Laparoscopic-assisted Proctocolectomy With Prolapsing Technique for Familial Adenomatous Polyposis

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Purpose: The role of laparoscopic total proctocolectomy (TPC) and ileal pouch-anal anastomosis (IPAA) for familial adenomatous polyposis (FAP) has been controversial, given its technical difficulty of selecting the appropriate distal transection line and achieving safe anastomosis. We herein describe our initial experience with the prolapsing technique for laparoscopic-assisted TPC and IPAA (J-pouch) in the treatment of FAP.

Methods: A consecutive series of patients with FAP undergoing laparoscopic-assisted TPC with IPAA were identified from a prospectively collected database between June 2004 and February 2012. Medical records were reviewed for patient demographics, operative outcomes, and follow-up.

Results: The surgery was successfully completed in all 6 patients without any conversion to open surgery. The median operating time was 279 minutes (range, 240 to 386 min) and the median blood loss was 17.5 mL (range, 5 to 161 mL). No patient required blood transfusion. The median length of diet resumption and postoperative hospital stay were 7 days (range, 6 to 10 d) and 15 days (range, 13 to 21 d), respectively. A postoperative complication, wound infection, occurred in 1 patient. No anastomotic leakages or small bowel obstructions occurred. At a median follow-up of 59 months (range, 14.2 to 107.5 mo), no carcinoma had developed at the pouch or at the anastomotic site. Sexual function and fertility were unchanged as compared with preoperatively in 2 male patients. None of the patients experienced night-time incontinence or had to use a pad.

Conclusions: Our limited experience suggests that this prolapsing technique helps prevent problems with laparoscopic-assisted TPC and IPAA for FAP patients.

Key Words: laparoscopic colectomy, total colectomy, total proctocolectomy, IPAA, prolapsing technique, familial adenomatous polyposis

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After a decade of experience and improvements in technology since the first laparoscopic colectomy was performed,[1] initial discouraging results with laparoscopic surgery for ulcerative colitis (UC) have been virtually eliminated. The advantages of laparoscopic surgery include shorter hospital stay, faster postoperative recovery, decreased risk of adhesional small bowel obstruction,[2] and significantly improved cosmesis.[3]

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Familial adenomatous polyposis (FAP) is a hereditary disease characterized by the presence of thousands of colonic adenomas, which lead to an almost 100% chance of developing colorectal cancer by 40 to 50 years of age. Surgery is currently the only means of preventing colorectal cancer in FAP.[4] There are 3 surgical options: total colectomy and ileorectal anastomosis, restorative proctocolectomy, and total proctocolectomy (TPC) with or without ileostomy. A key characteristic of this disease is that patients are predominantly identified and treated while young. For this reason, several recent reports have focused on the advantages of minimally invasive and cosmetically unobtrusive laparoscopic surgery.[3–6] However, laparoscopic TPC and ileal pouch-anal anastomosis (IPAA) is a complex and demanding procedure in laparoscopic colorectal surgery, requiring significant experience in advanced laparoscopic surgery. The role of laparoscopic TPC and IPAA for FAP has been controversial, given its technical difficulty of selecting the appropriate distal transection line and achieving safe anastomosis. We therefore applied a prolapsing technique to address these challenges in the laparoscopic procedure. We herein describe our initial experience with the prolapsing technique for laparoscopic-assisted TPC and IPAA (J-pouch) in the treatment of FAP.

METHODS

A consecutive series of patients with FAP undergoing laparoscopic-assisted TPC with IPAA were identified from a prospectively collected database between June 2004 and February 2012. The indication for surgery was simply a confirmed clinicopathologic diagnosis of FAP. Patients with previous abdominal surgery for colonic resection or peritonitis were not candidates for the laparoscopic approach. Our treatment algorithm for FAPs is shown in the Figure 1. A single surgeon performed all the procedures. Informed consent was received from all the patients for the procedure, and the difference between the stapled IPAA with prolapsing technique and the hand-sewn IPAA with transanal mucosectomy was explained.

Medical records were reviewed for patient demographics, operative outcomes, and follow-up. Operative outcomes include operating time, blood loss, length of diet resumption, length of postoperative hospital stay, morbidity, mortality, sexual dysfunction, and functional results. Morbidity and mortality were defined as those deaths occurring within 1 month of surgery. Continuous data were expressed as medians (range).

Surgical Techniques

Port placements for laparoscopic-assisted TPC and IACA are shown in Figure 2. Dissection was begun at the ileocolic vessels, which were then resected in all patients.

