

## CURRENT PROBLEMS ON OPERATIVE STRATEGY FOR COMPLICATED COLON DIVERTICULAR DISEASE

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### ABSTRACT

Perforation of complicated diverticular disease of the colon with generalized peritonitis is common life-threatening emergency requiring surgical intervention. Although the absolute prevalence of perforated diverticulitis complicated by generalized peritonitis is low, its importance lies in the significant postoperative mortality, ranging from 4–26%, regardless of selected surgical strategy. The optimal treatment for perforated diverticulitis has been always a matter of debate, changing the “gold standard” several times in the last decades. Primary resection has become the standard practice, but fear of anastomotic leakage often deterred many surgeons from performing primary anastomosis. Therefore, for many surgeons Hartmann’s procedure has remained the favored option. We share our 10 years departmental experience in complicated diverticular disease of the colon studying 146 cases with diverticular disease treated in our clinic between 2000–2010. The indications for operation were diverticulitis complications - perforation, obstruction and bleeding, demonstrated on clinically by generalized peritonitis - 21, acute obstruction - 4 and rectorrhagia - 2. Operation was performed in 29 patients in urgent setting. Primary resection with anastomosis was done in 12 patients (41.38%). Manual anastomoses were performed in 4 cases, while mechanical anastomoses with staplers were accomplished in 8 cases. In 6/50% of the latter we used our standardized technique for linear stapler latero-lateral/functional end-to-end anastomosis, formerly implemented by us for colonic cancer resections and anastomoses. We had 2/6.9% anastomosis dehiscences. Hartmann’s procedure was performed in 17 patients (58.62%). We did not have any complications or death with standardized stapler resections and anastomoses. Hospital operative mortality was 13.79% /4 cases/. We advocate the primary anastomosis as the standard procedure, especially for older patients. Using a standardized technique with linear stapler for primary colon resection and anastomosis in complicated diverticular disease we favor the patient’s outcome with safety, efficiency and effectiveness.

Key words Perforated Diverticulitis /PD/, Primary Resection /PR/, Hartmann’s procedure/HP/

### INTRODUCTION

Diverticular disease of the colon is a common disease in developed countries, rising from 10% in patients under 40, up to 50–66% of those above 80. /8,13/.

While most people with diverticular disease remain asymptomatic, approximately 15% develop symptoms, and 15% of these, will develop significant complications, such as perforation. In most cases perforation is the first manifestation of the disease. Perforation with generalized peritonitis is the most common life-threatening emergency requiring surgical intervention. Although the absolute prevalence of perforated diverticulitis complicated by generalized peritonitis is low, its importance lies in the significant postoperative mortality, ranging from 4–26%, regardless of selected surgical strategy/18,19/.

The optimal treatment for perforated diverticulitis has been always a matter of debate, changing the “gold standard” several times in the last decades. Primary resection has become the standard practice, but fear of anastomotic leakage

often deterred many surgeons from performing primary anastomosis. Therefore, for many surgeons Hartmann’s procedure has remained the favored option. Nevertheless, improvements in surgical techniques, radiological intervention techniques, anesthesia, advances in intensive care medicine, and progress in the management of peritoneal sepsis have led to an increasing interest in resection with primary anastomosis with or without diverting stoma or colonic lavage/17/. Recently, laparoscopic lavage and drainage without resection has been successfully used for patients who have generalized peritonitis caused by perforated diverticulitis. Because this nonresectional mini-invasive surgical strategy was associated with a reduction in morbidity and mortality, it might be a promising alternative to the standard open resectional practice/8,19/.

In 80% it is asymptomatic, 10–25% of patients have acute attack, further 30% develop complicated diverticulitis/8/ Fig. 1/.

