

Intracorporeal Ileorectal Anastomosis after Single Incisional Laparoscopic Total Colectomy

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ABSTRACT

Background: Patients with intractable slow transit constipation (STC) have undergone single-incision clipless laparoscopic total colectomy (SCLTC) with ileorectal anastomosis (IRA) using a functional end-to-end anastomosis (FEEA) through a transsurgical wound under direct vision since 2017 because the rectal contents prevented intestinal reconstruction using double stapling technique. Since 2021, five patients have undergone intracorporeal ileorectal anastomosis (IIRA) after SCLTC using our original procedure.

Methods: From January 2020 to December 2021, fourteen patients with intractable STC who underwent SCLTC with IRA with our original procedure in the National Hospital Organization Nishisaitama-Chuo National Hospital, were retrospectively registered in this study. The medical records of all patients were reviewed, and the patients comprised two groups: the first nine consecutive patients who underwent IRA using FEEA through a transsurgical wound under direct vision (TSA group), and the last five consecutive patients who underwent IIRA using FEEA (IIRA group).

Results: The median surgical time was 242 (207-271) min for the IIRA group and 196 (150-234) min for the TSA group. A significant difference was identified between the two groups (0.009). There were no significant differences between the groups with respect to mean age, sex, body mass index, intraoperative blood loss, or postoperative hospital stay. No postoperative complications, such as anastomotic leakage, bowel obstruction, or bleeding, were encountered in either group more than one year after surgery.

Conclusion: Our results suggest that IIRA is feasible and safe for patients undergoing SCLTC.

Key words: intracorporeal anastomosis, ileorectal anastomosis, single incisional surgery

INTRODUCTION

Total colectomy with ileorectal anastomosis (IRA) has been the gold standard surgical procedure for patients with intractable slow transit constipation (STC) (1,2). In 2014, we reported single-incision clipless laparoscopic total colectomy (SCLTC) with IRA as a type of reduced-port surgery for several benign diseases (3). Since 2011, we have performed SCLTC with IRA for patients with intractable STC. The double stapling technique (DST) was performed as an IRA after SCLTC for our initial patients. Almost all patients with intractable STC had large

Received: 11.10.2023

Accepted: 15.12.2023

quantities of intestinal contents in the rectum that could not be completely removed by preoperative preparation. We have performed IRA after SCLTC using a functional end-to-end anastomosis (FEEA) through a transsurgical wound under direct vision since 2017 because the rectal contents prevented intestinal reconstruction using DST. Since 2021, five patients have undergone intracorporeal ileorectal anastomosis (IIRA) after SCLTC using our original procedure.

METHODS

From January 2020 to December 2021, fourteen patients with intractable STC who underwent SCLTC with IRA by a single surgeon, H. K., with our original procedure (3,4) in the National Hospital Organization Nishisaitama-Chuo National Hospital, were retrospectively registered in this study. The medical records of all patients were reviewed, and the patients comprised two groups: the first nine consecutive patients who underwent IRA using FEEA through a transsurgical wound under direct vision (TSA group), and the last five consecutive patients who underwent IIRA using FEEA (IIRA group) (*table 1*).

SURGICAL TECHNIQUE

After a total colectomy specimen resected by our original procedure, SCLTC (3,4), was delivered through the wound, the SILSTM Port (Medtronic plc Dublin, Ireland) was replaced at the umbilical wound with two 5-mm trocars and a 12-mm trocar. After pneumo-peritoneum, the laparoscopic procedure was started under observation using a 5-mm flexible

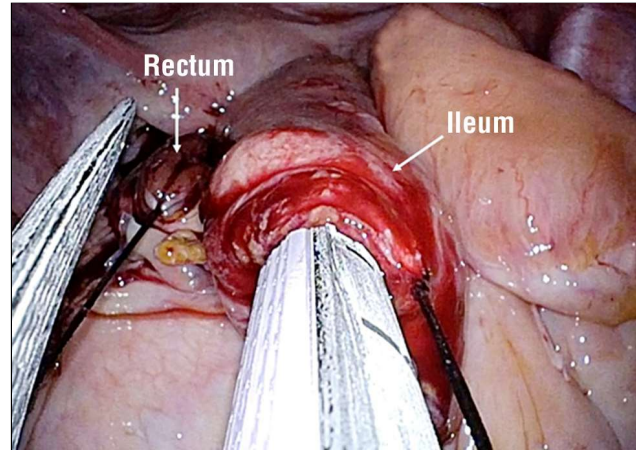


Figure 1 - Surgical view of anastomosis using a stapler. A fork with a stapler cartridge is inserted into the entry hole of the ileal stump

