Indications and outcomes of home parenteral nutrition in patients with an ileoanal pouch

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ABSTRACT

INTRODUCTION Restorative proctocolectomy is a surgical treatment for patients with medically refractory ulcerative colitis and some cases of familial adenomatous polyposis. Intestinal failure, defined as an inability to maintain adequate hydration and micronutrient balances when on a conventionally accepted normal diet, is a rare complication of restorative proctocolectomy. We describe our experience of patients with restorative proctocolectomy who have developed intestinal failure requiring parenteral support.

MATERIAL AND METHODS This was a retrospective analysis using a database of patients referred to our intestinal failure unit from January 1998 to January 2016. We analysed the records of all those patients who had restorative proctocolectomy who developed intestinal failure.

RESULTS 807 patient records analysed, 35 patients were found to have had a restorative proctocolectomy (13 male and 22 female). Ninety-one percent (n = 32) of patients developed IF as a consequence of unpredictable complications which occurred after RPC formation. Potentially predictable complications were noted in 9% (n = 3) of patients.

DISCUSSION AND CONCLUSIONS Most cases of intestinal failure in restorative proctocolectomy were unpredictable. In a small number of patients, accurate assessment and measurement of the small intestine may have better predicted the adverse outcome of intestinal failure allowing improved pre-operative counseling of patients.

KEYWORDS

Ileoanal pouch – Intestinal failure – Home parenteral nutrition

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Introduction

Restorative proctocolectomy (RPC) with ileal pouch–anal anastomosis is a surgical treatment for patients with medically refractory ulcerative colitis, ulcerative colitis with dysplasia and some cases of familial adenomatous polyposis (FAP).¹ Restorative proctocolectomy removes the entire colon and rectum, while preserving the anal sphincter.^{2–5}

Although the majority of patients undergoing RPC have good functional and long-term outcomes, the procedure is associated with many complications. Some 20% of patients develop pelvic abscess and 5% have immediate postoperative complications including pelvic sepsis.^{6–9} Other complications include pouchitis (23–46%)^{1,10} strictures (11%),¹¹ fistulae (6%)¹² and small-bowel obstruction (9%).¹⁵ The overall failure rate, defined by excision of the pouch or indefinite diversion, is between 3.5% and 17%.^{1,14}

Intestinal failure is caused by a loss of absorptive capacity resulting in an inability to maintain adequate hydration and micronutrient balances when on a conventionally accepted normal diet and carries with it significant morbidity and mortality.¹⁵ Intestinal failure has two

different classifications.¹⁶ The first is a pathophysiological classification in which the condition is divided into five different categories based on the underlying pathophysiology. These are short bowel, mechanical obstruction, intestinal fistulae, intestinal dysmotility and extensive small bowel mucosal disease. The second classification is functional, and classifies patients into three different categories (type I, type II and type III) based upon onset and expected outcome. Type III intestinal failure is defined as a chronic condition in the metabolically stable patient requiring intravenous supplementation over months or years.

Standard management regimens for IF include long-term or lifelong home parenteral support (PS) in the form of parenteral nutrition or parenteral fluids and electrolytes. This is given in combination with dietary modification, anti-secretory agents and agents to reduce intestinal motility. Parenteral support is an expensive treatment, costing £95–235 per day.¹⁷ It is associated with a 10-year survival rate of 59–71% in the UK.^{18,19}

In our experience, intestinal failure following RPC is a rare complication, which, to the best of our knowledge, has not been reported in the literature. The intestinal

failure unit at our institution is the largest unit in the UK specialising in this condition. We describe a cohort of patients with RPC who have developed the rare complication of intestinal failure.

Materials and methods

Study design and setting

A retrospective analysis of a prospectively maintained clinical database was performed for all patients referred to the intestinal failure unit at our institution from January 1998 to January 2016.

Participants

All patients who had undergone RPC were identified and all relevant patient records were then analysed to obtain demographic data, underlying cause of intestinal failure, small intestinal length, type of parenteral support given to the patient and mortality. Patients were censored by date of death (if applicable) or by the date of 1 January 2016.

Criteria

Inclusion criteria were patients who had undergone RPC prior to receiving parenteral support and those with long-term (type III) intestinal failure requiring home parenteral support.²⁰ Exclusion criteria were parenteral support prior to RPC.

Variables

Baseline demographics including age and sex were recorded. Reason for needing restorative proctocolectomy and underlying cause for intestinal failure were collected. In addition, small bowel length, nutritional support, complications that led to intestinal failure and mortality were collated.

Bias

To help to avoid measurement bias, each individual patient's underlying pathophysiological categorisation was defined by two authors (SMO and JPS) by review of clinical records. Where the patient could be classed under more than one pathophysiological category, the most significant was deemed the most appropriate. Where disagreement occurred in categorisation, a decision was made on consensus agreement between SMO and SMG.

Study size

Of the 807 patient records analysed, 35 patients were found to have had a RPC (13 male and 22 female). The characteristics of intestinal failure patients with a previous RPC were compared with those without (Table 1).

Statistical methods

Survival analysis was performed using the Kaplan–Meier method. Patients were excluded from the survival analysis if they developed malignant disease as cause of intestinal failure. Statistical tests were performed using STATA (StatCorp LP 4905 Lakeway Drive, College Station, Texas 77845-4512, USA).

Table 1 Baseline Characteristics of the RPC Patients		
Variable	Restorative proctocolectomy (n = 35) ^a	
	(n) or mean	(%)
Sex:		
Male	13	37
Female	22	63
Supplementation:		
Parenteral fluids	6	17
Parenteral nutrition	29	83
Small bowel length:		
< 50 cm	1	4
50–100 cm	3	13
100–150 cm	7	29
> 150 cm	13	54
Unknown ^b	11	
^a Including four patients with desmoid/active cancer as cause of intestinal failure.		
^b Where bowel length was unknown, these values were not included in the statistical tests.		

