

Original Article

Laparoscopic total colectomy and proctocolectomy for the treatment of familial adenomatous polyposis

Jiang-Long Huang, Zong-Heng Zheng, Hong-Bo Wei, Yong Huang, Tu-Feng Chen, Bo Wei

Department of Gastrointestinal Surgery, The Third Affiliated Hospital of Sun Yat-Sen University, Guangzhou 510630, China

Received February 25, 2015; Accepted May 25, 2015; Epub June 15, 2015; Published June 30, 2015

Abstract: Objective: To evaluate the safety, feasibility and efficacy of Laparoscopic prophylactic treatment of familial adenomatous polyposis (FAP). Methods: Perioperative data and surgical outcomes of 11 FAP patients who underwent laparoscopic surgery between January 2012 and June 2014 in our hospital were analyzed retrospectively. Results: 2 Patients had laparoscopic total proctocolectomy with ileostomy, and 9 patients had laparoscopic total colectomy with ileorectal anastomosis. The median number of harvested lymph nodes was 36 (range, 21~46). The mean operating time was 330 minutes with a range of 240 to 380 minutes. Blood loss ranged from 90 to 200 ml with a median being 150 ml. The median incision length was 4 (3-5) cm. The bowel function recovered by the third (range from 2~4 day) postoperatively. The follow-up time of these patients were 3~32 months (median 20 months) respectively and no local recurrence or distant metastases were found. Conclusion: Laparoscopic prophylactic treatment for FAP can be performed safely and effectively with the advantage of minimal invasion by experienced surgeons.

Keywords: Laparoscopic surgical procedures, familial adenomatous polyposis, total colectomy, proctocolectomy

Introduction

Familial adenomatous polyposis (FAP) is an autosomal dominant disease resulting from mutation of the APC gene, with a penetrance of 80-100%. It is characterized by the presence of one hundred to thousands of polyps in intestinal mucosa. There is no difference between males and females in terms of the incidence, which ranges from 1:5000 to 1:25000. If not treated by prophylactic surgery, which is a widely accepted alternative to preventing cancerization, all of the patients present with symptoms at the age of 30 to 40 years and develop colorectal cancer at the age of 50 years [1]. Between January 2012 and June 2014, 11 patients undergoing laparoscopic total colectomy or proctocolectomy for treating FAP in our hospital achieved satisfactory outcomes. The report is as follows.

Patients and methods

Patients

11 patients diagnosed with FAP underwent Laparoscopic prophylactic treatment between

January 2012 and June 2014 in our hospital. There were 7 men and 4 women with a median age of 22 years (range: 18-59). They presented with abdominal pain, bloody stool and diarrhea. Preoperative colonoscopy revealed diffuse adenomatous polyps of 0.3-2.5 cm in rectum extending to cecum in all patients and biopsy showed malignancy of adenomas in a 37-year patient. 10 patients had a definite family history of FAP, including one whose older sister suffered from FAP with cancerization and one whose grandfather and uncle died of cancerization of FAP, while no family history was found in the remaining one patient.

Surgical procedure

Under general anesthesia via tracheal cannula, a pneumoperitoneum was established by insufflating the abdomen with carbon dioxide to a pressure of 12 to 13 mmHg. The patients were placed in a lithotomy position. Five laparoscopic ports were used. First a 10-mm trocar and laparoscope were successively placed in a vertical incision above the umbilicus. After exploration of the whole abdominal cavity, four additional trocars were inserted under laparoscopic

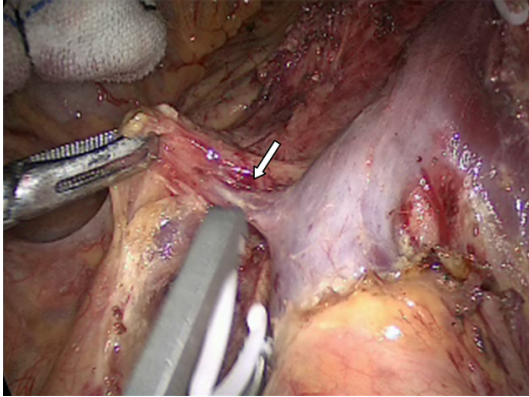


Figure 1. Ligation of the inferior mesenteric artery Arrow showed.

