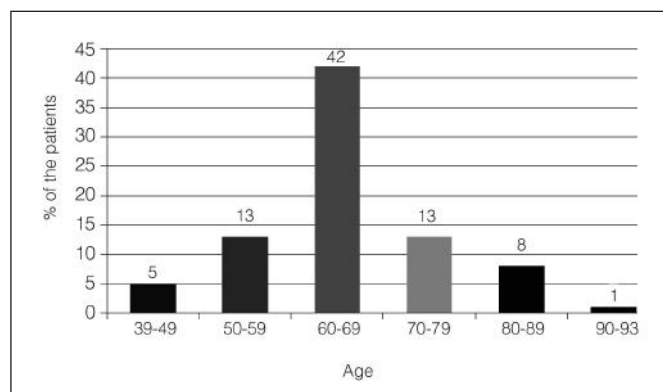


Fig. 1: Age distribution of patients operated for acute colonic diverticulitis.

TABLE II - History of episodes of diverticulitis related to indications for surgery

Indications for surgery	No. of patients	Patients with previous history of diverticulitis	Patients with no history of diverticulitis
Recurrence of diverticulitis (>2 attacks)	7	7 (100%)	–
Hinchey stages I or II	28	20 (71.4%)	8 (28.6%) $P = 0.04$
Hinchey stages III or IV	34	15 (44%)	19 (56%) $P > 0.05$
Diverticular stricture	8	8 (100%)	–
TOTAL	77	48 (62.8%)	29 (37.2%)

Of 82 patients submitted to surgical treatment, we have analyzed 77 patients with inflammatory complications, as recurrence of uncomplicated diverticulitis (more 2 episodes), local or diffuse peritonitis, and stenosis; the 5 patients with diverticular bleeding and fistula have been excluded.

The majority of patients presented with abdominal pain (92%). Other symptoms at the initial examination included fever ($>37^{\circ}\text{C}$, 53%), obstipation (39%), vomiting (39%). Sixty-five patients (84 %) had preoperative leucocytosis (white blood count > 10000 ; range: 7000 – 34000). Thirty patients (39%) were anemic with hemoglobin value under 12 g/dl (range: 7 – 15 g/dl).

Forty-eight patients (62.8%) had a previous episode of diverticulitis, whereas 29 (37.2%) did not.

All seven patients operated for recurrence of uncomplicated diverticulitis had two or more episodes of diverticulitis (mean: 2.5; range 2-4); 20 of 28 patients (71.4%) with Hinchey stages I or II had a history of at least one prior uncomplicated diverticulitis episode, whereas remnant 8 patients (28.6, $P = 0.04$) presented with complicated diverticulitis as their initial event; 15 of 34 patients (44%) with Hinchey stages III or IV had a history of prior uncomplicated diverticulitis episode, whereas remnant 19 patients (56%, $P > 0.05$) presented with complicated diverticulitis as their initial event; all eight patients with diverticular obstruction/stricture had a history of recurrence of uncomplicated diverticulitis episode (Tab. II).

Fifty-eight patients (79%) had one or more of the following comorbid conditions: cardiovascular disease, respiratory disease, immunosuppressive therapy, diabetes mellitus, visceral malignancy, collagen disease, and cirrhosis.

Cardiovascular disease (such as hypertension or coronary artery disease) was identified in 44 patients (57%), respiratory disease in 24 patients (31%), steroid therapy in 13 patients (17%), diabetes mellitus in 12 patients (15.6%), visceral malignancy in 6 patients (7.7%), collagen disease (lupus, rheumatoid arthritis, polymyalgia rheumatica) in 5 patients (6.5%) and cirrhosis in 4 patients (5.2%). The mean number of comorbid conditions per patient was 1.4 (Tab. III).

Immune system compromise such as steroid use, extreme age, chemotherapy, malignancy, and cirrhosis, was found in 15 (44,1%) of 34 patients with Hinchey stages III

or IV versus 3 (10,7%) of 28 patients with Hinchey stages I or II ($P = 0.03$).

Sixty-six patients (80,5%) underwent emergency surgery, and sixteen patients (19,5%) elective or semielective surgery. All seven patients with recurrence of uncomplicated diverticulitis were operated in election; 26 of 28 patients with local peritonitis (Hinchey stages I or II) were operated in emergency, and remnant 2 were operated in semielective surgery after CT-guided percutaneous drainage of abscess; all 34 patients with diffuse peritonitis (stage III and IV of Hinchey classification) were operated in emergency; and 6 of 8 patients with diverticular obstruction/stricture were operated in emergency, and remnant 2 in semielective surgery.

