Original Article

Laparoscopic Restorative Total Proctocolectomy with Ileal Pouch-Anal Anastomosis for Familial Adenomatous Polyposis and Ulcerative Colitis

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Abstract

Background: Although laparoscopic total proctocolectomy with ileal pouch-anal anastomosis has recently been used for this group of patients, there are rare reports of its treatment outcomes and postoperative complications. For this purpose, the very aim of the present study was to evaluate the complications of this surgery after 6 months in patients with familial adenomatous polyposis (FAP) and ulcerative colitis (UC).

Materials and Methods: The present cross-sectional study was performed on 20 patients undergoing restorative proctocolectomy with ileal pouch-anal anastomosis (RPC-IPAA) for FAP or UC during 2009–2014. Outcomes of patients were recorded 6 months after surgery for complications and satisfaction.

Results: There were 11 (60%) males and 9 (40%) females with a mean age of 30.65 ± 9.59 years. There were 12 patients (60%) with FAP and eight patients (40%) with UC. The length of stay (LOS) ranged from 4 days to 10 days with the mean of 6.40 ± 1.76 days. The incidence of complications including leak, urinary retention, and wound infection were 10%, 5%, and 10%, respectively. Moreover, no postoperative mortalities occurred. Male patients had no problems during sexual activity or micturition. All patients were highly satisfied with the outcome of the surgery.

Conclusion: According to the results of the present study, laparoscopic RPC-IPAA was a surgery with the least complications and the highest level of satisfaction for young patients with FAP and UC. Therefore, it seems that this surgery can be a suitable surgical method for the mentioned patients.

Keywords: Adenomatous polyposis, ileal pouch-anal anastomosis, total proctocolectomy, ulcerative colitis

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Introduction

Familial adenomatous polyposis (FAP) is a hereditary (autosomal dominant) disease characterized by the presence of numerous adenomatous polyps in the colon and rectum. It affects between 1 in 8000 and 1 in 14,000 live births, affecting both the sexes equally.[1] The polyps inevitably develop into cancer after 10–15 years of their appearance, and the only treatment that is available till now to prevent the cancer is total proctocolectomy (TPC).[2,3] The majority of the patients are young, and the average presentation age of colorectal cancer is 39 years.[4] Prophylactic colectomy is recommended in young FAP patients (usually at late adolescence age).[5]

Ulcerative colitis (UC) occurs in eight to 15 people per 100,000 in the United States and Northern Europe. The incidence is considerably lower in Asia, Africa, and South America, and among the nonwhite population in the United States. There are two incidence peaks; during the third decade of life and again in

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the seventh decade of life.[6] Indications for surgery in UC may be emergent or elective. Emergency surgery is done for patients with massive life-threatening hemorrhage, toxic megacolon, or fulminant colitis who fail to respond rapidly to medical therapy. Elective surgery indicated in patients which are intractabile despite maximal medical therapy and high-risk development of major complications of medical therapy, such as aseptic necrosis of joints secondary to chronic steroid use. Elective surgery also is indicated in patients at significant risk of developing colorectal carcinoma.[7] Restorative proctocolectomy with ileal pouch-anal anastomosis (RPC-IPAA) has become the procedure of choice for most patients.[8] Because of patients' young age, cosmesis has a significant role when choosing the mode of therapy. Hence, laparoscopic surgery is a desirable choice for the mentioned patients.

Therefore, the present study was performed with the aim of demonstrating the feasibility of laparoscopic RPC-IPAA for FAP and UC to verify its outcome.

Materials and Methods

The present study was cross sectional (retrospective). The study population included all patients with the diagnosis of FAP or UC that underwent laparoscopic RPC-IPAA in Hazrat Rasoul Hospital from 2009 to 2014. Due to the small size of the population and the rarity of this study and the necessary indications for performing this surgery, all these patients ($n = 26$) in the mentioned period were considered the sample of the study using the census technique if they met the inclusion criteria. Inclusion criteria consisted of patients with FAP and no previous history of bowel surgery recorded in the patient's medical record. If the patient's medical record was incomplete or there was no information to contact the patient and follow-up the patient's condition, the patient was excluded from the study. In this study, six patients were excluded from the study, and the sample size was reduced to 20 patients.

Before starting the study, the code of ethics (IR. MUI. REC.1395.3.1000) was obtained from the Ethics Committee of Isfahan University of Medical Sciences.