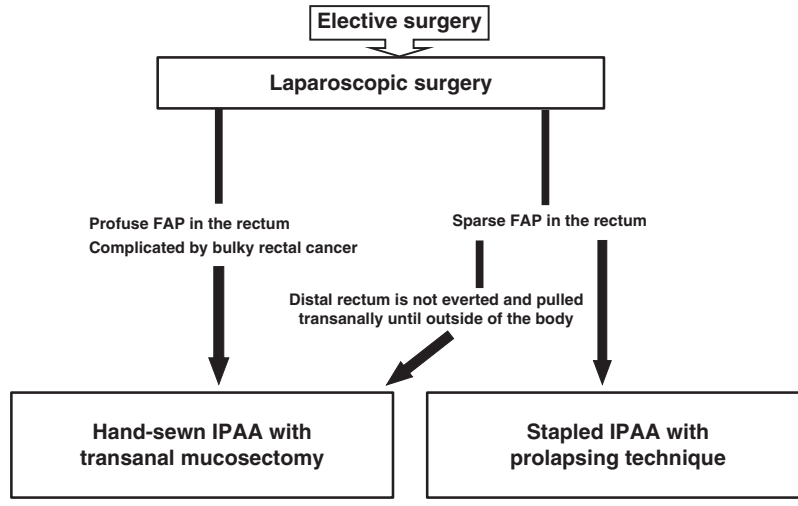

FIGURE 1. Therapeutic strategy for FAPs. FAP indicates familial adenomatous polyposis; IPAA, ileal pouch-anal anastomosis.

Medial-to-lateral mobilization was performed from the cecum to the hepatic flexure. The procedure was continued from the right side to the division of the transverse mesocolon and middle colic vessels. Dissection was performed as far as the splenic flexure using a vessel-sealing device in a clockwise direction. This step was concluded once the ligament of Treitz was identified. The medial-to-lateral dissection proceeded under the left colon to the lateral sidewall. The inferior mesenteric vessels were then resected. The left colonic mesentery was dissected in an anticlockwise direction until the previously dissected ligament of Treitz was encountered. Mobilization of the left colon was performed from the sigmoid colon to the splenic flexure in an anticlockwise direction. We then joined up with the right-side dissection line at the splenic flexure. At this point, mobilization of the total colon was finished. The rectum was dissected between the mesorectum and the presacral fascia, identifying and preserving the hypogastric nerves and the pelvic plexus. The anterior dissecting plane was between the Denonvilliers' fascia and the rectum. The rectococcygeal ligament was severed intra-abdominally to facilitate the prolapsing technique. Resection of the proximal colon was performed at the rectosigmoid colon. The proximal colon was transected laparoscopically using a 60 mm endoscopic stapler. A grasper was inserted under the laparoscopic view from the anus to the staple in the stump of the distal rectum, and the distal rectum was everted gradually and pulled transanally until outside of the body. Rectal washout and wiping off were carried out extracorporeally, and transection of the distal rectum was performed 1 to 2 cm from the Hermann line under direct vision with the same device (PROXIMATE TX 60 mm Reloadable Linear Stapler, Green; Ethicon Endo-Surgery, Cincinnati, OH) used in the open surgery (Fig. 3). The

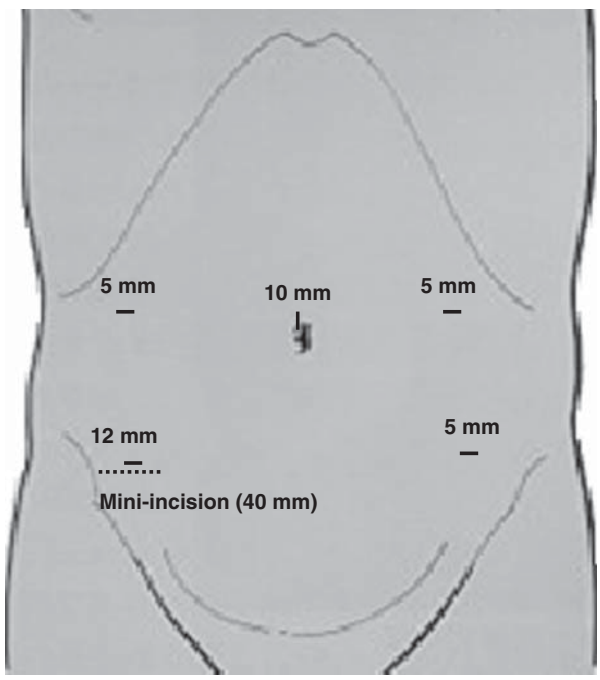

FIGURE 2. Port placement for laparoscopic TPC and IPAA. A 5-port technique is used in laparoscopic proctocolectomy, with a 10 mm port at the navel, a 12 mm port in the lower right quadrant, and a 5 mm port in each of the other 3 quadrants. IPAA indicates ileal pouch-anal anastomosis; TPC, total proctocolectomy.

