

Intracorporeal Functional End to End Anastomosis Versus Overlap Anastomosis in Laparoscopic Right Hemicolectomy for Cancer: A Single-Center Study

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Abstract

Background: Two types of intracorporeal anastomosis can be used in Laparoscopic Right Hemicolectomy (Lap-RH) for right side colon cancer, namely, Functional End to End Anastomosis (FEEA) and Overlap Anastomosis (OLA). However, the efficacy of these two techniques remain unclear. The purpose of this study was hence to compare the short-term outcomes of both techniques.

Methods: A total of 32 patients underwent Lap-RH with intracorporeal anastomosis (FEEA in 17 patients and OLA in 15 patients) from July 2014 to July 2016 in our institution. The short-term outcomes of both groups were retrospectively analyzed.

Results: There were no patients with cancer of the transverse colon in the FEEA group. Conversely, there were no patients with cancer of the cecum in the OLA group. There were hence significant differences in cancer location between the two groups. Operative time, blood loss, anastomosing time, time to first flatus and length of post-operative stay were similar between the two groups.

Conclusions: Our results demonstrated that FEEA is a suitable technique for cecal cancer and ascending colon cancer, whereas OLA is a suitable technique for transverse colon cancer. FEEA and OLA were similar in their level of safety and recovery rates of bowel function after Lap-RH; therefore, we believe that these two types of anastomotic techniques should be chosen appropriately depending on the specific site of the right-side colon cancer.

Keywords: Functional End to End Anastomosis; Intracorporeal Anastomosis; Laparoscopic Surgery; Overlap Anastomosis; Right Side Colon Cancer

Introduction

Recently, advanced laparoscopic surgical techniques have facilitated the use of intracorporeal anastomosis in Laparoscopic Right Hemicolectomy (Lap-RH). In general, even today, Functional End to End Anastomosis (FEEA) is widely used in Lap-RH with intracorporeal anastomosis [1,2]. However, FEEA

is unsuitable in some situations. Hence, we have introduced the use of intracorporeal Overlap Anastomosis (OLA) for Lap-RH. The aim of our retrospective study was to analyze the short-term outcomes of both anastomotic techniques for right side colon cancer in Lap-RH.

Materials and Methods

Study Design

A total of 32 patients underwent surgery (FEEA in 17 patients and OLA in 15 patients) in our institution from July 2014 to July

2016. All surgeries were performed by one surgeon certified by the endoscopic surgical skill qualification system. Informed consent was obtained from all individual participants included in the study and the ethics committee of the institution approved the study.

Data Collection

Patient characteristics included age, sex, Body Mass Index (BMI), American Society of Anesthesiologist (ASA) score and tumor location. Surgical outcomes included operative time, anastomosing time, blood loss, harvested lymph nodes and length of the specimen. Short-term outcomes included postoperative complications, time to first flatus, length of hospital stay post-surgery and mortality within 30 days.

Data Analysis

Statistical analyses were performed using the IBM SPSS statistical package version 24.0 SPSS Inc., Chicago, IL, USA software. All data comparisons of continuous parameters between the two groups were performed by the Student t-test or Mann-Whitney test, depending on the data distribution. A p-value of less than <0.05 was considered to represent a statistical significance between two groups.

