Laparoscopic colorectal surgery: beyond the short-term effects
Bartels, S.A.L.

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Chapter

Early, minimally invasive closure of anastomotic leaks: a new concept

T. Verlaan
S.A.L. Bartels
M.I. van Berge Henegouwen
P.J. Tanis
P. Fockens
W.A. Bemelman

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ABSTRACT

Aim
Chronic pelvic sepsis after ileoanal or coloanal anastomosis precludes ileostomy closure and if closure is ultimately possible, function of the neorectum is badly affected. Early closure of anastomotic leak might prevent chronic pelvic sepsis and its adverse sequelae.

Methods
A consecutive group of patients with early closure of a leaking low anastomosis is described.

Results
In our experience of early closure in a consecutive group of six patients with a leaking low anastomosis (five with ileal pouch-anal anastomosis and one after a low anterior resection), we were able to achieve anastomotic closure in five by means of initial Endosponge therapy followed either by early suture (four patients) or endoscopic clip repair (one patient). Early closure failed in the one patient that did not have a defunctioning ileostomy. Mean number of days between surgery and first treatment (endosponge or endoscopic clip repair) was 13.2 (range 8-23). Mean number of days from the diagnosis of a leak until closure of the defect was 13.2 (range 3-29). In five patients the ileostomy was closed after a median of 137 days (IQR 86-243).

Conclusion
Early minimally invasive closure of low anastomotic leaks is therefore possible provided that the para-anastomotic cavity is drained well prior to closure and the anastomosis is defunctioned.
INTRODUCTION

Colorectal or coloanal anastomoses and ileoanal anastomoses have a relatively high leak rate. Defunctioning of the anastomoses might prevent anastomotic leakage in some. Even in the presence of a defunctioning ileostomy, however, large presacral abscesses may occur. Following the partial or total mesorectal excision technique generally applied in these Patients, a large presacral cavity remains that is not filled completely by the neorectum. In the presence of a leak, mucus and fluid will accumulate in the cavity because the closed anus prevents adequate drainage of the neorectum and presacral cavity. In time, these presacral para-anastomotic abscesses might mature into a chronic presacral sinus. This sinus mostly precludes ileostomy closure and, if closure is finally possible, the chronic pelvic sepsis and consequent fibrotic scarring jeopardizes proper function of the neorectum as a result of reduced neorectal capacity and pliability.\(^1\)\(^-\)\(^3\) Van Koperen et al.\(^4\) reported on 834 patients who underwent a low anterior resection (LAR) for cancer and on 229 patients who underwent a restorative proctocolectomy (RPC) for ulcerative colitis (UC) or familial adenomatous polyposis (FAP). Of these patients, 5% and 0%, respectively, developed anastomotic leakage. A chronic presacral sinus developed in 1.0% of patients after LAR and in 0.9% of patients after RPC, indicating that approximately one-third of all patients with an anastomotic leak develop a chronic sinus. Hallbook and Sjodahl\(^5\) showed that all therapeutic options aiming at preserving the neorectum or pouch have an unpredictable and unsuccessful natural course, including low ileostomy closure rates and poor function. Therefore, the key is prevention of the presacral sinus with concomitant sepsis.\(^6\) We report on a novel technique for early closure of the anastomotic gap using a combination of endosponge drainage and closure by sutures or a novel endoscopic clip.

METHODS

Patients

Six patients with anastomotic leakage after either partial or total mesorectal excision were eligible for this study. Anastomotic leakage was detected by CT, endoscopy or laparoscopy carried out when there was clinical suspicion of this complication. Routinely, a diverting ileostomy was created, open or laparoscopically, when this had not been performed during the primary operation. Next, a flexible sigmoidoscopy was carried out in order to assess the extent of the anastomotic defect and the size of the presacral abscess. Before closure, the presacral abscesses occurring after coloanal or ileoanal anastomotic leakages were initially treated with endosponge placements, as previously described by Weidenhagen et al.\(^7\)\(^-\)\(^8\)
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Endosponge treatment

