Proctocolectomy and Brooke Ileostomy for Chronic Ulcerative Colitis

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ABSTRACT

Proctocolectomy and permanent ileostomy is an option for selected patients with ulcerative colitis. Current indications include the elderly, patients with poor anal continence, and those with malignant lesions of the low rectum. Advantages of this procedure are that it has fewer complications than an ileal pouch-anal anastomosis, it is a one-stage operation removing all the diseased mucosa, and it is a relatively straightforward operation. The operative technique is discussed.

KEYWORDS: Ulcerative colitis, proctocolectomy, Brooke ileostomy

Objective: Upon completion of this article, the reader should be able to describe the indications and operative technique of proctocolectomy and ileostomy for ulcerative colitis.

For several decades and until the 1980s, proctocolectomy with permanent end ileostomy was considered the “gold standard” operation for patients with chronic ulcerative colitis (CUC) who required surgical therapy. Refined surgical technique and the advent of improved appliances contributed to its durability and made it a relatively low-risk procedure that offered improved quality of life. Ideally, the terminal ileum is used to construct the eversion Brooke ileostomy, which is positioned in the right lower quadrant of the abdomen where an appliance applied over the stoma collects the patient’s unregulated feculent discharge at all times. However, the continued desire to find a way to avoid a permanent stoma and the advent of innovative, continence-preserving techniques have led to the creation of continent ileostomies such as the Kock pouch and later the ileal pouch-anal anastomosis (IPAA). Moreover, with the advent of laparoscopic colorectal surgery, the operation can be performed with better cosmesis, less morbidity, and more rapid recovery than in the past. Consequently,

the role of proctocolectomy with permanent Brooke ileostomy is much more limited, especially in view of the successful outcomes of IPAA. Not all patients, however, are candidates for IPAA, and 10% or more may ultimately fail.¹ For these reasons, proctocolectomy with Brooke ileostomy remains a simple and safe alternative with predictable long-term outcome and it should still be considered in selected patients.

INDICATIONS

Proctocolectomy and permanent end ileostomy is indicated for those patients who require surgical treatment of ulcerative colitis, yet are not candidates for IPAA. These may include patients who are elderly, those who have poor anal continence, and those patients with malignant lesions of the low rectum who will undergo sphincter-compromising surgery or pelvic radiation or both. Patients that are considered too high a risk for the more complicated two-stage IPAA may also be best served by

Ulcerative Colitis; Editor in Chief, David E. Beck, M.D.; Guest Editor, Bruce G. Wolff, M.D. *Clinics in Colon and Rectal Surgery*, volume 17, number 1, 2004. Address for correspondence and reprint requests: Eric J. Dozois, M.D., Division of Colon and Rectal Surgery, Mayo Clinic Foundation, 200 First Street SW, Rochester, MN 55905. E-mail: dozois.eric@mayo.edu. ¹Division of Colon and Rectal Surgery, Mayo Clinic Foundation, Rochester, Minnesota. Copyright © 2004 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA. Tel: +1(212) 584-4662. 1531-0043,p;2004,17,01,065,070,ftx,en;ccrs00162x.

a Brooke ileostomy. Finally, some patients may opt for a permanent Brooke ileostomy despite being candidates for an internal pouch based on personal considerations such as their workplace or lifestyle.

ADVANTAGES AND DISADVANTAGES

The advantages of the operation are that overall it has fewer complications than IPAA, it is a one-stage operation removing all the diseased mucosa, and that it is a relatively straightforward operation for well-trained surgeons.

The major disadvantage from the patient's perspective may be that patients are left with a permanent incontinent stoma requiring the constant wearing of an external appliance.² Other disadvantages, which should be discussed extensively with the patient preoperatively, include possible perineal wound complications such as delayed healing; acute and chronic stoma complications; physiologic consequences such as electrolyte abnormalities; urinary and gallstone formation; appliance-related difficulties; and complications associated with pelvic dissection such as urinary and sexual dysfunction.

