

## ILEOANAL ANASTOMOSIS WITH RESERVOIRS: COMPLICATIONS AND LONG-TERM RESULTS

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**OBJECTIVE:** To determine the rate of complications of ileoanal pouch anastomosis, their treatment and their influence on a successful outcome.

**DESIGN:** A computerized database and chart review.

**SETTING:** Three academic tertiary care health centres.

**PATIENTS:** All 239 patients admitted for surgery between 1981 and 1994 with a diagnosis of ulcerative colitis and familial adenomatosis coli.

**INTERVENTIONS:** Sphincter-saving total proctocolectomy and construction of either S-type or J-type ileoanal reservoir.

**OUTCOME MEASURES:** Indications, early and late complications, incidence of pouch excision.

**RESULTS:** Of the 239 patients, 228 (95.4%) were operated on for ulcerative colitis and 11 (4.6%) for familial polyposis coli. One patient in each group was found to have a carcinoma not previously diagnosed. Twenty-eight patients had poor results: in 17 (7.1%) the ileostomy was never closed or was re-established because of pelvic sepsis or complex fistulas, sclerosing cholangitis or severe diarrhea; 11 (4.6%) patients required excision of the pouch because of anal stenosis, perirectal abscess-fistula or rectovaginal fistula. Three patients died — of suicide, and complications of liver transplantation and HIV infection. Thus, 208 patients maintained a functioning pouch. The early complication rate (within 30 days of operation) was 57.7% (138 patients) and the late complication rate was 52.3% (125 patients). Pouchitis alone did not lead to failure or pouch excision. Emptying difficulties in 25 patients with anal stenosis were helped in 2 by resorting to intermittent catheterization. Patients with indeterminate colitis had a higher rate of anorectal septic complications, and all patients having Crohn's disease after pouch construction had complicated courses.

**CONCLUSIONS:** The complication rate associated with ileoanal pouch anastomosis continues to be relatively high despite increasing experience with this technique. Overall, however, a satisfactory outcome was obtained in 87% of patients.

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**OBJECTIF :** Déterminer le taux de complications d'une anastomose à réservoir iléoanal, leur traitement et leurs conséquences.

**CONCEPTION :** Étude de bases de données informatisées et de dossiers.

**CONTEXTE :** Trois centres de santé universitaires de soins tertiaires.

**PATIENTS :** Les 239 patients admis pour une intervention chirurgicale entre 1981 et 1994 chez lesquels on a diagnostiqué une colite ulcéreuse et une adénomatosis coli familiale.

**INTERVENTIONS :** Proctocolectomie totale épargnant le sphincter et construction d'un réservoir iléoanal en S ou en J.

**MESURES DE RÉSULTATS :** Indications, complications précoces et tardives, et incidence de l'excision du réservoir.

**RÉSULTATS :** Sur les 239 patients, 228 (95,4 %) ont subi une intervention pour une colite ulcéreuse et 11 (4,6 %) pour une polypose familiale du côlon. On a constaté la présence d'un cancer non diagnostiqué auparavant chez un patient de chaque groupe. Vingt-huit patients ont eu des résultats médiocres : chez 17

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(7,1 %), l'iléostomie ne s'est jamais refermée ou a été rétablie à cause d'une infection pelvienne ou de fistules complexes, d'une cholangite sclérosante ou d'une diarrhée grave; chez 11 (4,6 %) des patients, il a fallu exciser le réservoir à cause d'une sténose anale, d'un abcès-fistule périrectal ou d'une fistule recto-vaginale. Trois patients sont morts — de suicide, des complications d'une transplantation du foie et d'une infection par le VIH. Ainsi, 208 patients ont gardé un réservoir fonctionnel. Le taux de complications précoces (dans les 30 jours suivant l'intervention) s'est établi à 57,7 % (138 patients) et celui des complications tardives, à 52,3 % (125 patients). L'infection du réservoir iléal à elle seule n'a pas entraîné l'échec de l'intervention ou l'excision du réservoir. On a soulagé les difficultés d'évacuation chez 25 patients qui avaient subi une sténose anale en recourant dans deux cas à un catéthérisme intermittent. Les patients atteints de colite indéterminée présentaient un taux plus élevé de complications attribuables à une infection anorectale et tous les patients atteints de la maladie de Crohn après la construction du réservoir ont connu une évolution compliquée.