A quarter of patients with complicated diverticulitis develop life-threatening complications like perforation, ob-

struction or stricture, bleeding /Fig 2/, abscesses or phlegmon and fistulae where morbidity could reach 44% and mortality – 16%./2,5,6,7,11,12/

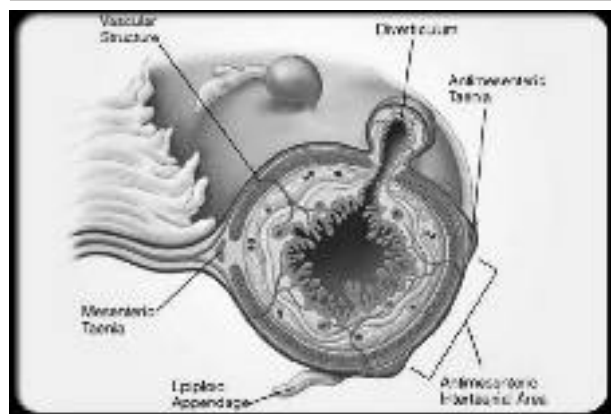


Fig.1 Diverticular disease of the colon

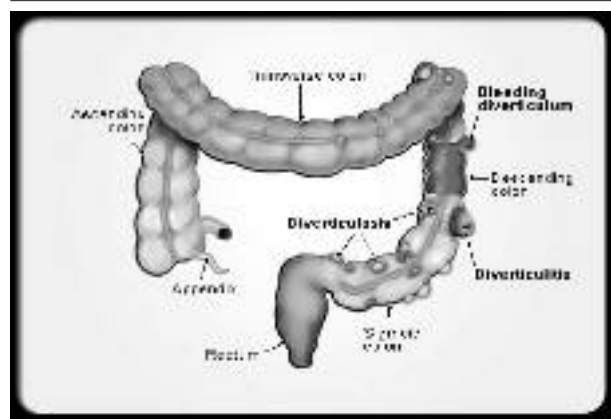


Fig. 2 Sygma Diverticulus

Hinchey's classification of CDDC is including a phlegmon(stage Ia), localized abscesses (stages Ib and II), free perforation with purulent (stage III) or feculent peritonitis/Fig 3,/(stage IV)/3,10/.



Fig 3. Feculent Peritonitis from Perforated Colon Diverticulitis treated with Laparostomy.

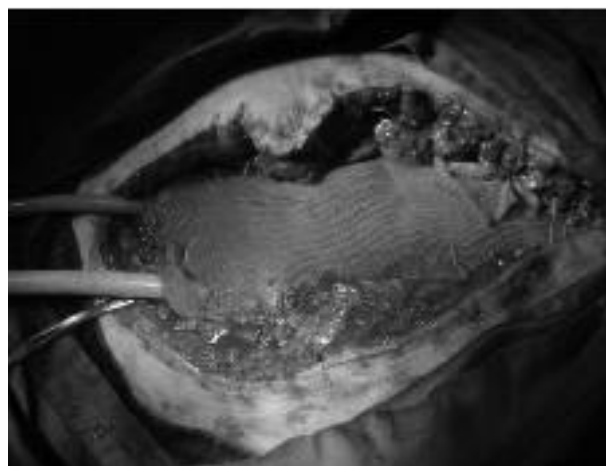


Fig 4. Feculent Peritonitis from Perforated Colon Diverticulitis treated with Laparostomy.

Acute diverticular bleeding affects 3% to 15% of individuals with perforated diverticulitis and increases its severity with age/7/. One in four of the patients with complicated diverticulitis require emergency operation because of perforation, peritonitis, or systemic complications/19//Fig 4/. At present, diverticulitis is the associated diagnosis for one third of all colostomies and/or colon resections. Hartmann's operation or primary resection with anastomosis is most commonly performed /4/.

### AIM

To analyze 10 years departmental experience in complicated diverticular disease of the colon and optimize treatment modalities.

### MATERIALS AND METHODS

We studied 146 cases with diverticular disease treated in our clinic between 2000-2010.