In the present single-center study, all surgeries were performed by an experienced surgeon with the help of a single surgical team.

The polyethylene glycol solution was used for preoperative bowel preparation. All patients received intravenous (IV) antibiotics in the form of cefazolin 1 g IV and metronidazole 500 mg IV 1 h before surgery. Antithrombotic prophylaxis was administered with elastic stockings. A nasogastric tube and a urinary catheter were inserted before the start of the procedure. The patient was placed in a semilithotomy position with arms secured alongside the patient. The thighs were flexed minimally not to impede the movement of laparoscopic instruments. The gravity was used as a retractor to keep the bowels away from the operating area and prepare a suitable working room. A 30°, 10-mm laparoscope was used throughout the procedure. Two video screens positioned on either side of the patient were also utilized.

The ports were placed in a standard diamond configuration. The first 11-mm trocar was inserted in the supraumbilical area using a close technique. Insufflation was performed with co2 to reach the pressure of 12 mmHg. The procedure started with releasing the greater omentum and mobilizing the sigmoid and rectosigmoid, which was continued cranially toward the descending colon, is the mentioned procedure was performed by the surgeon on the right side of the patient. The surgeon moved between the legs of the patients for mobilizing the splenic flexure and transverse colon. The ascending colon and hepatic flexure were mobilized from the left side of the patient. The surgeon returned to the right side for mobilizing the rectal. Staplers were used for the ultra-low resection of the rectum (usually EGA/45/2.5). The medial-to-lateral approach was used during all the phases of the surgery. The dissection followed oncological planes as these planes are avascular.

The inferior mesenteric pedicle was ligated during the rectosigmoid dissection. Thereafter, the left colic and middle colic pedicles were ligated in a similar manner during the dissection of the left and transverse colon, respectively. The ligature, which prepares a relatively bloodless field and minimal perioperative blood loss, was employed for the dissection.

After taking adequate measures to protect the wound, the specimen was extracted through a minilaparotomy Pfannenstiel incision. The terminal ileum was cut with a stapler (EGA/60/3.5) and oversewed with 2-0 prolene. A J pouch was fashioned using a stapler. The length of each limb of the J-pouch was 15 cm. An enterotomy was made at the apex of the pouch, and the blades of the EGA stapler (60/3.5) were introduced into each of the limbs of the pouch and were sequentially fired three times to obtain the pouch. The anvil of the circular stapler (28 mm) was inserted into the apex of the pouch through the enterotomy and was secured with purse-string sutures. The pouch was delivered into the abdomen, the Pfannenstiel incision was closed, and pneumoperitoneum was reestablished. The pouch was anastomosed to the anal canal through a transanal circular stapler after correcting its orientation.

A protective ileostomy was performed in all patients with UC placed in the right iliac fossa, which was closed after 6–8 weeks.

In the patients' medical records, information such as age, sex, type of disease, amount of blood loss during surgery, amount of blood transfusion before surgery, duration of surgery, start of liquid diet, LOS, and the incidence of any of the complications such as leak, wound infection, urinary retention, male patients' sexual activity problems, and mortality were extracted and recorded. Moreover, the level of patient satisfaction was assessed and recorded at three levels of low, medium, and high.

Finally, the collected information was entered into the SPSS software (version 25; SPSS Inc., Chicago, Ill., USA). Data were presented as means ± standard deviation or n (%).

Results

There were 12 patients (60%) with FAP and eight patients (40%) with UC. The patients consisted of 11 (60%) males and 9 (40%) females with the mean age of 30.65 ± 9.59 years (range: 16–45 years). The mean body mass index was 22.73 ± 1.47 kg/m^2 (range: 19.5–25 kg/m^2). All FAP patients had a family history of multiple colonic polyposis. The mean operating time was 190.10 ± 24.49 min ranged from 150 min to 230 min. The mean blood loss was 120.50 ± 23.95 mL with a range of 80 mL to 150 mL. None of the patients were given a perioperative blood transfusion. No conversions were necessary. None of the patients had extracolonic manifestations. One of the FAP patients had colon malignancy. In FAP patients, preoperative colonoscopy and biopsy had not revealed adenocarcinoma in polyps. The American Joint Committee on Cancer staging of this patient was T2N0M0. The tumor was located in the rectosigmoid junction, and the margins were free from tumor. Furthermore, 16 patients (80%) resumed a liquid diet on the 2nd postoperative day, while four patients (20%) did so on the 4th postoperative day. The length of stay (LOS) ranged from 4 days to 10 days with 6.40 ± 1.76 days [Table 1].