An open-pored polyurethane endosponge was used (B. Braun Medical B.V., Melsungen, Germany, Figure 1). First, the abscess cavity was examined and rinsed with saline (0.9%) using a small-calibre flexible gastroscope (GIF-100 Video Gastroscope; Olympus, 9.8-mm diameter, Olympus Corp., Tokyo, Japan) and the sponge was installed transanally. Second, the length and the size of the abscess cavity were estimated and the endosponge was cut accordingly. When the cavity was too large for one sponge, multiple sponges were placed. After introduction of the small-calibre gastroscope into the deepest point of the cavity, a plastic tube, positioned over the gastroscope, was advanced into the deepest point of the cavity. After withdrawal of the gastroscope, the endosponge was inserted through the lubricated tube by using a pushing probe, while retracting the plastic tube. Next, the sponge was connected to a low-vacuum suction bottle (Redyron® TRANS PLUS suction device, Melsungen, Germany), creating a constant negative pressure in the sponge. Correct positioning of the sponge was checked endoscopically. Fixation of the sponge was not necessary because the low-pressure suction fixes the sponge in the abscess cavity. To prevent pain upon sponge changing as a result of tissue growing into the endosponge, the sponge was changed every 3–4 days. Just before removal, a lidocaine or saline solution was introduced into the sponge to facilitate painless extraction.4

Figure 1. Endosponge introduction system (B. Braun Medical BV, Melsungen, Germany)
Defect closure
When the cavity was considered clean after endosponge treatment and the oedema of the neorectum had subsided, the anastomotic defect was resutured transanally under general anaesthesia. The cavity was then drained for 72 h with two transanastomotic drains connected to the low-vacuum suction bottle (Redyron® TRANS PLUS suction device). In colorectal anastomoses, if the defect was limited to 1–2 cm, it was drained externally – either percutaneously or surgically – before endoscopic closure with an Over-The-Scope-Clip (OTSC; Ovesco, Tuebingen, Germany), shown in Figure 2.9,10 Closure of the abscess cavity and anastomotic defect was subsequently evaluated by sigmoidoscopy and CT with an enteral water-soluble contrast.

Outcomes
Main outcome parameters were closure of the defect and presacral abscess, number of days from initial surgery to first treatment of the leak, number of days to closure of the defect and number of days from ileostomy creation to reversal. Patient data were recorded prospectively.

Statistical analysis
Continuous data are presented as mean with a range or as median with an interquartile range (IQR) where appropriate. Categorical data are presented as frequency or percentage. Statistical analyses were performed with PASW Statistics for Windows, version 18 (SPSS Inc., Chicago, IL, USA).

RESULTS
Clinical data of the six patients studied are shown in Table 1. Five patients underwent an RPC for UC or attenuated FAP. Resection of the rectum during RPC or CP was performed either according to the ‘total mesorectal excision’ (TME) principle or according to the ‘close rectal dissection’ principle. One patient had a LAR according to the partial mesorectal excision (PME) principle for rectal malignancy after radiotherapy. None of the patients had a loop ileostomy initially. Data on diagnosis and treatment of the anastomotic leakage are shown in Table 2. Anastomotic leakage was diagnosed at a mean of 11.5 (range 5–21) days after surgery, mostly by CT scan. In five patients a presacral abscess was observed. All but one (patient 3) of the patients underwent reoperation and had a loop ileostomy created.
Table 1. Patient characteristics

<table>
<thead>
<tr>
<th>No.</th>
<th>Sex</th>
<th>Age</th>
<th>Indication</th>
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<th>Procedure</th>
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<th>Technique</th>
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Table 2. Diagnosis and treatment of anastomotic defect

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<th>Time to diagnosis (days)</th>
<th>Loop ileostomy</th>
<th>No. of endosponge treatments</th>
<th>Endosponge treatment to closure (days)</th>
<th>Primary surgery to closure (days)</th>
<th>Closure modality</th>
<th>Ileostomy reversed?</th>
<th>Time to ileostomy reversal (days)</th>
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Sutures: sutured transanally. OTSC: over-the-scope clip

