

Long-term Functional Outcome after Restorative Proctocolectomy

A cross-sectional study

Short title: Restorative Proctocolectomy

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The study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki (6th revision, 2008). The Research and Ethics Committee of Pirkanmaa Hospital District approved the study (R12100). All participants gave written informed consent.

Abstract

Objective

Restorative proctocolectomy is the procedure of choice in the surgical treatment of ulcerative colitis. Functional outcome is the key result of surgery. The aim of this study was to evaluate the long term-functional outcome after the procedure.

Material and Methods

The study comprised 282 ulcerative colitis patients over 18 years of age who underwent restorative proctocolectomy between 1985 and 2009. The median follow-up time was 13 years (range 4-28). Functional outcome of the pouch was evaluated by the disease specific Öresland questionnaire with a score 0 to 15; 15 being the worst, and score <8 considered well-functioning.

Results

The mean functional score was 5.5 (men 5.6, women 5.0). Seventy per cent of the patients had a well-functioning pouch. Those with poor function had had significantly more pouchitis than the patients with well-functioning pouches, 51.0 vs. 25.6 % respectively ($p=0.001$). No association was found between functional score and the time since the operation. In multiple regression analysis only the occurrence of pouchitis were associated with poor functional results.

Conclusions

The functional results were good and remained stable in the majority of the patients. Pouchitis seemed to have a negative impact on the functional results. Elderly patients especially need careful planning and counselling before restorative proctocolectomy.

Keywords: Functional results, restorative proctocolectomy, ulcerative colitis, ileal-pouch-anal anastomoses, Öresland score

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Data availability: Data is available upon request from the corresponding author

Introduction

Restorative proctocolectomy (RPC) is the standard operation for patients with active ulcerative colitis (UC) [1, 2]. With successful surgery people are expected to live a normal life, the cancer risk is no more concrete and a permanent stoma is avoided. However, RPC is associated with complications and functional failures [3, 4] likely to affect health related quality of life [5]. The majority of patients are young with a long life-expectancy. Therefore, long-term functional outcome is essential in evaluating the decision how to operate and the results of the operation.

Some studies have reported good and stable functional results [6-8] whereas others have found a slight deterioration in number of bowel movements and continence over time [9, 10]. This study aimed to assess the long-term functional results and determining factors over a period of two decades in a single centre.

Material and Methods

Patients

In this cross-sectional study, all consecutive 352 patients with UC who had undergone RPC at Tampere University Hospital between 1985 and 2009 were identified in the patient records using the ICD-9 and ICD-10 codes for UC and NCSP (Nordic Classification for Surgical Procedures) codes for the operations performed. A database to form an RPC registry was collected from patient files including details on patient history, surgical technique, postoperative morbidity and follow-up. The clinical data on the study patients were retrieved from this registry.

Pouch failure (excision or permanent ileostomy without excision) had occurred in 42 patients, three could not be reached and 25 had died. Only one died due to the complication off RPC. The patient had an early postoperative haemorrhage, and refused of red cell transfusion for religious reasons. One patient died of musinotic colorectal cancer found in the pouch after its removal due to fistula and functional problems. Of the remaining patients 282 (80.1%) could be identified and were included in this study. The questionnaire was sent by surface mail; one reminder was sent to the non-respondents. Data were collected between October 2012 and May 2013.

All pouches were of J-type and the anastomosis was either hand-sewn (80%) or stapled (20%). Covering ileostomy was applied in 76 (41%). The surgical technique has moved towards stapled anastomoses and the standard use of covering ileostomy in our hospital [11].

Assessment of Pouch Function

Pouch function was assessed by Öresland score [12]. This questionnaire has been tailored for RPC and has been used in many studies to elicit pouch function [5, 13, 14]. The questionnaire includes items about the number of day-time and night-time bowel movements, incontinence for liquid or solid stools, pad usage, urgency, diet, medication and social handicap; the ratings are summarized into a single score (range 0-15; 15 being the worst possible). The questionnaire was translated into Finnish and was used with the permission of the developer [12]. In the study by Berdtson et al. poor Öresland scores correlated negatively with health-related quality of life results; the authors classified the score indicating function to be very good (0-4), good (5-7) or poor (8-15) [5]. In the present study we decided to combine the very good and good pouch function groups and the cut-off between the groups was therefore set at a score of 8.

