Clinical Aspects of Continent Ileostomies

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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 the height of its popularity soon after its introduction in 1969, but subsequently was supplanted by ileal pouch-anal anastomosis (IPAA), 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 IPAA or for whom IPAA or end ileostomy have failed. Complication rates that initially were high have decreased during the past three decades following the steady introduction of technical improvements.

KEYWORDS: Continent ileostomy, Kock pouch, technique, review

Objectives: Upon completion of this article, the reader should be able to summarize current indications for continent ileostomy and be able to discuss changes in continent ileostomy design that have resulted in improved function.

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 Enthusiasm for the Kock pouch was initially strong but subsequently declined for two reasons.² First, the technique of pouch construction, especially of the valve, is complex and associated with complications and the need for reoperation is high.³⁻⁸ Second, Parks and Nicholls introduced an alternative in 1978, the restorative proctocolectomy or ileal pouch-anal anastomosis (IPAA) which preserves the natural route of defecation by using the patient's own sphincters to maintain continence.⁹ The IPAA has a relatively low reoperation rate for complications and high patient satisfaction.¹⁰⁻¹¹

Although the indications for continent ileostomy have contracted, the operation is still appropriate for some patients.² This article summarizes the current indications for continent ileostomy and major technical improvements made during the last three decades that have decreased complication rates and preserved a place

for the procedure in the armamentarium of intestinal surgeons. The initial management of continent ileostomy patients who present with urgent or emergency problems related to their continent stoma is also discussed.

INDICATIONS FOR CONTINENT ILEOSTOMY

Although the majority of patients with a conventional ileostomy live a near-normal life, some patients experience debilitating problems including hernia, fistula, prolapse, recession, and leakage.^{2,12} Such patients are candidates for continent ileostomy, especially if stoma revision and relocation have already failed and if it is not possible to construct a pelvic reservoir. It may be impossible or inappropriate to construct an IPAA if the small intestine is not long enough to reach the pelvic floor to create an anastomosis, the patient's anal sphincter function is inadequate, or a low rectal cancer is present. In these circumstances, continent ileostomy

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: David E. Beck, M.D., Department of Colon and Rectal Surgery, Ochsner Clinic Foundation, 1514 Jefferson Hwy., New Orleans, LA 70121. E-mail: dbeckmd@aol.com. ¹Department of Colon and Rectal Surgery, Ochsner Clinic Foundation, New Orleans, Louisiana. Copyright © 2004 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA. Tel: +1(212) 584-4662. 1531-0043,p;2004,17,01,057,063,ftx,en;ccrs00161x.

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.^{13,14} Converting an IPAA to a continent ileostomy (Kock pouch) is attractive for two reasons. First, continence is preserved. Second, the intestine used in the original pelvic pouch construction may be conserved in many cases. Conversion of a failed pelvic reservoir to a continent ileostomy has been reported by several groups since the 1980s.^{15,16}

Most patients with a conventional ileostomy are satisfied with its function and are able to work and perform tasks of daily living. Indications for converting a conventional to a continent ileostomy include organic problems and psychosocial maladjustment to end ileostomy.¹⁷ A continent ileostomy provides little to no physiologic improvement, but significantly improves lifestyle and body image. Continence and the lack of an external appliance enhance ability to engage in physical and social activities.

CONTRAINDICATIONS FOR CONTINENT ILEOSTOMY

Several patients should not be considered for a continent ileostomy. Since the reservoir will not drain itself spontaneously, patients who are unlikely to master pouch intubation for mental, psychological, or physical limitations should not receive a continent ileostomy. Patients with a personal or family history of desmoid disease are advised against continent ileostomy because the initial or potentially repeated surgery may stimulate desmoid growth.¹⁸ Obesity is a relative contraindication for continent ileostomy because excessive mesenteric fat increases the risk of valve slippage.

Small bowel length is an important consideration. To construct a continent ileostomy, ~50 or more centimeters of small intestine are used. When a pelvic pouch fails, the reservoir must be removed, resulting in the loss of a considerable length of intestine which may produce a short bowel syndrome. Therefore, a continent ileostomy is not usually offered to patients with marginal small bowel length. Patients who choose continent ileostomy must 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.^{2,19,20} However, most surgeons and the author of this manuscript feel that the risks of recurrent disease, complications, and the potential for subsequent bowel loss is too great a risk to construct a continent ileostomy in a patient with known Crohn's disease. More than 50% of patients with a continent ileostomy or anal pouch develop significant complications or lose their pouch.

POUCH DESIGN

In 1969, Kock reported a high-volume low-pressure intra-abdominal reservoir constructed from the terminal ileum using a double folding technique.^{1,21} As the technique evolved, a nipple valve was added by intussuscepting the efferent loop of the pouch. This addition proved to be the key element in preservation of continence. Kock and others have made various modifications that include enlargement of the pouch with a third loop, creation of mesenteric windows to facilitate the intussusception of the efferent loop, scarification of the ileum in the intussuscepted segment, and stabilization of the nipple valve with staples²²⁻²⁵ (Fig. 1). Prosthetic material was used to reinforce the intussusception in the past, but this led to an unacceptable number of fistulas. The use of prosthetic materials is not currently recommended.

