

Ileal pouch–anal anastomosis for ulcerative colitis: a Canadian institution’s experience

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Abstract

Background We aimed to summarize the outcomes of ulcerative colitis (UC) patients receiving an ileal pouch–anal anastomosis (IPAA) over an 11-year period at a high-volume Canadian inflammatory bowel disease (IBD) center.

Methods A retrospective chart review was performed for subjects with UC who underwent IPAA between 2002 and 2013. Patient charts were reviewed for demographic data, clinical characteristics, preoperative medical treatment, and surgical outcomes. Univariate and multivariate logistic regression modeling were used to determine significant factors in postoperative outcomes.

Results Seven hundred fifty-eight were included from the IBD database. The median age at the time of surgery was 37.1 (±12.1). Mean preoperative disease duration was 8.1 years (±8.7). Three hundred sixty-nine patients (48.7 %) had systemic corticosteroids (>15 mg/day) within 30 days prior to surgery. Of these, 286 patients had high dose (>30 mg/day) corticosteroids within 7 days of their first surgery. One hundred nine (14.0 %) IPAA procedures were performed laparoscopically.

Pelvic pouches were created in traditional 2 ($n = 460$) and 3 ($n = 285$) stages; the remainder ($n = 13$) was performed in non-traditional staged operations. Early complications, defined as occurring within the same stay in hospital, consisted of pelvic abscess ($n = 135$, 17.8 %), small bowel obstruction ($n = 134$, 17.7 %), wound infection ($n = 108$, 14.3 %), and deep vein thrombosis ($n = 33$, 4.4 %). The overall pouch leak rate was 92 (12.1 %). There was one death in our study. The median length of stay was 10.3 days (SD6.0). Late complications, defined as occurring after discharge from hospital, consisted of anal stricture ($n = 55$, 7.3 %), pouch fistula ($n = 26$, 3.4 %), and functional pouch failure ($n = 7$, 0.9 %).

Conclusions IPAA has been found to be a safe and effective method of surgical management of UC patients in a high-volume IBD center.

Keywords Ulcerative colitis · Pouch surgery · Anastomotic leak · Postoperative complications

Introduction

Ulcerative colitis can be a severely limiting disease for patients with poorly managed symptoms; chronic medical dependence, lifestyle altering bowel habits, and frequent hospital admissions can affect both physical and mental well-being. Proctocolectomy is curative and, with a restorative procedure, health-related quality of life (HRQoL) and health status can be comparable to that of healthy controls [1].

Restorative proctocolectomy (ileal pouch–anal anastomosis [IPAA]) was introduced in the late 1970s by Parks and Nicholls [2] and is now considered the procedure of choice for most patients undergoing surgical management for ulcerative colitis [3]. It was initially described by Parks and Nicholls with an “S” pouch and the Utsonomiya pouch in a

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“J” configuration was subsequently introduced. Both were described with a handsewn anastomosis to the dentate line after mucosectomy of the rectal cuff [2]. Over the next decade, multiple variations including S, H, and W configurations were evaluated prior to the J configuration subsequently being accepted as the preferred technique due to ease of construction and efficiency of evacuation [4]. Over the last decade, likely the most significant modification of the traditional J pouch has been the use of a stapled pouch–anal anastomosis without mucosectomy [5]. Our center has previously published results of the IPAA during a transition period from handsewn to stapled anastomosis; this study examines the updated institutional experience of stapled IPAA over an 11-year period.

Significant morbidity can be associated with IPAA and complication rates of up to 50 % have been reported [6]. A topic of frequent debate is the effect of various factors such as disease characteristics, patient demographics, and medication use on the success of the IPAA procedure. We have previously published that handsewn IPAA, tension, misdiagnosis, and leak were associated with pouch failure [7]. The objective of this study is to re-examine the factors associated with perioperative complications and short- and long-term IPAA failure.

Methods

Study cohort

All UC patients who underwent an IPAA procedure between the dates of January 2002 and June 2013 were selected for review from the IBD database at Mount Sinai Hospital in Toronto, Canada. Their demographics, clinical course, and operative details were recorded and validated by two independent reviewers (EZ, RM). Patients undergoing IPAA with a final pathologic diagnosis other than ulcerative colitis (Crohn’s disease [CD], indeterminate colitis, or familial adenomatous polyposis [FAP]) were excluded. Recreation and revision of existing pelvic pouches were excluded from this study.