laparoscope. The ileal stump was placed on the right side of the rectal stump in the cephalad direction. The traction fiber from the rectal stump was removed from the body through a 12-mm port, into which a stapler was inserted. The traction fiber from the ileal stump was removed through a 5-mm port. First, a fork with a stapler cartridge was inserted into the entry hole of the ileal stump (*fig. 1*). Next, the other fork with a stapler was inserted into the entry hole of the rectal stump (*fig. 2*). After side-to-side ileorectal anastomosis was performed, the enterotomy was temporarily closed with three manual stitches (*fig. 3*). The enterotomy was completely closed with a stapler, pulling the first stitch of the enterotomy toward the abdominal side (*fig. 4*). IIRA was completed after suturing two mesenteries for the prevention of postoperative internal hernia.

Table 1 - Comparison of characteristic between IA group and TSA group

Characteristic	IA group (n=5)	TSA group (n=9)	p value
Mean age (range), years	46 (22-67)	50 (30-65)	0.738
Gender, n (%)			1.000
Male	0 (0)	0 (0)	
Female	4 (100)	10 (100)	
Body mass index (range), kg/m ²	23 (14-24)	24 (19-25)	0.236
Operation time (range), minutes	242 (207-271)	196 (150-234)	0.009
Intraoperative blood loss (range), ml	< 10	< 10	1.000
Postoperative hospital stay (range), days	10 (8-10)	9 (8-12)	0.678
Postoperative complication	0	0	1.000

The data are presented as median (range) or as n (%)

IA: intracorporeal anastomosis

TSA: transsurgical wound anastomosis

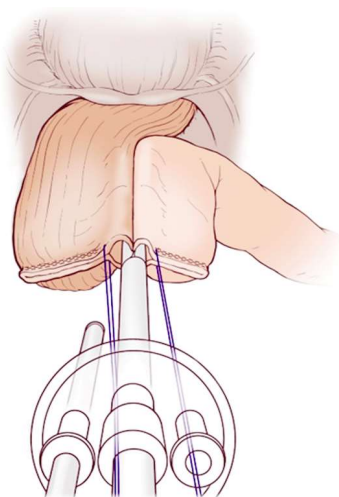


Figure 2 - Schema of anastomosis using a stapler.
Two forks are inserted into each entry hole of both intestinal stumps respectively.

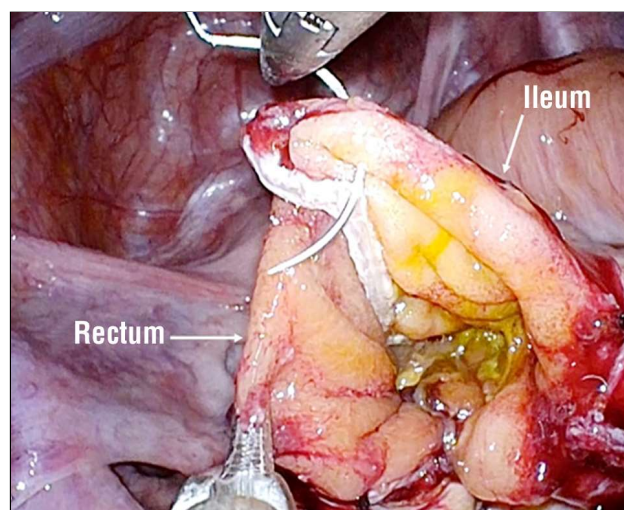


Figure 3 - Surgical view of anastomosis after side-to-side ileorectal anastomosis.
After side-to-side ileorectal anastomosis is performed, the enterotomy is temporarily closed with three manual stitches

Statistical analysis

Continuous variables are expressed as the median and range. The Wilcoxon rank-sum test was used to compare the continuous variables, and Fisher's exact test was used to compare the categorical data. A p value less than 0.05 was used to indicate significance. All data were analyzed using the Statistical Package for Social Sciences (SPSS) 24.0 (IBM SPSS, Tokyo, Japan).

RESULTS

The median surgical time was 242 (207-271) min for the IIRA group and 196 (150-234) min for the TSA group. A significant difference was identified between the two groups (0.009). There were no significant differences between the groups with respect to mean age, sex, body mass index, intraoperative blood loss, or postoperative hospital stay. No postoperative complications, such as anastomotic leakage, bowel obstruction, or bleeding, were encountered in either group more than one year after surgery.

