Continent Ileostomy: Current Status

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ABSTRACT

Continent ileostomy (Kock pouch) is an alternative to end ileostomy for patients who have undergone total proctocolectomy. The procedure reached its height of popularity in the late 1960s and early 1970s, but has been supplanted by restorative proctocolectomy, an operation that preserves the natural route of defecation. Continent ileostomy is still appropriate for selected patients with ulcerative colitis and familial polyposis who are not candidates for restorative proctocolectomy, for whom restorative proctocolectomy or end ileostomy have failed, and in a few other selected cases. Complication rates have decreased during the past three decades following technical improvements, but remain significant. In this review, the author summarizes the current indications for continent ileostomy, examines recent technical modifications, and discusses the management of complications.

KEYWORDS: Continent ileostomy, Kock pouch, technique, complications

Objectives: On completion of this article, the reader should be able to summarize current indications for continent ileostomy and be able to discuss changes in construction techniques and the management of complications.

In the 1950s, total proctocolectomy and end ileostomy was the standard operation for ulcerative colitis. The continent ileostomy, introduced by Kock and colleagues in 1969, improved patients' quality of life by eliminating the need for a protruding stoma and an external appliance.¹⁻³ Enthusiasm for the continent ileostomy (Kock pouch) was initially strong, but subsequently declined for two reasons.⁴ First, the technique of pouch construction, especially of the valve, is complex and is associated with a high incidence of complications and reoperation.⁵⁻¹⁰ Second, the introduction of the restorative proctocolectomy (ileal pouch-anal anastomosis or IPAA) in the late 1970s, preserved the natural route of defecation, had high patient satisfaction, and had a relatively lower rate of complications.¹¹⁻¹³ Although the indications for continent ileostomy have contracted, the operation is still appropriate for selected patients. In this review, I summarize the current indi-

cations for continent ileostomy, examine recent technical modifications, and discuss the management of complications.

CURRENT INDICATIONS FOR CONTINENT ILEOSTOMY

Current indications for a continent ileostomy are listed in Table 1. Although the majority of patients with a conventional ileostomy live a near-normal life, some experience debilitating problems including hernia, fistula, prolapse, recession, and leakage.¹⁴⁻¹⁸ Patients with ileostomy malfunction may be candidates for continent ileostomy, especially if stoma revision and relocation have already failed and if it is not possible to reestablish bowel continuity.

Construction of an IPAA may not be possible if the small intestine is not long enough to reach the pelvic

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Table 1 Indications for a Continent Ileostomy

Conventional ileostomy malfunction
Pelvic pouch not an option
Failed pelvic pouch
Patient preference

floor or if anal sphincter function is inadequate. Patients with rectal cancer and ulcerative colitis may need sphincter resection or pelvic radiation. In these circumstances, continent ileostomy may be considered in patients who wish to avoid a conventional ileostomy.

When a pelvic pouch operation fails, three options are available: end ileostomy, redo-IPAA, and continent ileostomy.^{19,20} Converting an IPAA to a continent ileostomy has two attractions. "Continence" is preserved and the intestine used in the original pelvic pouch construction may be conserved in many cases. Conversion of failed pelvic reservoirs to continent ileostomies has been reported by several groups.²¹⁻²⁴ The technique involves intussuscepting the afferent (long end of the "J") into the pouch to create a valve. The bowel above the valve is divided and reconnected to the previous distal opening of the pouch (apex). The new continent ileostomy is attached to the abdominal wall (Fig. 1).

Most patients with a conventional ileostomy are satisfied with its function and are able to work and perform tasks of daily living. Indications for conversion to a continent ileostomy include organic stomal prob-

lems and psychosocial maladjustment to end ileostomy.²⁵ In a series of 85 continent ileostomy constructions reported by Cohen in 1982, most conversions to a continent ileostomy were done because of psychological and sexual difficulties related to a conventional ileostomy and external appliance.²⁶

CONTRAINDICATIONS FOR CONTINENT ILEOSTOMY

Contraindications to construction of a continent ileostomy are summarized in Table 2. Because the reservoir will not drain itself spontaneously, patients must be psychologically and physically able to intubate their reservoirs several times a day. Patients with disabilities or those in a nursing home may be better off with a conventional ileostomy.

