Single-Incision Laparoscopic Colostomy or Ileostomy for Unresectable Colorectal Cancer

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We applied colostomy or ileostomy using single-incision laparoscopic surgery (SILS) in patients with unresectable colorectal cancer, and evaluated SILS based on our experience.

The subjects were 18 patients who underwent single-incision laparoscopic colostomy or ileostomy. Before surgery, the part of the intestinal tract for the stomal site and the application sites was decided. In the procedure, we used a circular incision for a single port. After the intra-abdominal observation, we could confirm peritoneal metastasis, direct invasion, and make a cytological examination of ascites. Dissection and mobilization were applied if necessary.

Stoma was applied in 15 colostomies and 3 ileostomies. We could confirm peritoneal or omental metastasis in 6 patients. Another 4 patients were diagnosed with peritoneal metastasis by laparoscopic examination. We also performed examination of ascites in 9 patients. In three of them, carcinoma cells were found. In addition, in 7 patients, an adhesion was dissected and the intestine was mobilized.

Single-incision laparoscopic colostomy and ileostomy facilitate postoperative stoma management because there is no scarring without a stoma. In addition, they enable accurate colorectal cancer staging and dissection of adhesion and mobilization of the intestine, which are also marked advantages.

Key words: single-incision laparoscopic surgery, minimally invasive surgery, stoma management, individualized treatment

Introduction

The indication of single-incision laparoscopic surgery (SILS) has recently been expanded to include not only cholecystectomy and appendectomy but also colostomy for colorectal cancer. However, some challenges remain to be resolved, in terms of safety and technological issues, and the majority of devices specific to SILS are still under development¹⁾.

We apply laparoscopic colostomy or ileostomy using a single incision in patients with obstructive unresectable colorectal cancer. Generally, the advantage of SILS in comparison with open surgery is its low invasiveness, decreased rate of hospitaliza-

tion, dissection of adhesion and mobilization of the intestine²⁾. In addition, its advantages compared with multi-port laparoscopic surgery are cosmetic, in terms of less scarring, and the facilitation of stoma management.

Here, we report the results of SILS in association with colostomy or ileostomy in our hospital, which involves a retrospective analysis.

Methods

1. Subjects and surgical procedure

The subjects were 18 patients who had unresectable colorectal cancer and underwent single-incision laparoscopic colostomy or ileostomy at our hospital between July 2009 and April 2013.

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Figure-1 Incision site view (platform)
The use of E-Z AccessTM as a platform with an 11 mm port and two 5 mm ports in case 8.

Figure-2 Postoperative incision site view
In the surroundings of the stoma, no wounds are found at the lateral side of the sigmoid colon in case 5.

Before surgery, use of a particular part of the intestinal tract was decided by examination using a water-soluble contrast enema or a CT scan, and the stomal application sites on the abdominal wall were marked in four places for confirmation³⁾.

This procedure was performed in the lithotomy position; a circular incision was made at one of the advanced stomal markings, and we used this incision as a single port. Insufflation was applied using the glove method¹⁾ or E-Z AccessTM (Hakko, Tokyo, Japan) (Figure-1). We used a VersaStepTM bladeless trocar (Covidien, Mansfield, MA) of 11 mm as the camera trocar. We also used two Kii Access SystemsTM (Applied Medical Resources, California, U.S.A.) of 5 mm, or a YELLOW PORT PURUS[®] (Surgical Innovations, Lancashire, England) 5 mm handle trocar and a 30° squint rigid laparoscope (Karl Storz, Tuttlingen, Germany), for intra-abdominal observation.

In advanced cases, the cytological examination of

ascites was performed, and searches for peritoneal metastasis and direct invasion were undertaken. The need for elevation of the intestine was confirmed, and dissection and mobilization were performed, if necessary. When it was difficult for us to dissect and mobilize the intestine under the SILS, we inserted an assisting port. Then, colostomy or ileostomy was applied to the single-incision site (Figure-2).

2. Evaluated items

Single-incision laparoscopic colostomy or ileostomy were evaluated in terms of patient background, intraoperative findings and progress retrospectively.