Surgical Techniques

Under general anesthesia, the operator was positioned on the patient's left, looking towards the monitor above the patient's head. The assistant stood on the patient's right, and the cameraman stood between the patient's legs. A total of 5 ports were placed in a circle around an umbilical 12-mm camera port on the abdomen in a square position. After adequate lymphadenectomy, the right side colon was mobilized. The terminal ileum as the proximal end and transverse colon as the distal end were transected intracorporeally using a linear stapler. First, for intracorporeal FEEA, the end of the ileum and colon at the appointed sites for anastomosis were brought together to lie side by side. A small enterotomy was made at the designated point of about 1 cm from the stapled line of the ileum and colon. The jaw of the linear stapler, which was introduced via the lower left port was inserted into the small enterotomy as appropriate (Figure 1). The ileocolostomy was performed using the linear stapler. Three stitches were made in the small enterotomy and lifted up. This helped to guide placement of the linear stapler and to excise the enterotomy, for completion of the FEEA. Second, in the intracorporeal OLA group, a small enterotomy was made 1cm distal to the ileum staple line, whereas a small enterotomy was made 6 cm distal to the stapler line end of the transverse colon. After the jaw of the linear stapler was inserted into the small enterotomy on the ileum and transverse colon which were juxtaposed in the axial direction in parallel cross arrangement, they were joined together to form an overlap anastomosis (Figure 2). The small enterotomy was closed not using a linear stapler but a double layer hand-sewn technique to avoid stenosis of the

anastomotic lumen. The intracorporeal OLA was completed.

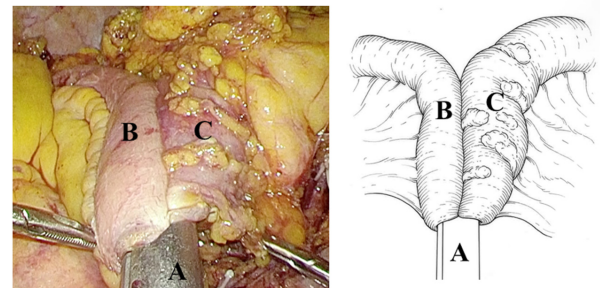


Figure 1: The ileocolostomy was performed using the linear stapler, functional end to end anastomosis was established.

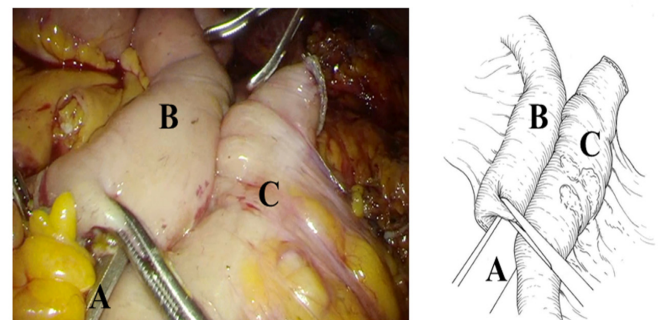


Figure 2: After the jaw of the linear stapler was inserted into the small enterotomy on the ileum and transverse colon which were juxtaposed in the axial direction in parallel cross arrangement, overlap anastomosis was completed.

Results

Table 1 shows the patient characteristics. There were no significant differences in age, sex, BMI score, and ASA score between the FEEA group and OLA group. There were significant differences in tumor location. There were no patients in the FEEA group with cancer in the transverse colon. Conversely, there were no patients in the OLA group with cancer in the cecum. Table 2 shows the short-term surgical outcomes and complications. Operative time, blood loss, and anastomosing time were similar between the two groups. The number of harvested lymph nodes and length of the specimens were also similar between the both groups. One patient in the FEEA group and 1 patient in the OLA group had postoperative surgical site infection, which improved with aspiration drainage of the intra-abdominal collection by the CT guide technique. One patient in the FEEA group and 1 patient in the OLA group developed ileus, which improved upon treatment with naso-intestinal tube, without requiring further surgery. Anastomotic leakage, wound hernia, pneumonia, and deep vein thrombosis were found in two groups. There were no significant

difference in time to first flatus and length of post-operative stay between the two groups. There were no mortalities within 30 days after the surgery in two groups

	FEEA (n=17)	OLA (n=15)	p-value
Age (year)	71 (55-87)	67 (50-85)	0.36
Sex (M/F)	10-Jul	7-Aug	0.49
BMI (Kg/m ²)	22.6 (15.0-29.9)	21.2 (16.4-32.1)	0.86
ASA score (1/2/3)	14/3/0	11/3/2001	0.54
Tumor location			0.001
Cecum	11	0	
Ascending colon	6	2	
Transverse colon	0	13	
FEEA, functional end-to-end anastomosis; OLA, overlap anastomosis; BMI, body mass index; ASA, American Society of Anesthesiologists.			

