Seminars in Colon and Rectal Surgery 25 (2014) 90–94

Contents lists available at ScienceDirect

Seminars in Colon and Rectal Surgery

journal homepage: www.elsevier.com/locate/yscrs

Role of fecal diversion in colorectal anastomotic failure: Where are we now?

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A B S T R A C T

The value of a diverting ostomy after low colorectal anastomosis continues to be a controversial subject in the literature. Sphincter salvage surgery has increased in recent years, and the role of prophylactic diversion continues to evolve. The authors sought to provide an evidence-based review of current recommendations for use of a diverting stoma in the setting of a low pelvic anastomosis. A search of MEDLINE, PubMed, and the Cochrane database was performed. Abstracts were evaluated for relevance. Selected articles were then reviewed in detail, including references. Recommendations were then drafted based on evidence and conclusions in the selected articles. A total of 100 articles were identified, of which 54 were included for complete analysis, including 2 meta-analyses. A diverting ostomy lowers clinical anastomotic leak rate and need for re-operation as a consequence of a leak by 30–70%. Small non-randomized studies have suggested that a diverting ostomy can be selectively omitted in some low-risk patients with good results. The morbidity associated with diverting ostomies is not inconsequential and includes risk for readmission and increased odds of renal failure. This risk must be balanced against that of anastomotic leak. The current data suggests that a diverting ostomy does not prevent anastomotic leak but can significantly limit the clinical sequelae and need for re-operation. The creation of a diverting stoma is not without morbidity and as such should be selectively performed in high-risk colorectal anastomosis that meets specific criteria.

Introduction

The value of a diverting ostomy after low colorectal anastomosis remains a controversial subject in the literature. In the past, patients with mid- and distal rectal cancers would traditionally be offered an abdominoperineal resection as the oncological operation of choice. In recent years, our improved understanding of the natural history and oncological spread of rectal cancer has enabled surgeons to perform more sphincter-preserving operations for low-lying rectal lesions.[1,2] Creating a low colorectal or coloanal anastomosis does come at a price with numerous studies demonstrating considerably higher leak rates in low pelvic anastomoses.[3–5] Mortality and morbidity rates associated with symptomatic anastomotic leaks vary in the literature, from 6% to 20%.[6] In addition, there have been reported long-term functional difficulties from a poorly compliant neorectum secondary to an anastomotic leak.[7] Risk factors for anastomotic leak have been widely reported in the literature, including tension, poor blood supply, male gender, obesity, previous radiation or steroid therapy, and need for intra-operative blood transfusion.[8,9] As a result, fecal diversion has evolved as a potential way to circumvent the morbidity of this procedure. To date, the question remains whether or not diversion prevented the leak entirely or merely diminished the consequences of it.

However, the routine creation of a diverting ostomy is not without risk. High stoma output with resultant dehydration and electrolyte disturbances, peristomal hernia, skin irritation, obstruction, and stomal prolapse is a common morbidity associated with diverting stomas.[10] Furthermore, an additional operation is needed in order to restore intestinal continuity, adding additional morbidity and cost to the management of these patients.[11]

The overall impact of the use of a diverting stoma has been studied extensively in the sphincter-preserving era. This review seeks to define the overall impact of the use of this strategy.

Why do it?

As mentioned earlier, the development of a clinical leak can have severe consequences with high rates of morbidity and mortality. Poor long-term outcomes have also been reported to

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http://dx.doi.org/10.1053/j.scrs.2014.04.006
1043-1489/

be associated with anastomotic leak, including poor functional results, delay in use of adjuvant chemotherapy,[12–14] increased recurrence rates, and the ultimate need for a permanent stoma.[15–17] The currently accepted paradigm is that diversion does not prevent anastomotic leak but merely diminishes the clinical consequences of it. Several studies have supported this observation.[18–20] In a meta-analysis including 4 randomized controlled trials (RCTs) with a total of 11,429 patients who underwent low anterior resection (LAR) for rectal cancer, Tan et al.[21] demonstrated a lower clinical anastomotic leak rate [relative risk (RR) = 0.39, CI: 0.23–0.66, $p < 0.001$] as well as a lower re-operative rate (RR = 0.29, CI: 0.23–0.53, $p < 0.001$) in their analysis of the stoma group in the 4 RCTs. Extending their analysis into the 21 non-randomized trials, they also found decreased rates of clinical anastomotic leak (RR = 0.74, CI: 0.67–0.83, $p < 0.001$), lower rates of re-operation (RR = 0.28, CI: 0.23–0.35, $p < 0.001$), and lower mortality rates (RR = 0.42, CI: 0.28–0.61, $p < 0.001$) in the stoma group. Another meta-analysis undertaken by Huser et al.[22] included 4 RCTs and 26 non-randomized studies (18 single institutions and 9 multicenter) for a total of 15,538 patients. This study also demonstrated significantly decreased clinically relevant anastomotic leaks [odds ratio (OR) = 0.32, CI: 0.17–0.59] and decreased need for re-operation (OR = 0.27, CI: 0.14–0.51). Both meta-analyses (which together provide the largest aggregate data available to date) would suggest that fecal diversion is protective for clinical development of anastomotic failure. However, it should be noted that the use of neoadjuvant therapy varied in these meta-analyses, which included studies published anywhere from 1983 to 2008. Additionally, the meta-analysis conducted by Huser et al.[22] excluded any laparoscopic or hand-assisted approaches from their analysis. Furthermore, in both the meta-analyses, the criteria for creation of the diverting ostomy were not standardized. Reasons varied between studies, including surgeon preference, defective donuts (without mention of resultant leak test), poor bowel prep, prior pelvic radiation, and technical challenges.

