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Abstract

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Reference


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Discriminatory influence of Pinpoint perfusion imaging on diversion ileostomy after laparoscopic low anterior resection

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Abstract

While still debated, it was advised to perform a protective temporary ileostomy after a low anterior resection (LAR). This might help to decrease the leak rate and therefore offers the patient better outcomes. Anastomotic leak can occur in many situations after a LAR and the control of the risk factors helps to adapt the need of an ileostomy. Near infrared technology allows assessing the microvascularisation of the anastomosis at the time of surgery and therefore might be an important tool to avoid a stoma in given situation. This article reviews the evidences with the use of this technology.

Keywords: Pinpoint, indocyanine green, near infrared, low anterior resection, ileostomy, leak

What does this paper add to the literature?

This paper summarizes the literature about ileostomy in low anterior resection. It describes the possible benefit of near infrared vascularisation assessment.

Introduction

The role of ileostomy in low anterior resection (LAR) remains a matter of debates. It is proved that an ileostomy would decrease the leak rate [1] at the cost of an increased morbidity compared to the same surgery without a stoma, but only if there is no leak. Unfortunately there is no possibility to assess during the surgery the likelihood of an anastomotic leak (AL). If this happens it will induce a large number of complications for the patient and could lead to the loss of the anastomosis or to major complications, which could lead to death. In this article we review the current evidence and risk factors in LAR for AL and the protective effect of an ileostomy. The use of near infrared (NIR) technology is described to decrease the leak rate after LAR and maybe the need for a protective ileostomy.

Ileostomy decreases leak rate

Initially defunctioning ileostomy was reported to decrease only the severity of an AL. However since 2007, a decreased rate of AL after LAR was also described. The authors demonstrated that there was 10% risk of AL in the group with stoma vs 28% without [1]. Hüser and Tan in their meta-analysis confirm this positive effect on AL rate for LAR using a stoma [2,3]. This led to change in practice among European countries, like in Sweden where a routine defunctioning ileostomy is performed for all low rectal cancer surgery [4]. The Procure Belgian group draw the same conclusions among a group of 1912 patients over a 5 years period [5], with a significant decrease in leak rate from 10.2% to 4.3%, with an associated mortality of 0% vs 4.8%. A recent Japanese prospective trial showed a leak rate of 12.7% without a stoma against 3.8% for the patients having a diverting stoma. When looking for anastomosis below 2 cm from the anal verge, these results were even more obvious (44% vs 0%) [6]. In their experience, anastomosis located below 5 cm (from the anal verge or anorectal junction?) or even lower should have a temporary stoma.

The main reasons reported in the literature to perform a protective stoma when it is not a routine procedure, are an ultralow anastomosis level (< 5 cm), a lower tumor location or in case of preoperative chemoradiotherapy [2,3].

Drawback on diverting stomas

Patients with ileostomy have a high risk to develop side effects or complications during the time of the stoma,
even leading to a risk of having a definitive stoma instead of a temporary one. The main complications are: acute renal failure (dehydration), local wound problems, parastomal hernia, or morbidity associated with the stoma reversal which could be significant.

Dehydratation

Jafari and colleagues describe the morbidity associated with diverting ileostomy in rectal cancer using the American College of Surgeons National Surgical Quality Improvement Program (2005–2011) for low anterior rectal cancer surgery. Of 6337 cases, 991 (16%) received a temporary ileostomy. Patients were slightly younger but had significantly more preoperative radiotherapy (39 vs 12%) in the stoma group. Diversion induced more acute renal failure (OR 2.4), but the rate of reoperation due to AL decreased with the use of an ileostomy. In their paper, the group of Malmö in Sweden showed that 29% of the patients had at least one episode of dehydration (with a readmission rate of 50%), most of the time in the early postoperative period (mean, 5.8 weeks). In addition, elderly patients were more prone to develop dehydration than younger one.

Other common complications include: skin excoriation, stoma retraction or obstruction, especially if the stoma has been performed by laparoscopy, and parastomal hernia.

All theses complications will lead to an increased length of stay and finally increase the cost.

Complication with stoma reversal

Stoma reversal is not uneventful, even if usually a local approach can be done. Besides, the total length of stay is prolonged by another 4–6 days [4].

Morbidity could be as high as 40%. There is a wide range of complications, but the worst being the ileocolic AL, leading most of the time to a second operation and a new stoma. Of note, ileus, sepsis or hernia could also occur.