Stoma closure in UC patients was undertaken after 8 weeks. All patients were continent with stools and flatus. The pouch frequency varied between 3 and 8 times. Initially, patients complained of liquid stools, but by 4 weeks postoperatively, they had semisolid stools and did not suffer from urgency.

There were 2 leaks. No postoperative mortalities occurred. Two patients (10%) developed wound infection that was treated by conservative management. One patient (5%) had postoperative urinary retention, which was managed conservatively with catheterization. The catheter was removed on the 7th day. He did not have any problems thereafter.

All the patients were called for follow-up after 1 month, 3 months, and 6 months. The patients have not experienced any problems after a mean follow-up of 6 months. Male patients had no problems during sexual activity, or micturition. All the patients were highly satisfied with the outcome of the surgery and the cosmesis and would recommend the procedure to other patients. All the FAP patients' first-degree relatives have been counseled to undergo screening for FAP [Table 2].

Discussion

UC is a dynamic disease characterized by remissions and exacerbations. The clinical spectrum ranges from an inactive phase to low-grade active disease to fulminant disease.

UC incidence peaks during the third decade of life and again in the seventh decade of life. Indications for surgery in UC may be emergent or elective. Emergency surgery is required for patients with massive life-threatening hemorrhage, toxic megacolon, or fulminant colitis who fail to respond rapidly to medical therapy.

Indications for elective surgery include intractability despite maximal medical therapy and high-risk development of major complications of medical therapy, such as aseptic necrosis of joints secondary to chronic steroid use.[9] Elective surgery also is indicated in patients at significant risk of developing colorectal carcinoma. The risk of malignancy increases with pancolonic disease and the duration of symptoms is approximately 2% after 10 years, 8% after 20 years, and 18% after 30 years.[10,11]

TPC with end ileostomy has been the "gold standard" for patients with chronic UC.[8] This operation removes the entire affected intestine and avoids the functional disturbances associated with ileal pouch-anal reconstruction. Most patients function well physically and psychologically after this operation. TPC with continent ileostomy (Kock's pouch) was developed to improve function and quality of life after TPC, but morbidity is significant and restorative proctocolectomy generally is preferred today. Since its reintroduction in 1980, RPC-IPAA has become the procedure of choice for most patients who require TPC.[8] Our patients candidated for operation because of intractability despite maximal medical therapy and wish to avoid a permanent ileostomy.

Table 1: Basic and clinical characteristics of patients

Characteristics	Frequency (%)
Sex	
Male	11 (55)
Female	9 (45)
Age (years), mean±SD	30.65±9.59
BMI (kg/m^2), mean±SD	22.73±1.47
Type of disease	
FAP	12 (60)
Ulcerative colitis	8 (40)
Blood loss (mL), mean±SD	120.50±23.95
Perioperative blood transfusion	0
Operation time (min), mean±SD	190.10±24.49
Start liquid diet	
Second postoperative day	16 (80)
Forth postoperative day	4 (20)
LOS (days), mean±SD	6.40±1.76

SD: Standard deviation, BMI: Body mass index, LOS: Length of stay

Table 2: Complications and patient satisfaction after surgery

Complications	Frequency (%)
Leak	2 (10)
Wound infection	2 (10)
Urinary retention	1 (5)
Male patients problems sexual activity	0
Mortality	0
Satisfaction of surgery	4 (20)
Low	0
Moderate	0
High	20 (100)

FAP is a rare autosomal dominant disease caused by a defect in the APC gene of the 5q21 chromosome. All affected untreated patients will die of colorectal adenocarcinomas in the fourth or fifth decades.[2]

Early detection and treatment of this disease have resulted in a reduced incidence of death from colorectal cancer. It has been demonstrated that establishment of a national registry reduces the prevalence of colorectal cancer, and improves survival.[12] Today, the most frequent causes of death in screening-detected patients are duodenal cancer and desmoid tumor.[13,14] Similarly, in a study based on the Hong Kong registry, the median age of diagnosis was significantly lower in patients detected by screening than those diagnosed by symptomatic presentation (29 years vs 34 years, respectively). At the time of diagnosis, 9.7% of the screened patients had malignancy compared with 61% of the unscreened patients.[15]

However, there is not a systematic screening program in Iran for FAP patients. As a result, there was just one patient with family history of FAP which was referred to us for the management of his disease. While other patients being investigated by us for abdominal symptoms or rectal bleeding. Thus, establishment of national or regional registries is important to help early detection and treatment of these patients.