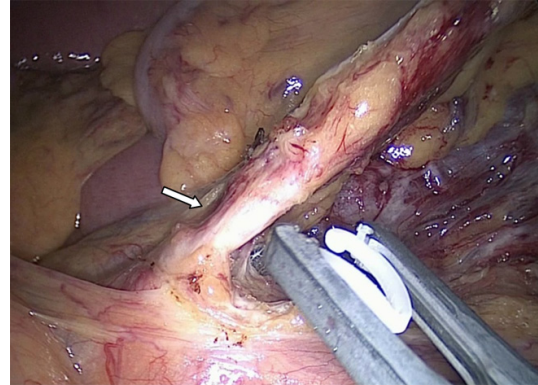


Figure 3. Ligation of ileocolonic vein Arrow showed.

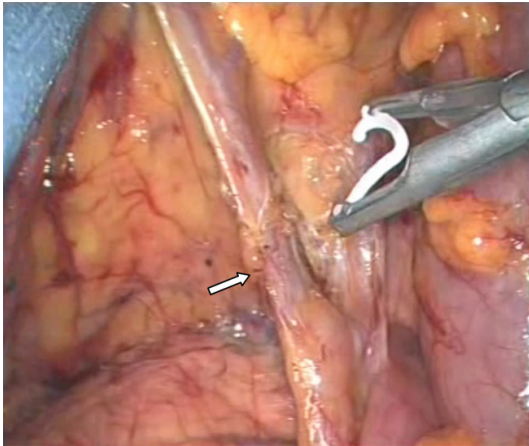


Figure 2. Ligation of the right branch of middle colic artery Arrow showed.

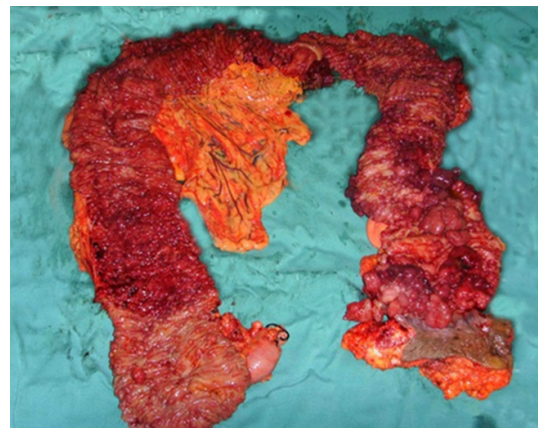


Figure 4. Specimen: presence of one hundred to thousands of polyps in intestinal mucosa.

guidance. The surgeon's location varied during the procedure. Resection of lower rectum and sigmoid colon were performed from the right side of the patient, while resection of descending colon, transverse colon and ascending colon were performed with the surgeon standing between the legs of the patient. Meanwhile, the position of assistants, monitor and patient were adjusted correspondingly. Intraoperatively, mobilization of the bowel was done in a counterclockwise manner. An ultrasonic scalpel was used for sharp dissection. Firstly, the rectum was mobilized as a result of accessing presacral space and transecting lateral ligament of rectum. Meanwhile, ligation of the inferior mesenteric vessels were done (**Figure 1**). Then, mobilization of the sigmoid was accomplished after division of the attachment to parietal peritoneum of pelvis by sigmoid and dissection of mesosigmoid. Secondly, the peritoneum and

mesentery of descending colon were dissected with careful protection of the ureter. Then, branches of middle colic artery were cut off and ligated along the bowel (**Figure 2**). Therefore, splenic flexure and descending colon became free. Finally, gastrocolic ligament was transected and transverse colon was raised, which was followed by mobilization of hepatic flexure and ascending colon, the vessels were ligated at their roots (**Figure 3**). Then terminal ileum was raised and mesoileum was mobilized from posterior peritoneum. As a result, the total colon, partial rectum and their mesentery were completely mobilized.