**CONCLUSIONS :** Le taux de complications associées à l'anastomose du réservoir iléoanal demeure relativement élevé en dépit de l'expérience croissante tirée de l'utilisation de cette technique. Dans l'ensemble, toutefois, on a obtenu un résultat satisfaisant chez 87 % des patients.

**C**onstruction of the ileoanal pouch is an innovative approach to the management of ulcerative colitis and familial polyposis that has revolutionized the care of these patients. Encouraging reports with very satisfactory functional outcomes have been published widely.<sup>1-4</sup> Groups with large experience have documented the early complications related to the surgery and have shown a progressive decline in early complications as surgical experience increases.<sup>5</sup> Changes in pouch function over time have raised new questions for the surgeon. The aim of our study was to analyse the appearance of disease-related events over time in a cohort of patients followed up at the McGill University teaching hospitals.

**PATIENTS AND METHODS**

A computerized registry (Dbase III+) of 239 patients (139 men and 100 women with a mean [and standard deviation] age of 34 [11] years) treated by the authors for ulcerative colitis or familial adenomatous coli, and containing a list of names, case numbers, date of surgery, diagnosis and date and type of complications, was generated in a prospective manner. From this list and from the hospital registry, the hospital charts of all patients operated upon between July 1981 and March 1994 were reviewed. The data collected included name, age,

sex, diagnosis, duration of disease, date of surgery, type of reservoir construction, the use of a temporary ileostomy and functional results over time (patient's report of stool frequency, degree of continence at follow-up visits, complications after surgery and their management).

Of these 239 patients, 180 (75.3%) had S-type (triple loop, hand sewn) reservoirs constructed and 59 (24.7%) had J-type (double loop, stapled) reservoirs constructed. Two hundred and twenty-eight (95.4%) were operated on for ulcerative colitis and 11 (4.6%) for familial polyposis coli. An unsuspected malignant lesion of the colon was found at laparotomy in 1 patient in each group: a Dukes' stage A lesion (limited to bowel wall) was found in the sigmoid colon of a patient with ulcerative colitis and a carcinoma of the sigmoid colon with a solitary, re-

sectable liver metastasis was discovered in a 24-year-old woman with polyposis coli. The most frequent indications for surgery in ulcerative colitis were intractability, toxic colitis or megacolon (Table I). In 151 (63.2%) patients, the colectomy and pouch construction was performed at the same session (2-stage), whereas in 88 (36.8%) a colectomy and ileostomy had been done before the pouch conversion (3-stage).

For the purpose of this study, early complications were those occurring in the first 30 days after operation and late complications were those occurring beyond this period over several years of follow-up. Early and late effects on bowel function and the patients' general condition were recorded. The original pathological diagnosis was reviewed, and associated extraintestinal manifestations were recorded.

**Table I**

**Indications for Ileoanal Pouch Anastomosis in 239 Patients**

Indication	No. of patients
Intractable ulcerative colitis	172
Megacolon/toxic colitis	33
Dysplasia in ulcerative colitis	8
Hemorrhage in ulcerative colitis	7
Pouch revision or reconstruction	4
Perforation in ulcerative colitis	2
Hemolytic anemia and ulcerative colitis	2
Adenomatous polyposis coli	11

## Operative procedure

Briefly, the patients receive a complete mechanical bowel preparation and either prophylactic oral antibiotics (neomycin and metronidazole) the day before operation with 1 dose of intravenous first-generation cephalosporin on induction of anesthesia or intravenous broad-spectrum antibiotics before induction, depending on the surgeon's preference. In general, autologous blood donation is encouraged. The total abdominal colectomy, with omental preservation, is followed by a meticulous pelvic dissection close to the rectum, preserving the pelvic nerves and allowing the levator muscles to be exposed. The rectum is then divided with cautery after an assistant has measured a 4-cm stump by placing a finger in the anus. When an endorectal mucosectomy is planned, peranal exposure is provided by effacement of the anus with 2 sets of Gelpi retractors placed at right angles, obliquely in women to avoid injury to the perineal body. The dentate line is visualized and the submucosa injected with a dilute solution of saline with epinephrine (1:200 000). The dissection is initiated with a cautery tip at the mucocutaneous junction and is continued with scissors cranially, preserving the internal sphincter in a circular manner until the cut edge of the rectal stump is reached. The ileum is then mobilized by freeing the root of the mesentery to the level of the duodenum, and the ileocolic artery is divided proximal to its last branching to preserve the blood supply to the end of the divided ileum. A useful measure is to test the length so it reaches beyond the symphysis pubis. In the majority of patients when construction of an S-pouch is planned, the pouch is then prepared by opening 3 limbs of ileum 15 cm long measured on the stretch with a 2-cm distal limb unopened. The cut edges are anastomosed side to side with 1 row of running polyglycolic acid 3-0 suture. The

distal line is anastomosed to the dentate line with interrupted hand-sewn absorbable 3-0 sutures when a transanal mucosectomy is performed.

