International Journal of Surgery 27 (2016) 53–57

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original research

Does omental pedicle flap reduce anastomotic leak and septic complications after rectal cancer surgery?☆

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HIGHLIGHTS

- This study evaluated the role of omental pedicle flap (OPF) creation on anastomotic leak and septic complications in rectal cancer surgery.
- Patients were categorized into two groups based on OPF versus no-OPF creation.
- OPF did not have any impact on the rates of anastomotic leak and septic complications nor in the management of anastomotic leak.

ARTICLE INFO

Article history:
Received 15 December 2015
Accepted 21 December 2015
Available online 14 January 2016

Keywords:
Omental pedicle flap
Rectal cancer surgery
Anastomotic leak
Surgical site infections

ABSTRACT

Introduction: Whether creation of omental pedicle flap (OPF) to reinforce bowel anastomosis can reduce septic outcomes remains controversial. The aim of this study was to investigate the role of this technique on anastomotic leak and septic complications after rectal cancer surgery.
Methods: Patients who underwent rectal cancer surgery from 01/2008 to 12/2013 were identified and categorized into two groups based on OPF creation versus no-OPF creation. Clinical, operative characteristics and postoperative anastomotic leak and surgical site infections within 30 days after surgery were compared between the groups.
Results: There were 65 (14%) and 403 (86%) patients in OPF and no-OPF group, respectively. In multivariate analysis, OPF was not found to be associated with anastomotic leak ($p = 0.35$), organ/space infections ($p = 0.99$) and overall surgical site infections ($p = 0.65$). Three hundred and sixty eight (78.6%) patients underwent diversion. OPF did not reduce septic complications irrespective of the stoma status ($p > 0.05$). There were no differences between the two groups in terms of operative ($p = 0.46$) and non-operative management ($p = 0.14$).
Conclusion: OPF neither reduced the incidence of anastomotic leak and surgical site infections nor had any impact on the management of anastomotic leak.

1. Introduction

Anastomotic leak (AL) and intra abdominal septic complications are the most feared and serious complications in rectal cancer surgery. Despite important progress regarding surgical techniques and perioperative management, the reported incidence of AL ranges from 3% to 15% [1,2]. In order to decrease the rate of AL and septic complications, several methods have been suggested. These may include, among others, various stapling techniques, use of an anastomosis ring [3], and omental pedicle flap (OPF) creation [4,5]. Although, there are several publications that investigate the role of omentoplasty in colon anastomosis, there are less than handful publications addressing the outcome of omentoplasty in rectal cancer.

The ability of the omentum to improve healing of tissues, absorb fluid and reduce infections has been shown by a number of experimental and clinical studies [4,6,7]. Since Bennett [8] first described its use in the treatment of perforated gastric ulcer, these features have eventually led to the established use of the omentum to promote healing in a range of surgical conditions such as rectovaginal fistulas, liver surgery and body wall defects [9–11]. However, surgeons' opinions regarding the role of the omentum to

☆ This study was presented as a poster in the American Society of Colon and Rectal Surgeons meeting, May 30 – June 3, 2015, Boston, USA.

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http://dx.doi.org/10.1016/j.ijsu.2015.12.070
1743-9191/

reinforce intestinal anastomoses differ widely. Some authors report a decrease in AL when an OPF is used [4,12,13], whereas others claim that neither the rate nor the severity of AL is affected with this technique [5].

We hypothesized that creation of omental pedicle flap (OPF) may reduce the frequency of AL and septic consequences in patients undergoing surgery for rectal cancer because of the aforementioned mechanical and biological features of the omentum. Our data is the largest data in the literature from one institution that investigates the role of OPF in the prevention and management of these complications after rectal cancer surgery.

2. Methods

Patients who underwent rectal resection and anastomosis for cancer between January 2008 and December 2013 were identified from the institutional review board-approved prospectively maintained colorectal cancer database. Exclusion criteria were emergency surgery, abdominoperineal resection, re-operative procedures due to tumor recurrence, and absence of the omentum secondary to concurrent or prior surgery which required omentectomy.

Patients were divided into two groups based on the OPF creation: OPF group and No-OPF group. This selection was primarily based on surgeons' preference, that is, OPF creation was performed selectively based on intraoperative findings and judgment. Clinical, operative characteristics and postoperative AL and surgical site infections (SSIs) within 30 days after surgery were evaluated. Data collected included patient demographics (age, gender), body mass index, American Society of Anesthesiologists (ASA) status, comorbidity, preoperative albumin level, previous abdominal surgery, neoadjuvant chemoradiotherapy, tumor stage, tumor distance from anal verge, tumor size, operative procedure, type (stapled or handsewn) and configuration of anastomosis (end-to-end or end-to-side or colonic J pouch), diverting stoma formation, operative time and blood loss.