Modifications by Barnett included constructing the intussuscepted valve from the afferent antiperistaltic segment of ileum and using an ileal cuff passed through the mesentery to prevent slippage of the nipple valve.²⁶ This method of continent ileostomy construction has been called a Barnett Continent Ileostomy Reservoir, or BCIR.²⁶ See Figure 2. An additional modification to either type of continent ileostomy (BCIR or three-limb S-pouch type) involved stapling the valve to the side of the reservoir and even more recently placing the staple line at the site of one of the pouch suture lines.^{2,27}

Finally, a new type of reservoir, the T pouch, has been evaluated. This type of pouch was originally used as an orthotopic ileal neobladder.²⁸ This reservoir features a serosal-lined antireflux mechanism (Fig. 3) instead of an intussuscepted valve. An recent report by Kaiser and associates introduced the T pouch as an intra-abdominal continent stool reservoir.²⁹ Because the valve is not intussuscepted, it cannot desusscept or slip. Long-term results with significant numbers of patients are needed before widespread adoption of this option can be recommended.

While the nipple valve is the key to the maintenance of continence, it is also the Achilles heel of the procedure because most complications are related to the valve. Currently a three-limb S pouch, BCIR, or the T pouch are being offered to patients. Discussion of the specific technical details of each of these procedures is beyond the scope of this article, but several articles on each procedure may be found in the reference list. A few centers are currently performing these procedures, but none has enough patients to perform randomized studies.

COMPLICATIONS

Early complications 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.

Figure 1 Continent ileostomy. (A) Three limbs of small bowel are measured and the bowel wall is sutured together. (B) After opening the bowel along the dotted lines in (A), the edges are sewn together to form a two-layered closure. (C) A valve is created by intussuscepting the efferent limb into the pouch and fixing it in place with a linear noncutting stapler. (Inset: staples in place on valve.) (D) The valve is attached to the pouch side-wall with the linear noncutting stapler. A cross-section of the finished pouch is shown. (E) After closure of the last suture line, the pouch is attached to the abdominal wall and a catheter is inserted to keep the pouch decompressed during healing.

Major hemorrhage, perforation, or valve necrosis usually requires surgical repair.

Late complications include valve slippage, prolapse, fistulas, volvulus, perforation hernia, valve stenosis, or pouchitis. 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 the pouch.

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

complete 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 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 and using this as a guide a catheter can be inserted into the pouch to provide longer-term drainage to relieve the functional

Figure 2 Barnett Continent Ileostomy Reservoir (BCIR). (A) Two limbs of small intestine are sewn together and opened. (B) The afferent limb is intussuscepted to form a valve and the valve is stapled and stapled to the side of the reservoir. (C) The pouch is folded back and sutured closed. Insert shows cross-section of pouch. (D) Completed BCIR. The afferent limb of bowel has been divided and reattached to the apex of the pouch and the efferent limb is wrapped around the valve to form a collar.

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 to assist drainage until the pouch can be revised surgically.

In the large series of continent ileostomies done at 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

Figure 3 T pouch. (A) Seromuscular sutures approximate the back wall of the pouch and fix the valve segment to the pouch through mesenteric windows. (B) The bowel is opened. (C) Edges of the bowel are closed over the valve segment. (D) The reservoir is folded in half and closed.

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 the operation 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, 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.

Dislocation and volvulus of the pouch are caused by inadequate fixation of the reservoir to the abdominal 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.³⁰

The incidence of mucosal inflammation in the pouch (pouchitis) varies from 10 to 30% in various series. It is manifested clinically by an increase in volume of the effluent. The succus entericus becomes watery,

Table 1 Complications after 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

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foul-smelling, and sometimes bloody. Patients may also develop abdominal pain, distention, fever, and nausea. The complication is thought to be secondary to overgrowth of bacteria and is usually treated successfully with metronidazole and continuous catheter drainage to avoid stasis.

A summary of complications from several series is presented in Table 1.³¹ As with most postoperative complications, the incidence is dependent on the length of follow-up and how aggressively the complications are sought. A recent review of the experience from Helsinki University Central Hospital described 96 patients who were followed from 0.5 to 29 years.³² Eighty-five reconstructions were performed in 57 patients and the most common indication was nipple valve dysfunction. The cumulative success rate was 77% at 15 years and 71% at 29 years.

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 and those with a functioning colon a mechanical cleansing. Admissions occur on the day of surgery. Postoperatively, patients are managed as described in *Clinics of Colon and Rectal Surgery*, volume 16–3. 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 expand the time they leave the catheter out as described in Table 2.

A recent review of the long-term durability of continent ileostomies was performed by Lepisto and Jarvinen.³² Reviewing 96 patients who received continent ileostomies from 1972 to 2000 at Helsinki

Table 2 Catheter Management after Continent Ileostomy

1. Leave catheter in pouch and to drainage for 2 to 3 weeks after surgery. Catheter may be removed for a few minutes to wash out any blockage and then reinserted.
2. On postoperative day (POD) 14 remove catheter for 1 hour then reinsert catheter to drain pouch. Continue draining every hour while awake. Reinsert catheter and connect to drainage while asleep.
3. On POD 15 extend time between drainage to 2 hours.
4. On POD 16 extend time between drainage to 3 hours.
5. On POD 17 extend time between drainage to 4 hours.
6. On POD 18 extend time between drainage to 5 hours.
7. On POD 19 extend time between drainage to 6 hours.
8. If crampy abdominal pain is experienced or the pouch feels full, reinsert the catheter to drain out stool or gas. Then resume the schedule to dilate the pouch.
9. When the catheter can be left out for 6 or more hours, the catheter may be left out during sleep.
10. At this point, the pouch should be intubated (catheterized) four to five times a day, usually before meals and at bedtime.

University Central Hospital, these authors identified a cumulative success rate of 71% at 29 years. The most common reason for pouch excision was nipple valve dysfunction and 85 reconstructions were required in 57 patients. The success rate of continent ileostomies was significantly lower than an ileoanal anastomosis.

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. It 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 use of afferent intestine for neonipple 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—appear promising.

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