Statistics

The data were analysed using SPSS (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp). For categorical variables the results were given as frequencies and percentages, for continuous variables as means and standard deviations, or as medians. Comparisons between different patient groups were tested with chi-square test. Multiple regression analysis was used to identify independent patient and operation characteristics related to functional results. P -values ≤ 0.05 were considered statistically significant.

Ethics

This study was conducted according to the principles of the Declaration of Helsinki. The Research and Ethics Committee of Pirkanmaa Hospital District approved the study (R12100). All participants gave written informed consent. The Competitive State Research Financing of the Expert Responsibility area of Tampere University Hospital, Grant number 9P060, supported this study financially.

Results

Of the 282 patients, 187 (66.3%) (87 women, 100 men) returned the questionnaires. The median age of the responders was 53 years (range 23-81) and the median follow-up time after RPC was 13 years (range 4-28). The 95 RPC patients who did not return the questionnaire were three years younger on average than those who responded and median follow-up time of the non-responders was 11.7 years (range 4-28). There was no gender difference or significant difference in the occurrence of leakage or pelvic sepsis between the respondents and non-respondents.

Altogether 131 (70%) of the patients reported having a well-functioning pouch with a score of < 8 , and the remainder 56 (30%) poor function [Fig.1.]. The surgical details of the patients and most relevant complications for good and poor pouches are shown in [Table 1.]. The poor function group had had significantly more pouchitis than the well-functioning group, 25.6 and 51.0% respectively ($p=0.001$). The poor function group patients were slightly older at the time of surgery 41.0 vs. 36.9 ($p=0.044$) but the difference disappeared in the multiple regression analysis. There was no significant difference between these groups in pelvic sepsis, leakage or in whether the patient developed fistula, abscess or stricture. No association was found on how much time had elapsed since the operation. Anastomotic stricture was almost twice as common in the poor function group as in the well-functioning pouches, 7.9% vs. 13.2%, respectively, but the difference was not statistically significant (Table 3).

The median functional Öresland score was 5.5 for males and 5.0 for females. The various functional sub-scores are presented in [Table 2.]. Fifty-five per cent of the recipients had ≤ 5 bowel movements in daytime and 66% had 0 or ≤ 1 /week at night. Occasional seepage or incontinence was reported by 20% in daytime and by 42% at night. Forty-nine per cent had experienced dietary restrictions, 29% used antidiarrheals and 25% had experienced a social

handicap. The only significant difference between the genders was that males suffered more from nocturnal incontinence than females, 51% and 33% respectively, $p = 0.015$. When the patients were categorized into three age groups (≤ 35 , 36-62, ≥ 63 years of age), the older groups reported more daytime incontinence than younger ones, 0%, 21.2%, 27.3% respectively ($p=0.02$), but nocturnal incontinence was not age-dependent. The use of protective pads was significantly more frequent in subjects in the oldest group, ≥ 63 years of age than in the younger patients; both in daytime (in 4.0, 8.5, 27.3%, $p = 0.002$) and at night (12.0, 22.9, 40.9% respectively, $p = 0.016$).

A multiple regression analysis of nine variables (sex, age at time of surgery, body mass index at time of surgery, type of anastomosis, use of covering stoma, complications including leakage, fistula or abscess, stricture and pouchitis) showed that only age at the time of surgery and the development of pouchitis were independently related to a poor functional outcome [Table 3].

Discussion

In this study the long-term functional outcome of RPC was found to be good and stable in the majority (70%) of patients. Pouch function was assessed by means of a questionnaire based on Öresland score questionnaire which has especially adapted for this purpose and has been employed in several studies [5, 13, 14].

