The role of surgical treatment in colon diverticultis: indications and results

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Abstract

Purpose *Colon diverticulitis is a common illness with affects 37-45% of western populations.*
Indications regarding therapy guidelines, operative timing and which surgical procedure to perform are still controversial.
Material and Method *Between January 1977 and December 1997, 239 patients, diagnosed with diverticulitis, have been admitted, on emergency, to our Department of General Surgery; 135 males (56%) and 104 females (44%), (mean age of 63 years).*
Results and Discussion *Forty-two patients (18%), clearly diagnosed with diffuse or local peritonitis, underwent delayed emergency surgical procedure; 44 (22%) out of 197 patients, treated with medical therapy and subsequently underwent elective surgery procedures for complications (fistulas or stenosis). Among the 42 patients treated in emergency, 26 cases (62%) underwent to resection with immediate reconstruction. Among the elective surgery group 39 (89%) out of 44 underwent to resection with immediate reconstruction. Complications reached 40% in the group of emergensy patients (mortality rate 12%) and 16% in the elective surgery group (mortality rate 2%).*
Several features possible influencing mortality rate have been analysed; age > 70 years, acute associated diseases, generalised peritonitis and surgical timing show a statistical significance.
Conclusion *Therefore, a careful evaluation of the patients, an appropriate pre and post-operative medical treatment, with a wider use of the most recent techniques such as CT scan guided drain, intra-operative wash-out and peritoneal lavage are recommended in order to reduce morbidity and mortality.*
Key words: Diverticulitis, colon disease, surgical treatment.

Introduction

Colon diverticulitis is a common illness occurring in an average of 37-45% of the population of the western countries. The incidence is directly related to age and affects only 1-2% of the patients below 30 years, 30% of patients between 40 and 60 years, and more than 50% of patients over 70 years (4, 33). It is often asymptotic. Clinical manifestation is present in 10-25% of the cases, usually related to a complication: generalised peritonitis (purulent or fecal) is the mainstay in 47.5% of patients, pericolic abscess in 32.2%, bowel occlusion in 12.3%, fistula in 5.3%, and severe intestinal haemorrhage in 2.1% (22). Such pathological entity continues to attract clinical and scientific interest because of the variety of the clinical presentations, the possible regression of the diverticulitis episode with medical therapy, the elderly age in many of these patients, and to the high intra-operative mortality (15.3% in the last 10 years) (32, 36).
Therapy guidelines (medical or surgical treatment); operation timing (emergency, urgency, delayed or elective surgery); and surgical options are still open to discussion. While the 3-stage procedure is considered quite obsolete, the debate lies on choosing either the 2-stage procedure (Hartmann's operation) or a one-stage procedure (3, 40). Our experience regards 239 patients who were admitted in the last 20 years.

Materials & methods

Between January 1977 and December 1997, 239 patients with acute diverticulitis have been admitted to the General Surgery I Department of the Catholic University of the Sacred Heart. Hundred and thirty-five were males (56%), 104 females (44%), and mean ages was 63 (range 32-89 years).
On admission, all patients have undergone to an accurate clinical evaluation, blood tests (Hct with formula, main hepatic and renal indexes) and ECG. Upright abdominal radiographs were the most utilised visual diagnostic test. Abdominal ultrasound was reserved for clarifying

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Tab. I – INSTRUMENTAL TESTS PERFORMED

Tests	*N.*	*%*
Blood		
White blood cells	42/42	100
Radiographs		
Plain upright abdomen rays	40/42	95
Free intraperitoneal air	11/40	27
Air fluid levels	28/40	70
Normal	1/40	3
Abdominal ultrasound scan	14/40	33
Positive	10/14	72
Negative	4/14	28

uncertain diagnoses (Tab. I). All patients received antibiotic and infusion therapy. Patients with complete recovery after medical therapy were dismissed and subsequently studied by means of barium enema and/or colonoscopy. Elective surgery was planned for the patients of this group who developed post-diverticulitis complications (stenosis and/or fistulas) or relapsing diverticulitis. Patients with instrumental and clinical signs of generalised or localised peritonitis underwent emergency surgical treatment. According to the severity of clinical presentation and to antibiotic therapy response, we classified our procedure has:

- Emergency procedures (within 6 hours from admission)
- Delayed emergence procedures (within 48 hours)
- Delayed procedures (after 48 hours, but always within the same admission)

We reviewed data about the peri-operative morbidity, mortality, late complications and the kind of surgery performed of all surgically treated patients. The severity of the anatomo-pathological presentation in the emergency surgery diverticulitis cases was scored according to Hinchey's classification: I° stage, pericolic abscess; II° stage, pelvic abscess; III° stage, generalised purulent peritonitis; IV° stage, fecal peritonitis. "Fisher's exact test" was used for statistical.

