

## Diverticulitis: First Attack

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# Hartmann's Procedure or Primary Anastomosis?

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### Key Words

Diverticulitis · Emergency surgery · Perforation · Sigmoid colectomy

### Abstract

Perforation following acute diverticulitis is a typical scenario during the first attack. Different classification systems exist to classify acute perforated diverticulitis. While the Hinchey classification, which is based on intraoperative findings, is internationally best known, the German Hansen-Stock classification which is based on CT scan is widely accepted within Germany. When surgery is necessary, sigmoid colectomy is the standard of care. An important question is whether patients should receive primary anastomosis or a Hartmann procedure subsequently. A priori there are several arguments for both procedures. Hartmann's operation is extremely safe and, therefore, represents the best option in severely ill patients and/or extensive peritonitis. However, this operation carries a high risk of stoma nonreversal, or, when reversal is attempted, a high risk in terms of morbidity and mortality. In contrast, primary anastomosis with or without loop ileostoma is a slightly more lengthy procedure as normally the splenic flexure needs to be mobilized and construction of the anastomosis may consume more time than the Hartmann operation. The big advantage of primary anastomosis, however, is that there is no need for the potentially risky stoma reversal operation. The most interesting

question is when to do the Hartmann operation or primary anastomosis. Several comparative case series were published showing that primary anastomosis is feasible in many patients. However, no randomized trial is available to date. It is of note, that all non-randomized case series are biased, i.e. that patients in better condition received anastomosis and those with severe peritonitis underwent Hartmann's operation. This bias is undoubtedly likely to be present, even if not obvious, in the published papers! Our own data suggest that this decision should not be based on the extent of peritonitis but rather on patient condition and comorbidity. In conclusion, sigmoid colectomy and primary anastomosis is feasible and safe in many patients who need surgery for perforated diverticulitis, particularly when combined with loop ileostomy. Based on our own published analysis, however, we recommend performing Hartmann's operation in severely ill patients who carry substantial comorbidity, while the extent of peritonitis appears not to be of predominant importance.

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### Introduction

Perforation in sigmoid diverticulitis typically happens during the first attack and is subsequently followed by emergency surgery in many cases [1]. The options for operations on perforated sigmoid diverticulitis are manifold. One is to resect the sigmoid colon and perform a

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Hartmann procedure, which means that the rectal stump is closed and the descending colon diverted as colostomy. A different option is to resect the sigmoid colon and do a primary anastomosis which may either be protected by a loop ileostomy or not. While the traditional approach is to do this surgery by a conventional laparotomy, there are several reports indicating that this type of emergency surgery is also possible by laparoscopic access [2]. In recent years, a different approach has been published which consists of a primary laparoscopy and a simple drainage and a suture of the perforation and then, subsequently, when the infection has calmed down to do a laparoscopically assisted sigmoid colectomy without an ostomy [3]. This newer approach has only been described in some series and there are no comparative studies to the traditional approach by Hartmann's procedure of sigmoid colectomy with primary anastomosis.

### **Pros and Cons of Different Procedures**

Whether a Hartmann procedure or a primary anastomosis with or without loop ileostomy should be performed is a matter of frequent debate. The key problem is that there are no good randomized studies available that really clarify this issue. Recently, a report of a multicenter study from Italy has been published showing that there is no substantial difference between the two procedures; however, this randomized study was not completed due to insufficient recruitment. Therefore other reports that were published before also need to be considered. These reports are all hampered by the fact that they are not randomized and only case series that were compared which opens the door for a substantial bias which means that in most series it is obvious that patients who were in a worse situation were operated by Hartmann's procedures while the better ones received a sigmoid colectomy with or without ileostomy.

The advantages of the Hartmann procedure are that it is a fairly quick operation and also be done by an inexperienced surgeon. The focus of infection is cleared and the risk of an anastomotic leakage is basically avoided. Even if the Hartmann stump opens up, it usually only gives some fever and minor septic symptoms without really compromising the patient's general conditions and not putting the patient at risk as regards death. However, the downside of the Hartmann procedure is that the stoma is not reversed in many cases, particularly in critically ill patients and these are the ones who typically suffer from sigmoid perforation due to diverticulitis. The rates are

very depending on how frequently Hartmann's procedure was done. But there are series with nonreversal of up to 60%. However, if also fairly healthy patients are generally treated by Hartmann's procedure, this rate will be substantially lower.