IMPORTANT PREOPERATIVE CONSIDERATIONS

Preoperatively, patients need to have a clear understanding of the necessity for surgery, the magnitude of the operation, and its inherent risks, as well as the fact that once the rectum is removed together with the sphincter apparatus they will not be candidates for future IPAA. Consultation with an enterostomal therapist can be useful to dispel patients' misconceptions and fears regarding the ileostomy and to give patients a better understanding of stomal appliances. The enterostomal therapist is an integral part of the health-care team and brings knowledge of ostomy management, wound and skin care techniques, and skills to assist the patient in need of a stoma.³ Moreover, stoma therapists can also help with proper selection of the site of the stoma which is ideally located over the right rectus muscle on a flat area away from skin folds and bony prominences. Patients should have a clear understanding of all the risks, benefits, and alternatives of the Brooke ileostomy, especially the possibility of impaired sexual function. Young male patients who want to father children may choose to cryopreserve a sample of their sperm prior to the operation.⁴

OPERATIVE TECHNIQUES

Patients are given a preoperative bowel preparation of polyethylene glycol or Fleet's Phospho-Soda and oral antibiotics the evening before surgery. Intravenous prophylactic antibiotics should be given 1 hour prior to

induction. Patients treated with corticosteroids in the last 12 months should be given intravenous stress dose hydrocortisone prior to induction of general anesthesia and continued corticosteroid therapy through the postoperative course. In the operating room, the patient is positioned in the modified lithotomy position to provide ready access to both the abdomen and the perineum. A Foley catheter is placed in the bladder and the abdomen and perineum are prepared in the usual sterile fashion.

Conventional Laparotomy

A low midline incision is made from the umbilicus down to the pubis and the abdomen is explored to rule out incidental pathology and evidence of Crohn's disease. The large intestine is then mobilized entirely with careful preservation of the greater omentum. The ileocolic artery is preserved and the blood vessels supplying the rest of the colon are ligated. After this is completed, pelvic dissection is undertaken with careful identification and preservation of the ureters and hypogastric nerves. Dissection is carried down to the level of the pelvic floor anteriorly, posteriorly, and laterally, staying close to the rectal wall. The perineal portion of the operation is then completed using a small elliptical incision around the anus and dissecting within the intersphincteric plane to join the dissection from the abdominal side. Once the rectum, anal canal, and colon are removed the perineal wound is closed primarily in layers leaving two soft silastic drains in the deep pelvis that exit transperineally through separate lateral stab wounds. The previously marked stoma site is then excised and a defect is created in the abdominal wall splitting the rectus muscle. The ileum is brought out through the defect and grasped with a noncrushing clamp. The abdomen is irrigated and hemostasis secured. Positioning of the small bowel mesentery is checked before closure to avoid twisting the distal ileum proximal to the stoma. The abdomen is closed in the standard fashion and the stoma is matured after everting the distal ileum upon itself to create a "budding" effect as described by Brooke (see Fig. 1).

Laparoscopic Resection

Laparoscopic applications in colon and rectal surgery are still evolving and high rates of conversion and intraoperative and postoperative complications seen in the early experience of many groups may have obscured the true benefits of the laparoscopic approach.^{5,6} In recent years, laparoscopic colorectal surgery has been shown to be safe and feasible conferring the benefits expected from a minimally invasive approach, that is, reduction in postoperative pain, length of ileus, and hospital stay, and better cosmesis and body image.⁷ Laparoscopic proctocolectomy is likely one of the most challenging laparoscopic procedures for the colon and

Figure 1 Creation of Brooke ileostomy. Printed with permission of Mayo Clinic, Rochester, Minnesota.

rectal surgeon as it involves operating in multiple quadrants of the abdomen as well as performing pelvic dissection. Despite these challenges, several centers, including our own, have published their results now with good outcomes.⁸⁻¹⁰