Development of pouchitis seemed to have a negative impact on functional results. The number of bowel movements was ≤ 5 in 55% of patients. Eighty percent were continent during the day and 64% at night. These findings are similar to those of earlier reports with the median follow-up time [5, 6, 15, 16]. As in the present study, nocturnal seepage or incontinence in males has also been reported by others [5, 17, 18].

In this study patients ≥ 63 years of age reported more daytime incontinence than younger ones, whereas nocturnal incontinence was not age-dependent. In the multivariate analysis, age at time of surgery weakened the functional outcome. Similar results have also been reported in two studies with a large number of patients and an organized follow-up. Hanhloser et al. [9] reported in a study of 409 patients with follow-up at 1, 5, 10 and 15 years that bowel movement frequency remained the same within the follow-up period, but perfect continence dropped from 81% to 55%. Delaney et al. [19] reported functional results in 1,895 patients divided into age groups of ≤ 45 , 46-55, 56-65 and >65 years and follow-up data at 1, 3, 5 and 10 years after surgery. Stool frequencies remained constant but perfect continence was least common in the oldest group after 10 years 53%. Although results of continence deteriorated slightly, this had little or no influence on quality of life or on patient satisfaction [9, 19]. All these studies showed that the functional results were stable over time, and that patient selection in the oldest patient groups had to be carefully planned, especially concerning sphincter function, although age in itself is not a contraindication for RPC.

In our study pelvic sepsis or leakage had no association with poor pouch function. On the contrary, people with well-functioning pouches had experienced such complications more frequently; pelvic sepsis in 16.0 vs. 10.7% ($p=0.24$) and leakage in 10.7 vs. 7.1% ($p=0.32$). By contrast, Kiely et al. [10] reported in a large study ($n=3234$), that pelvic sepsis (6.2%) did weaken perfect continence; 77.8 vs. 69.5% ($p=0.03$) and daytime seepage 21.8 vs. 30.4% ($p=0.03$). An Italian study reported an association with septic pouch complications and poor functional results for stool frequency, pad usage and use of antidiarrhoeals, although all patients nevertheless reported good quality of life [20]. As in our study, two Swedish studies showed that leakage or fistulae had no impact on long-term functional results, but, as also in the present study, pouchitis did [21, 22]. In this study there was more strictures in the poor functioning group, although not statistically significantly. We have earlier reported before that patients with hand-sewn anastomosis had significantly more anastomotic strictures than those with stapled anastomosis (17.6% vs. 0%, $p=0.001$) [23]. Partly due to this we have performed handsewn anastomoses only for the patients with rectal dysplasia preoperatively since the year 2005 [23].

The limitation of this study was the large number of patients who did not return the questionnaires. Response rates have declined in Finland in recent decades both in men and women in all age groups, faster among men and in younger age groups [24]. Another limitation of our study was the cross-sectional design without organized follow-up at specific intervals. There are larger studies than ours, but the results are in line with those of larger studies, and this was a single-centre study including all patients undergoing RPC in our catchment area.

In conclusion, our results support the finding that RPC yields good and stable functional results for the majority of patients. Older patients considered for surgery require careful

individual planning and due to the continence problem we recommend assessment of sphincter function. Pouchitis is the most common long-term complication affecting the functional results and therefore research on the prevention of pouchitis is important.

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Table 1. Demographic, surgery related and complication information on patients operated on for restorative proctocolectomy (mean (range) or n (%))

