

Advantages of Hand-Assisted Laparoscopic Surgery for Ulcerative Colitis

Hisanaga Horie¹, Masaki Okada¹, Masayuki Kojima¹,
Koji Koinuma¹, Hideo Nagai¹, Fumio Konishi²

Abstract

To ascertain the advantages of hand-assisted laparoscopic surgery (HALS) for ulcerative colitis, the present retrospective study compared a series of 14 patients with ulcerative colitis who underwent total colectomy by HALS at the first stage operation during the period between 1999 and 2004 (HALS group) and a series of 13 patients who underwent total colectomy using the conventional procedure at the first stage operation (CP group). No significant differences existed between the two groups for age, gender, duration from onset to surgery, total prednisolone dose, staged surgery methods or operative time. However, volume of intraoperative bleeding was significantly lower for the HALS group than for the CP group. Conversion to open colectomy occurred in one HALS patient. This was because the amount of intra-abdominal fat was very large, resulting in the difficulty of securing a working space for the necessary intra-abdominal procedures using the left hand, and the inflamed serosal membrane had caused strong adhesion of the colon to the retroperitoneum. The length of time to initiate oral intake was significantly shorter for the HALS group than for the CP group. Duration of postoperative hospital stay tended to be shorter for the HALS group, however the difference was not significant. As far as postoperative complications were concerned, no significant intergroup differences were identified in the incidences of wound infection and bowel obstruction. These findings suggest that, except for patients with large amounts of intra-abdominal fat or severe serosal inflammation, HALS offers a safe and effective treatment for ulcerative colitis, as relatively few technical difficulties are present and postoperative recovery of bowel function is rapid.

(Key words : hand-assisted laparoscopic surgery, ulcerative colitis, total colectomy)

¹ Department of Surgery, Jichi Medical School

² Department of Surgery, Jichi Medical School Omiya Medical Center

Introduction

According to reports published in the early experience period of laparoscopic total colectomy for ulcerative colitis, the only advantage was that the size of surgical wound was smaller compared to open surgery, and no advantages were identified in terms of surgery time, duration of hospital stay or postoperative complications^{1,2}. With time, advantages such as faster recovery of bowel function and shorter hospital stay have been reported, but little improvement in the operative time has been attained^{3,4}. This is because the area of dissection is extensive, and particularly in patients on high-dose steroid therapy, the gastrointestinal tissue is often fragile. As a result, surgery needs to be performed in a gentle manner to avoid bleeding and perforation of the intestinal wall. Some technical difficulties thus remain to be overcome. Hand-assisted laparoscopic surgery (HALS) was developed to overcome the disadvantages associated with conventional laparoscopic surgery, and is reportedly useful in complex laparoscopic operations^{5,6}. Insertion of the left hand into the abdominal cavity allows the surgeon to gently hold and mobilize the intestine, and because favorable visual fields are easily secured, HALS is highly advantageous in surgery for ulcerative colitis. One study on laparoscopic total colectomy reported that, compared to standard laparoscopic techniques, operative time was significantly reduced with HALS without increasing the frequency of postoperative complications⁷. Our department has been performing HALS for total colectomy in the treatment of ulcerative colitis since 1999. The present study retrospectively analyzed the indications for and safety of HALS in total colectomy for ulcerative colitis in our department.

Patients and Methods

As for therapeutic strategies for ulcerative colitis in our department, the inflammatory large bowel disease is treated by either a 3-stage procedure if the dose of prednisolone (PSL) has not been sufficiently reduced preoperatively or general condition is poor because oral intake is not possible. A 2-stage procedure is used for all other cases. In the 3-stage procedure, total colectomy, ileostomy and mucus fistula are performed at the first stage, followed by mucosal proctectomy, ileal pouch anal anastomosis (IAA) and temporary diverting loop ileostomy at the second stage, and ileostomy closure at the third stage. In the 2-stage procedure, total colectomy, mucosal proctectomy, IAA and temporary diverting loop ileostomy are performed at the first stage, followed by ileostomy closure at the second stage. From 1999 to 2004, total colectomy was performed using HALS at the first stage in 14 patients (HALS group). Between 1981 to 1999, total colectomy was performed using conventional procedures at the first stage in 13 patients (CP group). Parameters as operative time, bleeding and postoperative complications were compared between these 2 groups using Mann-Whitney's U-test or Fisher's exact probability test.