The preoperative investigations in patients with elective surgery included a combination of one or more of the following: abdominal CT scan; flexible colonoscopy; contrast enema.

In emergency surgery an abdominal CT scan with or without water-soluble contrast was often performed.

We had performed 43 (55,9%) Hartmann's procedures, and 34 (44,1%) primary colonic resections-anastomosis. Hartmann's operation was performed in 5 of 28 (17,9%) patients with Hinchey stages I or II because elevated comorbidity, in all 34 patients with Hinchey stages III or IV, and in 4 of 8 patients (50%) with diverticular obstruction/stricture.

Primary colonic resections-anastomosis was performed in all 7 patients with recurrence of diverticulitis operated in election, in 23 of 28 patients (82,1%) with Hinchey stages I or II, and in 4 of 8 (50%) patients with diverticular disease; none patients with Hinchey stages III or

TABLE III - Comorbidities of the patients

Disease	Percentage (n. of the patients)
Cardiovascular disease	57% (44)
Respiratory disease	31% (24)
Immunosuppressive therapy	17% (13)
Diabetes mellitus	15.6% (12)
Malignancy	7.7% (6)
Collagen disease	6.5% (5)
Liver disease	5.2% (4)

TABLE IV. *Surgical procedures according to diagnosis*

Procedure	Tot.	Recurrence of diverticulitis	Hinchey stages I – II	Hinchey stages III – IV	Diverticular stricture
Resection anastomosis	34 (44.1%)	7 (100%)	23 (82.1%)	–	4 (50%)
Hartmann	43 (55.9%)	–	5 (17.9%)	34 (100%)	4 (50%)
TOTAL	77	7	28	34	8

IV underwent primary colonic resections-anastomosis (Tab. IV).

Of 34 patients with primary colonic resection-anastomosis, we had performed a temporary loop ileostomy in 3 patients and an intraoperative colonic lavage in 2 patients.

The overall perioperative mortality rate was 7.8% (6 patients). Perioperative mortality was defined as death in hospital or postdischarge and within 30 days of surgery. However, all patients who died despite surgical therapy suffered from distinct preexisting comorbidity.

There was 1 death in 28 patients (3.5%) with Hinchey stages I or II, there were 5 deaths in 34 patients (14.7%) with Hinchey stages III or IV ($P = 0.2$). Four of 5 deaths with Hinchey stages III or IV had some form of immune system compromise such as steroid use (2 patients), chemotherapy (1 patient), malignancy (2 patients), extreme age (mean age 74 years; range 62 – 93 years). There was no death in 8 patients with diverticular obstruction/stricture.

All 6 patients who died were operated in emergency (6/66; 9% mortality in emergency surgery). None of 11 patients who were operated in election died.

Analyzing the mortality related to surgical procedure, 1 of 34 (3%) patients undergone primary colonic resections-anastomosis died and 5 of 43 (11.6%) patients undergone Hartmann's procedure died ($P = 0.4$).

The overall perioperative morbidity rate was 18.2%; there were postoperative complications in 14 patients. The morbidity rate in 28 patients with Hinchey stages I or II was 17.8% (5 patients); the morbidity rate in 34 patients with Hinchey stages III or IV was 23.5% (8 patients; $P = 0.7$).

The surgical complications was 2 anastomotic leaks, 6 abdominal wound infections, 2 peritoneal abscesses, and 5 prolonged postoperative ileus. The medical complications was 5 sepsis, 2 pleuro-pulmonary disease, 1 deep venous thrombosis complicated by pulmonary embolism. The causes of 6 postoperative deaths were 5 sepsis and 1 pulmonary embolism.

Four patients (5.2%) were reoperated for anastomotic leakage (2 patients) and peritoneal abscess (2 patients). The anastomotic leak rate in 34 patients underwent primary colonic resection-anastomosis was 5.9% (2 patients).

Hartmann's reversal was performed in 13 of 39 patients survived to primary colonic resection-anastomosis (33.3%). The mean age of patients operated for

Hartmann's reversal was 62 years (range 39 – 69 years); there were 6 females, and 7 males. The postoperative mortality and morbidity rate in Hartmann's reversal were zero. The mean time interval between Hartmann's reversal and the primary Hartmann's procedure was 5 months (range: 140 – 160 days).