DISCUSSION

An abdominal minilaparotomy for delivering the surgical specimen or extracorporeal bowel anastomosis is generally required in most conventional laparoscopic approaches. To reduce the invasiveness of laparoscopic colectomy, a variety of surgical techniques have been developed regarding total intracorporeal bowel anastomosis. Recently, laparoscopic right colectomy with

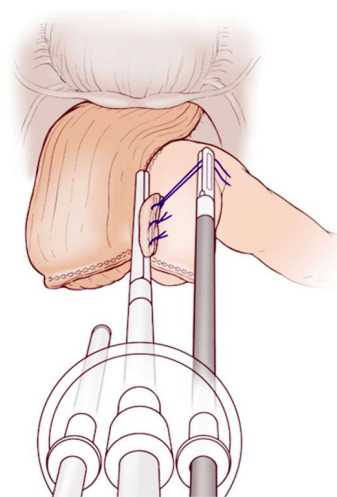


Figure 4 - Schema of the enterotomy closed with a stapler.
The enterotomy is completely closed with a stapler, pulling the first stitch of the enterotomy toward the abdominal side.

intracorporeal ileocolostomy has become a widespread adoption of laparoscopic techniques for colon cancer (5-7). However, few surgeons perform intracorporeal bowel anastomosis for patients with colon cancer in Japan. There are concerns about postoperative abdominal abscess or peritoneal recurrence due to the spillage of intestinal contents during surgery (8).

DST has been the gold standard surgical procedure for intracorporeal anastomosis between the rectum and the colon or the ileum following intestinal resection. We performed DST as an IRA for the initial patients with intractable STC. Almost all patients had large quantities of intestinal contents in the rectum that

could not be completely removed by preoperative preparation. Therefore, we have performed IRA after SCLTC using FEEA through a transsurgical wound under direct vision since 2017 (4). After the ileal stump is placed on the right side of the rectal stump in the cephalad direction, side-to-side IRA is performed through a small transsurgical wound under direct vision. However, closure of the enterotomy with a stapler is very difficult via a transsurgical wound procedure using only one small surgical wound. Since 2021, we have performed IIRA after SCLTC using FEEA. We encountered some problems with the surgical technique in single incisional laparoscopic surgery. It was easy to place the ileal stump on the right side of the rectal stump in the cephalad direction in the pelvic space because the direction of both intestinal stumps and the direction of view obtained by a laparoscope were the same. However, it was difficult to insert two forks of the stapler into each entry hole of both intestinal stumps under single incisional laparoscopic surgery. We noticed that using two traction fibers was useful for this procedure. A traction fiber from the rectal stump is pulled out of a body through a 12-mm port, into which a stapler is inserted. The other traction fiber from the ileal stump is pulled out through a 5-mm port. These procedures make it easy to insert two forks of the stapler into each entry hole of both intestinal stumps without any additional ports.

Under direct vision, closure of the enterotomy with a stapler is very difficult via a transsurgical wound procedure using only one small surgical wound. It is difficult to close the enterotomy with a stapler because it is hard to align the enterotomy using three manual stitches through a small transsurgical wound. Under single incisional laparoscopic surgery, the enterotomy can be easily closed with a stapler due to straightening the enterotomy closed with three manual stitches by pulling the first stitch of the enterotomy toward the abdominal side.

One of the most important problems is the intraperitoneal spillage of intestinal contents during surgery, which is responsible for postoperative abdominal abscess. When side-to-side ileorectal anastomosis was performed, little intestinal contents were found around the anastomosis through the enterotomy in our procedure. After resection of total colectomy, there were vanishingly small amounts of intestinal contents in the upper rectum and ileum end. Because intestinal contents in the distal ileus were removed to the colon using extraintestinal maneuvers immediately before amputation of the terminal ileum,

and intestinal contents in the upper rectum were removed to the sigmoid colon using extraintestinal maneuvers immediately before intestinal amputation. Our procedure has a low risk of intraperitoneal spillage of intestinal contents during surgery.

In this study, no postoperative complications, such as anastomotic leakage, bowel obstruction, or bleeding, were encountered in either group. IIRA seems feasible and safe for patients undergoing single incisional laparoscopic total colectomy, albeit with a prolonged operative time. To our knowledge, this is the first report about IIRA performed via single incisional laparoscopic surgery.

Conflict of interest

The authors declare no financial conflict of interest.

Funding

No funding.

Ethics statement

The Ethics Committee for Biomedical Research of the National Hospital Organization Institutional Review Board approved the protocol (2021-5).

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