Results

Eighty-two percent of the patients (197 patients) had a full recovery from the symptoms with therapy. Surgery has been performed on 86 patients (48% as. emergency and 52% as elective operations).

Emergency surgery

Amongst the 42 patients who underwent emergency procedures, 15 cases (36%) were operated within 6 hours from admission; 5 cases (12%) within 48 hours (delayed-emergency) and 22 cases (52%) after 48 hours, but within the same admission (delayed surgery). A severe associated pathology was present in 11 patients (26%): 4 former myocardial infarction (MAI); 2 cases of cerebro-vascular insufficiency, 1 case of extra-colonic neoplastic disease; 2 cases of chronic obstructive pulmonary disease (COPD); 2 patients with various morbid conditions. Transfer to Intensive Care Unit (ICU) and mechanical ventilator assistance was needed for 5 patients (12%); one of them died for acute respiratory failure. Mean stay in ICU was on 7 days (range 1-28.) Hinchey's classification of anatomy-pathological presentation at operation time is showed on Tab. II: 13 patients (31%) had a pericolonic abscess (stage b; 9 patients (21%) had a pelvic abscess (stage II); in 18 pts (43%) a generalised purulent peritonitis and in 2 cases (5%) a diffiuse fecal peritonitis was found. The types of operative procedures performed are listed on Tab. III: 31 patients (75%) underwent resection with immediate reconstruction associated or less to a protective colostomy; 6 patients (14%) underwent Hartmann's procedure; in 5 cases (11%), all prior to 1980, abdominal drainage excluding colostomy or colonic perforation exteriorisation (Miculitz's operation)was surgical treatment. Hartmann's procedure was preferred in 4 cases (68%) because of the presence of purulent or fecal generalised peritonitis, in 1 case (16%) because of the patient's compromised. general conditions and in 1 case (16%) according to the surgeon's choice. Overall morbidity was of 40%. Tab. IV reports different types of complications. Early complications were: 6 wound infections; 4 intra-abdominal sepsis, two of which required reapportion (one day); 2 anastomosis' dehiscences, re-intervention in one case; 1 intestinal bleeding, treated conservatively and 1 pelvic abscess treated with a CT-guided percutaneous drainage. Late

Tab. II – CLINICAL-ANATOMICAL PRESENTATION AT TIME OF OPERATION (HINCHEY'S CLASSIFICATIO)

Stage	*N.*	*%*
I	13	31
II	9	21
III	18	43
IV	2	5

Tab. III – OPERATIVE PROCEDURES

Procedures	*N.*	*%*
Resection + immediate reconstruction	26	63
Hartmann's procedure	6	14
Resection + immediate reconstruction + Protective colostomy	5	12
Colostomy + drainage	3	7
Miculitz' procedure	1	2
Plain drainage	1	2

Tab. IV – POST-OPERATIVE COMPLICATIONS

Complications	*N.*	*%*
Early complications		
Wound infection	6	35
Sepsis	4	23
Pelvic abscess	1	6
Anastomosis' dehiscence	2	12
Intestinal bleeding	1	6
Late complications		
Colo-vescical fistula	2	12
Anastomosis' stenosis	1	6

Tab. V – DECEASED PATIENTS

Age	*Associated pathology*	*Hinchey*	*Surgical procedure*	*Surgical timing*	*Death cause*
76	Former MAI	I	Res. Ant + colostomy	< 24 h	MAI
77	CG	III	Miculitz's	1 week	sepsis
66	COBP	III	Hartmann's	48 h	MAI
65		III	Colonstomy + drainage	1 week	MAI
78	Breast cancer	III	Drainage	1 week	MAI

COBP: Chronic obstructive brhoncopneumopathy;
MAI: Myocardial acute infarction;
CG: Congestive heart disease.

Tab. VI – MORTALITY INFLUENCING FACTORS (FISHER'S EXACT TEST)

Factors	*Alive*	*Dead*	*P value*
Age (> 70 yrs)	12	3	0.01
Acute associated pathologies	11	4	0.02
Generalised peritonitis	20	4	0.02
Surgical timing			
< 24 h	26	4	0.03
> 48 h	16	1	
Peritonitis:			> 0.05
fecal	2	0	
purulent	18	4	
Post-operative mechanical ventilation	5	1	> 0.05

post-operative complications were 2 colo-vescical fistulas that needed re-interventions; 1 anastomotic stricture endoscopically dilated. Total mortality rate was of 12% (Tab. V). In the generalised peritonitis patients group mortality rate reached 20%. Possible mortality influencing factors have been reported on Tab. VI. For 4 of these (age > 70 years; associated pathologies; generalised peritonitis and surgical timing) showed statistical significance (Tab. VI).