FIGURE 3. Transection of the distal rectum. Transection of the distal rectum is performed 1 to 2 cm from the Hermann line under direct vision with the same device used in the open surgery.

distal rectum was pushed back through the anus into the pelvis. The right lower-quadrant trocar site was enlarged 3 to 4 cm to allow for specimen retrieval. A 12-cm-long ileal J-pouch construction was performed extracorporeally. The rod of a circular stapler inserted transanally was used to pierce the rectal wall. The anvil of a circular stapler was secured into place and the bowel returned intra-abdominally. The anastomosis was performed intracorporeally using a double-stapling technique with a 25 mm circular stapler. The anastomotic integrity was verified by filling the pelvis with saline and insufflating the rectum with air. Finally, a 30 Fr Foley catheter was inserted into the J-pouch on postoperative day 7. No temporal loop ileostomies were created in the FAP patients.

RESULTS

Six patients (2 men and 4 women) underwent laparoscopic-assisted TPC and IPAA. Patient demographics are summarized in Table 1. The median age was 31 years (range, 24 to 57 y) and the median body mass index was 21.8 kg/m^2 (range, 18.1 to 25.8 kg/m^2).

Operative outcomes are detailed in Table 2. The surgery was successfully completed in all 6 patients without any conversion to open surgery, and there were no inadvertent injuries during laparoscopic bowel mobilization. The median operating time was 279 minutes (range, 240 to 386 min) and the median blood loss was 17.5 mL (range, 5 to 161 mL). No patient required blood transfusion. The median length of diet resumption and postoperative hospital stay were 7 days (range, 6 to 10 d) and 15 days (range, 13 to 21 d), respectively. A postoperative complication, wound infection, occurred in 1 patient. No anastomotic leakages or small bowel obstructions occurred. At a median follow-up of 59 months (range, 14.2 to 107.5 mo), no carcinoma had developed at the pouch or at the anastomotic site.

All 6 patients were interviewed every 6 months after surgery. None had to use a pad beyond 6 months postoperatively, and the median number of bowel movements after 12 months was 5 (range, 3 to 10) per 24 hours. At 1 year after surgery, 100% enjoyed complete continence. Sexual function and fertility were unchanged as compared with preoperatively in 2 male patients. All the patients were highly satisfied with the outcomes of their surgical scars (Fig. 4).

DISCUSSION

In recent publications, laparoscopic surgery has been reported as a useful surgical treatment for FAP that does not compromise quality of life and offers longevity equal to that of the general population.[3–6] Although the minimally invasive and cosmetically beneficial features of laparoscopy are widely accepted, FAP can be complicated by specific accompanying syndromes or multiple primary cancers, and can require ≥ 2 surgeries. Considering these factors, it is extremely important that, as a surgical treatment, laparoscopic surgery minimizes adhesion. In addition, better results can be obtained even in function-preservation surgeries because laparoscopic surgery widens the field of vision and allows easier preservation of delicate nerves in the narrow pelvic area. Furthermore, because many FAP patients are young adults, laparoscopic surgery is advantageous from a cosmetic perspective. However, several issues have been reported with double-stapling anastomosis in laparoscopic surgery.[7–13] In particular, deep rectal transection and endoscopic stapling can be difficult, often requiring multiple applications to divide the rectum and thus incurring anastomotic leakage. Moreover, laparoscopic surgery can be anticipated to have even more difficulty reaching the anorectal junction for accurate transection with the linear endostapler, potentially leaving even more of the rectal stump. An obvious shortcoming of the double-stapled

TABLE 1. Patient Demographics

Demographics	Laparoscopic-assisted Proctocolectomy (n = 6)
Age (y)*	31 (24-57)
Sex ratio (male/female)	2/4
BMI (kg/m^2)*	21.8 (18.1-25.8)
Previous abdomen operation (n)	0

*Values are median (range).
BMI indicates body mass index.

TABLE 2. Operative Outcomes

Variables	Laparoscopic-assisted Proctocolectomy (n = 6)
Operating time (min)*	279 (240-386)
Blood loss (mL)*	17.5 (5-161)
Drain placement (d)*	8 (6-9)
Diet resumption (d)*	7 (6-10)
Postoperative hospital stay (d)*	15 (13-21)
Morbidity (n)	
Wound infection	1
Anastomotic leakage	0
Small bowel obstruction	0
Mortality (n)	0
Pathologic examination (n)	
Adenoma	3
Carcinoma in situ	3

*Values are median (range).