Our approach entails a simplified four-port laparoscopic technique (see Fig. 2). The first port is placed via cut-down in the supraumbilical position. Two additional 5-mm ports are located in the left lower quadrant and suprapubic midline areas, respectively. A fourth port, 10 to 12 mm, is situated in the right lower quadrant

exactly at the site of the future Brooke ileostomy. The left colon is mobilized first by taking down the lateral peritoneal attachments from the pelvic brim to the level of the splenic flexure. The omentum is freed only from the distal transverse colon sufficient to allow splenic flexure mobilization. The right colon is then mobilized from the ileocecal junction to the hepatic flexure. Both ureters are identified and protected. The pararectal peritoneum is scored bilaterally, the presacral space is entered, and the rectum is dissected free posteriorly to the pelvic floor and then laterally and anteriorly. The distal rectum/upper anal canal is transected with one or two firings of the articulated laparoscopic linear stapler. The supraumbilical port site incision is extended, around the umbilicus, in the midline for 4 to 6 cm in length. The entire colon and rectum can then be exteriorized through this midline incision. Exteriorization expedites the procedure by allowing mesenteric and bowel resection as well as inspection of the entire small bowel for signs of Crohn's disease (see Fig. 3). The terminal ileum is then brought out through the right lower quadrant port site for the Brooke ileostomy and the suprapubic port site is used for a single pelvic drain (see Fig. 4). The operator then moves to the perineum and performs an intersphincteric dissection and removes the remaining rectum and anal canal.

Figure 2 Laparoscopic four-port set-up. Printed with permission of Mayo Clinic, Rochester, Minnesota.

POSTOPERATIVE CARE

Historically, a silastic soft nasogastric tube has been left in place for the first 24 to 48 hours. Several publications that report on randomized controlled trials have questioned the validity of the routine use of nasogastric tubes in patients undergoing colectomy and this practice should be individualized as most patients will not require nasogastric tube decompression.^{11,12} The ileostomy will

Figure 3 Colorectal exteriorization. (Courtesy of Tonia Young-Fadok, M.D.)

begin functioning around the second or third postoperative day. Diet is initiated at the surgeon's discretion. Early postoperative feeding after elective colorectal surgery has been studied and appears to be safe and successful in most patients.^{13,14} Laparoscopic patients tolerate early feeding even better due to earlier resolution of ileus. Diet is gradually increased over the course of several days to soft food as tolerated. In the postoperative period, the enterostomal therapist will visit the patient on numerous occasions to counsel and advise on the care

Figure 4 Completed laparoscopic proctocolectomy and Brooke ileostomy. (Courtesy of Tonia Young-Fadok, M.D.)

of the ileostomy, as most patients will be taking care of their own ileostomy. It is also helpful to have a dietitian counsel the patient about the types of food that may be used to decrease the output from the stoma and on avoiding foods that may lead to obstructive symptoms.

COMPLICATIONS

Complications following proctocolectomy and Brooke ileostomy are generally less severe than those seen with the ileoanal procedure. Minor complications can occur in up to 39% of patients and major complications in 17%, sometimes requiring reoperation and readmission to the hospital^{14a} (see Table 1). Perineal wound infection with delayed healing, urinary retention, sexual dysfunction, misdiagnosis, stomal complications, pelvic infection, and small bowel obstruction are some of the complications that may be encountered in both the early and late postoperative periods. Stoma complications vary between 5% and 25%. The most common complications include peristomal dermatitis, stomal hernia, retraction or prolapse, and stricture, some of which will necessitate surgical revision.