Discussion

In Western countries, the prevalence of diverticular disease has increased over the past century (36-37). This probably reflects both an increase in detection and an ageing population. Diverticular disease represents the fifth most important gastrointestinal disease in western countries in terms of direct and indirect healthcare costs³⁸. At present diverticulitis is the associated diagnosis for one third of all colostomies and/or colon resections³⁹. Surgical treatment is reserved for cases of complicated diverticulitis. Although this may seem clear-cut, decisions regarding if and when to operate patients with diverticulitis remain a topic of significant debate.

The treatment of patients with Hinchey stages I and II depends on the magnitude, and the location of abscess, the patient's clinical condition and the co-morbidities. Small pericolic abscesses (Hinchey stage I) may resolve with antibiotic therapy and bowel rest; therefore, the patient may not require urgent surgical intervention⁴⁰⁻⁴². For patients with large diverticular abscesses (Hinchey stages II), two options are available, percutaneous or surgical drainage. The potential advantage of percutaneous drainage is that it may allow stabilization of the patient and avoidance of a temporary stoma and second intervention. Percutaneous drainage is successful in 70 – 90 % of patients⁴⁰. Recently some authors have suggested that surgical resection after successful percutaneous drainage may not be mandatory. However, at present few papers support this concept. In our experience we had performed 2 CT percutaneous drainage in patients with large diverticular abscess > 5 cm in diameter; in all two cases the patients underwent surgical resection with anastomosis one week after percutaneous drainage.

Patients with abscesses that are not amenable to percutaneous drainage or in whom clinical symptoms persists despite percutaneous drainage are candidates for surgery; in these cases colonic resection is mandatory and a primary anastomosis may be often performed, depending on patient's overall condition and comorbidity. In

TABLE V. Operative mortality according to indications for surgery

Indications for surgery	N. of patients	Operative mortality	Emergency surgery	Operative mortality	Elective surgery	Operative mortality
Recurrence of diverticulitis	7	0	-	-	7	0
Hinchey stages I or II	28	1*(3.5%)	26	1 (3.9%)	2	0
Hinchey stages III or IV	34	5*(14.7%)	34	5 (14.7%)	-	-
Divericular stricture	8	0	6	0	2	0
TOTAL	77	6 (7.8%)	66	6 (9%)	4	0

**P* = 0,3

TABLE VI. Operative mortality according to surgical procedure and indications for surgery

	Surgical procedure		Recurrence of diverticulitis		Hinchey stages I or II		Hinchey stages III or IV		Diverticular stricture	
	No.	Mortality	No.	Mortality	No.	Mortality	No.	Mortality	No.	Mortality
Resection anastomosis	34 (44%)	1* (3%)	7	0	23	1 (4.3%)	-	-	4	0
Hartmann's procedure	43 (56%)	5* (11.6%)	-	-	5	0	34	5 (14.7%)	4	0
TOTAL	77	6 (8%)	7		28	1 (3.5%)	34	5 (14.7%)	8	0

**P* = 0,4

our study Hartmann's procedure was performed in 17.9% of patients with Hinchey stages I or II; these patients had elevated associated comorbidity. Primary colonic resections-anastomosis was performed in the remnant 82.1% of patients with Hinchey stages I or II.

When the patient presents with perforation and diffuse peritonitis, whether it is purulent or faecal (Hinchey stages III and IV) surgical procedure is mandatory. However, the ideal surgical procedure in such cases of perforation remains a matter of debate. The possible surgical procedures advocated range from primary resection with a Hartmann's procedure, to primary resection with anastomosis, diverting ileostomy, and finally, a primary resection with anastomosis and no temporary stoma. Of these, American surgeons are most likely to perform the Hartmann's procedure, which has been advocated as the standard of care for stage III, and specially stage IV¹⁸. The Hartmann's operation has proven to be a safe and effective approach, and is based upon the idea that an anastomosis in the setting of acute infection/inflammation is dangerous and associated with a high rate of suture line breakdown. Belmonte et al. looked at 277 consecutive patients treated for acute diverticular disease at the University of Minnesota, both urgently and electively. Of these, 88% had a primary anastomosis, most of them without diversion. They found that primary anastomosis was quite safe, with an overall 4% leak rate.

Interestingly, none of these leaks were in their subset of patients with Hinchey stage IV diverticulitis, a group that comprised 9% of their total study population⁴³.

A systematic literature review of 50 studies by Salem and Flum comparing a Hartmann's procedure to a primary resection with anastomosis for perforated diverticulitis found 569 reported cases of primary anastomosis. The reported mortality and morbidity in the patients with an anastomosis was the same as in the patients who underwent the Hartmann's procedure³⁹.