Surgical technique of hand-assisted laparoscopic total colectomy

Under general anesthesia, the patient was placed in a lithotomy position. A 12-mm incision was made in the infra-umbilicus, and open laparotomy was performed. After placing a 12-mm port in the infra-umbilicus, a pneumoperitoneum up to 12 mmHg was established. A laparos-

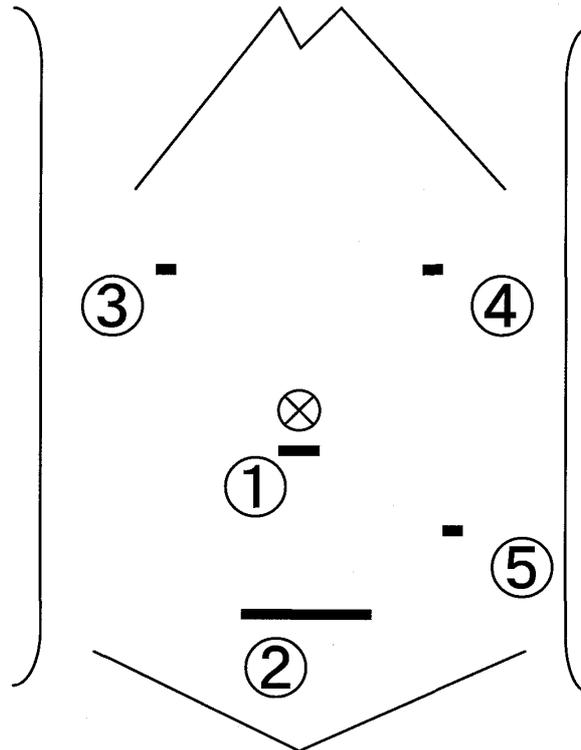


Figure 1A : ① : 12mm port for laparoscope, ② : 7cm incision for LAPDISK[®], ③④⑤ : 5mm port for forceps.

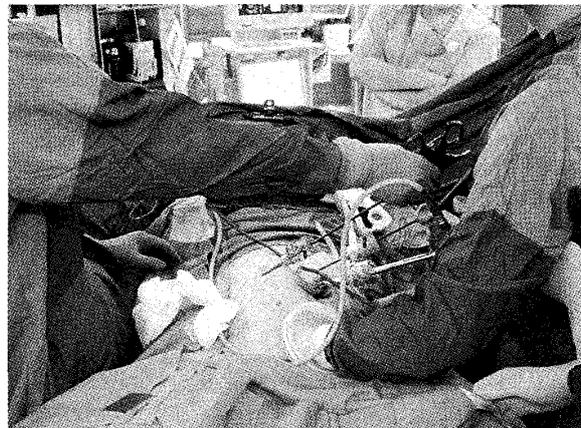


Figure 1B : The left hand of the operator is inserted into the abdominal cavity through LAPDISK[®].

cope was inserted from the 12-mm port to observe the abdominal cavity, and then a 7-cm horizontal incision was placed in the lower abdomen about 4cm above from the upper margin of the pubic bone to open the abdomen. A wound protector, LAPDISK[®] (Hakkou, Tokyo, Japan), was attached to the incision, and the surgeon's left hand was inserted into the abdominal cavity. Pneumoperitoneum was again established, and three 5-mm ports were placed in the right and left upper quadrants and left lower quadrant (Fig.1). The ileocecal region and ascending colon were mobilized from Toldt's fusion fascia and the hepatic flexure was taken down using a Harmonic Scalpel[®] (Ethicon Endosurgery, Tokyo, Japan) with assistance of the left hand. The greater omentum was dissected free from the transverse colon and the bursa

omentalis was opened. The descending colon and splenic flexure were mobilized laterally from the fusion fascia. Major mesenteric vessels except for ileocolic artery were divided after clips were applied, and the mesentery was divided using the Harmonic Scalpel®. After removing the left hand from the abdominal cavity, bowel resection was performed extra-corporeally after exteriorization via the LAPDISK®.

Results

No significant intergroup differences existed in age, gender, duration from onset to surgery, total PSL dose and staged surgery methods (Table 1). As far as indications were concerned, one CP patient had severe toxic megacolon, and another CP patient had severe bleeding. While surgery time tended to be longer for the HALS group than for the CP group, no significant differences were identified (Table 2). Volume of intraoperative bleeding was significantly lower for the HALS group than for the CP group. In 1 HALS patient, the procedure was converted to open colectomy. Although the body mass index of this patient was low (20.1), significant amounts of abdominal fat made ensuring a working space for the left hand difficult, and an inflamed serosal membrane had resulted in severe adhesion of the colon to the retroperitoneum. Although duration of postoperative hospital stay tended to be shorter for the HALS group, no significant intergroup differences existed. Regarding postoperative complications,