Results

This procedure was performed in 18 patients. There were 7 males and 11 females aged a median of 65 (28-83) years. The primary sites of colorectal cancer were as follows: rectum in 9, sigmoid colon in 6, and cecum and ascending and transverse colon in one patient each. In addition, 12 patients were diagnosed at clinical stage (cStage) IV, 4 patients at cStage IIIC and 1 patient at cStage IIA, in accordance with the TNM classification (UICC ver. 7)⁴⁾ (Table-1).

The median operating time was 98.5 (40-245) minutes. The median intra-operative blood loss was 5 (0-60) mL. The breakdown of the platform was as follows: in 9 patients, E-Z AccessTM was used, and in 9 patients, the Glove method was used. We could confirm peritoneal or omental metastasis in 6 patients. Among these, in 2 patients, carcinoma cells were found in a frozen section. Another 4 patients were diagnosed with peritoneal metastasis by laparoscopic examination. We also performed examination for ascites in 9 patients. Among these, carcinoma cells were found in 3 of them. In addition, in 7 patients, an adhesion was dissected and the intestine was mobilized. Three of 7 patients had an assisting trocar inserted because the primary tumor was massive and there was severe adhesion (Table-2).

Colostomy was applied to the sigmoid colon in 7 patients and the transverse colon in 8 patients; ileostomy was applied in 3 patients. In all patients, the stoma was created at the stomal marking site before the operation without complication during

Table-1 Background

Case	Age	Sex	Primary site	TNM (UICC ver.7)		
				T-category	M-category	cStage
1	28	F	R	T4 (Vagina)	-	IIIC
2	79	F	S	T4 (Vagina/Bladder)	-	IIIC
3	65	F	R	T4	Inguinal LN	IV
4	49	M	R	T4	Liver	IV
5	78	M	S	T4	Peritoneum	IV
6	62	M	R	T3	Liver	IV
7	83	F	R	T3	-	IIA
8	65	M	R	T4	Lung/Liver	IV
9	70	F	R	Pelvic recurrence	-	-
10	47	F	S	T4 (Ureter)	Lung	IV
11	51	M	R	T3	Lung/Liver/Bone	IV
12	68	F	S	T3	Lung/Liver	IV
13	66	F	T	T4	Peritoneum	IV
14	53	F	S	T4	Lung/Ovary/Brain	IV
15	29	M	A	T4 (SMV embolization)	-	IIIC
16	65	F	S	T4 (Urethra)	Lung	IV
17	47	M	R	T4 (Prostate)	-	IIIC
18	81	F	C	T4	Peritoneum	IV

(C: Cecum, A: Ascending colon, T: Transvers colon, S: Sigmoid colon, R: Rectum)

Table-2 Operative course

Case	Operation time (min)	Blood loss (ml)	Platform	Dissection or Mobilization	Peritoneum Tubercle	Ascites cytological diagnosis
1	105	10	G	-	-	Negative
2	100	5	G	+	-	Negative
3	110	15	G	-	-	-
4	94	2	E-Z	+	-	-
5	57	3	G	-	+	-
6	113	10	G	+	-	-
7	57	1	G	-	-	-
8	92	7	E-Z	-	+	Negative
9	150	1	E-Z	-	-	-
10	127	0	E-Z	+	-	Suspicious
11	125	5	E-Z	+	+	Positive
12	175	1	E-Z	+	-	Negative
13	119	5	E-Z	+	+	Positive
14	245	60	G	-	+	-
15	70	3	E-Z	-	-	Negative
16	40	1	G	-	-	-
17	54	5	G	-	-	-
18	97	5	E-Z	-	+	Positive

(G: Glove, E-Z: E-Z AccessTM)

the surgery. The median time for the initiation of oral ingestion was 2 (1-7) postoperative days. The start of self-stoma care occurred at 2.92 (2-4) postoperative days on average. Only one patient had ileus after surgery, but recovered via conservative treatment.