FIGURE 4. Excellent esthetic results after laparoscopic TPC and IPAA. IPAA indicates ileal pouch-anal anastomosis; TPC, total proctocolectomy.

pouch is the retention of some anorectal mucosa, which has the potential to undergo carcinomatous transformation.[6–11] Such transformation has been confirmed by the demonstration of polyps or dysplasia in surgical doughnuts or biopsies taken just distal to the stapled IPAA for FAP.[7,9,13] The prolapsing technique for laparoscopic TPC and IPAA overcomes these issues with the stapling technique. Using this technique, ultra–low rectal dissection, which was considered problematic in laparoscopic surgery, could be performed with single stapling by everting the rectum, allowing stable double-stapling anastomosis. In addition, by everting the rectum, the dentate and the Hermann lines can be examined under direct vision, thereby ensuring preservation of the anal canal by ileal J-pouch-anal anastomosis. A rectal prolapsing technique was first performed by Mandl[14] in 1922. Since then, other reports have also demonstrated the usefulness of this method in treating rectal cancer. In the present study, we performed a 1-stage laparoscopic-assisted proctocolectomy using a prolapsing technique without constructing a diverting ileostomy for FAP. One of the reasons we recommended using the described surgical procedure for FAP is because our objective was to focus on preserving anal function, based on the consideration that this disease is benign and occurs in young people. Another reason was that we believed it was a safer, 1-stage operation that could be performed with stapling anastomosis, which is a more stable operation. As a precondition to performing this procedure, we obtained consent from the patients to continue follow-up examinations every 6 months to check on the small amount of remaining rectal mucosa. As the postoperative clinical course was excellent in all cases and the patients were discharged from hospital without complications, we believe that this technique is superior from a safety perspective. As diverting ileostomy is not performed, no scars result from the closure of a temporary stoma. This technique is thus extremely advantageous from the perspective of cosmesis, accentuating one of the greatest benefits of laparoscopic surgery. This point should not be underestimated in a group where most patients are young. Dunker et al[15] compared functional outcomes, quality of life, and the impact of cosmesis in 19 matched laparoscopic and open proctocolectomies with IPAA for UC. No differences were found regarding functional outcomes or quality of life, and cosmetic results of the scar were significantly more satisfactory in the laparoscopic group than in the conventionally treated group. They concluded that better cosmesis was the most important long-term advantage of the laparoscopic approach. Brown et al[16] compared laparoscopic and open approaches with restorative proctectomy in a series of 25 UC patients. They also concluded that the main advantage of the laparoscopic technique was the size of the wound. In the present study, we were able to perform the prolapsing technique in the entire series of 6 patients. However, if a large tumor is present on the rectum, or if the mesorectum has thickened to the point that eversion is not possible, it is advisable to be practical and perform hand-sewn anastomosis at the level of the dentate line from the perineal approach instead.

Although the laparoscopic approach for pouch surgery has been shown to be feasible and safe, long operating times continue to represent a barrier for many surgeons.[4,6,17] In the meta-analysis, there were no significant differences in mortality, complications, or recovery parameters between open and laparoscopic IPAA groups for UC and FAP. However, the operating time was longer in the laparoscopic group.[18,19] In our study, operating times were similar to those of other series, with a median operating time of 279 minutes. Given that excellent cosmesis can be obtained with complete intracorporeal dissection using this technique, we consider the operative time to be fully acceptable. Although the prolapsing technique for laparoscopic-assisted TPC and IPAA increases the operating time, there are long-term functional advantages. As one of the consequences of an IPAA is a decrease in the consistency of the stools, IPAA should only be performed in patients with good anal continence. Michelassi and colleagues reported the long-term functional results of 391 consecutive J-pouch procedures performed for UC. They found that the mean number of bowel movements was 6 per 24 hours, including at least 1 night-time bowel movement in two thirds of the patients.[20] In our study, the functional analysis results show that none of the patients experienced night-time incontinence or had to use a pad. We have been conducting verbal assessments based on the Wexner incontinence score at the follow-up visits every 6 months. We have performed the procedure not only in patients with FAP, but also in 13 patients with UC and 15 patients with rectal cancer, and found that none of these patients suffered from any injuries to the sphincter or incontinence.

In conclusion, we describe a procedure for laparoscopic-assisted TPC and IPAA (J-pouch) using the rectal prolapsing technique. Our limited experience suggests that this prolapsing technique helps prevent problems with laparoscopic-assisted TPC and IPAA for FAP patients.

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