Table 1: Patient characteristics.

	FEEA (n=17)	OLA (n=15)	P-value
Operative times (minutes)	236 (184-289)	259 (187-343)	0.08
Anastomosing time (minutes)	26 (17-33)	24 (17-37)	0.27
Blood loss (mL)	10 (5-100)	10 (5-130)	0.86
Harvested lymph nodes	15 (5-51)	13 (2-40)	0.15
Length of specimen (cm)	220 (90-405)	200 (110-370)	0.49
PM	95 (30-175)	70 (25-180)	0.11
DM	86 (30-320)	70 (40-294)	0.74
Anastomotic leakage	0	0	-
SSI	1	1	0.06
Ileus	1	1	0.06
Wound hernia	0	0	-

Pneumonia	0	0	-
DVT/PE	0	0	-
Time to first flatus (days)	2 (1-4)	1 (1-4)	0.7
Length of hospital stay post-surgery (days)	10 (7-16)	11 (7-23)	0.23
Mortality within 30 days	0	0	-
FEEA, functional end-to-end anastomosis; OLA, Overlap anastomosis.			

Table 2: Short-term surgical outcomes and complications.

Discussion

Some studies [3-8] have reported that Lap-RH with intracorporeal anastomosis is less invasive than extracorporeal anastomosis, specifically regarding the earlier return of bowel function, lower morbidity, and a shorter length of postoperative stay. In our present study, we performed FEEA as a universal technique for cecal cancer and ascending colon cancer, because it is an easier produce than OLA, as it requires less suturing skill. On the other hand, OLA was performed for transverse colon cancer, mainly owing to the anatomical characteristics of the transverse colonic mesentery that is centrally located and relatively short for performing FEEA. Therefore, to perform FEEA, it is difficult to align the linear stapler and bowel, and to insert the staple into the small enterotomy, which is supplied from the lower-left port of the patient's abdomen. On the other hand, in OLA for transverse colon cancer, the ileum, transverse colon, and linear stapler are arranged on the same axis, which enables easier insertion of the linear stapler into the small enterotomy of the bowel. In our study, this is the reason why OLA was performed more frequently than FEEA in transverse colon cancer.

OLA may require a longer operative time than FEEA, and there is a high probability of anastomotic leakage, and hence OLA requires advanced laparoscopic suturing skills to close the enterotomy. The anastomosing times were similar between the two groups, as a laparoscopic surgeon with sufficient intracorporeal suturing skills performed the surgeries. Previous literature [9] have reported that the rate of anastomotic leakage was between 0% and 8.5% in Lap-RH. No patients with anastomotic leakage were identified in two groups. We believe that proper closure of the enterotomy prevents anastomotic leakage. A double layer closure of the enterotomy may result in a very low rate of anastomotic leakage [10]. In this study, double layer closure of the enterotomy of the OLA showed favorable surgical result. There was no statistically significant difference in time to first flatus and length of post-operative stay between the two groups. Post-operative complication rates were similar. Our results suggest that FEEA

and OLA can be safely and reliably performed and the rates of recovery of bowel function of both techniques were equivalent for intracorporeal anastomosis in Lap-RH. We believe that it is best to use two types of anastomotic techniques depending on the location of the tumor for right side colon cancer.

In conclusion, FEEA was the most suitable technique for cecal cancer and ascending colon cancer, whereas OLA was a suitable technique for transverse colon cancer. To the best of our knowledge, this is the first study that focuses on the two types of anastomosis in Lap-RH with intracorporeal anastomosis. However, there are several limitations, such as the small number patients, being a single center study, and the retrospective nature of the study. In the future, a randomized clinical trial would be useful for drawing definitive conclusions regarding this issue.

Disclosure Statement

No competing financial interests exist.

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