After colostomy or ileostomy, postoperative systemic chemotherapy was performed in 10 patients, and chemo-radiotherapy was performed in 2 patients. Primary tumor resection could be performed after the chemo-radiotherapy in these 2 patients. They could start these therapies at a median of 15

Table-3 Post operative course

Case	Stoma site	Ingestion (POD)	Chemotherapy	
			Content	Start date
1	S	3	mFOLFOX6 + B-mab **	15
2	S	2	CRT*: S-1	21
3	S	3	CRT*: Capecitabine	14
4	S	2	XELOX + B-mab **	13
5	T	2	XELOX	40
6	S	2	Observation	-
7	S	1	Observation	-
8	T	3	mFOLFOX6 + B-mab **	15
9	T	2	Observation	-
10	T	1	mFOLFOX6 + B-mab **	15
11	S	1	Observation	-
12	T	1	XELOX	11
13	I	1	mFOLFOX6 + P-mab ***	8
14	T	2	Observation	-
15	I	7	mFOLFOX6 + B-mab **	25
16	T	2	S-1	24
17	T	1	mFOLFOX6	9
18	I	2	Observation	-

(*Chemo radio therapy, **Bevacizumab, ***Panitumumab)

(I: Ileum, T: Transvers colon, S: Sigmoid colon)

(8-40) days postoperatively (Table-3).

Discussion

Laparoscopic colostomy was first established in 1984 by Cherenkov⁵⁾. However, it initially involved methods of creating fistulas in patients with gastrointestinal cancer. The next phase of laparoscopic colostomy was achieved in 1991 by Lange *et al.*⁶⁾. They created colostomy because of stool incontinence owing to a severe sphincter lesion. Laparoscopic surgery involves various methods. And the laparoscopic surgery spreads for cancer treatment. In particular, SILS has gradually been attracting attention in recent years in the field of digestive organ surgery.

In recent years, colon cancer has been increasing in both men and women. In association with this, the recent progress of chemotherapy has increased the opportunities to apply colostomy and ileostomy for colorectal cancer.

In colostomy or ileostomy, laparoscopic surgery can be performed employing close intra-abdominal observation and a simple procedure⁶⁾. When peritoneal metastasis or direct tumor invasion was present, we could confirm it. In addition, we could perform cytological examination of ascites and

confirm the presence of dissemination nodules. Therefore, these techniques facilitated accurate diagnosis of the disease stage.

Even though intestinal adhesion was unexpectedly present, dissection and mobilization can be carried out by the laparoscopic surgery. Stoma can also be applied to the planned site, avoiding sudden changes in the surgical procedure, which is another advantage compared with open surgery. In addition, accurate staging and transition to the next treatment are possible in unresectable colorectal cancer patients^{2) 7)-10)}, suggesting that this procedure is very useful for deciding on the therapeutic policy and for the benefit of patients.

When the disease stage has progressed in patients undergoing colostomy, a low-invasive procedure is desirable. Schwandner *et al.*²⁾ reported that laparoscopic surgery was superior to open surgery with regard to early recovery, postoperative pain and the duration of the hospital stay after surgery.

In this study, E-Z Access was used in our hospital because of its simplicity. The median operation time was 98.5 (40-245) minutes and blood loss was 5 (0-60) ml respectively. However, these results are acceptable because there were many cases with

additional intraoperative procedures. Furthermore, there is no major difference in the method for colostomy or for ileostomy, or in terms of the complications.

From our observations, the performance of SILS in the abdominal cavity is non-inferior to multi-port laparoscopic surgery. Recently, SILS has seemed to be equivalent to multi-port laparoscopic surgery in colorectal cancer surgery. However, SILS may not allow the same level of manual dexterity and technical performance compared with open or multi-port laparoscopic surgery. We apply stoma to the single-incision site in SILS, so no wound is formed in the surroundings of the stoma, which makes postoperative stoma management easy^{6) 7)} compared with that in open or multi-port surgery (Figure-2). We think that this also provides a marked advantage for patients.

Recently, chemotherapy for colorectal cancer has developed remarkably. The Japanese Society for Cancer of the Colon and Rectum guidelines²⁾ recommend various combinatorial regimens¹¹⁾. It is very important that the choice of chemotherapy matches the particular patient¹²⁾⁻¹⁵⁾.