Elective surgery

We have performed 44 elective surgery operations: 23 cases (52%) for post-diverticulitis complications and 21 cases (48%) for recurrent diverticulitis (Tab. VII). Nineteen patients (43%) presented an associated pathology on admission: 9 had former MAI; 3 cases extracolonic neoplastic disease; 2 cases renal failure; 2 cases chronic obstructive pulmonary disease; 3 cases with associated morbid conditions. None of the patients needed, post-operatively ICU or mechanical ventilator assistance. Tab. VIII shows the kind of surgical procedures performed: 39 patients (89%) underwent a colectomy with immediate reconstruction; 4 patients (9%) a resection-anastomosis operation with a protecting colostomy; only 1 patient (2%) underwent Hartmann's procedure. Total morbidity was 16%. Complications are listed on Tab. IX: 3 surgical wound infections; 2 intra-abdominal sepsis; 1 anastomosis' dehiscence that required reoperation. Total post-operative mortality was of 2%.

Discussion

Reviewing the literature, the most relevant problem in acute abdomen, probably due to an acute diverticulitis,

Tab. VII – ELECTIVE SURGERY PROCEDURES

Post diverticular complications	*N.*	*%*
Recurrent diverticulitis	21	48
Post-diverticular complications	23	52
Stenoses	14	61
Colo-vescical fistulas	6	26
Palpable mass	2	9
Hidden perforation	1	4

Tab. VIII – TYPE OF OPERATION

Type of operation	*N.*	*%*
Resection + immediate reconstruction	39	89
Resection + immediate reconstruction + Protective colostomy	4	9
Hartmann's procedure	1	2

Tab. IX – POST OPERATIVE COMPLICATIONS

Complications	*N.*	*%*
Wound infection	3	44
Sepsis	2	28
Anastomosis' dehiscence	1	16
Anemia	1	16