Chow et al. [7] reviewed 48 studies assessing the complications associated with the reversal of an ileostomy, in more than 6000 patients. The morbidity rate was 17.3% with a low mortality rate (0.4%). Post reversal most common complications were wound sepsis (5%), relaparotomy (2.5%), incisional hernia (1.8%), AL (0–8.3%), post operative ileus (0.8–13.8%), fistula (0–8.6%), bleeding (0–4%), or intra-abdominal abscess (0–1.4%). Risk factors for AL were the same as for any other anastomosis. In addition, the median age and rate of immediate anastomosis-related complications were significantly lower for diverting-stoma patients.

Permanent stoma risk

Looking at a diverting stoma, there is always a risk of transforming a temporary one into a permanent one. In a recent study, looking at 895 patients who have been operated on for rectal cancer, Lim et al. (Lim et al. Langenbecks Arch Surg (2013) 398:259–264), observed that 35.2% of patients had a diverting stoma. Among them, 86% had an ileostomy. After a mean follow up of 35.2 months (range: 2–90), only 81% had the stoma reversed with a mean time up to the reversal of 5.6 months. Multivariate analysis showed stage IV (OR 3.4), AL (OR, 3.3), stoma type (colostomy [OR, 7.3]), systemic metastasis (OR, 2.7), and local recurrence (OR, 4.2) were the main risk factors for a permanent stoma instead of a temporary one.

How to better select patient who will benefit of a temporary ileostomy?

There are many risk factors for an AL. They are summarized in Table 1 and represent the main reasons why a patient could develop a leak. It is therefore fundamental to try to overcome those factors. The technical factors should not lead to a leak; however a simple staple misfire or bad manipulation could change the fate of an anastomosis. An anastomosis should be made without tension and well vascularised.

Patients factors are most of the time difficult to overcome, but need to be assessed aiming to improve. For example, the glycaemia in a diabetic patient needs a rigorous control in, or a smoker should be encouraged to stop. Some authors have proposed a new score based on clinical parameters to try to predict which patient and when an anastomosis dehiscence would happen most likely [8,9].

### Table 1 Risk factors for anastomotic leak

<table>
<thead>
<tr>
<th>Risk factors</th>
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<tbody>
<tr>
<td>Age &gt; 80 years old</td>
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<tr>
<td>Male</td>
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<tr>
<td>Comorbidity</td>
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<tr>
<td>Steroids</td>
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<td>Smocking</td>
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<td>Neo-adjuvant therapy</td>
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<td>Per-operative contamination</td>
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<td>Lower anastomosis</td>
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<tr>
<td>Technical difficulty to perform the anastomosis</td>
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<td>Important blood loss</td>
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<td>Multiple resection</td>
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<td>Length of operation</td>
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</tbody>
</table>
Role of near infrared technology to avoid a stoma

In this situation, the role of NIR technology seems to offer a way to assess preoperatively the microvascularisation of an anastomosis. A poor anastomotic perfusion is indeed one of the main factors leading to a leak. Sherwinter’s group [10] showed in a group of 20 patients having had an anterior resection, that the four patients with a bad perfusion angiogram where more prone to develop a leak, while the patients with a good angiograms were less likely to have a leak. In patients with bad angiograms, a defunctioning ileostomy was performed in two, while the remaining two (without stoma) developed a leak. Using this technology in LAR, Jafari et al. [11] described a leak rate of 6% for NIR patients vs 18% for patients without NIR. In our recent study [12] on colorectal microperfusion using the NIR technology, we performed six very LAR; and according to a very good signal in three of them, we decided not to perform a defunctioning ileostomy. They did not present a leak. Lately in the Pillar II trial [13], the authors described a leak rate of 1.9% among high anterior or LAR, however an ileostomy was performed only in 26 patients among the 139 patients. NIR technology offers a new tool to the surgeon to better assess the risk of an AL, increasing the perception of the reality and allowing to avoid a stoma in selected cases with a good signal.

Conclusion

Near infrared imaging allows to better identify patient’s microvascularisation at the time of the surgery. This could lead to a reduction of AL rate, and ultimately to a decrease for the need of a defunctioning ileostomy. Evidences are scarce so far and this question needs to be addressed in large multicentric studies.

Acknowledgements

None.

Conflicts of interest

None declared.

Reference

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