Reoperation is always a possibility with a continent ileostomy. Therefore, patients with familial polyposis and a personal or family history of desmoid disease are often discouraged from a continent ileostomy as the surgery may stimulate desmoid growth.²⁷

Obesity is a relative contraindication for continent ileostomy because excessive mesenteric fat increases the risk of valve slippage (see below).

To construct a continent ileostomy, ~50 to 70 cm of small intestine are used. When a pelvic pouch fails, the reservoir must be removed, resulting in intestinal loss. Therefore, a continent ileostomy is usually not offered to patients with marginal small bowel length because of the

Figure 1 The conversion of a J-pouch to a continent ileostomy.

Table 2 Contraindications for a Continent Ileostomy

Mentally or physically challenged
Desmoid disease
Obesity
Marginal small-bowel length
Inability to accept risk of complications
Crohn's disease

risk of short bowel syndrome. Patients who choose continent ileostomy should be fully informed of the risks of the procedure, including the possible need for reoperation because of pouch malfunction.

Whether intestinal reservoirs should be offered to patients with Crohn's disease is controversial.²⁸⁻³⁶ Each of the large reported series of continent ileostomies has contained a few patients with Crohn's disease (either diagnosed after creation of the continent reservoir or known preoperatively). As a group, Crohn's patients have a higher complication rate including pouch loss, similar to the restorative proctocolectomy experience.^{4,31} Some authors have tried using jejunum to construct the reservoir,³²⁻³⁴ or they selected patients with an absence of small bowel disease.³⁶ Unfortunately, none of these measures has significantly reduced subsequent complications. Currently, most surgeons would be extremely hesitant to offer a continent ileostomy to a Crohn's patient.

CURRENT POUCH DESIGNS

Continent ileostomies have two major components: a reservoir and an outlet valve. Variations on these components are used in the three types of pouches currently being constructed: a 3-limb S-pouch, the Barnett continent ileal reservoir (BCIR), and the T-pouch.³⁷

The *3-limb S pouch* introduced by Fazio uses three 15-cm small bowel limbs to construct the reservoir (Fig. 2), and the efferent limb of 15 to 20 cm is intussuscepted to produce the valve. Because the pouch is closed horizontally rather than by a vertical folding, the tip of the valve enters a wide open space. In addition, the locations of the valve and the proximal intestine supplying the pouch are separated from each other. This arrangement makes attachment of the pouch and valve to the internal aperture of the abdominal wall technically easier and reduces the chances of pouch injury with intubation. This type of pouch also has the advantage of high capacity.^{4,37}

Over the years, several technical aspects of the pouch have been modified to improve its success. Valve intussusception and adherence between the opposing intussuscepted intestinal walls can be difficult to achieve. A durable valve requires a segment of small bowel to be fixed in a position of lasting intussusception. Dessusception leads to incontinence and impaired pouch intuba-

tion. The weakest point of the valve is on the mesenteric side where intussusception produces a large bulk of fatty mesentery that prevents the two intussuscepted walls from firmly attaching to each other. To minimize this problem, the peritoneum and fat of the mesentery of the bowel used to make the valve is removed prior to its intussusception.^{4,38-40} After it is intussuscepted, linear staples are used to stabilize the valve to itself and fix the valve to the side wall of the reservoir (Fig. 2).^{3,41-43}

In the 1980s, Barnett noted that naturally occurring intussusceptions develop in a forward, isoperistaltic direction and often require mechanical or surgical reduction. With that in mind, he advocated a type of reservoir that he designated as a *Barnett continent ileal reservoir* (BCIR).^{44,45} The reservoir is composed of a folded two-limb pouch (Fig. 3), with the afferent limb of small bowel used to construct the nipple valve by isoperistaltic intussusception (direction of peristalsis toward the pouch).^{33,46} The residual efferent limb is wrapped around the nipple valve and the proximal bowel is reattached to the bottom of the pouch to resume intestinal continuity.⁴⁷ This modification was designed to reduce the incidence of valve slippage and fistula formation. However, it is a complicated pouch to construct and more recent valve modifications such as stapling the valve to the reservoir wall have limited its necessity. Isoperistaltic valves are routinely created in two other instances: conversion of failed pelvic pouches to continent ileostomy^{21,23} (Fig. 1) and pouch rotation to create a new valve (Fig. 4).³⁷

