



Optimizing The Timing of Diverting Coloostomy During Sphincter-Preserving Surgery for Rectal Cancer



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Abstract

Purpose: Diverting Transverse colostomy (DC) and diverting ileostomy (DI) are the most common stoma options for rectal cancer surgery. In previously published trials that compared methods for diverting stoma (DS), some studies have favored DI over DC. However, it remains unclear as to which of these two is the better option. Here, we compared the outcomes of DC and DI in sphincter-preserving surgery in patients with rectal carcinoma, at what time we discussed better to create DC.

Methods: In total, 147 patients underwent sphincter-preserving surgery at a single institution between October 2013 and July 2016. Of the patients, 94.5% (n=139) underwent laparoscopic procedures and 5.5% (n=8) underwent open procedures. Data were collected prospectively at the Kansai Medical University Hospital. We compared surgical outcomes and complications between the two groups in terms of stoma creation and closure. Complications were identified by reviewing medical records.

Results: Of all patients, 38% (n=56) were constructed diverting stoma. DI and DC were constructed respectively 37 and 19 in DS. In the time of creating DS, skin irritation was significantly higher in the DI group than in the DC group (P =0.0003). High-output stomata (HOS) were more common in the DI group than in the DC group (odds ratio 6.281 [20–64.0]; P=0.016).

Conclusion: Skin irritation and HOS had significantly higher presentation in the DI group than in the DC group after DS creation, and we suggest selecting DC in patients with deteriorating kidney function and tending to be permanent stoma.

Keywords: Rectal cancer surgery; Laparoscopic procedures; Coloanal anastomosis; Skin irritation; Systemic metastasis

Abbreviations: DC: Diverting Transverse Colostomy; DI: Diverting Ileostomy; DS: Diverting Stoma; DET Score: Discoloration Erosion Tissue Overgrowth Score; HOS: High-Output Stomata

Introduction

The most common stoma options in rectal cancer surgery are diverting transverse colostomy (DC) and diverting ileostomy (DI). In previously published trials that compared methods for diverting stoma (DS), some studies have favored DI over DC. However, it remains unclear as to which of these two is the better option. The reported advantages and disadvantages of both methods are summarized. DI was superior in terms of prolapse, wound infection and sepsis, on the other hand developed complications of dehydration after DS creation [1,2]. DC increases the incidence of wound infection [2,3], and DI often develops intestinal occlusion after DS closure [4]. Laparoscopic procedures for rectal cancer have been adopted in most high-volume centers

in Japan [5]. In the laparoscopic setting, DI is preferred to DC in these centers because both the construction and closure of DI are easier. We routinely used the DI for fecal diversion between September 2013 and March 2015. However, we experienced various complications associated with DI and changed it to DC for fecal diversion. Between March 2015 and July 2016, we mainly used DC. Herein, we compared the outcomes of DC and DI in sphincter-preserving surgery in patients with rectal carcinoma and discussed the superiority and inferiority of these procedures.

Materials and Methods

A total of 147 patients underwent sphincter-preserving surgery at a single institution, between October 2013 and July

2016. Of the patients, 94.5% (n=139) underwent laparoscopic procedures and 5.5% (n=8) underwent open procedures. Data were collected prospectively at the Kansai Medical University Hospital. Informed consent was obtained from all patients before surgery. The stoma therapist marked both the loop ileostomy and transverse colostomy sites before surgery. The decision to create a diverting stoma was made on the completion of the colorectal or coloanal anastomosis. This study involved the construction of a defunctioning stoma for early postoperative anastomotic leakage. We compared surgical outcomes and complications between the two groups in terms of stoma creation and closure. Complications were identified by medical record review. Skin irritation in stoma

construction was determined by the Discoloration Erosion Tissue Overgrowth Score (DET Score), with a maximum total score of 15. The stoma therapist assessed the DET scores of all patients. We evaluated renal function with estimated GFR (eGFR) and defined decreased renal function as eGFR<60 ml/min/1.73 m².

Statistical Analysis

Statistical significance was set at 0.05. All of the analyses are conducted using R version 3.2.4 (2016-03-10). R: Language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria.