Patients after RPC

After RPC, in four of five patients the presacral cavity was drained during the reoperation by placement of an endosponge. Further endosponge exchanges were performed in the endoscopy department under light sedation. In these patients, the remaining anastomotic dehiscence, varying from 1 to 6 cm, was closed with transanal sutures under general anaesthesia (Figure 3). The patient that did not have a defunctioning ileostomy (patient 3) eventually did require one because of pouch dysfunction caused by a small abscess. One patient (patient 4) had an endoscopic evaluation of the defect and an endosponge was placed during the same procedure. In this patient, endosponge placement was repeated until the cavity was almost closed. The remaining gap was then closed using the OTSC. For all patients after RPC, the mean number of endosponge treatments was 3.4 (range 1–6) over a mean period of 13.8 (range 5–28) days.
Early closure of anastomotic leaks: a new concept

Figure 2. Endosponge-supported early closure of the anastomotic gap at day 7, day 13 and day 16 (after closure)
Figure 3. Residual defect after endosponge treatment (left) and closed with an Over-The-Scope-Clip (OTSC) (right).

Figure 4. (A) Defect in a colorectal (side-to-end) anastomosis (left) with an Over-The-Scope-Clip (OTSC) (right). (B) Gastrograffin enema in the same patient 4 months later showing the OTSC in place (left) as well as the closed anastomotic defect (right).
Early closure of anastomotic leaks: a new concept

Patient after LAR
In the patient with a leaking colorectal anastomosis after LAR an OTSC was endoscopically placed (Figure 4), 3 days after surgical drainage and creation of an ileostomy. The mean time between surgery and the first treatment (endosponge or OTSC) was 13.2 (range 8–23) days. The mean time from the diagnosis of a leak until closure of the defect was 13.2 (range 3–29) days.

Overall, in five patients the ileostomy was closed, after radiological or endoscopic imaging of the anastomosis, at a median of 137 (IQR = 86–243) days after creation of the loop ileostomy.

DISCUSSION
The present study shows that early closure of low anastomotic leaks is possible in the majority of patients. A short course of endosponge treatment resolved the sepsis and co-existing oedema, enabling transanal suture of the anastomotic defect. Apparently, defunctioning is an essential step as the one failure occurred in the patient who was not defunctioned. In this patient closure was attempted without an ileostomy because the anastomotic defect and presacral cavity were small. Higher colorectal anastomoses are less suitable for endosponge treatment because endosponge placement is more difficult. For this reason, the patient with a limited anastomotic defect had a defunctioning ileostomy, OTSC placement and external drainage. Early closure is an attractive option because it might shorten the duration of defunctioning required and increase the ileostomy closure rate. Potentially, neorectal function might be improved because of early prevention of chronic sepsis.

Alternative treatment options for low anastomotic leaks are defunctioning and percutaneous or transanastomotic drainage, often requiring a long stay in hospital. The outcome is uncertain; some of the para-anastomotic abscesses will close, whereas others will mature in a chronic presacral sinus. Mostly the ileostomy will be permanent once a chronic sinus has developed.4,11 Chronic sepsis will cause fibrosis of the neorectum, compromising the neorectal function if ileostomy closure is attempted. In some cases the presacral sinus is symptomatic and requires dismantling of the low anastomosis. Even malignant degeneration has been described in the chronically inflamed presacral sinus.11 For these reasons, prevention of the sinus is of paramount importance and aggressive treatment of the presacral abscess is essential. Other options are closure of the ileostomy in the presence of the sinus and observation of what happens, closure by adhesive agents (such as fibrin glue) or deroofing the sinus to incorporate the sinus in the neorectal reservoir. In all cases neorectal function is uncertain if closure of the ileostomy is attempted. Also, recurrent abscesses can occur. Weidenhagen et al. indicated that extensive endosponge
treatment alone does close the gap in the long term. However, an average duration of 5 weeks’ endosponge therapy is generally required and even then small fistulas remain. Also, recurrence of the anastomotic defect after closure of the loop ileostomy was reported. This time-consuming treatment with uncertain results forced us to try early closure after endosponge cleansing of the cavity. Although our results are very encouraging, long-term neorectal function still has to be assessed. Van Koperen et al.\textsuperscript{12} indicated that the earlier endosponge therapy is started, the more likely the cavity will close because the neorectum is still flexible. Attempts to close the anastomotic defect will therefore have the best chance of success if the sepsis is drained early and effectively, followed by closure of the anastomotic defect. A trial comparing early closure after a short course of sepsis treatment should determine whether this policy is more (cost) effective than defunctioning alone followed by a wait-and-see policy.
REFERENCES