Sigmoid colectomy has the big advantage that there is no stoma closure necessary or, in the case of loop ileostomy, it is a fairly easy procedure to be performed. The problem of course is, that sigmoid colectomy goes along with the risk of anastomotic breakdown which would mean a second septic hit for the patient with the potential of death subsequent to this anastomotic problem. In our own series, which was published recently, the mortality following primary anastomosis was 4% and the anastomotic leakage rate 19%, which is a lot higher compared to the elective indication. However, the sigmoid colectomy with primary anastomosis is a more difficult procedure which is at times not easy to perform with a limited surgical team as it is normally necessary to mobilize the left flexure.

### **Which Operation to Choose in the Emergency Situation?**

The key question is which operation should be chosen when surgery is undertaken for perforated diverticulitis. First of all, it is certainly dependent on different factors, while the focus in the past was always on the Hinchey stage. It is of note, however, that the Hinchey stage describes an extent of infection of peritonitis at the time of surgery. It is not a staging system that was designed for preoperative staging. In Germany it is generally accepted, that patients with Hinchey stages I, II and III should receive a sigmoid colectomy of primary anastomosis and a loop ileostomy, the Hartmann procedure is generally accepted to be reserved for Hinchey stage IV. In Hinchey Stage IV, we have generalized fecal peritonitis and the patient is usually extremely ill. This convention as regards choice of the procedure is not formally documented or accepted everywhere. It is mainly based on a few publications comparing cohorts of patients who underwent either sigmoid colectomy with or without loop ileostomy or Hartmann's procedure [4]. These comparative studies always show that most patients who receive a Hartmann procedure never get their stoma reversed, while this rate is a lot better in patients who receive a primary anastomosis. It is questionable, however, whether these studies do not altogether have a substantial bias including the reviews that were made towards a selection of better patients in the primary anastomosis group. None of the studies

can really exclude this. In a recent report there was a randomized study not completely finished. Both groups did well, so that the favor was to choose sigmoid colectomy with primary anastomosis. However, this study was not formally completed due to insufficient recruitment of patients, so that conclusions are very limited as well.

In our own analysis of 789 patients that were treated in our department from 1996 to 2006, we had 73 patients who underwent emergency surgery [5]. 36 received a primary anastomosis without stoma, 11 a primary anastomosis with loop ileostomy and 26 a Hartmann procedure. Thus, our policy was to be liberal with the primary anastomosis. The result is that anastomotic leakage with a rate of 19% which is too high when compared to the elective situation. Mortality was 4% in the anastomosis group, 27% in the Hartmann's procedure group and 12% over all. Thus, the Hartmann operation was obviously reserved for the extremely ill patients which is also shown by other subsequent complications such as stoma necrosis or a leak of the rectal stump to a substantial extent. We further analyzed our data as regards Hinchey stages and patients conditions with the help of the ASA classification. Although this analysis is hampered by many factors, it suggests that the main risk factor for an anastomotic leakage is a high ASA score which means that extremely ill patients having a lot of comorbidity during the time of surgery subsequently have a substantially increased risk of anastomotic leakage. In contrast, patients who have little comorbidity coming to surgery in a good conditions do well even if they have anastomosis in Hinchey stage III, i.e. purulent peritonitis. Thus, our conclusion was that the focus when making a decision whether to create an anastomosis or not should be the general condition that the patient presents in rather than the local situation in terms of extent of peritonitis. This policy subsequently is now followed in our hospital.

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## Conclusions

Sigmoid colectomy and primary anastomosis or Hartmann's procedure are both feasible for perforated diverticulitis, while new approaches just to close the leakage with a stitch plus drainage and to perform secondary sigmoid colectomy is not yet clear whether it represents a valid alternative. Unfortunately, next to no randomized studies are available and the one that is available was closed prematurely so that definitive conclusions are not possible. Both procedures which are sigmoid colectomy with primary anastomosis and sigmoid colectomy with Hartmann's procedures entail potentially high complications rates. These complication rates seem to be mainly determined by the comorbidity that patients present with rather than the intraoperative extent of peritonitis, although certainly both aspects need to be considered when a decision is made which procedure to perform.

In summary, I would personally recommend considering sigmoid colectomy and loop ileostomy as the standard of care and then deviate from this when the patient's general condition is very bad which seems to be the most important aspect. If in doubt it should be borne in mind that Hartmann's procedure may save lives even at the costs of a permanent stoma, while the primary anastomosis may kill the patient when a second septic hit occurs with the anastomotic leakage.

## Disclosure Statement

The authors declare that no financial or other conflict of interest exists in relation to the content of the article.