The double stapling technique without mucosectomy is used in J-pouch construction. Here, a transverse linear stapler is applied at the level of the levator muscles, which is usually 1 cm above the dentate line by inspection with an anoscope. Two limbs, each 15 cm long, are anastomosed using linear staplers, with elimination of the distal spur.

All the patients had a temporary loop ileostomy constructed, with all S-pouch patients having a counterclockwise rotation to place the functional opening inferiorly; most were supported over a small rod for 7 days. After an average of 3 months, patients are considered for takedown. Before closure of the stoma, digital anorectal examination, endoscopy with a narrow rigid sigmoidoscope and a contrast imaging study is obtained to assure integrity of all suture lines and to assess emptying. When an abnormality is detected, such as a leak, fistula, dehiscence or stenosis, closure is delayed until the problem is resolved satisfactorily. The incision is closed primarily over a hand-sewn reanastomosis of the antimesenteric wall.

## RESULTS

### Overall

Overall, in our study, 208 out of 239 patients maintained a functional pouch for a success rate of 87.0%. Twenty-eight (11.7%) patients had poor results: 11 (4.6%) patients had pouch failure or need for excision, and in 17 (7.1%) the ileostomy was never closed or was re-established. The commonest reason for pouch failure was severe chronic perianal septic complications including high anal fistulas, rectovaginal fistula and recurrent supralelevator abscess. Although clini-

cally suspected, pathologic Crohn's disease of the pouch was only confirmed in 1 patient who subsequently underwent pouch excision for severe pouch-perianal fistulous disease. Reasons for nonclosure or re-establishment of the ileostomy were pelvic sepsis (11 patients) excessive diarrhea (4), sclerosing cholangitis (1 patient) and complex anal fistula (1). Three patients died of unrelated events: suicide, death after liver transplantation and post-transfusion HIV infection.

### Early complications

The most frequent early complications were infectious (Table II) and included 41 (17.2%) patients with urinary tract, wound or intra-abdominal sepsis. The overall incidence of wound infection was 9.2% if the 6 infections in the closure of the ileostomy phase are included. Paresis of the upper extremities was present in 5 patients and of the lower extremities in 3 (1 in Lloyd-Davis and 2 in Allen stirrups). The pareses resolved spontaneously. They were likely related to positioning in lithotomy with excess lower limb abduction and overabduction of the upper extremities. Nasogastric suction was not routinely used post-operatively; however, prolonged ileus developed in 12 (5.0%) patients, necessitating decompression. Complete bowel obstruction requiring laparotomy occurred in 11 (4.6%) patients. Subclavian vein thrombosis and pulmonary embolism developed despite the routine prophylactic use of subcutaneously administered heparin. Compartment syndrome of both lower extremities occurred in 1 patient early in the series when prolonged elevation was used; bilateral fasciotomy was required. Five anastomotic leaks occurred at the site of the stapled ileoanal anastomosis. Following takedown of the stoma, other complications developed: ileus in 12 (5.0%) patients, wound infection in 6 (2.6%)

patients and anastomotic leak in 3 (1.2%) patients at the site of intestinal closure; in 1 patient, anastomotic leakage of the ileostomy closure led to peritonitis and re-establishment of the stoma. This patient preferred the stoma to restoration of continuity. In 5 (2.1%) patients, an anastomotic sinus was found. In 3 it was found in as-

sociation with rectovaginal fistula at the time of pouch contrast study before closure of the ileostomy. In these patients, the pouch could not be restored despite local attempts to treat the problem. In 1 patient, rectovaginal fistula developed after resolution of the sinus and closure of the stoma. This responded to a new stoma and a bulbocavernosus flap repair, with eventual closure of the stoma. In the fifth patient, a fistula that had healed before closure of the stoma recurred with an abscess. A new stoma was required followed by a total revision of the pouch and later closure of this stoma. In another 4 patients, satisfactory healing of the sinus did not lead to recurrent anastomotic problems when the stoma was closed.

