

Laparoscope-Assisted Versus Conventional Restorative Proctocolectomy with Rectal Mucosectomy

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Abstract To assess the advantages of a laparoscope-assisted proctocolectomy with ileal J-pouch anal anastomosis compared with conventional procedures, we retrospectively analyzed the results of the two procedures as follows: Eleven patients including five patients with familial adenomatous polyposis (FAP) and six with ulcerative colitis (UC) underwent a laparoscope-assisted proctocolectomy and hand-sewn ileal J-pouch anal anastomosis at our department from June 1997 to November 1999. This laparoscope-assisted colectomy (LAC) group was then compared with a group of 13 patients who had undergone conventional ileal pouch anal anastomosis using a standard laparotomy from 1986 to 1997. The median operative time of the LAC group was 8 h 23 min, which was 81 min longer than that of the standard colectomy (SC) group. The number of days during which eating was prohibited were similar in the two groups but the median post-operative hospital stay was significantly shorter in the LAC group (24.1 days). In the LAC group, the small incisions showed better cosmetic results and there was also a remarkable reduction in the degree of post-operative pain. In conclusion, a laparoscope-assisted proctocolectomy with ileal J-pouch anal anastomosis can be employed widely in patients with FAP and also in selected patients with UC.

Key words Ileal pouch anal anastomosis · Laparoscopic colectomy · Familial adenomatous coli · Ulcerative colitis

Introduction

Recently, laparoscopic surgery has become widely accepted in the field of gastrointestinal surgery because of the advantages of being minimally invasive and having better cosmetic results. In particular, benign diseases of the digestive tract are often accessible for treatment by laparoscopic approaches.

Since 1997, the laparoscopic approach has been applied to a proctocolectomy and ileal J-pouch anal anastomosis for familial adenomatous polyposis (FAP) and ulcerative colitis (UC) in our hospital. This procedure consists of a mucosectomy of the distal rectum and a proctocolectomy by an anoabdominal approach. The ileal J pouch is constructed using a linear stapler, and the ileal pouch anal anastomosis is performed by hand-sewn anastomosis. The operation is finally completed by a loop ileostomy. No colonic mucosa is left since a complete removal of the colonic mucosa is considered to be rational and curative in the surgical treatment of FAP and UC.^{1–6}

The purpose of this study was to analyze our results in a series of patients who had undergone a proctocolectomy with ileal J-pouch anal anastomosis assisted by a laparoscopic approach, and to compare the result of the laparoscope-assisted approach with that of the conventional procedure.

Patients and Methods

Eleven patients underwent a laparoscope-assisted proctocolectomy with hand-sewn ileal J-pouch anal anastomosis at Tohoku University Hospital from June 1997 to November 1999. Five patients had FAP and 6 had UC. The median age of the patients was 30 years (range 19–47 years), and they consisted of 7 women and 4 men. Two of 6 patients with FAP were histopathologically diagnosed to have in situ adenocarcinoma within

the polyps after surgery. Because of a severe attack of UC, one of the patients underwent an emergency operation with a good outcome, while the other patients all underwent elective surgeries. Five of the 6 cases with UC have remained in remission under steroid treatment. With respect to the complications due to steroid treatment, one patient with UC had hypertension while another had a lumbar vertebral compression fracture. The principal indications for laparoscope-assisted surgery were as follows: (1) the patient did not have any severe side effects from steroid therapy; (2) no advanced cancers in the peritoneal cavity were found by precise preoperative examinations;⁷⁻⁹ (3) none of the patients with UC were in serious condition; (4) the patients were generally considered suitable to undergo elective surgery.

Operative Procedures

At first, the patient is placed in a prone jack-knife position. A rectal mucosectomy is performed from the dentate line to the level of the levator ani muscle. Secondly, after the patient is moved to the supine position, a 12-mm trocar is inserted below the umbilicus using the open technique. After establishing pneumoperitoneum with CO₂ gas, two 10-mm trocars are inserted into the bilateral flanks and two 5-mm trocars are inserted into bilateral subcostal incisions (Fig. 1). After exploring the peritoneal cavity by a laparoscope inserted through the umbilical trocar, laparoscopic surgery is commenced. The ascending colon is mobilized from the retroperitoneum. Next, the descending colon is mobilized. After dissecting the major omentum using a Harmonic Scalpel (UltraCision, Smithfield, RI, USA), splenicocolic and hepaticocolic ligaments are taken down to mobilize the transverse colon. Following the mobilization of the colon, the mesocolon is dissected