In 2009, a small RCT of 40 patients with mid-low rectal cancer was conducted by Ulrich et al.[23] The study was terminated early given the increased number of severe adverse events (anastomotic leak necessitating operative re-intervention) noted in the non-diverted group. Non-diverted patients ($n = 6$) who experienced an anastomotic leak and required operative re-intervention had a significantly longer hospital stay (29 days) compared to those who did not experience a leak (10–11 days). Given the large difference in clinical anastomotic leak rates between the diverted (5%) and the non-diverted patients (37%), the authors advocated the implementation of a diverting ostomy in patients undergoing resection for mid- and low rectal cancer in high-risk patients. Of note, the use of neoadjuvant therapy was significantly different between groups, with 50% of the non-diverted patients receiving neoadjuvant therapy (vs. 83% in the diverted group).

There have been a number of retrospective, multicenter reviews exploring the role of fecal diversion in the prevention of anastomotic leak. Gastinger et al.[18] studied 2729 patients undergoing LAR, 60% of whom did not get a diverting stoma while the remaining 32.3% patients were diverted. Overall, anastomotic leak rates were similar between the 2 groups at 14%. However, the incidence of leak that required surgical intervention was significantly lower in the diverted group (3.6% vs. 10.1%, $p < 0.001$). Mortality rate, although low in both groups, was also statistically lower in the diverted group (0.9% vs. 2%, $p = 0.037$). A potential bias in this study is that a higher percentage of patients received neoadjuvant chemoradiation in the diverted group (13.5% vs. 4.3%).

Recently, the 2013 ASCRS practice guidelines in the management of rectal cancer reported grade 1B evidence advocating creation of diverting ostomy in patients undergoing total mesorectal excision (TME) for rectal cancer.[24] Although diversion does not prevent the leak, the current evidence suggests that the short- and long-term sequelae of anastomotic leak are significantly reduced. For this reason, it is the preference of the authors of this review to routinely perform a diversion as a default.

Why not do it?

Studies have long challenged the need for a diverting stoma in low colorectal anastomosis. Mealy et al.[25] demonstrated a similar leak (5.3%) and subsequent mortality rate (3.5%) in 114 anterior resections performed without diversion vs. published controls. As a result, they suggested that a defunctioning stoma could be safely avoided in patients undergoing a low colorectal anastomosis. Grabham et al.[26] selectively performed diversion in their series of 77 patients, with a 3% leak rate in non-diverted patients. More recent studies include a non-randomized review of 1078 patients over a 10-year period at a single institution. In this study, Wong and Eu[27] found that the rates of clinical anastomotic leak after LAR or ultra-low anterior resection (ULAR) were no different (4%) between both the diverted and the non-diverted groups. Given this, they advocated the creation of a diverting stoma only be done selectively to minimize the clinical sequelae in poor-risk patients where the consequences of an anastomotic leak would be devastating. It should be noted that the authors excluded anyone who received radiation, which was only done in 12 patients.

In a smaller review of 131 patients who underwent low colorectal (< 7 cm from anal verge) or coloanal anastomosis without a diverting ostomy, Lee et al.[28] demonstrated an overall anastomotic leak rate of 5%. They demonstrated no difference in anastomotic leak rates between colorectal anastomosis (7%) and coloanal anastomosis (4%); however, increased leak rates (28%) were seen in the subgroup that received neoadjuvant radiation. All leaks were successfully managed either with a diverting ostomy as salvage or by conservative measures. Overall, long-term complications after an anastomotic leak occurred in 16%. They concluded that a well-performed low pelvic anastomosis can be done safely without diversion in select patients. The same authors separately reported their hand-sewn coloanal experience of 96 patients managed without a diverting ostomy and demonstrated a 6% complication rate. Only 1 patient developed anastomotic leak, and this was managed conservatively. Based on this, the authors suggested that a diverting ostomy may not be required in a hand-sewn coloanal anastomosis as well.[29]

Both older and newer data support the notion that in selective circumstances, a low pelvic or coloanal anastomosis may be safely performed in the absence of a protective stoma. However, it must be noted that the aforementioned studies may be limited in their ability to be generalizable to all populations. For instance, in the Asian cohorts, the average BMI in the study patients was in the low to mid-20 range. Furthermore, despite 70–80% of the analyzed patients having stage 2 or greater rectal cancer, a low percentage (0–24%) of these patients underwent preoperative radiation therapy. This was also true in older series. These important factors might help explain the overall lower leak rates that the above-mentioned authors' experience. Although they suggest that abandonment or selective use of diverting ostomies in low colorectal or coloanal anastomosis is feasible, patient selection remains a key factor.

One final argument against the use of a “diverting” stoma is the potential for permanent fecal diversion. Peeters et al.[30] demonstrated that 19.2% of patients with a “temporary diversion” still had a stoma after a median follow-up of 5 years. Gastinger et al.[18] had a slightly lower rate, where 10.5% of ileostomy patients and 14.9% of those with a colostomy did not have intestinal continuity restored. Reasons for non-reversal varied and included patient