Late complications

Idiopathic reservoir inflammation or pouchitis developed in 44 (18.4%) patients over the study period (Table III). In 1 patient pouchitis presented before

closure of the temporary ileostomy, and endoscopy showed quite severe mucosal changes with edema, weeping of watery mucus and fine punctate ulcerations. The inflammation responded to topical instillation of steroid foam and resolved completely when the stoma was closed, suggesting a form of defunctioned ileitis. In 2 patients, a stool analysis revealed the presence of *Clostridium difficile* toxin during an episode of severe diarrhea; vancomycin was used in one, and metronidazole was effective in the other. In 31 (70%) of the patients who had pouchitis, a single episode of diarrhea, malaise, rectal urgency and loss of control in severe cases occurred and responded to oral metronidazole combined with a bismuth preparation. Patients intolerant to metronidazole received trimethoprim-sulfamethoxazole or ciprofloxacin. In the remaining 30% of patients recurrent episodes were recorded. In no case was pouchitis implicated solely in the decision to excise the pouch.

Anal complications were quite frequent. Anal abscess-fistula developed in 23 (9.6%) patients and required drainage or fistulotomy, or both. The type of anastomosis (hand sewn or stapled) did not make a difference, with an occurrence in 18 of 180 hand-sewn and 5 of 59 stapled initial constructions. A history of fistula-in-ano did not predict the subsequent development of this complication. In 3 patients having pyoderma gangrenosum (manifested by perineal, peristomal or facial lesions), complex anal fistulas did lead to pouch excision. The appearance of a low fistula several years after pouch construction did not lead to pouch excision or loss of continence. Three patients with a high supralelevator fistula communicating with the pouch were suspected of having Crohn's disease and eventually required pouch excision when all conservative measures, including diversion, failed to heal the fistula. A fourth patient retained his pouch with

**Table II**

**Early Postoperative Complications (Within 30 Days) in 239 Patients Who Underwent Ileoanal Pouch Anastomosis**

Complication	No. (%) of patients
Urinary infection	19 (7.9)
Wound or drain site infection	16 (6.7)
Ileus	14 (5.8)
Anal abscess	12 (5.0)
Small-bowel obstruction	11 (4.6)
Paresis (arms or legs)	8 (3.3)
Anastomotic leak	8 (3.3)
Hemorrhage	8 (3.3)
Intra-abdominal abscess	6 (2.5)
Addisonian phenomenon	4 (1.7)
Deep venous thrombosis	3 (1.2)
Peritonitis	3 (1.2)
High ileostomy output	3 (1.2)
Subclavian vein thrombosis	3 (1.2)
Central line sepsis	3 (1.2)
Rectovaginal fistula	3 (1.2)
Pneumonia	2 (0.8)
Retrograde ejaculation	2 (0.8)
Early pouchitis	2 (0.8)
Shock, sepsis	1 (0.4)
Pulmonary embolism	1 (0.4)
Compartment syndrome (legs)	1 (0.4)
Pulmonary edema	1 (0.4)
Peristomal abscess	1 (0.4)
Wound dehiscence	1 (0.4)
Ileostomy prolapse, strangulation	1 (0.4)
Ileocutaneous fistula	1 (0.4)
Total	138 (57.7)

**Table III**

**Late Postoperative Complications in 239 Patients Who Underwent Ileoanal Pouch Anastomosis**

Complication	No. (%) of patients
Pouchitis	44 (18.4)
Anal stenosis	25 (10.5)
Anal abscess-fistula	23 (9.6)
Small-bowel obstruction	8 (3.3)
Crohn's disease	7 (2.9)
Rectovaginal fistula	6 (2.5)
Excessive diarrhea	4 (1.7)
Pyoderma gangrenosum	3 (1.2)
Pancreatitis	1 (0.4)
Sclerosing cholangitis	1 (0.4)
Desmoid abdominal wall	1 (0.4)
Anal squamous carcinoma	1 (0.4)
Mucosal prolapse	1 (0.4)
Total	125 (52.3)

3 continent bowel actions per day on long-term immunosuppression for a high perineoscrotal fistula.

Anal stenosis requiring dilatation under anesthesia was quite common (10.5%). In most cases, intermittent self-dilatation with a Hegar dilator size 14–15 was successful in restoring easy evacuation. In 11 (6.1%) patients with S-pouches, self-intubation using a straight Medina catheter 3 to 4 times daily allowed prompt emptying, thus avoiding excessive straining or inability to spontaneously evacuate the pouch. In 2 patients, despite the complete resolution of the stenosis, spontaneous evacuation remained impossible and required intermittent self-catheterization. This manoeuvre is not perceived as an impediment by the patients as long as satisfactory evacuation is achieved.

