

Surgical Outcomes of Laparoscopic Versus Open Abdominoperineal Resection for Anorectal Cancer: A Comparative Study

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Abstract

Introduction: There has been no large, randomized prospective trial and few retrospective studies to clarify the surgical outcomes of laparoscopic abdominoperineal resection (Lap-APR) for anorectal cancer. The aim of this study was to clarify the surgical outcomes of Lap-APR for anorectal cancer.

Methods: A consecutive series of 39 patients who underwent abdominoperineal resection for anorectal cancer was studied: 24 underwent Lap-APR, and 15 open abdominoperineal resection (Open-APR). Patient characteristics, tumor characteristics and operative outcomes were compared between the groups.

Results: There were no significant differences between the groups in patient and tumor characteristics. The mean number of harvested nodes in the Lap-APR group was significantly more than that in the Open-APR group (11.8 ± 8.7 vs. 7.6 ± 3.6 , $p=0.046$). Although the mean operation time was similar in the two groups (372.1 ± 79.0 vs. 402.7 ± 118.4 min, N.S), the mean blood loss in the Lap-APR group was significantly less than that in the Open-APR group (244.6 ± 175.0 vs. 795.3 ± 544.9 g, $p=0.002$). Additionally, time to start oral intake of solid foods and time to first education of stoma management were significantly less after Lap-APR than Open-APR.

Conclusion: Lap-APR offered particular advantages to patients with anorectal cancer, including less blood loss, rapid oral intake of solid foods and education of stoma care.

Keywords: Laparoscopic abdominoperineal resection; Anorectal cancer; Stoma management

Introduction

The incidence of colorectal cancer in Japan is increasing [1], and the change to a more westernized diet, characterized by a high intake of fat and meat, is known to be related to these increases [2]. According to the Japanese Society for Cancer of the Colon and Rectum (JSCCR), a total of 77520 patients, 405288 with colonic and 36992 with rectal cancer, were registered in the 20-year period 1974 to 1993 in Japan [3].

Laparoscopic surgery for colon disease has been widely adopted since it was first reported in 1990 [4] and is being used increasingly in Japan [5]. Laparoscopic surgery has been associated with less pain, quicker return of gastrointestinal function, better pulmonary function, decreased stress response, a shorter stay and better postoperative quality of life (QoL) than open surgery [6]. In addition, recent large randomized trial comparing laparoscopic with open surgery for colon cancer have reported that laparoscopic surgery for colon cancer is equivalent to open surgery in terms of long-term outcomes [7-10]. However, there has been no large, randomized prospective trial and few retrospective studies to clarify the surgical outcomes of Laparoscopic abdominoperineal resection (Lap-APR) for anorectal cancer. The aim of this study was to clarify the surgical outcomes and benefits of Lap-APR for anorectal cancer.

Patients and Methods

Between 2002 and 2012, 39 patients with anorectal cancer underwent APR at the department of Gastroenterological Surgery, Oita University. This retrospective study included 39 consecutive patients with anorectal cancer. Patients with bulky tumors, those with a history of extensive adhesion, ulcerative colitis and those with multiple cancers, and distant metastasis were excluded in this study. Of the 39 patients, 24 underwent Lap-APR and 15 underwent open abdominoperineal resection (Open-APR). All patients underwent

preoperative colonoscopy, barium study and radiographic study. When the authors introduced Lap-APR in 2002, only T1/T2 tumors in the lower rectum were targeted. In 2006, the indications for it have expanded T1-T3 tumors in our institution. We did not perform any emergency APR during this period. Neoadjuvant chemoradiotherapy was performed in patients with clinical T3 or T4 tumors.

Surgical technique of Lap-APR: Our Lap-APR was performed according to Pugliese et al. [11]. In brief, the patient was placed in a modified lithotomy position. Pneumoperitoneum was created by the open technique using Hasson trocar inserted above the umbilicus. Four working trocars were inserted under direct vision. The sigmoid colon and rectum were mobilized from the pelvic floor using medial and lateral approach. The inferior mesenteric artery was clipped and divided at 1.5 cm from its origin preserving the hypogastric nerve. After the rectum with the mesorectum was completely mobilized according to the Total Mesorectal Excision (TME) rule [12], sigmoid colon was transected with linear stapler. The specimen was removed through the perineal wound. A terminal colostomy using sigmoid colon was fashioned at the left lower trocar site. Lateral dissections were not performed for all cases.