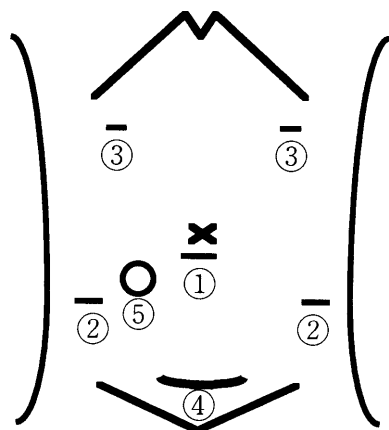


Fig. 1. Skin incisions in a laparoscope-assisted colectomy. 1, 12-mm trocar; 2, 10-mm trocars; 3, 5-mm trocars; 4, 6-cm transverse skin incision; 5, ileostomy

with the Harmonic Scalpel. Adding a 6–8-cm transverse suprapubic incision, the rectum is mobilized and the entire colon with the rectal mucosa is removed after transecting the terminal ileum through the incision. Thirdly, in the lithotomy position after constructing the ileal J-pouch using a linear stapler, ileal J-pouch anal anastomosis is then performed in a hand-sewn fashion from the anal side with PDS (Ethicon, Somerville, NJ, USA). Finally, a loop ileostomy is fashioned in the right lower abdomen.

The laparoscope-assisted colectomy (LAC) group was compared with 13 patients, including 7 with FAP and 6 with UC, who had undergone a proctocolectomy with ileal J-pouch anal anastomosis by a standard colectomy (SC) between 1986 and 1997. Comparisons were made regarding the operative time, amount of blood loss, the day of resuming oral feeding, the length of postoperative hospital stay, wound pain, and the degree of operative scarring.

Statistical Analyses

All values are presented as the median (range), and were compared with Mann-Whitney's *U*-test and Fisher's exact probability test. Statistical difference was determined to be significant if the *P* value was less than 0.05.

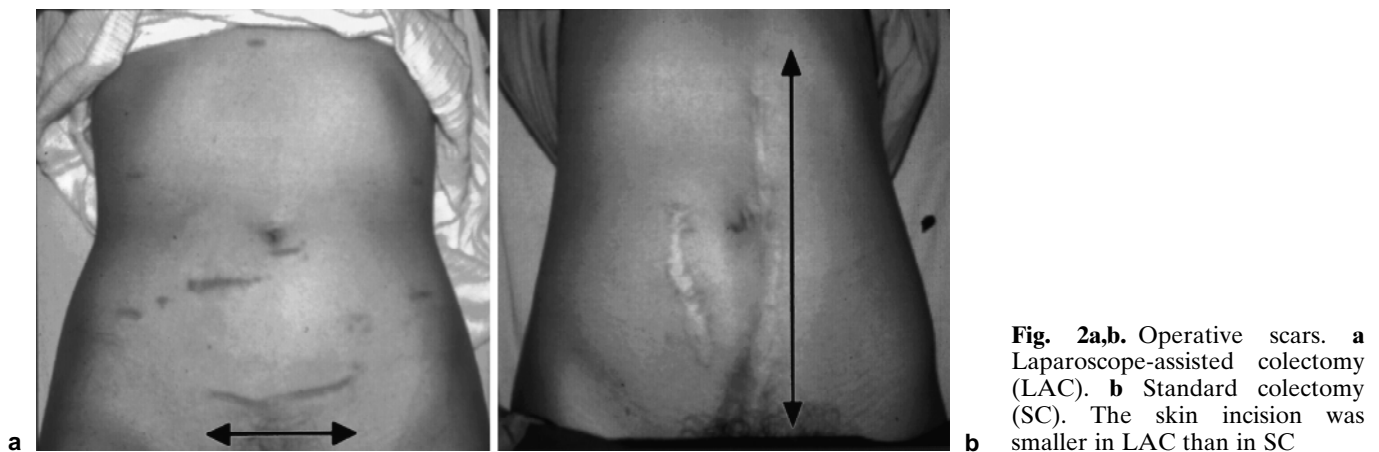
Results

The median operative time was 483 (range 410–624) min, and the median duration of the laparoscopic procedure was 173 (range 115–240) min. In some cases an autotransfusion was performed using preoperatively stored blood. None of the patients received any blood transfusions. The median operative time in the LAC group was significantly longer than in the SC group, by 81 min. The median blood loss was 361 (range 60–987) ml in the LAC group, which was about 200 ml less than that in the SC group. The median duration of postoperative food prohibition was 3.6 (range 2–6) days in the LAC group, which was similar to that in the SC group. The median postoperative hospital stay was 24.1 (range 13–36) days in the LAC group, which was significantly shorter than that in the SC group (Table 1). Neither any intraoperative trouble nor conversions were observed. Postoperative complications were encountered in 6 patients of the LAC group and in 5 patients of the SC group (Table 2). Intestinal obstruction occurred in 3 patients of the LAC group. Two of them improved after conservative therapy but one patient required a laparotomy. One patient had a minor leakage of the ileal J-pouch anal anastomosis and a cuff abscess around the anastomosis, which was able