Costandinidies et al selected fifteen studies, published between 1984 and 2004, with inclusion and exclusion criteria to compare primary resection anastomosis with Hartmann's procedure. The authors observed that patients selected for primary colonic anastomosis have a significantly reduced postoperative mortality compared with Hartmann's procedure in emergency setting. Considering primary colonic resection anastomosis and Hartmann's procedure performed under conditions of Hinchey stage > II, no significant difference in mortality was found⁴⁴. These data may be the consequence of the careful selection of patients undergoing primary colonic resection anastomosis that may form a group of particularly good prognostic outlook and are hence able to withstand the increased risk of anastomotic leakage and other surgical complications.

These studies are intriguing, but clinical extrapolation of

results should be done with extreme caution until high quality, randomized studies become available to clarify the issue.

In the absence of randomized controlled studies, we still recommend the Hartmann's procedure in patients with significant purulent or faecal peritonitis, and those patients with any instability related to the systemic effects of sepsis. This recommendation is based on the finding that an anastomosis involving the left colon is risky when performed under emergency conditions.

However, in a patient with Hinchey stage III, who is clinically stable, a primary anastomosis with intraoperative colonic lavage or temporary diverting ileostomy at the first operation can be performed depending on the degree of peritoneal contamination, magnitude of sepsis, timeliness of operative procedure, and associated comorbidity. Grading of comorbidities with classification systems such APACHE II or the Mannheim Peritonitis Index (MPI) can facilitate decision-making with respect to question of anastomosis versus Hartmann's procedure (45-48). The surgeon's decision must be choiced on the basis of each patient's condition and needs.

In our experience we had performed a Hartmann's procedure in all patients with Hinchey stages III and IV, because there were an elevated associated comorbidity. In our analysis, we identified a significant association between Hinchey stages III or IV and immune system compromise, such as steroid use, extreme age, chemotherapy, malignancy, and cirrhosis; immune system compromise was found in 44,1% of patients with Hinchey stages III or IV versus 10,7% of patients with Hinchey stages I or II ($P=0.03$). Many studies have shown a significant correlation between immunosuppression and perforation. In a review of 209 patients with acute diverticulitis, Tyau et al. identified a significantly higher proportion of immunocompromised patients developing perforated diverticulitis (43%) compared with non-immunocompromised patients (14%). Postoperative mortality was 39% in immunocompromised compared with 2% in immune-competent patients⁴⁹.

Our postoperative mortality in patients with Hartmann's procedure was 11,6% versus 3% of primary colonic resection anastomosis. The difference has no significance ($P = 0.4$), but the higher mortality in patients with Hartmann's procedure is explained by elevated comorbidities of these patient and by high percentage of the patients with Hinchey stages III or IV (79%, 34 of 43 patients). Four of 5 deaths with Hinchey stages III or IV had some form of immune system compromise such as steroid use (2 patients), chemotherapy (1 patient), malignancy (2 patients), extreme age (mean age 74 years; range 62 – 93 years).

If the indication to surgery is mandatory in complicated disease, less well defined are the indications for elective surgery after successful medical treatment of diverticulitis. The question of when to recommend elective, preventive surgery for patients with diverticulitis remains

very controversial. Practice parameters of American Society of Colon and Rectal Surgeons (ASCRS), revised in 2000, suggest preemptive surgery for any patient who has had two attacks of acute uncomplicated diverticulitis, with the intention of preventing another attack that could present with perforation and would necessitate a stoma (18). This recommendation for surgery after the second episode of diverticulitis arise from the pioneering work of Parks. In 1969 Parks published a prospective study of 455 patients that were followed between 1951 to 1965 and from 1 to 16 years. A total of 317 patients were treated medically on the first admission. Of these 317 patients, 24,6% were admitted with a second episode, 3,8% with a third episode, and 1,6% with fourth episode. The mortality rate for each subsequent attack of diverticulitis increases from 4.7% during the first admission to 7.8% during each subsequent admission. Thus, Parks concluded that the medical therapy of recurrent disease was less responsive after each admission, with a 70% response after the first episode vs 6% response after the third episode³. However, this study was conducted prior the application of computed tomography and there are little data to support this concept of poor response to medical treatment in subsequent attacks of diverticulitis.