Result

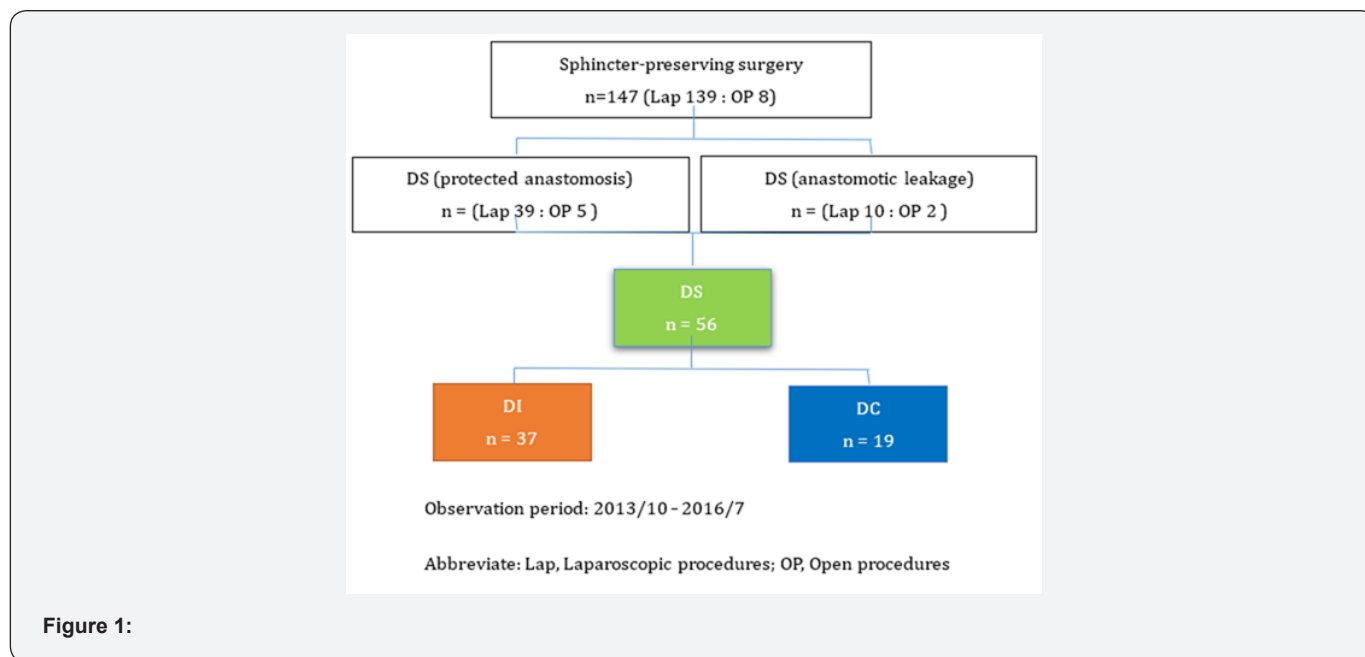


Figure 1:

Between October 2013 and July 2016, we performed 147 sphincter-preserving surgeries for rectal cancer (Figure 1). Of all patients, 38% (n=56) were constructed diverting stoma, of which 44 patients were performed for protected anastomosis, 12 patients were performed for anastomotic leakage. DI and DC were constructed respectively 37 and 19 in DS. Patient Characteristics were recorded from all patients including gender, age, tumor

location, pStage, operative procedure, operation time, blood loss (Table 1). The mean age was significantly higher in the DC group than in the DI group (P =0.015). The distributions of tumor location, pStage, and operative procedure were similar, and the operative time and blood loss were not significantly different between the two groups.

Table 1: Patients and Characteristics.

	DI	DC	P
N (56)	37	19	
Gender (Female/Male)	9/28/	4/15/	1.00
Age (years)	64(40-83)	69.0(44-81)	0.015
Tumor location (RS/Ra/Rb/P)	7/5/21/4	5/3/11/0	0.18
pStage (I/II/III/IV)	19/7/10/1	2/4/12/1	0.38
HAR/LAR/ISR	1/23/2013	3/15/2001	0.371
Operation time(min)	326.5(145-564)	2148(102-542)	0.371
Blood loss	78(0-1186)	73(3-899)	0.371

Abbreviation: HAR, High anterior resection: LAR, Low anterior resection: ISR, Inter Sphincteric Resection

DI: Diverting Ileostomy, DC: Diverting Colostomy.

§ Median (range) P-values obtained from Fisher’s exact test or Mann-Whitney U test.