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Stomal care: After operation the stomas of all patients were cared by trained stomal nurses in our university surgical unit. Patients were discharged from hospital when a nurse was satisfied that the patient could fit a new appliance, could change a pouch without leakage, and could deal with minor accidents such as stomal leakage, skin excoriation, and excessive gas in the stomal pouch.

Patient characteristics, tumor characteristics and operative outcomes were compared between groups. These data were obtained from medical charts, operation records and pathology reports. Pathologic findings were based on the 6th TNM classification [13]. The median follow-up period was 43 months (range 3-109 months).

The results were expressed as mean ± standard deviation (SD). The Fisher's exact test was used to compare categorical variables and the t test for continuous variables. A p-value<0.05 was considered statistically significant.

Results

In the Lap-APR group, no conversion to open surgery was required. Table 1 shows the patients characteristics enrolled in this study. Although there were no significant differences between groups in patient age, gender, incidence of previous surgery and body mass index, patients treated with preoperative chemoradiotherapy(CRT) in Lap-APR group were significantly more than those in Open-APR group(20.8 vs. 60 %, p=0.013). Tumor characteristics were also shown in Table 2. Posttreatment clinical TNM stage is shown for patients treated with preoperative CRT. There were no significant differences between groups in tumor location, histologic type, depth of tumor invasion (T), nodal involvement (N), and stage. The mean number of harvested nodes in the Lap-APR group was significantly more than that in the Open-APR group (11.8 ± 8.7 vs. 7.6 ± 3.6, p=0.046).

The operative outcomes were shown in Table 3. Although the mean operation time was similar in the two groups (372.1 ± 79.0 vs. 402.7 ± 118.4 min, N.S), the mean blood loss in the Lap-APR group was significantly less than that in the Open-APR group (244.6 ± 175.0 vs. 795.3 ± 544.9 g, p=0.002). The postoperative complication rate was similar in the two groups (33.3 vs. 40.0%, NS). Although the time to first passage of flatus and length of postoperative hospital stay were similar in the two groups, time to start oral intake of solid foods and fist education of stoma management were significantly less after Lap-APR than Open-APR. In addition, the rate of tumor recurrence was also similar in the two groups.

Discussion

Several studies have shown favorable surgical outcomes of laparoscopic surgery, In particular, laparoscopic surgery has been characterized by less blood loss in gastric [6] and colorectal cancer surgery [14]. Our study also showed the mean blood loss in the Lap-

	Lap-APR (n=24)	Open-APR (n=15)	P value
Age (y)	69.2±17.7	61.5±10.6	N.S.
Gender (M/F)	15/9	12/3	N.S.
Previous surgery (Present/ Absent)	9/15	5/10	N.S.
BMI	21.3±4.00	22.7±4.4	N.S.
Preoperative CRT	5 (20.8%)	9(60%)	0.013

Mean±SD
BMI, Body mass index

Table 1: Patients characteristics.

	LapAPR(n=24)	Open-APR (n=15)	P value
Location (Rectum/ Anus)	23/1	15/0	N.S
Histologic type (well/mod/other)	7/14/3	4/11/0	N.S
T			N.S
T1	6	0	
T2	6	5	
T3	12	9	
T4	0	1	
N			N.S
N0	18	10	
N1	5	5	
N2	1	0	
Stage			N.S
I	10	4	
II	8	6	
IIIa	5	5	
IIIb	1	0	
Harvested nodes (n)	11.8±8.7	7.6±3.6	0.046

Mean±SD

Table 2: Tumor characteristics.