Table 1. Patient demographics

	HALS (n=14)	CP (n=13)	P
Age	34.5(17-68)	37.0(16-66)	NS
Sex (M : F)	5 : 9	4 : 9	NS
Duration (years)	5.5(0.3-27)	5.0(0.25-15)	NS
Total PSL (g)	13.0(2.9-109)	9.0(0-70)	NS
Indication for operation			NS
Toxic megacolon	0	1	
Bleeding	0	1	
Dysplasia	0	1	
Medical failure	14	10	
Method of operation			
2-stage : 3-stage	3 : 11	5 : 8	NS

Data are expressed as median (range) and were compared using Mann-Whitney's U-test. Fisher's exact probability test was used for comparisons of sex, indication and method. HALS, hand-assisted laparoscopic surgery ; CP, conventional procedure ; PSL, prednisolon ; NS, not significant.

Table 2. Outcomes

	HALS (n=14)	CP (n=13)	P
Operative time (min)	307(180-520)	250(130-400)	0.0764
IBL (ml)	85(10-605)	500(10-1440)	0.0346*
Oral intake (days)	2.5(1-5)	5.0(2-20)	0.0034*
Postoperative hospital stay (days)	23.0(13-41)	34(16-142)	0.0582
Wound infection	4	8	0.085
Bowel obstruction (requiring op.)	4(1)	2(1)	0.410

Data are expressed as median (range) and were compared using Mann-Whitney's U-test. Fisher's exact probability test was used for comparisons of wound infection and bowel obstruction. HALS, hand-assisted laparoscopic surgery ; CP, conventional procedure ; IBL, intraoperative blood loss ; op., operation ; *, statistically significant.

several CP patients experienced wound infection, but no significant intergroup differences were identified. Likewise, no significant differences existed between groups for the frequency of postoperative bowel obstruction.

Discussion

Laparoscopic surgery is currently performed for the treatment of various gastrointestinal diseases. Of the various gastrointestinal organs, the colon is most suitable for laparoscopic surgery, because lesions can be exposed through a small wound by dissection and mobilization. In our department, laparoscopic surgery was introduced for the treatment of colon cancer in 1993. Compared to open colectomy, postoperative recovery is faster for laparoscopic surgery, while long-term prognosis is comparable. As a result, laparoscopic surgery represents a safe and effective procedure for the treatment of colon cancer in patients meeting certain criteria⁸⁻¹⁰). Conversely, no general consensus has been reached regarding suitable indications for laparoscopic total colectomy in the treatment of ulcerative colitis. In Japan, the number of institutions performing laparoscopic surgery for ulcerative colitis is limited. This is due to the technical difficulty of the procedure. Compared to laparoscopic surgery for colon cancer, the extent of intestinal resection and dissection is greater, and gentler handling of the colon is required. One Japanese study compared laparoscopic-assisted proctocolectomy and open surgery for the treatment of ulcerative colitis and noted that while surgical wounds were smaller and postoperative recovery was faster for the laparoscopic surgery, operative time was significantly longer¹¹). If a general consensus on the feasibility of laparoscopic surgery is to be reached, technical difficulties and operative time need to be further reduced.

HALS is a surgical technique that was developed to resolve the disadvantages associated with laparoscopic surgery. By inserting the left hand into the abdominal cavity, the intestine can be handled and mobilized gently, and favorable visual fields can be obtained. Compared to standard laparoscopic total colectomy, surgery time for HALS is significantly shorter, without increasing the frequency of postoperative complications⁷). In our department, HALS has been selected to resolve some of the technical difficulties associated with laparoscopic surgery. Operative time tended to be longer for the HALS group than for the CP group, but no significant difference was identified. Volume of intraoperative bleeding was significantly lower for the HALS group than for the CP group. These findings suggest that HALS facilitated dissection of the intestinal tract, allowed relatively easily securing of visual fields, and handled the intestinal tract in a gentle manner. We believe that time required for surgery can be reduced by performing HALS on more patients. However, HALS is not indicated due to the potential for technical difficulties if preoperative CT shows large quantities of intra-abdominal fat or remarkable serosal inflammation.

Regarding postoperative course, duration to initiation of oral intake was significantly shorter for the HALS group than for the CP group, and length of postoperative hospital stay also tended to be shorter. As far as postoperative complications were concerned, no significant intergroup differences in the frequency of wound infection or bowel obstruction were noted. These findings suggest that HALS represents a safe treatment for ulcerative colitis.