For each patient, demographic details such as sex, BMI, and smoking status were documented. Clinical characteristics such as disease duration and severity, disease extension, extraintestinal manifestations, age at operation, and albumin at time of IPAA were also reviewed. Disease severity and extension were graded according to the Montreal Classification¹: extent was classified as ulcerative proctitis (E1), left-sided UC (E2), or pancolitis (E3) and severity was classified as clinical remission (S0), mild UC (S1), moderate UC (S2) with passage of stool more than four times a day but without signs of systemic toxicity, or severe UC (S3) with signs of systemic toxicity such as pulse rate greater than 90 beats per minute, temperature greater than 37.5, hemoglobin less than 10.5 g/100 mL, and ESR greater than 30 mm/h. In addition, we

recorded the type of procedure including staged approaches and open versus laparoscopic IPAA.

Each patient chart was reviewed for postoperative outcomes including complications such as deep vein thrombosis (DVT), small bowel obstruction (SBO), wound infection, urinary tract infection (UTI), pneumonia, and pelvic abscess. We also documented pouch specific outcomes including both early and late complications such as pouch leak, pouch fistula, pouch failure, and anal stricture. Patients without adequate clinical documentation at the 30-day postoperative period were excluded.

Preoperative exposure to medical therapy was reviewed. We examined the type of therapy (systemic corticosteroids, high-dose corticosteroids, azathioprine/6MP, anti-TNF) and proximity of last dose to the date of the first operative procedure. Anti-TNF drug levels and serum antibodies were also measured.

Surgical technique

All IPAA procedures were performed at Mount Sinai Hospital in Toronto, Canada using the previously described stapled IPAA technique in a two-stage or three-stage procedure [5]. The traditional two-stage procedure is defined as a proctocolectomy and with creation of the IPAA and defunctioned with a loop ileostomy with a second procedure consisting of closure of the ileostomy. A non-traditional two-stage procedure is defined as a proctocolectomy then a second operation for creation of the IPAA with no protective ileostomy. The three-stage procedure consists of a proctocolectomy, then creation of the IPAA with defunctioning loop ileostomy followed by closure of the ileostomy at a third operation.

Statistical analysis

The Pearson chi-square test and rank sum test were used for categorical and continuous covariates, respectively. Odds ratios (OR) and 95 % confidence intervals (CI) were initially estimated using univariate logistic regression analyses to quantify the association between the outcome and possible factors. A multivariate analysis was performed using a variable selection process with adjustment for potential confounders. All statistical analysis was performed using SAS version 9.2 (SAS Institute Inc., NC) and significance was evaluated using two-sided *p* values at the 5 % testing level.

Results

Patient demographics

Of 758 IPAA UC patients reviewed, 321(42.4 %) were female. The average BMI in our review was 25.6 ± 4.9 . Amongst the UC patients, 26 (3.4 %) were smokers (Table 1).

Table 1 Patient demographics and disease characteristics

	Median (% of total 758 cases)	SD
Female	321 (42.4)	
Smoker	26 (3.4)	
Body mass index (BMI)	25.6	4.9
Disease duration	8.1 years	8.7
Albumin at time of IPAA	42.7	5.6
Disease severity		
S1	69 (9.1)	
S2/3	607 (80.1)	
Unknown	82 (10.8)	
Disease extension		
E1	9 (1.2)	
E2	109 (16.0)	
E3	574 (84.0)	
Unknown	66 (8.7)	
Extraintestinal manifestations	101 (13.3)	
Primary sclerosing cholangitis	27 (3.6)	
Laparoscopic technique	106 (13.9)	
Systemic corticosteroids		
PO within 30 days of surgery (>15 mg)	369 (48.7)	
IV within 7 days of surgery (>30 mg)	386 (50.9)	
Azathioprine/6MP		
Within 90 days of surgery	128 (18.8)	
Anti-TNF exposure		
Within 14 days of surgery	38 (21.5)	
Within 30 days of surgery	37 (20.9)	
Beyond 30 days prior to surgery	102 (57.6)	

Disease severity and extension

Mean age at time of IPAA was 37.1 ± 12.1 years old with a mean duration of disease of 8.1 ± 8.7 years. Mean albumin at the time of pelvic pouch surgery was 42.7 ± 5.6 . The majority of patients had S2 and S3 severity of disease (607, 80.1 %) while a minority had only S1 disease (69, 9.1 %) at time of surgery. Eighty-two patients (10.8 %) did not have disease severity recorded. Disease extension was limited to left-sided colitis (E2) in 109 (14.4 %) of patients versus pancolitis (E3) in 574 (75.7 %) of patients (Table 2). One hundred one (13.3 %) UC patients had at least one extraintestinal manifestation of their disease; 27 (3.6 %) had primary sclerosing cholangitis (PSC). The indication for surgery in the majority of cases was refractory disease (568, 74.9 %). Dysplasia or malignancy were cited as the indication for surgery in 68 (9.0 %) patients and other indications such as acute UC, toxic megacolon, or perforation were the indication in 77 (10.2 %) of patients.