is the diagnosis. Diagnostic tests such as plan abdomen x rays, U/S and CT scan must be performed to confirm clinical diagnosis. The upright abdomen Rx is an aspecific test though often very helpful to understand the pathology: in our study we find free air in 27% of the cases and hydroaerial levels in 70% of them. Ultrasound has proved to be an easy test to perform, extremely reliable (97.7%), with an excellent sensitivity (98.1%) and specificity (97.5%) (40). The routine CT scan is still controversial. It is helpful in evaluating the colonic wall's thickness, the flogosis extension, the presence of an abscess, with sensitivity ranging from 63% and 95% in the different series (30, 33). CT scan is also widely used in draining pelvic abscess, as reported in many Authors'experience (19). Diagnostic procedures are helpful to evaluate associated pathologies, which are present in 32% of the cases in Elliot's study (9) and in 26% in ours. In this way it's possible to plan an effective therapeutic strategy, placing the patient in a risk class according to the ASA or MPI indexes. An ASA index of 3, associated pathologies, a shock state as well as a high MPI index, raises operative mortality (9). Except for generalised peritonitis cases (20%) (42) in which emergency surgery is the only accepted procedure, medical therapy (i.e. intestinal rest, electrolytic rebalancing, wide specter antibiotical somministration) and a strict observation of the clinical evolution are widely accepted (41). The acute diverticulitis episode resolves completely by itself in 75% of the patients (27, 43). In our study these patients (82%) were dismissed and underwent further evaluation by performing by double contrast barium enema and/or colonoscopy 4-6 weeks later. In post-diverticulitis complications, such as stenosis, fistulas or neoplastic suspicion or recurrent diverticulitis, elective surgery was performed. Patients' age associated risk factors were evaluated before surgery. In our series 22.3% of the patients underwent elective surgery and mortality was 2% (1/44 patients), similar to literature data (12, 15, 24, 33, 34). During surgical choice, we must also consider, that a diverticulitis relapse range from 25-30% (20) to 100% in patients below 40 years of age (5). Moreover, we have to consider that 25% of patients with disease need emergency procedures (9, 11) and that resection/ anastomosis in one stage is choice in elective surgery. Acute patients, not improving with conservative treatment must be operated on within 4 8 hours because prolonged sepsis significantly worsened the prognosis (14). As proposed by some Authors, in cases in which diverticulitis resolves only partially with medical therapy, we perform further diagnostic tests (i.e. U/S or CT scan) to exclude presence or persistence of a paracolic abscess. The treatment of such complications may be a delayed emergency operation within the same admission or a CT scan guided percutaneous drain of the abscess, in high risk patients (14, 16, 19, 38). Controversy still persists regarding the type of surgical procedures; however, most Authors prefer one stage resections/anastomosis. Non resective surgery (drainage, drainage and colostomy, perforation exteriorisation), largely utilised in the 70's is now considered obsolete and is associated with elevated morbidity and mortality: 50% mortality in exteriorisation operations (18, 35), 20-40% in colostomy and drainage interventions (1, 31) and 30% in the first stage of three-stage planned operations (21, 26).Being sepsis responsible of most deaths (7, 37), resection of affected colon has to be the choice operation (6, 29). At present the most performed operation are: resection with immediate anastomosis, resection anastomosis with protecting colonostomy and Hartmann's procedure. Resection/ anastomosis is the treatment of choice in elective surgery for diverticulitis, because trascurable morbility and mortality and the considerable advantages for the patient. Its use in emergency surgery is controversial some Authors refer a moderate rate of mortality (6-7%) (8, 10, 12, 24, 26, 44), while others report a higher rate (17, 23). These different results depend from not homogeneous and comparable date, because the lacking of correlation between clinical presentation, pathological situation and surgical procedure. The only confirm, arising from the analysis of these date, is that post-operative morbidity and mortality raise with generalised purulent and fecal peritonitis (26).Therefore it's our opinion, that resection and immediate anastomosis must be used in emergency surgery in Hinchey's stages I and II, while its use in stages III and IV must be caretully evaluated (2, 24). One-stage operation may also be adopted in generalised peritonitis using intraoperative colon washout (28, 41) or the post-operative peritoneal lavages (39). In 63% of ours patients, we preferred to perform one stage operations, with a protective colostomy in 12% of the cases, in which peritonitis was not generalised yet to need Hartmann's procedure (12%). Colostomy closure has always been performed after a short period, without complications. The role of Hartmann's procedure is still controversial Literature reports a mortality rate ranging from 2.6% to 36.8% (mean 17%) (12, 22); moreover, it is reported a mortality rate of 4% during recanalization (18, 29, 44). Recanalization rate (22), only partially reduced by mechanical staplers (25) ranges from 20 and 85% with a rate of morbidity ranging between 4 and 16% (9, 27, 34). Anyway, apart from the present trend to search for larger grounds for one-stage operation indications, Hartmann's procedure remains the choice in Hinchey's stages III and IV. It is also indicated when an adequate colonic washout is not possible, in presence of a severe colonic distension and in poor condition patients.

Conclusion

Analysing the result of surgery for diverticulitis depend from the general patient's status, the presence of a diffuse peritonitis and the evidence of a sepsis. Therefore, a

careful evaluation of the patients, an appropriate pre and post-operative medical treatment, with a wider use of the most recent techniques such as CT scan guided drain, intra-operative wash-out and peritoneal lavage are recommended in order to reduce morbidity and mortality.