Furthermore, the advent of CT scanning and better antibiotics has improved nonoperative management of these patients. In a study of Alexander et al. 673 patients with diverticular disease were followed for 10 years. Only 3% of patients required emergency operations⁵⁰.

Makela et al. followed 336 patients with diverticular disease for a mean of 10 years; 84% were admitted once for uncomplicated diverticulitis and treated medically, 8% twice, 5% 3 times, and 3% ere admitted 4 times. During follow up, no deaths were due to recurrent diverticulitis and recurrence was not associated with an increased rate of either complications or less successful medical management⁵¹. Haglund et al. noted that only 25% of 392 patients followed over 12-year period with diverticular disease developed recurrent attacks of acute diverticulitis. In this 25%, there were no perforations, and medical management was successful in all patients (29). Moreover, Chautems et al. followed 118 patients after first episode of acute diverticulitis for a median of 9,5 years; 71% of patients had no recurrent episodes. None patients with subsequent attacks for diverticulitis died or required surgery²¹. Looking at the issue from another angle, Somasekar et al. reviewed 108 patients admitted with complicated diverticulitis; 104 required emergency surgery. Interestingly, only 28 patients (26%) were known to have diverticular disease previously. Only 3 patients (2,7%) had been admitted in the past with a previous episode of acute diverticulitis. In other words, only 2,7% of patients in this group would have benefited from an elective resection. Complications of diverticular disease occur de novo in the majority of patients who have no previous history of the disease⁵².

Chapman et al. retrospectively analyzed 337 patients admitted to Mayo Clinic with complicated diverticulitis; only 157 patients (46,6%) had an antecedent history of uncomplicated diverticulitis. However, the overall mortality rate for those patients with a previous episode of diverticulitis was not increased but was significantly lower than patients who present with complicated diverticulitis as an initial presentation. In this study mortality was associated with perforated diverticulitis²². The authors concluded that this significant difference in mortality rate is most likely due to well-known finding that perforated diverticulitis is more common as an initial presentation of diverticulitis. Patients with a history of diverticulitis are prone to present with abscess or inflammatory phlegmon. Many authors have observed, as we also have, that an attack of diverticulitis may be somewhat protective. A phlegmon or a inflammatory mass may occur with a small localized perforation, which basically make a shelter with the omentum or small bowel to the area of perforation. This may very well serve as a protection for any subsequent attacks. In a case-controlled study, Hart et al. found that 78% of patients with perforated diverticulitis had no history of diverticulitis⁵³.

In our study, 56% of patients with Hinchey stage III and IV, because of perforated diverticulum, had no previous history of diverticulitis; furthermore 71.4% of patients with Hinchey stage I and II had a history of at least one previous uncomplicated diverticulitis episode. Thus, it appears that elective resection might have little impact on the incidence of patients requiring emergency procedures because most of these occur with the first attack of diverticulitis. Subsequent attacks of diverticulitis in the same patient seem to be akin to their previous ones, suggesting that specific patients are predisposed to a set pattern of diverticulitis, and once settled into this pattern they stay within it. The threat of the colostomy to a patient who has been successfully managed medically during two previous attacks may be unwarranted and misleading.

In addition, it is important to recognize that elective surgery for diverticulitis is not without complications. Bookey et al. demonstrated that elective diverticular disease resection is associated with higher rates of morbidity and mortality than elective colorectal carcinoma resection, with the mortality rate increasing from 0 to 15% with advancing age⁵⁴. Furthermore, colectomy is not a guaranteed cure for diverticulitis, with recurrence rate varying from 3 to 13%. These rates have improved, however, with the recognition that the chances of recurrence are fourfold higher if a colosigmoid anastomosis is performed, emphasizing the importance of resecting the entire sigmoid colon in an operation for diverticulitis⁵⁵. With these conflicting data in mind, we retain that the patients with uncomplicated diverticulitis can be managed conservatively. The number of episodes of acute uncomplicated diverticulitis is not necessarily an overriding factor in defining the appropriateness of surgery.

At the light of recent publications a more conservative recommendation was emphasized. Recent published practice parameters for sigmoid diverticulitis recommend that elective sigmoid colectomy after recovery from acute uncomplicated diverticulitis should be made on a case-by-case basis. The decision to recommend surgery should be influenced by age and medical condition of the patient, the frequency and severity of the attacks, and whether there are persistent symptoms after acute episode⁵⁶.