Table 2 Perioperative complications

	N (% of total cases)
Deep vein thrombosis (DVT)	33 (4.4)
Small bowel obstruction (SBO) or ileus	134 (17.7)
Pelvic abscess	135 (17.8)
Wound infection	108 (14.3)
Urinary tract infection	5 (0.7)
Pneumonia	20 (2.7)
Death	1 (0.13)

Operative details

The majority of cases were performed using a pure open technique versus laparoscopic (548 (72.3 %) vs. 106 (14.0 %)). Twelve (1.6 %) were laparoscopic cases converted to open. Two hundred twenty-three patients (29.4 %) had a traditional two-stage procedure, 237 (31.3 %) had a non-traditional two-stage procedure, and 285 (37.6 %) had a traditional three-stage procedure. Thirteen patients (1.7 %) did not have complete documentation of their staged procedures. Average length of stay in hospital for the pouch procedure only was 10.3 ± 6.0 days.

Postoperative complications

DVT occurred in 33 (4.4 %) patients. Postoperative SBO was observed in 134 (17.7 %). Observed perioperative infectious complications included wound infection (108, 14.3 %), pelvic abscess (135, 17.8 %), pneumonia (20, 2.7 %), and urinary tract infection (5, 0.7 %) (Tables 2 and 3). Pouch-specific complications were also documented; 92 (12.1 %) of patients had an anastomotic leak on clinical or radiologic exam, 26 (3.4 %) had a pouch fistula, 7 (0.9 %) had long-term pouch failure, and 55 (7.3 %) patients had a symptomatic anal stricture.

Exposure to medical therapy

Among our cohort, 369 (48.7 %) had systemic corticosteroids within 30 days of the first stage of surgery; 386 (50.9 %) had

Table 3 Pouch-related complications

	Number of patients	% of total patients (N = 758)
Anastomotic leak	92	12.1
Pouch fistula	26	3.4
Pouch failure	7	0.9
Anal stricture	55	7.3

high dose corticosteroids within 7 days of the first operation. One hundred twenty-eight (16.9 %) of patients were treated with azathioprine/6MP within 90 days of the first surgery. Of patients who received anti-TNF therapy, 102 (13.5 %) had received it >30 days prior to surgery. Thirty-eight (21.5 %) were exposed to anti-TNF therapy less than 15 days prior to surgery and 37 (20.9 %) were exposed to biologic therapy 15–30 days before surgery. At the time of surgery, 108 (14.3 %) of patients had accumulated more than four infusions of anti-TNF. Eleven patients showed positive levels of serum antibodies.

Risk factors for complications

Univariate analysis did not show any correlation with pelvic abscess or pouch leak. Traditional 3 stage vs. 2 stage (traditional and non-traditional) was not associated with a higher rate of pelvic abscess and pouch leak. Preoperative steroid use (>15 mg) was associated with increased risk of pouch leak only.

Multivariate analysis was performed using a logistic regression model adjusting for potential confounders such as age, disease severity, disease extension, disease duration, sex, systemic corticosteroids, hydro-corticosteroids, biologics, and type of operation. An association between systemic corticosteroids >15 mg and pouch leak (OR 1.61) was observed (Table 4).

Discussion

The objective of this study was to review our institutional experience with stapled IPAA technique over the last decade

and re-visit risk factors for postoperative pouch complications in our center.

Over 2200 IPAA procedures have been performed at our institution of which 758 were performed for a diagnosis of UC between January 2002 and June 2013. Out of these 758 IPAA patients, there was one death and 7 (0.9 %) pouch failures requiring excision. 12.1 % had clinically relevant pouch leaks documented by clinical signs with radiologic confirmation, 3.4 % had a pouch-vaginal or pouch-cutaneous fistula, and 7.3 % developed a clinically relevant anal stricture. The majority of patients had severe S2/3 disease or E3 pancolitis [8].¹ The mean albumin and BMI of UC patients in our review were within normal ranges at the time of pouch creation (42.7 and 25.6, respectively) and did not show a positive correlation with pouch leak or pelvic abscess. There was a very low number of smokers in our study ($n = 26$, 3.4 %). One reason for this may be that our patients are often counselled on risk factors for poor wound healing and perioperative complication, so many patients try to optimize their surgical risk by improving their diet and lifestyle including reduction or cessation of smoking. The rate of smokers in our study may also reflect the limitation of retrospective database review in that smoking status may not have been thoroughly captured at the time of database design. Postoperative complication rates were 4.4 % for DVT, 17.7 % for ileus or SBO, 17.8 % for pelvic abscess, 14.3 % for wound infection, 2.7 % for pneumonia, and 0.7 % for UTI. After multivariate analysis, only systemic corticosteroid use (>15 mg/day) was shown to be positively associated with pouch leak.