Infection and/or failure to heal the perineal wound can lead to significant morbidity for the patient occurring in up to 25% of patients after proctectomy.^{15,16} The problem of poor wound healing has led many to perform intersphincteric perineal dissections to improve blood supply and closure of dead space, thereby decreasing wound-related complications.¹⁷ When wound healing is delayed, local wound care with packing may be necessary for several months. Complex tissue flaps and transposition of the gracilis muscle have been used with some success in recalcitrant cases.^{18,19} Recently, there has been interest in the use of vacuum-assisted closure devices to heal complex wounds of the perineum.²⁰

From a physiologic standpoint, patients with ileostomies are at risk for dehydration, electrolyte abnormalities, and urinary and gallstone formation. The patient should be counseled and know how to measure

Table 1 Reasons for Readmission and Reoperation after Proctocolectomy and Brooke Ileostomy for Chronic Ulcerative Colitis*

Readmission	[†] Patients	Admissions
Ileostomy dysfunction	13	20
Small bowel obstruction	10	11
Perineal wound	6	6
Other	3	5
Reoperation	[†] Patients	Operations
Ileostomy	11	15
Small bowel obstruction	2	2
Perineal wound	5	5
Other	1	2

*Modified from Phillips RK et al.^{14a}

[†]Number of patients in study = 70.

stomal output and seek medical care if it is not adequate, too watery, or too thick. Electrolyte abnormalities may be seen more commonly in patients with a significant portion of the distal ileum resected; these include loss of sodium, chloride, potassium, and bicarbonate leading to acidosis.²¹ The low output of acidic urine may lead to precipitation of uric acid stones in the urinary tract. Bile acid malabsorption and supersaturated bile may be responsible for increased incidence of gallstones seen in ileostomy patients that are postcolectomy for ulcerative colitis.^{22,23}

Technical complications during pelvic dissection can lead to urinary and sexual dysfunction due to damage of sympathetic and parasympathetic nerves. This may have a profound psychological impact on patients post-operatively. Impotence can occur in 1 to 2% of patients following proctectomy for benign disease.²⁴ Retrograde ejaculation is a more common complication and has been reported in up to 5% of males. Dyspareunia and episodic vaginal discharge resulting from pelvic floor disruption may lead to impaired quality of life in females. Female fertility may be diminished, but the procedure does not preclude full-term pregnancy with normal vaginal delivery.²⁵ Complications can be minimized with meticulous dissection and a clear understanding of pelvic anatomy.

QUALITY OF LIFE

There is no question that physicians must be cognizant of the fact that quality of life is of major importance to the patients we care for and it should be looked at as an important outcome measure of the success of any surgical procedure. For example, a well-constructed stoma can have a significant impact on a patient's quality of life compared with a poorly constructed one. In general, the quality of life of patients who have undergone proctocolectomy and Brooke ileostomy is greatly improved when compared with their quality of life prior to surgery due to eradication of the disease and restoration of overall general health. Although the clinical results are good for proctocolectomy and Brooke ileostomy, patients are permanently incontinent of gas and stool. Presence of the stoma certainly has limiting effects socially, sexually, and for sport activities. Despite these drawbacks, over 90% of patients adapt well to the limitations and can enjoy a near-normal lifestyle including return to work. The great success of the ileal pouch-anal operation may not only be the fact that it is a safe and effective operation, but that it likely offers patients a better quality of life. Pemberton and associates²⁶ looked at quality of life after Brooke ileostomy and IPAA and found that 93% of patients with Brooke ileostomy were satisfied, compared with 95% of patients with IPAA. Dietary variables and return to activities in Brooke ileostomy patients were comparable to those patients with an IPAA (see Table 2).

Table 2 Patient Satisfaction after Proctocolectomy*

Variable	Brooke (%)	IPAA (%)
Overall satisfaction	93	95
Dietary satisfaction	97	95
Dietary restriction	28	22
Return to work/school	98	94

*Modified from Pemberton JH et al.²⁶

CONCLUSIONS

Innovative thinking and the desire by colon and rectal surgeons to improve patients' quality of life have led to changes in the surgical management of chronic ulcerative colitis. Proctocolectomy with Brooke ileostomy has been supplanted as the "gold standard" operation by IPAA for the treatment of patients plagued by this debilitating disease. Despite its limited role, proctocolectomy and Brooke ileostomy remains a safe and effective operation in selected patients who are not good candidates for IPAA. In well-trained hands this operation can be done with low morbidity and mortality and provide excellent long-term results.

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