Elective surgery may also be offered to patients who have had one or more episodes of severe diverticulitis, as determined by their clinical presentation and CT grade. CT graded severity of a first attack is a predictor of an adverse natural history and may be helpful in determining the need for surgery⁵⁷. Inability to exclude carcinoma is another appropriate indication for colectomy. In our study, 7 of 82 patients (8.5%) underwent surgical treatment for recurrence of diverticulitis without septic complications (> 2 episodes). We had selected these patients on the basis of the age, medical condition, and severity of initial clinical presentation and the CT grade. There is no clear consensus regarding whether younger than 50 years treated for diverticulitis are at increased risk of complications or recurrent attacks (18, 20, 21, 24, 34, 55, 58-63). Nevertheless, because of their longer life expectation, younger patients will have a higher cumulative risk of recurrent diverticulitis, even if the virulence of their disease is no different than older patients.

Conclusions

Diverticular disease is a common benign condition whose incidence is increasing in the Western population. Although most patients with uncomplicated diverticulitis recover with medical treatment, 20 % of them develop complications.

The indications for surgery when complications occur are clear. The most commonly performed procedures in the complicated disease are either the primary colonic resection-anastomosis or the Hartmann's operation, depending on the severity and the stage of the disease, patient's overall condition and comorbidities. In our experience we had performed a Hartmann's procedure in all patients with Hinchey stages III and IV. In these patients with acute infection/inflammation, an anastomosis is dangerous and associated with a high rate of suture line breakdown; thus the Hartmann's operation is a forced choice in these stages. In the Hinchey stages I or II, a primary colonic resection-anastomosis may be often performed, depending patient's overall condition and comorbidities.

If the indication to surgery is clear in complicated disease, less well defined are the indications for elective surgery after successful medical treatment of diverticulitis. Practice parameters of American Society of Colon

and Rectal Surgeons (ASCRS), revised in 2000, suggest elective surgery for any patient who has had two episodes of acute uncomplicated diverticulitis, with the intention of preventing another episode that could present with perforation and would necessitate a stoma. The data used to support these practice parameters is outdated. Many studies in recent years reveal that perforated diverticulitis, which carries the highest risk of mortality and morbidity, most commonly was the first manifestation of complicated diverticular disease. In our study, 56% of patients with Hinchey stage III or IV had no prior history of diverticulitis; furthermore 71.4% of patients with Hinchey stage I or II had a history of at least one prior uncomplicated diverticulitis episode. At the light of recent publications on the topic, the decision to recommend surgery should be influenced by age and medical condition of the patient, the frequency and severity of the attacks, and whether there are persistent symptoms after acute episode. Elective surgery may also be offered to patients who have had one or more episodes of severe diverticulitis, as determined by their clinical presentation and CT grade.

Riassunto

INTRODUZIONE: La diverticolite semplice può essere generalmente trattata con terapia medica. Il trattamento chirurgico è riservato ai casi di diverticolite recidivante ed alla diverticolite complicata. Riportiamo la nostra esperienza nel trattamento chirurgico della diverticolite acuta del sigma.

METODI: Tra il 2001 ed il 2006 abbiamo operato 82 pazienti con diverticolite acuta del sigma.

RISULTATI: Le indicazioni chirurgiche includevano diverticolite semplice recidivante (7 pazienti), stadio I o II di Hinchey (28 pazienti), stadio III o IV di Hinchey (34 pazienti), stenosi diverticolare (8 pazienti), sanguinamento (3 pazienti) e fistola colo-vescicale (2 pazienti). Tra gli 82 pazienti operati, abbiamo analizzato 77 casi con complicanze infiammatorie acute. Abbiamo effettuato 43 (55,9%) interventi di Hartmann e 34 (44,1%) resezioni coliche con anastomosi primaria. L'intervento di Hartmann è stato effettuato in 5 dei 28 pazienti allo stadio I o II, in tutti i 34 pazienti allo stadio III e IV ed in 4 degli 8 casi (50%) con stenosi diverticolare. La resezione colica con anastomosi primaria è stata effettuata in tutti i 7 pazienti con diverticolite recidivante, in 23 dei 28 pazienti (82,1%) allo stadio I o II ed in 4 degli 8 pazienti (50%) con stenosi diverticolare. La mortalità operatoria globale è stata 7,8%. La morbilità postoperatoria globale è stata 18%.

CONCLUSIONI: Come si evince dalla letteratura e dalla nostra esperienza, la resezione colica con anastomosi primaria rappresenta la prima scelta in pazienti con malattia allo stadio I o II. L'intervento di Hartmann conferma la sua efficacia nella malattia allo stadio III o IV.

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