Patients were treated conservatively with combination of antibiotics, intravenous infusions of colloids and crystalloids, plasma or haemotransfusion. The indications for operation were diverticulitis complications - perforation, obstruction and bleeding, demonstrated on clinically by generalized peritonitis - 21, acute obstruction - 4 and rectorrhagia – 2.

Operation was performed through a laparotomy in 29 patients in urgent setting. The operation method was selected on the basis of local conventions: operations were carried out in a unit in which laparoscopic procedures are not routinely performed.

The primary resections and anastomoses in 6 cases were performed by an original standardized technique with a linear stapler, formerly implemented by as for colonic cancer resections and anastomoses.

The study was approved by the local ethics committee and a written informed consent was obtained from all patients.



Fig 5. Standardized technique for Sigma resection/ anastomosis with L cutter 55



Fig 6. Standardized technique for Sigma resection/ anastomosis with L cutter 55

## RESULTS

Epidemiological data showed sex ratio M: F (1:1.22) and medium age of 66.4 /49 – 88/ years were recorded. Diagnosis relayed on irrigography, fibrocolonoscopy and CT-scan.

Admission diagnosis were Colorrhagia, Ileus, Peritonitis, Colonic Cancer, Acute appendicitis. Diverticulosis as primary diagnosis was assumed only in 10%/14 cases/. Sigma was affected in 95/65%/.

Perforation/ Fig 3/, bleeding and obstruction were the main complications.

Causes for interventions were acute generalized peritonitis and failure of conservative measures.

Time from admission to operation varied from 6 hours to 3 days, depending on the severity of the clinical signs, symptoms and diagnostic findings of an acute abdomen.

Hartmann's procedure was performed in 17 patients (58.62%).

Primary resection with anastomosis was done in 12 patients (41.38%). Manual anastomoses were performed in 4 cases, while mechanical anastomoses with staplers were accomplished in 8 cases. In 6/50%/ of the latter we used our standardized technique for linear stapler latero-lateral/functional end-to-end anastomosis.

We had have 2 /6.9%/ anastomosis dehiscences, requiring relaparotomy and laparostomy/ Fig 4/. In both of those patients anastomoses were hand-sewn.

Hospital operative mortality was 13.79% /4 cases/. One death was in a patient with primary anastomosis, due to sepsis after anastomosis insufficiency, relaprotomy and laparostomy.

The other three deaths were after Hartmann's procedure: in 1 – polyorganism insufficiency, 1 – pulmonary embolism and 1 - decompensated heart insufficiency.

## DISCUSSION

Some authors state that diverticulitis in younger patients has more aggressive course than in older patients and shows an increased risk of complications. Therefore, most physicians recommended elective resection after a single attack in such patients./16/. Conversely, some recent reports highlight that the clinical course and complications are similar in both age groups./14, 16/. We did not find in our series any substantial difference in the clinical course of complicated diverticular colon disease dependent on age or sex.

On principle surgery is reserved for patients with complicated disease/10/, but the indication for colectomy should not be based on the potential risk of free perforation./15, 21/. The variety of surgical approaches and techniques for complicated colon diverticulitis in the first decade of 21<sup>st</sup> century has been the prerequisite for us to have a short glimpse on this matter in the last 100 years.

The first report of surgical treatment for complicated diverticulitis was by Mayo in 1907. The classic three-stage operation includes an initial diverting colostomy and drainage followed by resection of the involved colon and finally, a colostomy closure as the third stage. This nonresectional surgery strategy was reaffirmed and advocated by the experiences at the Mayo Clinic, which presented the results in 1924, to be the safest. Smithwick reported a postoperative mortality after a three-stage procedure of nearby 12% compared with 17% if the involved colon segment was resected during initial surgery. Considering that antibiotics were not discovered yet, these results can be regarded as remarkable/19/.

Until the late 1960, combinations of antibiotics against gram-negative bacteria and anaerobic bacteria had shown better survival in septic patients. The basic cause of the remaining high mortality was that the source of infection left in the peritoneal cavity. Clinical observations and new understanding of pathophysiology of diverticulitis led to the

conviction that the colonic perforation had to be removed primarily /18,19/.