In recent reviews, centralization of the IPAA procedure in high volume centers has been discussed as a method of improving outcomes [5, 9]. In our patient population, we observed similar outcomes to other large volume centers. A study by Tekkis et al. [10], of 2491 patients undergoing

Table 4 Univariate analysis and multiple variable logistic regression model

Factor	Level	Univariate analysis		Multivariable analysis
		OR (95 % CI)		OR (95 % CI) for pelvic abscess/pouch leak
		Pelvic abscess/pouch leak	Pouch leak	
Gender	Female vs. male	1.07 (0.74, 1.54)	1.11 (0.72, 1.72)	0.90 (0.61, 1.34)
Age	≥35 vs. <35	0.82 (0.57, 1.19)	0.88 (0.57, 1.37)	1.01 (0.68, 1.49)
BMI		0.99 (0.97, 1.01)	0.99 (0.97, 1.02)	
Anti TNF	Yes vs. no	1.31 (0.88, 1.97)	1.15 (0.71, 1.87)	
Steroids >15 mg	Yes vs. no	1.61 (1.08, 2.40)	1.46 (0.91, 2.36)	1.61 (1.07, 2.41)
Combination anti-TNF and steroid >15 mg	Yes vs. no	1.36 (0.83, 2.24)	1.15 (0.62, 2.12)	1.39 (0.90, 2.14)
Disease extent	3 vs. 2	1.34 (0.77, 2.34)	1.09 (0.58, 2.05)	
Disease severity	2/3 vs. 1	1.45 (0.72, 2.92)	0.95 (0.46, 2.00)	0.90 (0.61, 1.34)
Disease duration	≥8 vs. <8	1.15 (0.78, 1.69)	1.24 (0.79, 1.95)	1.61 (1.07, 2.41)
IPAA stage	3 vs. 2	1.47 (0.94, 2.29)	1.03 (0.64, 1.67)	

IPAA (79.9 % for UC), showed rates of pouch leak (5.5 %), stricture (16.8 %), and pouch fistulae (11.8 %). Although our pouch leak rate was higher, the UK National Pouch Registry study population included patients with familial adenomatous polyposis, indeterminate colitis, and other preoperative diagnoses whereas the Mount Sinai Hospital study specifically assessed postoperative complications in UC patients. Their postoperative complications, including SBO (12.3 %), wound infection (4.4 %), and pelvic sepsis (11.8 %), were comparable to our experience. At the Cleveland clinic, a 26 year experience with IPAA in UC patients demonstrated a 6.3 % pouch leak rate (4.8 % early, 1.5 % late), 9.0 % pelvic sepsis, and 16.5 % stricture rate [11].

The Japanese experience in 944 IPAA patients with UC has also been reported and although the late complication rate is much lower than our own (16 fistulae, 3 pelvic abscess, 3 obstruction), the reported mortality rate is higher with 1 death after 1 stage IPAA, 6 deaths after 2 stage, and 2 deaths after 3 stage [12]. Nine deaths were in IPAA patients; however, 20 deaths in total were observed in the study of patients with IPAA, TPC (total proctocolectomy), and IRA (ileorectal anastomosis) attributed to pneumonia, sepsis, advanced colorectal cancer, pulmonary infarction, hemorrhagic shock, or subarachnoid hemorrhage. In general, the results of our study were supportive of the current body of evidence.

The volume of IPAA surgery at our center is the primary strength of this study. The number of cases is comparable to large studies described in the literature. A weakness of the study is the retrospective approach of the study and the potential biasing effect of disregarding incomplete patient charts. The IBD database is incomplete in some outpatient files and may lead to variation in the reported clinical characteristics of our UC IPAA population. A total of 15 charts were excluded due to incomplete detailed clinical information. As our center moves towards an increasingly paperless electronic patient record, this data will be more consistently and completely captured in the future. In future studies, we will also consider defining outcomes and outcome measures prospectively and following patients over time although this may be costlier both fiscally and in terms of required resources.

IPAA, while associated with significant morbidity, is a viable reconstructive option for UC patients even after recent medical therapy with biologics. It can be performed safely in 2 or 3 stage operations. We will continue to offer this therapy to patients although careful discussion regarding perioperative risks,

pouch function, lifestyle challenges, and sexual function should be undertaken prior to consideration of this surgical option.

In conclusion, IPAA has been found to be a safe and effective method of surgical management of UC patients in a high volume IBD center.

Compliance with ethical standards

Financial support None.

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