Another recently described variation is the *T-pouch* in which a portion of ileum is folded into the side of the pouch rather than being intussuscepted (Fig. 5). Theoretically, this eliminates valve slippage. This antireflux device is also used in orthotopic ileal neobladder.⁴⁸ A recent report by Kaiser et al⁴⁹ introduced the T pouch as an intraabdominal continent stool reservoir. Unfortunately, there are no controlled data to suggest that this modification is any better than the standard procedure used at most centers.

COMPLICATIONS

Early complications of continent ileostomies include leakage from the suture lines, necrosis of the intussuscepted valve, and hemorrhage from the various suture lines.²⁹ Minor hemorrhage can be managed with irrigation of the pouch with saline or saline with epinephrine or endoscopic fulguration. Major hemorrhage, perforation, or valve necrosis usually requires surgical repair.

Late complications include valve slippage, prolapse, fistulas, volvulus, perforation hernia, valve stenosis, or pouchitis.⁵⁰ Valve slippage, when it occurs, usually does so in the first 3 months postoperatively and is uncommon after 12 months. Symptoms of valve slippage are incontinence to gas or feces or difficulty in intubating

Figure 2 The 3-limb S-pouch continent ileostomy.

Figure 3 The Barnett continent ileal reservoir (BCIR).

the pouch. Major valve slippage usually requires surgical repair.

When a valve cannot be intubated but the pouch remains continent, the patient has a functionally com-

plete bowel obstruction and needs urgent medical assistance. Several options are available to the initial provider to address the situation. A pediatric rigid or flexible endoscope can be inserted under direct vision through

Figure 4 Pouch rotation for failed nipple valve.

the stoma into the pouch. Gas and intestinal contents can be suctioned, temporally decompressing the functional obstruction. A guide wire or stylet can then be passed through the scope channel; using this as a guide, a catheter can be inserted into the pouch to provide longer term drainage, which relieves the functional small-bowel obstruction. The tube should be fixed in place (using a stabilizing belt or appliance) and connected to a drainage bag. The patient can then be referred to a specialized center for additional evaluation or treatment. If this is the patient's first episode of dysfunction, a 5- to 14-day period of continued drainage may be tried. This provides time for bowel edema to subside and may allow healing or resolution of the problem. After a period of drainage, attempts at reintubation by the patient under medical observation may be attempted. If intubation difficulties persist, the tube should be reinserted by the provider as described above. The tube should remain in the pouch connected to gravity drainage until the pouch can be revised surgically.

In the large series of continent ileostomies from the Mayo Clinic, there were fewer complications in women and in patients who were undergoing the continent ileostomy at the same time as the proctocolectomy rather than as a staged procedure.⁷ This was attributed to the fact that the mesentery at the primary operation was less likely to be thickened and scarified and thus more easily be intussuscepted. It was also thought that the superior results in women were due to the fact that their

mesentery was less fatty and could more easily be intussuscepted.

Valve prolapse occurs when the fascial defect, which is made to bring out the efferent loop, is too large. This can be remedied merely by narrowing the opening in the fascia. Fistulas can form at the base of the valve and cause incontinence by allowing the fecal stream to bypass the valve. In these situations, the patient will notice incontinence, but will not have difficulty intubating, as is the case with valve slippage.