	Total	Good pouch Score <8, n=131	Poor pouch score ≥8, n=56
Sex			
Male	99 (52.9)	65 (49.6)	34 (60.7)
Female	88 (47.1)	66 (50.4)	22 (39.3)
BMI at time of surgery	24.7 (16-36)	24.7 (18-36)	24.9 (16-34)
Age at time of surgery(yrs)	38 (18-67)	36.9 (18-65)	41.0 (19-67) p=0.044
Duration of the disease before surgery (yrs)	6.7 (0-41)	6.5 (0-34)	7.0 (0-41)
Indication for surgery			
Acute colitis	79 (42.2)	57 (43.5)	22 (39.3)
Medically refractory	93 (49.7)	63 (48.1)	30 (53.6)
Cancer or risk of cancer	15 (8.0)	11 (8.4)	4 (7.1)
Anastomosis			
Hand-sewn	140 (74.9)	98 (74.8)	42(75.0)
Stapled	47 (25.1)	33 (25.2)	14 (25.0)
Covering stoma			
yes	76 (40.6)	49 (37.4)	27 (48.2)
no	111 (59.4)	82 (62.6)	29 (51.8)
Pelvic sepsis	27 (14.4)	21 (16.0)	6 (10.7)
Leakage	18 (9.6)	14 (10.7)	4 (7.1)
Relaparotomy	10 (5.3)	9 (6.9)	1 (1.8)
Hospital stay (days)	11 (4-42)	11.3 (6-42)	11.3 (4-29)
Long-term complication			
Occlusion	23 (12.3)	15 (11.8)	8(15.1)
Fistula/abscess	13 (7.0)	10 (7.9)	3 (5.7)
Stricture	17 (9.1)	10 (7.9)	7 (13.2)
Pouchitis	58 (31.0)	32 (25.6)	26 (51.0) p=0.001
Chronic pouchitis	14 (8.0)	7 (5.6)	7 (13.7)

	<i>Rating</i>	<i>N</i>	<i>%</i>
Bowel movements			
<u>Daytime</u>			
≤ 4	0	43	23
5	1	60	32
≥6	2	84	45
<u>At night</u>			
0	0	21	11
≥1/week	1	99	53
≥2/night	2	67	36
Urgency	1	60	32
Evacuation difficulties	1	17	9
Soiling or seepage			
Daytime ≥ 1/week	1	37	20
At night ≥ 1/week	1	79	42
Perianal soreness			
Occasional	1	86	46
Permanent	2	16	9
Protective pad			
Daytime ≥ 1/ week	1	23	12
At night ≥ 1/ week	1	48	26
Dietary restrictions	1	91	49
Medication	1	55	29
Social handicap	1	44	24

Table 2. Functional results of Öresland score in 187 patients with ileal pouch
Urgency = inability to defer evacuation \geq 30 minutes; evacuation difficulties = \geq 15 minutes spent on toilet on any occasion during the week; medication = to modify stool consistency; social handicap = not able to resume fulltime occupation or to participate in social life.
Score: best 0; worst 15.

Table 3. Univariate and multivariate analysis of patients and operation characteristics in relation to poor pouch function defined by Öresland score (≥ 8).

	% or mean	Univariate		p-value	Multivariable		p-value
		OR	CI		OR	CI	
Sex							
Female	52.9	1.57	0.83-2.97	0.17	0.95	1.00-1.06	0.90
Male	47.1						
Age at surgery	36.9	1.03	1.00-1.05	0.04	1.03	1.00-1.06	0.07
BMI at surgery	24.7	1.01	0.94-1.10	0.74	0.99	0.89-1.09	0.78
Anastomosis							
Hand-sewn	70.1	1.01	0.49-2.08	0.98	1.33	0.48-3.68	0.58
Stapled	29.9						
Stoma	40.6	1.56	0.83-2.93	0.17	1.94	0.78-4.82	0.15
Leakage	9.6	1.56	0.50-4.95	0.46	1.23	0.35-4.36	0.75
Fistula/ abscess	7.0	1.43	0.38-5.40	0.60	1.54	0.37-6.46	0.56
Stricture	9.1	1.78	0.64-4.96	0.27	1.40	0.42-4.66	0.58
Pouchitis	63.1	3.02	1.53-5.97	0.00	4.21	1.94-9.10	0.00

Figure legends

Figure 1. Distribution of Öresland scores in the study population. A score of 8 was set as the limit between well-functioning pouches and poorly functioning pouches.