The rectum was transected by means of an endoscopic linear stapling and cutting mechanism. After deflation of the abdomen, the complete colon specimen was extracted through the main operating port in the right lower quadrant. Then the ileum was transected under direct vision. Among the 11 patients, one

59-year patient underwent total proctocolectomy and ileostomy, one underwent total proctocolectomy and ileostomy in the right lower quadrant due to cancerization of polyps in lower rectum, the remaining nine patients (81.82%) underwent total colectomy and rectal mucosectomy with Ileal Pouch Anal Anastomosis (IPAA).

Results

The surgery achieved a success in all patients. No open conversions were required and no intraoperative deaths occurred. 2 patients had laparoscopic total proctocolectomy with ileostomy and, 9 patients had laparoscopic total colectomy with ileorectal anastomosis. The median number of harvested lymph nodes was 36 (range, 21~46). The mean operating time was 330 minutes with a range of 240 to 380 minutes. Blood loss ranged from 90 to 200 ml with a median being 150 ml. The median incision length was 4 (3-5) cm. The bowel function recovered by the third (range from 2~4 day) postoperatively. One patient developed an anastomotic leak on the 5th postoperative day and was conservatively treated. No complications such as intra-abdominal bleeding, anastomotic bleeding, pneumonia, intra-abdominal infection, wound infection and ileus occurred. The median hospital stay was 13 days with a range of 10 to 19 days.

Postoperatively, the specimen revealed diffuse polyps in the total colon in all patients (**Figure 4**). Nine of them were diagnosed with numerous polyps in colonic mucous membrane by pathological examination, while the remaining two were diagnosed with numerous polyps in colonic mucous membrane with high-grade adenocarcinoma, of whom 32 and 46 lymph nodes showed no metastasis. The staging of the two cancer cases was T1N0M0 and no chemotherapy was given. During the follow-up with a range of 3 to 32 months (average: 20 months) of the 11 patients, no recurrence or metastasis of cancer was observed.

Discussion

Since laparoscopic approach was successfully used for colorectal surgery for the first time by Jacobs etc. [2], laparoscopic colorectal surgery has obtained broad application. As a result of matured laparoscopic skills and advanced

instruments, especially ultrasonic scalpel, success rate and complication rate have gradually increased and decreased respectively. Over the recent years, there have been reports on laparoscopic total colectomy for treating inflammatory bowel disease and hand-assisted laparoscopic total colectomy for FAP [3, 4]. A comparative study by Marcello etc. [3] and Seshadri etc. [5] showed a quicker return to intestinal function, shorter hospital stay and lower complication rate for laparoscopic total colectomy compared with conventional open surgery.

The 11 FAP patients in our series underwent laparoscopic total colectomy or proctocolectomy. None of them required open conversion. No intraoperative complications or deaths occurred. The incision length ranged from 3 to 5 cm. The median operative times were 330 (range, 240~380) min. Blood loss ranged from 90 to 200 ml with a median being 150 mL. Flatus began on the third (range from 2~4 day) postoperative day. The median hospital stay was 13 days with a range of 10 to 19 days. The results were the same.

However, sufficient patience and skillful techniques are necessary to laparoscopic total colectomy and proctocolectomy because of its wide range, technical difficulty, long surgical time, high conversion rate and complication rate. So we are of the opinion that the surgery is unacceptable unless the surgeon has developed adequate experience in colorectal surgery. There is a learning curve for laparoscopic colorectal surgery, which shows that with the increase in surgeries and accumulation of experience, operating time will become shorter and complication rate lower [6]. Three crucial points need attention during the procedure: (1) an appropriate location of trocars, which is the key to success. A optimal operating field can be kept by adjusting location of the surgeon and body position of the patient and taking full advantage of 30°-oblique viewing laparoscope; (2) bleeding control, which can be achieved by transecting main colorectal vessels from the roots using a Hemalock clip and choosing a proper layer for division, which is usually located anterior to front fascia of the kidney; (3) the sequence of mobilization of the bowel. Rectum, sigmoid, descending colon, transverse colon, ascending colon should be mobilized in a counterclockwise manner.