Given these findings, HALS in the treatment of ulcerative colitis appears to offer relatively fewer technical difficulties, and represents a safe and effective procedure except, in patients with extensive intra-abdominal fat or serosal inflammation.

References

- 1) Wexner SD, Johansen OB, Nogueras JJ, et al. : Laparoscopic total abdominal colectomy : A prospective trial. *Dis Colon Rectum*. 35 : 651-655, 1992.
- 2) Schmitt SL, Cohen SM, Wexner SD, et al. : Does laparoscopic-assisted ileal pouch anal anastomosis reduce the length of hospitalization? *Int J Colorectal Dis*. 9 : 134-137, 1994.
- 3) Marcello PW, Milson JW, Wong SK, et al. : Laparoscopic restorative proctocolectomy : Case-matched comparative study with open restorative proctocolectomy. *Dis Colon Rectum*. 43 : 604-608, 2000.
- 4) Seshadri PA, Poulin EC, Schlachta CM, et al. : Does a laparoscopic approach to total abdominal colectomy and proctocolectomy offer advantages? *Surg Endosc*. 15 : 837-842, 2001.
- 5) Kusminsky RE, Boland JP, Tiley EH, et al. : Hand-assisted laparoscopic splenectomy. *Surg Laparosc Endosc*. 5 : 463-467, 1995.
- 6) Litwin DE, Darzi A, Jakimowicz J, et al. : Hand-assisted laparoscopic surgery (HALS) with the HandPort system : initial experience with 68 patients. *Ann Surg*. 231 : 715-723, 2000.
- 7) Nakajima K, Lee SW, Cocilovo C, et al. : Laparoscopic total colectomy. Hand-assisted vs standard technique. *Surg Endosc*. 18 : 582-586, 2004.
- 8) Konishi F, Okada M, Nagai H, et al. : Laparoscopic-assisted colectomy with lymph node dissection for invasive carcinoma of the colon. *Surg Today*. 26 : 882-88-9, 1996.
- 9) Ozawa A, Konishi F, Nagai H, et al. : Cytokine and hormonal responses in laparoscopic-assisted colectomy and conventional open colectomy. *Surg Today*. 30 : 107-111, 2000.
- 10) Kojima M, Konishi F, Okada M, et al : Laparoscopic colectomy versus open colectomy for colorectal carcinoma : a retrospective analysis of patients followed up for at least 4 years. *Surg Today*. 34 : 1020-1024, 2004.
- 11) Hashimoto A, Funayama Y, Naito H, et al. : Laparoscope-assisted versus conventional restorative proctocolectomy with rectal mucosectomy. *Surg Today*. 31 : 210-214, 2001.

潰瘍性大腸炎に対する Hand-Assisted Laparoscopic Surgery の有用性

堀江 久永¹⁾ 岡田 真樹¹⁾ 小島 正幸¹⁾
鯉沼 広治¹⁾ 永井 秀雄¹⁾ 小西 文雄²⁾

要 約

潰瘍性大腸炎に対する Hand-Assisted Laparoscopic Surgery (HALS) の有用性を検討するため、1999年から2004年までに第一期目の手術に HALS にて total colectomy が施行された一連の潰瘍性大腸炎患者14例 (HALS group) の手術時間、出血量、術後合併症などを1981年から1999年までに通常の開腹手術 (conventional procedure) で total colectomy が施行された一連の潰瘍性大腸炎患者13例 (CP group) のそれらと retrospective に比較した。年齢、性別、発症から手術までの罹患期間、プレドニゾロン (PSL) の総投与量、分割手術の方法について2群間に違いは認められなかった。手術時間は2群間で統計学的有意差は認められなかった。術中出血量は HALS 群が有意に少なかった。HALS から開腹手術に移行した

症例は1例であった。開腹移行の理由は、腹腔内脂肪が非常に多く左手を腹腔内に入れて操作をする際に working space の確保が困難であったこと、炎症が漿膜まで強く及んでおり結腸が後腹膜に強固に癒着していたことであった。HALS 群が有意に早く経口摂取が可能であった。術後の入院期間は HALS 群が短い傾向が認められたが統計学的有意差は認められなかった。術後の合併症については、創感染と腸閉塞の発生率について2群で差は認められなかった。よって潰瘍性大腸炎手術に対する HALS は技術的困難性が比較的少なく、術後の消化管機能の回復も早いため、腹腔内脂肪が多量にある症例や、炎症が強く漿膜まで及んでいる症例を除けば、安全で適切な手術と考えられた。

1) 自治医科大学消化器一般外科
2) 自治医大大宮医療センター外科