The primary outcome measure was AL. AL was defined by imaging, clinical findings, or operative findings, and therefore any type of leak (clinical and subclinical leak) was considered as the primary outcome [14]. Secondary outcome measures were organ/space surgical site infections (SSIs) and overall SSIs (superficial, deep and organ/space). The diagnosis of SSIs was made based on the definitions stated in the guidelines reported by the CDC's NNIS system [15]. The discharge criteria were the same in both groups and included tolerance of meals without nausea or vomiting, good stoma function, adequate pain control with oral analgesia, and independent ambulation. Patients were deemed to have a postoperative ileus if they did not have return of intestinal function by postoperative day five and/or required nasogastric tube insertion due to abdominal distension, nausea, and emesis after having started a liquid diet, and in the absence of a mechanical obstruction [16].

2.1. Omental pedicle flap technique

For proctectomy, standardized principles were used including ligation of the inferior mesenteric vessels, mobilization of the sigmoid colon, total mesorectal excision, and creation of colorectal anastomosis. Following completion of the anastomosis, the OPF was created, as described by Topor et al. [12]. In brief, the omentum was mobilized from the transverse colon and an omental pedicle was created based on the left gastroepiploic arcade. In some patients, the flap was constructed using the right gastro-epiploic artery. The omentum was transposed to the pelvis, taking care to avoid any twisting or stretching of the tissue. Then, it was placed posterior to the anastomosis, wrapped loosely around the anastomotic suture line anteriorly and tacked to the bowel wall by sutures, when necessary.

2.2. Statistical analysis

Comparison of the groups was performed using chi-square test or Fisher's exact test with respect to categorical data and the Wilcoxon rank sum test with respect to quantitative data. Categorical measures were summarized using frequencies and continuous measures were described as means and standard deviations. Multivariate logistic regression analyses were performed to evaluate the association between OPF creation and AL and the septic complications. Outcomes were also compared between diverted versus non-diverted patients who underwent rectal resection with or without OPF. All tests were performed at a significance level of 0.05.

3. Results

During the 6-year study period, a total of 520 patients underwent rectal resection with anastomosis. Of these, 468 patients (326 [70%] males) with a mean age of 59 ± 12 years met the inclusion criteria.

Comparison of the patient demographics, preoperative characteristics and intraoperative findings in both groups is provided in Tables 1 and 2. Both groups were comparable with respect to preoperative characteristics, including age, gender, ASA class, body mass index, history of co-morbidities, smoking, steroid use, neoadjuvant chemoradiotherapy, history of previous abdominal surgery, and blood albumin and hemoglobin levels. Regarding intraoperative findings, operative procedure, type of anastomosis, anastomotic configuration, operative time were also similar in both groups. However, open surgery was more frequent (91 vs 64%, $p < 0.001$), and operative blood loss (335.9 ± 200.0 ml vs 302.2 ± 242.5 ml, $p = 0.045$) and transfusion requirement (42 vs 23%, $p = 0.002$) were higher in the OPF group. Stoma creation was more frequent in the no-OPF group (80% vs 68%, $p = 0.02$). Regarding tumor characteristics, tumor distance from anal verge, tumor stage, positive surgical margins, and histologic differentiation were also comparable between the two groups ($p > 0.05$).

Table 3 summarizes the frequencies of postoperative complications in both groups. Forty-seven patients (10%) had AL, 9 (14%) patients in the OPF and 38 (9%) in the no-OPF group. Organ/space SSI occurred in 8 (12%) and 41 (10%) patients in the OPF and no-OPF groups, respectively. Sepsis was observed in 3 (5%) patients in the OPF group and 9 (2%) in the no-OPF group. Ileus [n = 74 (18%) versus n = 7 (11%), $p = 0.13$] and small bowel obstruction [n = 7 (2%) versus n = 2 (3%), p = 0.47] rates were similar between the study groups regardless of OPF creation.

The results of the multivariate analysis are provided in Table 4. There was statistically no association between OPF and AL (OR: 1.51, 95% CI: 0.64–3.52, $p = 0.35$), organ/space SSIs (OR: 0.99, 95% CI: 0.42–2.37, $p = 0.99$) and overall SSIs (OR: 1.17, 95% CI: 0.59–2.33, $p = 0.65$). However, the only independent risk factor which had an adverse effect on each of these three outcomes was perioperative blood transfusion (for AL; OR: 3.75, 95% CI: 1.82–7.69, $p = 0.0003$, for organ/space SSIs; OR: 3.88, 95% CI: 1.93–7.80, $p = 0.0001$; and for overall SSIs, OR: 2.45, 95% CI: 1.39–4.34, $p = 0.002$).

Table 5 shows the comparison of the OPF and no-OPF groups according to diverting stoma creation. A total of 368 (78.6%) patients underwent diversion. A subgroup analysis showed that OPF did not have any impact on the rates of AL and septic complications in patients regardless of diversion ($p > 0.05$).

Considering 47 patients with AL, there were no differences