Representative chemotherapy regimens include FOLFOX therapy (5-FU, levofolinate and oxaliplatin) and FOLFIRI therapy (5-FU, levofolinate and irinotecan). The main side effects of oxaliplatin in FOLFOX include peripheral neuropathy. On the other hand, the main side effects of irinotecan in FOLFIRI include diarrhea. In cases with a gastrointestinal tract stenosis lesion and peritoneum dissemination accompanied by ileus, care needs to be taken.

Peritoneal dissemination and adhesion that cannot be identified before operation can be confirmed by observing the abdominal cavity in single-incision laparoscopic colostomy or ileostomy. This enables a better choice of chemotherapy regimen to be made after the operation. This is thought to make an adequate contribution to improved prognosis.

Conclusions

Single-incision laparoscopic colostomy or ileostomy facilitates postoperative stoma management because of no scarring without a stoma. In addition, they enable accurate colorectal cancer staging, as

well as adhesion dissection and intestine mobilization, which are also marked advantages. In addition, they are useful in terms of the choice of chemotherapy regimen after an operation because detailed observation of the abdominal cavity is possible in single-incision laparoscopic colostomy or ileostomy.

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References

- 1) Kojima Y, Tomiki Y, Sakamoto K: Our ideas for introduction of single-port surgery. *J Minim Access Surg*, 2011; 7: 109-111.
- 2) Schwandner O, Schiedeck TH, Bruch HP: Stoma creation for fecal diversion: is the laparoscopic technique appropriate? *Int J Colorectal Dis*, 1998; 13: 251-255.
- 3) Erwin-Toth P, Barrett P: Stoma site marking: a primer. *Ostomy Wound Manage*, 1997; 43: 18-22.
- 4) Union for International Cancer Control: TNM Classification of Malignant Tumours 7th ed. <http://www.uicc.org/resources/tnm>. Accessed 23 May 2013.
- 5) Cherenkov VG, Butenko AT: Laparoscopic methods of creating fistulas in cancer of the digestive organs. *Vestn Khir Im I I Grek*, 1984; 132: 41-45.
- 6) Lange V, Meyer G, Schardey HM, Schildberg FW: Laparoscopic creation of a loop colostomy. *J Laparoendosc Surg*, 1991; 1: 307-312.
- 7) Lysterly HK, Mault JR: Laparoscopic ileostomy and colostomy. *Ann Surg*, 1994; 219: 317-322.
- 8) Mizukami H, Yoshizawa Y, Sasaya S, Nemoto H, Maezawa K, Sanada Y: A case of advanced colon cancer invading the rectum effectively treated with chemoradiation therapy before surgery. *Gan To Kagaku Ryoho*, 2007; 34: 953-956.
- 9) Muntean V, Oniu T, Lungoci C, *et al*: Staging laparoscopy in digestive cancers. *J Gastrointest Liver Dis*, 2009; 18: 461-467.
- 10) Nguyen HM, Causey MW, Steele SR, Maykel JA: Single-port laparoscopic diverting sigmoid colostomy. *Dis Colon Rectum*, 2011; 54: 1585-1588.
- 11) Watanabe T, Itabashi M, Shimada Y, *et al*: JSCCR Guidelines 2010 for the Treatment of Colorectal Cancer. *Int J Clin Oncol*, 2012; 17: 1-29.
- 12) Uetake H, Ishikawa T, Sugihara K: Trend of the molecular target treatment for digestive organ cancer. *Japan Surgical Society*, 2011; 112: 39-42.
- 13) Takahashi T, Yoshida K, Iihara D, *et al*: Chemotherapy to give a hospital out-patient by team medical care for colon cancer. *Cancer chemotherapy of a hospital out-patient*, 2013; 31.
- 14) Takii Y, Maruyama S: New standard chemotherapy for liver metastases from colorectal cancer. *Niigata Cancer Center Hospital Medicine*, 2010; 49: 43-48.
- 15) Nakano H, Koike J, Otsubo T: Histopathologic feature of chemotherapy associated hepatotoxicity before hepatectomy in patients with colorectal liver metastases. *Colon Cancer Frontier*, 2010; 3: 58-64.