Fistulas can occur anytime after surgery and may arise from the nipple valve, the pouch, or a remote loop of small intestine.² Valve fistulas are the result of technical problems of valve construction (sutures being placed through the walls of the valve and tied too tightly, improper staple usage, overzealous use of electrocautery in the scarification of the bowel, or erosion of prosthetic material) or intestinal disease, especially Crohn's disease. Fistulas can also form between the pouch and the abdominal wall. They commonly present as a parastomal abscess, which then drains and matures as an enterocutaneous fistula. Fistulas that develop through the base of the valve allow the intestinal contents to bypass the valve and render it incontinent. Abscesses require drainage and antibiotics may help. Fistulas may respond to drainage, medication, closure with fibrin glue or plugs, or surgical correction.

Dislocation and volvulus of the pouch are caused by inadequate fixation on the reservoir to the abdominal

Figure 5 The T-pouch.

Table 3 Complications after a Continent Ileostomy

Complication	Incidence (%)
Pouchitis	10–30
Nipple-valve slippage	3–25
Fistula	0–10
Stomal stricture	10
Nipple prolapse	4–6
Complications requiring operative revision	15–25
Stomal necrosis	1–2

From Beck.³⁷

wall. If volvulus occurs, it can result in necrosis of the entire pouch. Catheter perforation occurs, but is a very rare complication that usually requires an operative repair.

Skin-level stenosis may hinder tube insertion. It can result from too small a skin opening at initial construction, intestinal ischemia, infection, healing abnormalities, stomal retraction, or repeated trauma. It can be repaired with a skin level revision or z-plasty repair (see article on abdominal wall modification in this issue).³⁰

The incidence of mucosal inflammation in the pouch (pouchitis) varies from 10% to 30% in various series.⁵¹ It is manifested clinically by an increase in volume of the effluent. The succus entericus becomes watery, foul smelling, and sometimes bloody. Patients may also develop abdominal pain, distention, fever, and nausea. The complication is thought to be secondary to an overgrowth of bacteria and is usually treated successfully with antibiotics (metronidazole or ciprofloxacin) or probiotics and continuous catheter drainage to avoid stasis.

A summary of complications from several series is presented in Table 3.⁵¹ As with most postoperative complications, the incidence is dependent on the length of follow-up and how aggressively the complications were sought.

PATIENT MANAGEMENT

Patients being considered for a continent ileostomy must be extensively counseled about the procedure, its limitations, and possible complications. At Ochsner, we currently perform ~5 to 6 continent ileostomy procedures per year. The patients receive a preoperative antibiotic bowel preparation; those with a functioning colon receive a mechanical cleansing. Admissions occur on the day of surgery. Postoperatively, patients are managed as described in my previous article in *Clinics of Colon and Rectal Surgery*.³⁷ They are offered liquids when they are hungry and solid food when there is gas, or intestinal contents start draining from their pouch catheter. Patients are instructed on catheter management and taught how to insert their drainage catheter. We use a Medina

catheter (Ileostomy catheter; Astra Tech, Molndal, Sweden). The pouch is left to continuous gravity drainage for 2 weeks. After this period, the patients extend the time they leave the catheter out until they reduce the number of intubations to 4 to 5 per day.

RESULTS

Recently, Lepisto and Jarvinen reviewed the long-term durability of continent ileostomies.⁵² Reviewing 96 patients who received continent ileostomies from 1972 to 2000 at Helsinki University Central Hospital, these authors identified a cumulative success rate of 71%. The most common reason for pouch excision was nipple-valve dysfunction; 85 reconstructions were required in 57 patients. The success rate of continent ileostomies was significantly lower than that for ileoanal anastomoses.

SUMMARY

The continent ileostomy continues to be a useful alternative for selected patients who have undergone total proctocolectomy for whom IPAA and conventional end ileostomy are not possible or desirable. Continent ileostomy offers patients freedom from the need for an external appliance with continence provided by a small intestinal valve. Reoperation still is commonly required for valve-related problems. Salvage surgery may involve valve recreation using the original intestine, valve excision, and the use of afferent intestine for neo-nipple valve creation with pouch rotation. The original operation introduced by Kock in 1969 has evolved, especially with regard to techniques directed at reducing the incidence of valve-related complications. In addition, innovative approaches such as the T-pouch (a continent reservoir that does not involve construction of an intussuscepted nipple valve) may provide additional promise.

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