Although in some centers, primary chemoprevention of FAP has been done with sulindac and cyclooxygenase inhibitors, it has not proven completely successful.[16,17] At present, surgery is the only effective therapy to prevent colorectal cancer in these patients. TPC and RPC-IPAA are the available surgical options. If the surgeon select TPC, the permanent ileostomy is mandatory, although is not a desirable option in these predominantly young patients. Thus, RPC-IPAA is the procedure of choice. The laparoscopic approach would seem a logical choice in these patients due to the improved outcomes and cosmetic benefits. However, laparoscopic total colectomy is a complex procedure, which requires significant experience in advanced laparoscopic surgery. Although the initial reports indicated significantly prolonged time in laparoscopic colectomy compared with open colectomy,[18,19] with increasing experience, the difference has been reduced.[20] Multiple studies have confirmed that laparoscopic surgery is associated with the decreased analgesic requirement, earlier return of bowel function, reduced LOS, earlier return to work, and improved cosmesis compared with open surgery.[21-23]

After introducing RPC-IPAA in 1978, this procedure has become the procedure of choice in the surgical management of patients with UC and FAP.[24] In 1992, for the first time, the laparoscopic approach was used for this procedure.[25] Laparoscopic pouch formation was described in the same year.[26] This is the preferred approach, especially in this group of patients who are usually young. There are some controlled studies that have compared laparoscopic RPC-IPAA with open procedures for patients with UC or FAP.[27-31] Most of the studies have shown prolonged operative times with the laparoscopic approach compared with the open approach.

Araki *et al*. showed similar operative times probably because only the colonic mobilization was being done laparoscopically, while the vessel transection and rectal mobilization were being done by a minilaparotomy incision.[27,29,31]

However, with the use of advanced instrumentation for vessel transection and tissue transection, the speed of surgery increases. Our median operating time was 217 min which was comparable to open resection times.

The return of bowel function is also early. Schmitt *et al*. reported a higher morbidity of 68% by the laparoscopic approach compared with 35% by the open approach,[29] while all of the later series showed lower morbidity by the laparoscopic approach.

In the present study, no significant complication was observed. The mean length of patients' hospitalization was 8 days, which was similar to that reported by other studies and was slightly lower than the mean reported for the open surgery. However, this was not a true reflection of the need for these patients' hospitalization because close monitoring of the patients during the 1st week was preferred in this study. Due to the mentioned reasoning, the length of hospitalization was inordinately long although most of the patients (85%) started an oral diet by the 2nd postoperative day and all patients started their oral diet by the 3rd day.

The mean blood loss was 120.50 mL, which was less than the reported mean for the open surgery. To have a good visual power in laparoscopy, vascular pedicles were first ligated and the anatomic planes were then followed as these planes were avascular.

In fact, cosmetic benefit alone is shown to be of paramount importance to patients, especially as the young age group of patients is more concerned about body image.[32] Dunker *et al*. have shown that satisfaction with the cosmetic result of the scar was significantly higher with the laparoscopic RPC-IPAA compared with the open group.[27] All our patients were appreciated the cosmetic benefit, and all of them would recommend this procedure to other patients.

Finally, the contentious issue is the cost factor. Although no studies to date have objectively dealt with the mentioned issue, the initial higher instrument cost for laparoscopic surgery can be offset by the implementation of a dedicated laparoscopic surgical unit, the use of reusable instruments, the lower operative duration due to the availability of advanced instrumentation, and the shorter hospitalization length. Moreover, the cosmetic benefit and patient satisfaction afforded by the laparoscopic approach have to be taken into consideration, as well. Considering the mentioned points, the researchers of the present study believe that laparoscopic RPC-IPAA should be the approach of choice in the predominantly young patients afflicted by FAP.

Conclusion

According to the results of the present study, RPC-IPAA had the lowest complications and the highest level of satisfaction in young patients with FAP and UC. Therefore, it seems that it is conceivable to minimize the complications, gain the patients' highest satisfaction level, and consider this surgery as a suitable method for these patients by increasing the experience and identifying the risk factors affecting the complications of this surgery.

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Conflicts of interest

There are no conflicts of interest.

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