Since the 1980s and 1990s, the standard practice of perforated diverticulitis has changed from non-resection surgery toward primary resection of the involved sigmoid. A two-stage operation with resection of the diseased segment, construction of a proximal colostomy and suture closure of the distal rectal stump became the preferred surgical strategy. The second stage was the colostomy closure. Among surgeons this operation has been known since as Hartmann's procedure (HP), although Hartmann himself only performed such a procedure for rectum carcinoma and had advocated that the patient should not undergo restoration of bowel continuity/1,19/.

The American Society of Colon and Rectal Surgeons in 2000 has published practice guidelines in which the three-stage operative approach strategy was no longer recommended for most patients because of high associated morbidity and mortality. As a result of improvements in radiological intervention techniques, postoperative complications and ongoing abdominal sepsis could be treated percutaneously, which made more radical resections during initial surgery possible. Hartmann's procedure had become mandatory for emergency indications in perforated diverticulitis. But skepticism about primary resection remained through the years/2, 19 /.

Although Hartmann's procedure is considered a two-stage procedure, the second stage (reversal of colostomy) will never be performed in a large number of patients. Restoration of bowel continuity after Hartmann's procedure is a technically challenging operation and is associated with significant morbidity and mortality. These rates can be as high as 25% and 14%, respectively, after colostomy reversal in patients who had undergone Hartmann's procedure for perforated diverticulitis/16, 19/.

Type of surgery seems no longer significantly related with postoperative mortality, although many recent studies favor primary anastomosis, with or without loop ileostomy, instead of Hartmann's procedure in purulent or fecal perforated diverticulitis. These statements were confirmed by a systematic review by Salem and Flum in which mortality rates after Hartmann's procedure and primary anastomosis of 19% and 10% respectively, were reported.

Our study supports this experience and policy, where death ratio is 3 to 1 in favor of Hartmann's procedure. Our standardized technique for linear stapler resection anastomosis used in 6 patients turned out to be safe, fast and not very expensive. We did not have any complications after performing it in emergency cases. Although quite small in number these cases encourage us to use it with preference and to recommend it to others.

Until now primary resection remains the standard treatment for perforated diverticulitis, although the European Association for Endoscopic Surgery Evidence-based Guidelines stated that laparoscopic nonresectional surgery may be considered in selected patients/19/

Advances in postoperative and critical care have significantly reduced the mortality from all forms of complicated

diverticulitis except for perforation. Patients selected for primary resection and anastomosis have a lower mortality than those treated by Hartmann's procedure in the emergency setting and comparable mortality under conditions of generalized peritonitis/1,6,7,9,18/.

The current situation in which both conventional and laparoscopic approaches are used, conventional sigmoid resection may be used as an alternative/18/. Resection and radiological drainage remain widely used in managing perforated sigmoid diverticulitis./20/.

## CONCLUSION

During the last century, mortality rates after emergency surgery for perforated colon diverticulitis have remained high - nearly 20%. Although progress in antibiotic sepsis management has led to more radical surgical procedures, survival did not improve significantly.

There is debate whether laparoscopic nonresectional surgery in combination with modern sepsis management is the key to success. Performed by an experienced surgeon it might be a good alternative in case of purulent peritonitis. Percutaneous drainage of abdominal abscesses will not play a leading role in the initial treatment of perforated diverticulitis in the near future.

We advocate the gaining popularity opinion, that the treatment of perforated diverticular disease with generalized peritonitis by resection and primary anastomosis should be the standard applied procedure. It must be considered as the surgical procedure of choice for older patients with multiple comorbidities, realizing that restoration of bowel continuity is not an issue.

Using a standardized technique with linear stapler for primary colon resection and anastomosis in complicated diverticular disease we favor the patient, s outcome with safety, efficiency and effectiveness. Although quite small in number these cases encourage us to use this technique with preference and to recommend it to others.

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