DS creation

DS creation performance, recovery of bowel function, time to resumption of solid diet, and length of hospital stay after stoma creation showed no significant differences between the groups (Table 2), and none of the patients experienced septic complications during the postoperative course. The stoma complications that occurred before closure were shown Table 3. The most common complication was skin irritation, and the

median of the maximum DET score was significantly higher in the DI group than in the DC group (P =0.0003). High-output stomata (HOS) were defined as those with output ≥ 1500 ml over 24 hours. HOS presented more often in the DI group than in the DC group (odds ratio 6.281 [20 to 64.0]; P=0.016). Dehydration affected renal function. The median values of eGFR in DI varied at different times (Figure 2). In DC subjects, the eGFR graph was flat, suggesting that DC prevented renal damage.

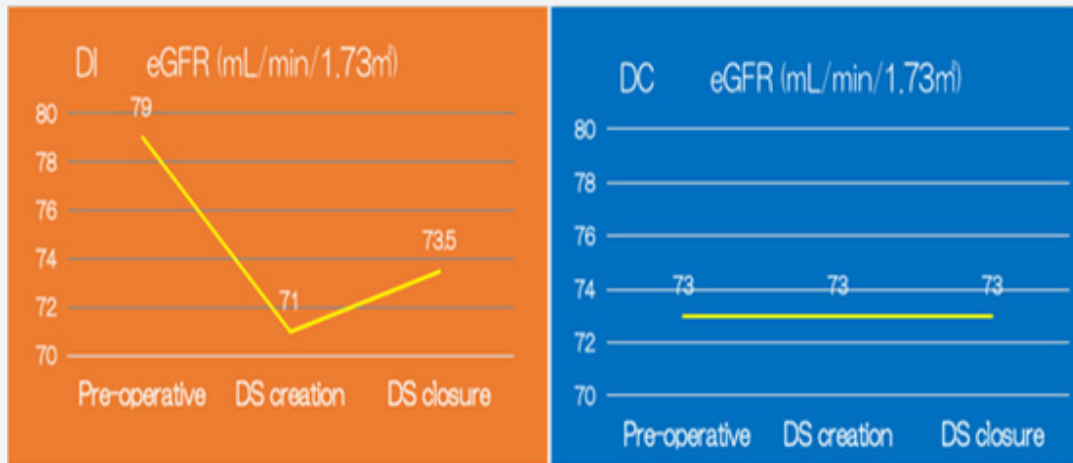


Figure 2.

Table 2: Performance of DS creation.

	DI	DC	P
n (56)	37	19	
First bowel movement (days)	0(0-1)	1(1-3)	1.00
Start fluid intake (days)	1(1-11)	1(1-8)	0.727
Start solid diet (days)	2(1-12)	2(1-11)	0.156
Postoperative hospital stays (days)	12(7-86)	11(7-46)	0.95

Abbreviations: DI: Diverting Ileostomy; DC: Diverting Colostomy.

§ Median (range) P-values obtained from Fisher’s exact test or Mann-Whitney U test. P values were obtained using Fisher’s exact test or the Mann-Whitney U test.

Table 3: DS creation-related complications.

	DI	DC	Relative Risk (95% CI)	P value
n (56)	37	19		
Prolapse	2	1	1.02(0.05-63.9)	1.00
Parastomal hernia	2	1	1.02(0.05-63.9)	1.00
Wound infection	5	2	1.3(0.19-15.2)	1.00
Occlusion	2	0		0.543
Skin irritation: DET-Score*	5.0(0-11)	2.5(0-5)		0.0003
High-output stoma**	16	2	6.28(1.20-64.0)	0.016

*DET-score (Discoloration, Erosion, Tissue overgrowth): median (range). **Stomata with maximum output/day > 1500 ml.

Abbreviations: DI: Diverting Ileostomy; DC: Diverting Colostomy.

§ Median (range) P-values obtained from Fisher’s exact test or Mann-Whitney U test.

DS closure

Approximately 87.5% (n=49) of the patients underwent DS closure. The median time during placement and reversal was 147 days in the DI group and 158 days in the DC group. There was no significant difference in the time taken before stomata closure in both study groups (P=0.776). The time to fecal output was longer

in the DC group (P=0.024). However, the time to resumption of solid diet and the length of hospital stay were similar in both groups (Table 4). By analyzing complication rates, we found a significantly higher incidence of intestinal obstruction in the DI group than in the DC group (P=0.037). The other complications were similar between the groups (Table 5).