Results

Table 1 shows the baseline demographics of the patients. The indication for RPC was UC (n = 26), FAP (n = 6), colonic volvulus (n = 1), colorectal cancer on a background of Crohn's disease (n = 1) and post surgical complications of a Hartmann's procedure for diverticular disease (n = 1). The type of PS was parenteral nutrition for 83%(n = 29) and fluid and electrolytes alone for 17%(n = 6) of patients.

In all cases, intestinal failure occurred as a consequence of a complication occurring after the RPC surgery. The complications are summarised in Table 2. These complications occurred after closure of the covering ileostomy in 91% (n = 32) with only 9% (n = 3) occurring before ileostomy closure. Nine per cent (n = 3) of patients developed complications unrelated to the RPC surgery (one had desmoid tumour-related obstruction and two had pseudo-obstruction) and these were all in the post-ileostomy closure group.

In most cases, intestinal failure developed as a consequence of the management of the index post-RPC complication. The causes of intestinal failure were categorised according to the underlying pathophysiological classification (Table 3).¹⁶ A graphical illustration of the survival times for those who had undergone RPC is shown in Figure 1.

Thirty one percent (n = 11) of patients who developed IF following RPC were eventually able to stop parenteral nutrition. For those who achieved autonomy median time on PS was 1.74 years (IQR 1.23), for those who did not achieve autonomy by the time of censor median time on PN was 3.02 years (IQR 3.33).

Table 2 Complications contributing to intestinal failure post-restorative proctocolectomy formation.

Complication	Post-ileostomy closure	Pre-ileostomy closure with covering ileostomy
High stoma/pouch output	1	2
Mechanical obstruction	9	1
Desmoid-related obstruction	1	–
Ischaemic bowel	3	–
Small bowel Crohn’s disease	1	–
Enterocutaneous fistula	7	–
Pseudo-obstruction	2	–
Perforated viscous	1	–
Short bowel post pouch excision	6	–
Unknown	1	–
Total	32	3

Table 3 Pathophysiological causes of intestinal failure in the restorative proctocolectomy patient group.

Cause	Patients	
	(n)	(%)
Short bowel	17	48.6
Intestinal failure	5	14.2
Intestinal dysmotility	2	5.7
Mechanical obstruction	10	28.6
Small bowel mucosal disease	1	2.9
Totals	35	100

Discussion

Complications of RPC resulting in type-3 intestinal failure are likely to be rare, although it is difficult to accurately describe incidence because only 25% of patients are captured in the national registry.²¹

In our cohort 91% (n = 32) of patients developed IF as a consequence of unpredictable complications which occurred after RPC formation. Potentially predictable complications were noted in 9% (n = 3) of patients. Two patients developed IF due to having a short bowel (one before and one after the closure of the covering ileostomy). Both these patients had a radiologically measured small bowel length of 50-100cm after index RPC formation and neither had documented small bowel resection prior to pouch formation. These two cases suggest that small intestinal length was not appreciated at time of RPC surgery.

One patient developed small bowel Crohn’s disease, after closure of ileostomy, in whom there was no documented evidence of small bowel imaging prior to RPC formation.

Normal small bowel length is variable and measurements taken from postmortem specimens, at time of intestinal transplant and using radiological measurements range from 275–850 cm.^{22–25} It is generally considered that nutritional and/or fluid supplementation will be required when there is less than 200 cm of small bowel remaining. It is therefore possible that RPC formation may lead to intestinal failure, if a patient has a total small bowel length on the shorter end of the normal spectrum. This is because removal of the colon both increases the small bowel transit time, owing to a loss of the ileal break mechanism,²⁶ and reduces their fluid absorption to the level of requiring supplementation leading to intestinal failure.

A further consideration that needs to be taken into account prior to pouch formation is the quality of the small bowel. In our small cohort, we encountered one patient in whom the pouch was formed for ulcerative colitis and who later developed intestinal failure due to Crohn’s disease of the small bowel. While it is possible that, at time of pouch formation, the small bowel may have been healthy and then later developed the Crohn’s phenotype, no preoperative imaging was found on review of the patient’s notes to show that this was the case.

Although these numbers are too small to draw firm conclusions, we feel that it is important that patients are appropriately selected for RPC. We suggest all patients have radiological imaging of the small bowel e.g. MR enterography or barium studies prior to surgery. This is firstly to exclude active small bowel Crohn’s or other small bowel pathology that may be present at the time of the decision to form a RPC and secondly to provide an estimation of small bowel length. If small bowel length is estimated at approximately 200cm patients should be counseled at time of operation for the possibility of intestinal failure as a post-operative complication. Finally, it is

paramount that small intestinal length is measured and documented where possible at time of the initial subtotal colectomy.

A study comparing patients with RPC who developed IF with those who did not is required. Unfortunately we are not able to provide this comparison as an accurate database of RPC patients managed at our institution is not available for the time period of this study.

Limitations of the study include the small patient cohort. The retrospective nature of the study means that there is a possibility of recording bias. Owing to the small numbers in our study, it is possible for type two errors to occur.

Conclusions

IF is an important, but rare consequence of RPC surgery. Our data have shown that most cases were unpredictable. Nonetheless, in a small number of patients, it is possible that accurate assessment and measurement of the small intestine may have better predicted the adverse outcome of intestinal IF allowing improved pre-operative counseling of patients.

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