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Commento Commentary

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Dallo studio di questa vasta casistica di "diverticoliti acute" del colon si evidenzia che l'età media dei soggetti ricoverati in regime di urgenza – 63 anni (con sostanziale equilibrio di sesso) – che corrisponde a quella in cui ancora di media i pazienti, salvo condizioni particolari, sono peraltro sostanzialmente sani; che 1/5 dei ricoverati si presentavano già al ricovero in fase di peritonite diffusa o circoscritta che richiesero un intervento immediato, in oltre la metà dei casi con ricostruzione immediata della continuità digestiva; che 1/5 dei pazienti trattati con terapia medica andarono comunque incontro a complicanze – fistole o stenosi – che richiesero successivamente un intervento chirurgico, in circa il 90% dei casi con ricostruzione immediata della continuità digestiva.
Quindi circa il 50% dovette dunque affrontare un intervento chirurgico, con molto diverse morbilità e mortalità in questi due distinti gruppi: 40% e 12% nel primo contro 16% e 2% nel secondo.
Il ritardo della diagnosi porta all'osservazione di pazienti che devono essere sottoposti ad interventi non sempre ideali per la necessità di un reintervento dopo aver superato la grave fase di peritonite diffusa, e la condotta seguita nella casistica presentata è interamente da sottoscrivere.
Molto spesso però la diagnosi di perforazione di un diverticolo è oggi molto più precocemente dimostrabile, per l'insorgenza nel corso di esami o manovre endoscopici. In questi casi l'esperienza sia personale che di numerosi altri chirurghi è quella che l'emergenza può essere superata al bisogno anche con semplice trattamento chirurgico conservativo. Infatti se la peritonite è soltanto iniziale, anche se naturalmente con contaminazione fecale recente del cavo peritoneale, è possibile ottenere la guarigione con semplice affondamento del diverticolo, che va ricoperto adeguatamente con lembi epiploici, facendo seguire a questo atto chirurgico un abbondantissimo lavaggio dell'intera cavità peritoneale con soluzione fisiologica ed antibiotici, o anche con betadine, lasciando a sorveglianza dei drenaggi. Quasi mai si deve reintervenire precocemente per deiscenza dell'affondamento, lasciando il tempo e l'opportunità di un'adeguata preparazione del colon prima di procedere a breve distanza di tempo ad un intervento resettivo in condizioni ottimali di elezione se la situazione anatomo-patologica locale studiata successivamente in elezione è tale da consigliarlo, e cioè specie se esiste una diverticolosi estesa e un chiaro atteggiamento stenotico o spastico a valle.
Per altro verso quando un paziente giunge al ricovero, anche al di fuori di una sindrome acuta, con una sintomatologia che si dimostra infine fondata sulla presenza di diverticoli del colon è oggi più difficile sostenere che si tratti di una semplice "diverticolosi", che richiede classicamente per lo più solo un trattamento medico conservativo. Ma la vita media si è allungata, e dunque questi pazienti – a meno che non siano portatori di un diverticolo isolato – andranno verosimilmente incontro a più grave riacutizzaizone del processo flogistico. I miglioramenti della tecnica operatoria, specie quando è possibile una adeguata preparazione del paziente e del colon – e dunque in elezione – induce oggi molti chirurghi, e noi con essi, a porre con maggiore larghezza l'indicazione operatoria, specie ma non soltanto in condizioni generali ottimali del paziente, con riduzione ben evidente della morbilità e della mortalità attuali e con l'effetto di una efficace profilassi per il futuro.

From the study of this vast number of patients with "acute diverticulitis" of the colon is highlighted that the middle age of the subjects admitted in emergency – 63 years (with substantial equilibrium among sexes) – is coinciding with that

in which still the average of patients, except particular conditions, are substantially healthy; that about 20% of the patients was already in phase of diffuse or localized peritonitis demandingan immediate surgical treatment, half of them with direct reconstruction of the gut continuity; that about 20% of the patients submitted to medical therapy medicate had anyway complications – that means fistulas or stenosis – demanding a subsequent intervention in not ideal condi - tions, but with about 90% of immediate reconstruction of the gut continuity.
Then about 50% of the patients had to be submitted to a surgical intervention, with very different morbidity and mor - tality in these two different groups: 40% and 12% in the first versus 16% and 2% in the second.
In cases of delayed diagnosis the patients have to be submitted in emergency to interventions not always optimal, for the necessity of a subsequent new operation after the overcoming of the serious phase of diffuse peritonitis, and therefore the surgical behavior of the present sesie is entirely to subscribe.
But very often the diagnosis of perforation of a diverticule is nowadays much earlier because possible complication of a diagnostic or operative endoscopy. In such cases the personal experience, common to many surgeons, is that the emergency could be overcome also with simple surgical conservative treatment. In fact if the peritonitis is only at its beginning, also if naturally with faecal contamination of the peritoneal cavity, it is possible to obtain the recovery of the patient with the simple suture-sinking of the perforated diverticule, and covering adequately the suture with epiloic edges, and washing afterwards the caelomic cavity with repeated and abundant antibiotic saline, or also with betadine, leaving at the end well drained peritoneom and Douglas. It is very infrequent the necessity of a precocious reintervention for a deiscent suture. It is possible then to adequately prepare the patient and its colon for an elective reintervention if the local situa - tion opportunely studied after the recovery is demanding, and it can be performed in optimal conditions. And this is the case of an extensive diverticulosis and a clear stenotic or spastic situation below.
If the patient asks an hospital admission, also outside an emergency situation, but for a simptomatology that demon - strates in the follow as related to the presence of a diverticular disease, it is nowadays much more difficult to support the view that it is only a simple "diverticulosis", requiring only, as in the past times, a conservative treatment. The ave - rage life expectancy is now lengthened, and then these patients – except in the case of an isolated diverticule – are expo - sed in the following life to new and more serious attacks inflammatory disease. The perfectionate surgical techniques, expecially if an adequate preparation of the patient and of his colon – and then in election situations – help today many surgeons, and we are among them, to set more easily the surgical indication to a colon resection. And this is true not only if the patient meets optimal general conditions of health, because the elective operation reduces the immediate morbility and mortality, with an adjunctive prophilactic advantage for the future.

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