To date, it has been controversial whether the rectum should be reserved. At present, three widely accepted treatment options for FAP exist: (1) Total proctocolectomy with ileostomy, which leads to a decline in quality of life resulting from resection of anus. Two patients in our series received this surgery, one because of personal requirement and the other because of cancerization of polyps in lower rectum; (2) Total colectomy with ileorectal anastomosis, which entails a long-term proctoscopic surveillance postoperatively due to the high risk for the development of rectal cancer in reliquous adenomas and difficulty in detecting cancerization preoperatively; (3) Total colectomy and rectal mucosectomy with IPAA, which is preferred at present due to resection of the whole mucosa and retention of anal sphincter [6, 7]. 9 patients in our series received this procedure. However, the surgery is complex and has a high complication rate. One of the patients developed an anastomotic leak postoperatively and was conservatively treated. We are of the opinion that an appropriate approach should be decided on a comprehensive consideration of the age and job of patients, the size, number and distribution of polyps and level of medical techniques.

Similar to the surgery for colorectal cancer, FAP with cancerization also needs a routine clearance of lymph nodes. Multiple-center studies have demonstrated that there is no significant difference in clearance of lymph nodes between laparoscopic surgery and conventional open surgery for colorectal cancer [8]. The median number of harvested lymph nodes was 36 (range, 21~46) in our group. During the respective follow-up of 9 months and 13 months, no distant metastasis or local recurrence occurred, which was considered as a satisfactory outcome. In a word, laparoscopic total colectomy or proctocolectomy is a feasible surgery with the advantage of minimal invasion for treating FAP in terms of techniques. However, due to the small sample size, insufficient data of prospective randomized study and inadequate demonstration, long-term follow-up and randomized study of large case series are needed to assess the exact value of laparoscopic total colectomy and proctocolectomy.

Disclosure of conflict of interest

None.

Address correspondence to: Dr. Hong-Bo Wei, Department of Gastrointestinal Surgery, The Third Affiliated Hospital of Sun Yat-Sen University, Guangzhou 510630, China. E-mail: drweihb@126.com

References

- [1] Wu JS, Paul P, McGannon EA, Church JM. APC genotype, polyp number, and surgical options in familial adenomatous polyposis. *Ann Surg* 1998; 227: 57-62.
- [2] Jacobs M, Verdeja JC, Goldstein HS. Minimally invasive colon resection (laparoscopic colectomy). *Surg Laparosc Endosc* 1991; 1: 144-150.
- [3] Marcello PW, Milsom JW, Wong SK, Brady K, Goormastic M, Fazio VW. Laparoscopic total colectomy for acute colitis; a case-control study. *Dis Colon Rectum* 2001; 44: 1441-1445.
- [4] Watanabe Y, Sato M, Kikkawa H, Yoshida M, Kusunose H, Kawachi K. Hand-assisted laparoscopic total colorectal resection for familial adenomatous polyposis with coexisting rectal cancer. *Surg Endosc* 2001; 15: 445-447.
- [5] Seshadri PA, Poulin EC, Schlachta CM, Cadeddu MO, Mamazza J. Does a laparoscopic approach to total abdominal colectomy and proctocolectomy offer advantages. *Surg Endosc* 2001; 15: 837-842.
- [6] Onairis MW, Mantyh C. Ileal pouch-anal anastomosis for ulcerative colitis and familial adenomatous polyposis: historical development and current status. *Ann Surg* 2003; 238 Suppl 6: s42-48.
- [7] Beveridge IG, Swain DJ, Groves CJ, Saunders BP, Windsor AC, Talbot IC, Nicholls RJ, Phillips RK. Large villous adenomas arising in ileal pouches in familial adenomatous polyposis: report of two cases. *Dis Colon Rectum* 2004; 47: 123-126.
- [8] Scheidbach H, Schneider C, Hügel O, Scheuerlein H, Bärlehner E, Konradt J, Wittekind C, Köckerling F; Laparoscopic Colorectal Surgery Study Group. Oncological quality and preliminary long-term results in laparoscopic colorectal surgery. *Surg Endosc* 2003; 17: 903-910.