	LapAPR (n=24)	Open-APR (n=15)	P value
Operation time (min)	372.1±79.0	402.7±118.4	N.S
Blood loss (g)	244.6±175.0	795.3±544.9	0.002
Complication	8 (33.3%)	6 (40.0%)	N.S
Time to first passage of flatus (days)	2.4±1.5	3±1.3	N.S
Time to start oral intake of solid foods (days)	2.7±1.1	4.5±3.2	0.013
Time to first education of stoma management (days)	6.1±2.5	8.3±3.4	0.031
Postoperative hospital stay (days)	31.2±24.0	38.9±20.0	N.S.
Recurrence	7 (29%)	10(67%)	N.S

Mean±SD

Table 3: Operative outcomes.

APR group was less than that in the Open-APR group. Because the perineal approach in the both groups remains unchanged, we believed that radical lymph node dissection and pelvic dissection in the narrow pelvic floor were archived with proper homeostasis by well visualization in the Lap-APR group.

Also, laparoscopic surgery has been reported as a procedure with longer operation time when compared with conventional open surgery. However, our study showed that there were no significant differences between groups with respect to the mean operation time. We believed that one of the reasons why the mean operation time was not significant was Lap-APR was characterized by a permanent stoma and perineal procedure as well as Open-APR and the other was that Lap-APR could be avoided closure of the midline laparotomy wound. Wong et al. [15] also reported that the median operation time in the Lap-APR was similar when compared with that in the Open-APR group in their non-

randomized prospective comparative study. Randomized control study to clarify the operation time is necessary.

Although this study did not reveal significant shortening the length of hospital stay in Lap-APR, most studies have reported that the hospital stay in the laparoscopic surgery for rectal cancer was shorter when compared with the conventional open surgery group [14,16,17]. Lap-APR was characterized by a permanent stoma and perineal wound as well as Open-APR. The patients in the Lap-APR group avoided a large abdominal wound which seemed to provide the earlier recovery. In addition, our results also showed that the patients who underwent Lap-APR could be educated and achieve in managing their stoma earlier because of no abdominal incision except trocar sites and stoma. Although length of postoperative hospital stay was not significantly different between groups, we believe that the patients undergoing Lap-APR without a large abdominal wound can manage their stoma easier than those undergoing Open-APR. To our knowledge, our study was first to clarify the benefit of Lap-APR in terms of stoma care.

Some surgeons have believed that patients who have a colostomy have a worse QoL than that without stoma. Therefore, they have indicated sphincter-preserving surgery for the patients with lower rectal cancer to avoid a permanent stoma. However, Cornish et al. [18] reported that the patients undergoing APR did not have a worse QoL than patients undergoing anterior resection problems, such as continence and controlling their stools, influenced on the worse QoL following anterior resection. Lap-APR without large abdominal wound may provide the better-stoma related QoL only related stoma care in patients who underwent Lap-APR is necessary.

Limitations of this study were retrospective, and that the study group was not randomized. Therefore, selection bias might have existed because the patients treated with preoperative CRT were less in Lap-APR group than Open-APR group. Although it is possible that preoperative CRT for rectal cancer could influence the surgical outcome, a prospective randomized trial, the comparison of open versus laparoscopic surgery for mid and low rectal cancer after neoadjuvant chemoradiotherapy (COREAN trial), reported the safety and short-term advantages including less blood loss and earlier recovery of bowel function in laparoscopic surgery for rectal cancer after preoperative CRT [19]. Lap-APR was also performed safely without any severe intraoperative complication in five cases with preoperative CRT in this study. We believe short-term advantages in Lap-APR group was not because of the bias of preoperative CRT, but because they were performed "laparoscopic operation".

To date, some studies have clarified the long-term results of Phase III randomized trial of laparoscopic surgery for colon cancer [7-10]. According to these studies, laparoscopic surgery has been accepted as a standard treatment for colon cancer. However, there has been no large, randomized, prospective trial to compare open and laparoscopic APR for anorectal cancer. Fleshman et al. [16] reported that there were no significant differences between both groups in overall disease-free survival rates in their 194 cases retrospective comparative study. Pugliese et al. [11] reported that 5-year survival rate of 32 cases undergoing Lap-APR for rectal cancer was 0.5 in their case series. However, a randomized, prospective trial is necessary to clarify the long-term outcomes of Lap-APR for anorectal cancer.

In conclusion, Lap-APR offered particular advantages to patients with anorectal cancer, including less blood loss, rapid oral intake of solid foods and education of stoma care.

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