Table 1. Patient characteristics in the LAC group and SC groups

	LAC group (n = 11)	SC group (n = 13)	Significance
Age	30.0 (19–47)	30.0 (18–49)	NS
Sex (M:F)	4:7	7:6	NS
FAP	5	7	} NS
UC	6	6	
Operative time (min)	483 (410–624)	402 (270–650)	$P < 0.05$
Intraoperative blood loss (ml)	361 (60–987)	569 (190–1444)	NS
Duration of postoperative prohibition from eating (days)	3.6 (2–6)	4.3 (2–7)	NS
Postoperative hospital stay (days)	24.1 (13–36)	31.3 (18–49)	$P < 0.05$

Data are expressed as the median (range) and are compared using Mann–Whitney's *U*-test. Fisher's exact probability test was used for comparisons of sex and diseases
LAC, laparoscope-assisted colectomy; SC, standard colectomy; FAP, familial adenomatous polyposis; UC, ulcerative colitis; NS, not significant



to be conservatively controlled. In 3 patients of the LAC group wound infections were observed, which was the same frequency as that seen in the SC group. The skin incisions were smaller and the cosmetic results were better in the LAC group (Fig. 2). The duration of postoperative epidural anesthesia was not different between the two groups but analgesic drugs were rarely given in the LAC group since there were few complaints regarding postoperative pain. After the operations 3 patients did not need any analgesic drugs and 3 patients of the LAC group were treated only once for postoperative pain. However, all 7 patients of the SC group who underwent postoperative continuous epidural block needed analgesic drugs more than twice for postoperative pain (Table 3).

Discussion

Laparoscope-assisted surgery usually takes longer than conventional surgery. However, the total operative time

Table 2. Comparison of postoperative complications between LAC and SC groups

	LAC group (n = 11)	SC group (n = 13)
Wound infection	3	4
Intestinal obstruction	3 (1)	0
Peristomal abscess	0	1
Anastomotic leakage	1	0

Figures represent the number of patients, with number of reoperations given in parentheses

Because one patient had two complications (intestinal obstruction and anastomotic leakage), seven complications occurred in six patients of the LAC group

including laparoscopic procedures has been getting shorter as the skill of surgeons has steadily improved. The hospital stays were significantly shorter in the present LAC group. In our series postoperative complications were more frequent in the LAC group. An intestinal obstruction was observed in three patients, and one required surgical treatment. Intestinal

Table 3. Frequency of analgesic drug administration in the first postoperative week

	Number of patients given analgesic drugs		
	LAC group (n = 11)	SC group (n = 7)	
None or once	6	0] $P < 0.05$
More than twice	5	7	

Comparisons were made between the two groups who received continuous epidural block postoperatively. Fisher's exact probability test was used for comparisons

twisting due to adhesion at the oral limb just beneath the stoma was found to cause the intestinal obstruction in this case. Stoma trouble not only occurs after LAC but also after standard operations requiring stoma. We thus consider a loop ileostomy to be safer even in LAC. The mesocolon was divided after ligations of right, middle, and left colonic arteries in SC while the mesocolon was dissected at the mesenteric attachment along the colon in LAC, because we wanted to avoid injuring any adjacent organs. As a result, in the LAC group the stump length of the mesocolon was longer than in the SC group although the skin incisions were smaller, which is considered to be one of the factors that caused an intestinal obstruction more frequently after LAC. Postoperative pain was reduced and operative scars were very small in the LAC group. These two points represent the most remarkable advantages of laparoscopic surgery.

No consensus regarding the indications of a laparoscopic total colectomy for FAP have yet been established.^{10,11} A laparoscopic total colectomy has not been shown to have as many advantages in patients with UC as in those with Crohn's disease.^{12,13} Milson et al. reported successful results regarding a laparoscopic total colectomy with ileorectal anastomosis performed on 16 patients with FAP who had less than 20 polyps in the rectum without cancer. They reported that such patients were likely to be more compliant with their follow-up, and suggested that this procedure was an appealing option in the management of patients with FAP.¹⁰ Schmitt et al. compared the surgical results of 22 patients who underwent LAC, and showed the cosmetic results to be the only benefit in the LAC group. The operative duration was prolonged and postoperative complications were more frequent. They reported that ileus occurred in 7 of 22 patients in the LAC group. Ileus was the most frequent morbidity in the LAC group in their series as well as in ours. The postoperative recovery in the bowel movement was not substantially different, and the length of hospitalization did not decrease in the LAC group. They thus con-

cluded that this procedure conferred none of the theoretical advantages associated with other laparoscopic procedures.¹¹ Watanabe et al. reported four cases with UC who underwent a laparoscope-assisted total proctocolectomy, two of whom underwent ileoanal canal anastomosis and another who underwent ileoanal anastomosis. They suggested that the cosmetic benefit to the patient was so considerable that this procedure should thus be widely performed in spite of the technical difficulties.¹⁴