Table 4: Performance of DS closure.

	DI	DC	P
N (49)	32	17	
Days before closure	147(39-459)	158(93-376)	0.776
Blood loss (ml)	62(22-285)	55(18-256)	0.897
Operation time (min)	106(57-163)	105(50-185)	0.938
First bowel movement (days)	3(1-7)	4.5(1-7)	0.024
Start fluid intake (days)	1(1-5)	1(1-2)	0.259
Start solid diet (days)	2.5(2-7)	3(2-4)	0.914
Postoperative hospital stays (days)	8(6-28)	8(6-23)	0.696

Abbreviations: DI, Diverting Ileostomy; DC, Diverting Colostomy.

§ Median (range) P-values obtained from Fisher's exact test or Mann-Whitney U test.

Table 5: Abbreviations: DI, Diverting Ileostomy; DC, Diverting Colostomy.

	DI	DC	Relative Risk (95% CI)	P
n (49)	32	17		
Wound infection	1	3	0.15(0.002-2.14)	0.113
Fistula	1	0		1.00
Occlusion	11	1	8.09(0.98-382)	0.037

§ Median (range) P-values obtained from Fisher's exact test or Mann-Whitney U test.

Discussion

The present study compared small sample sizes retrospectively in a hospital-based. However, study groups consisted of widely similar patients without any statistical differences concerning gender, age, tumor location etc. This study of 147 patients who underwent sphincter-preservation resection for rectal cancer, of which 139 (94.5%) were performed by laparoscopic procedure. The proportion of laparoscopic procedure was relatively high and distinguishing from the past literatures. As described in the beginning of introduction, some studies have favored DI over DC. However, it remains unclear as to which of these two is the better option. We retrospectively compared the two groups regarding the surgery outcomes and complications for stoma creation and closure. We almost had created DI Between September 2013 and March 2015, because of creating DI was easier than creating DC in laparoscopic surgery [6], the ileum could be extracted under direct visualization through the abdominal wall to create a loop ileostomy. However, the study found that DI group more often developed skin irritation and high-output stoma than DC group, which is in accordance with the past literature [1,2], so that we actively had created DC between March 2015 and July 2016. The

higher fluid loss after DI creation led to dehydration and incidence of renal insufficiency including hypokalemia and hypocalcemia [7]. Subsequently, estimated GFR seemed to tend to be elevated in the DI group without reaching statistical significance in our study. Peristomal skin irritation in terms of dermatitis occurred significantly more often in the DI group which is probably due to the more aggressive behavior of small bowel feces, which is in accordance with our study, the median of the maximum DET score was significantly higher in the DI group than in the DC group.

According to the past literature [8,9], the incidence of prolapse happened more often in DC group, however our study showed no significant differences between both groups, because we thought that this study compared small sample sizes. We tended to advise patients that their diverting stoma will be reversed more than 12 weeks of formation, as a result the mean time to closure was approximately 21-22weeks in our study. The literature [10] indicates that various reasons like scheduled adjuvant chemotherapy or critical clinical condition of the patients might lead to a delayed stoma reversal. Of the intended temporary stomata, 19% turned out to be permanent [11]. The reasons for permanent stomata were metastatic disease, unsatisfactory

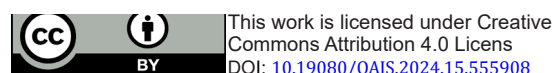
anorectal function, deteriorated general medical condition, new non colorectal cancer, patient refusal of further surgery, and chronic anastomotic leakage. In our study, seven patients who could not reverse stoma were same reason, too. Based on these results, the surgeon needs to consider that each diverting stoma might turn into a permanent situation. Various complications associated with DS creation like HOS or skin irritation might be temporarily acceptable but not for a long-life situation. Furthermore, DI-related complications were HOS, permanent renal failure, and skin necrosis in adjuvant chemotherapy [12]. We suggest that DI could cause such as sever problems, so need to predict the risk of permanent stoma after anterior resection for rectal cancer. For example, Stage IV, systemic metastasis, and local recurrence were independent risk factors for permanent stoma [13].

Conclusion

Skin irritation and HOS had significantly higher presentation in the DI group than the DC group after DS creation. The time to fecal output was longer in the DC group, whereas intestinal obstruction was a more frequent complication in the DI group after DS closure. Then we suggested selecting DC in patients of deteriorating kidney function and tending to be permanent stoma.

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