We performed a rectal mucosectomy and hand-sewn ileal J-pouch anal anastomosis as a standard method at our institution. Patients with UC or FAP have the possibility of occult abnormalities in the colonic mucosa and a high risk of carcinoma. In cases undergoing ileorectal anastomosis for these two diseases, carcinoma is also frequently found in the remnant rectum after a long-term follow-up.¹⁻³ On the other hand, the patients who underwent ileal J-pouch anal anastomosis with rectal mucosectomy could expect a good quality of life.⁴⁻⁶ We therefore recommend that patients with these diseases should undergo ileal J-pouch anal anastomosis with a rectal mucosectomy.

In the present study, the cosmetic results of laparoscope-assisted surgery were shown to be significantly beneficial for patients with FAP or UC, although some problems remain regarding the operative time and postoperative complications. In addition, the small skin incision and mitigation of postoperative pain could also reduce patient fear associated with this operation, and these merits might thus expand the operative indications for these diseases.

In conclusion, a laparoscope-assisted proctocolectomy with ileal J-pouch anal anastomosis not only leads to better cosmetic results, but can also reduce the degree of postoperative pain and the duration of hospital stay. This new procedure should thus be widely indicated in patients with FAP and also in a selected number of patients with UC.

References

1. Rita LO, Bruce GW, David H (1997) Total abdominal colectomy and ileorectal anastomosis for inflammatory bowel disease. *Dis Colon Rectum* 40:1445-1464
2. De Cosse JJ, Bulow S, Neale K, Jarvinen H, Alm T, Hurterantz R, Moesgaard F, Costello C, the Leeds Castle Polyposis group (1992) Rectal cancer risk in patients treated for familial adenomatous polyposis. *Br J Surg* 79:1372-1375
3. Madden MV, Neale KF, Nicholls RJ, Landgrebe JC, Chapman PD, Bussey HJ, Thomson JP (1991) Comparison of morbidity and function after colectomy with ileorectal anastomosis or restorative proctocolectomy for familial adenomatous polyposis. *Br J Surg* 78:789-792
4. Nyam DC, Brilliant PT, Dozois RR, Kelly KA, Pemberton JH, Wolff BG (1997) Ileal J pouch-anal canal anastomosis for familial adenomatous polyposis. *Ann Surg* 226:514-521

5. Jimmo B, Hyman NH (1998) Is ileal J pouch-anal anastomosis really the procedure of choice for patients with ulcerative colitis? *Dis Colon Rectum* 41:41–45
6. Fazio VW, O'Riordain MG, Lavery IC, Church JM, Lau P, Strong SA, Hull T (1999) Long-term functional outcome and quality of life after stapled restorative proctocolectomy. *Ann Surg* 230:57–586
7. Ramos JM, Gupta S, Anthonie GJ, Ortega AE, Simons AJ, Beart RW Jr (1994) Laparoscopy and colon cancer. Is the port site at risk? A preliminary report. *Arch Surg* 129:897–899
8. Cirocco WC, Schwartzman A, Golub RW (1994) Abdominal wall recurrence after laparoscopic colectomy for colon cancer. *Surgery* 116:842–846
9. Wexner SD, Cohen SM (1995) Port site metastases after laparoscopic colorectal surgery for cure of malignancy. *Br J Surg* 82:295–298
10. Milson JW, Ludwig KA, Church JM, Garcia-Ruiz A (1997) Laparoscopic total abdominal colectomy with ileorectal anastomosis for familial adenomatous coli. *Dis Colon Rectum* 40:675–678
11. Schmitt SL, Cohen SM, Wexner SD, Noguerras JJ, Jagelman DG (1994) Does laparoscopic-assisted ileal pouch anal anastomosis reduce the length of hospitalization? *Int J Colorect Dis* 9:134–137
12. Sardinha TC, Wexner SD (1998) Laparoscopy for inflammatory bowel disease. Pros and cons. *World J Surg* 22:370–374
13. Reissmann P, Salky BA, Pfeifer J, Edye M, Jageiman DJ, Wexner SD (1996) Laparoscopic surgery in management of inflammatory bowel disease. *Am J Surg* 171:47–51
14. Watanabe M, Teramoto T, Hibi N, Kitajima M (1997) Laparoscopic-assisted bowel resection in inflammatory bowel disease cases (in Japanese with English abstract). *Nihon Daichokoumonbyo Gakkai Zasshi (J Jpn Soci Coloproctol)* 50:1151–1157