Rectovaginal fistula developed in 6 (2.5%) patients as a late complication. In 2, this was repaired endoanally using an advancement of the pouch; in 2 others, a bulbo cavernosus muscle rotation flap with temporary diversion was successful. In the remaining 2 patients, associated perianal disease and poor healing led to pouch excision.

## DISCUSSION

Our data reveal a high rate of complications and suggest that prompt recognition and treatment provide satisfactory function in the majority of patients. Despite several years of experience with the ileoanal pouch procedure, there appears to be an overall early rate of complications of 57.7%. Preventable complications such as urinary tract and wound infections require meticulous attention to detail and insistence on adequate bowel preparation and sterile technique in catheter management.

Pouchitis developed in 18.4% of our patients after intestinal continuity was restored. Telander and colleagues<sup>6</sup> reported that 40% of their patients suffered from pouchitis; of these patients,

15% had straight ileoanal reconstruction and 25% had a J-pouch. Various authors have reported an 8% to 31% incidence of pouchitis in patients operated on for ulcerative colitis.<sup>7–9</sup> Biopsies revealed diffuse inflammation of variable degree.<sup>10–12</sup> Although almost all functioning pouches show an increase of chronic inflammatory cells in the lamina propria; villous atrophy seems to vary in different areas of the pouch. These changes appear to be confined to the reservoir and only rarely extend into the proximal ileum.<sup>13</sup> Setti Carraro and colleagues<sup>14</sup> reported that half their subjects had a gradient of decreasing inflammation from distal to proximal. We have also noted this phenomenon. Colonic metaplasia often confuses the pathologist who reports “colonic mucosa” in ileal-pouch biopsies. Studies have shown colonic-type mucin in ileal pouches using Alcian blue staining and monoclonal antibody PR3A5, which is thought to be specific for colonic-type mucin.<sup>13,15</sup> Villous atrophy has been reported early after the creation of defunctioned pouches, before restoration of continuity; these changes are not typical of Crohn’s disease or ischemia, and some have speculated on the possibility of diversion ileitis.<sup>16</sup>

In its active phase, pouchitis is similar in appearance histologically to ulcerative colitis. Polymorphs appear to be located predominantly through the epithelium with crypt abscess formation and ulceration. Intraepithelial lymphocyte counts are low in ileal pouches and do not increase in pouchitis.<sup>17,18</sup> The condition is essentially confined to patients with ulcerative colitis. Indeed we did not see pouchitis in the 11 patients treated for polyposis coli by this procedure. The onset of pouchitis is usually insidious, but according to one study<sup>14</sup> of 60 patients, pouchitis never developed in those with only minor inflammatory changes, whereas of those with chronic more severe changes, one third

were at risk for chronic pouchitis. Possible etiologic factors include greater bacterial counts with a relative increase in anaerobes.<sup>19,20</sup> Although stasis has been implicated, retention was not documented in one study in which a radionuclide enema in the pouch was used to assess the emptying fraction.<sup>21</sup> No specific pathogenic bacteria have consistently been found to be associated with pouchitis.<sup>17,22</sup> Clinical response to metronidazole in cases of pouchitis is supported by experimental data showing a reduction in granulocyte migration to the pouch demonstrated using indium-labelled granulocyte scanning.<sup>23</sup> In another study of 15 patients having pouchitis, 10 responded to metronidazole.<sup>24</sup> It is not clear why a reduction in anaerobes would allow resolution of the problem. Probably restoration of a certain equilibrium in the flora is a factor. The restoration of short-chain fatty acids in the lumen<sup>25</sup> has been documented after treatment, and the theory of reactivation of inflammatory bowel disease<sup>26</sup> in the distal ileum with colonic metaplasia has been suggested.<sup>27</sup>

Short-chain fatty acids are also implicated in the development of pouchitis. A reduced level of short-chain fatty acids was found in affected ileal reservoirs, associated with a reduction in available substrate.<sup>19,28</sup> Although one study failed to show improvement with instillation of short-chain fatty acids into the pouch,<sup>29</sup> another used L-glutamine (1 g) in 10 patients with chronic pouchitis and obtained a response in 6.<sup>30</sup> Bile salts were found to be higher in ileal reservoirs,<sup>17,31</sup> but cholestyramine does not seem to give a predictable benefit.<sup>17</sup>

The association of extraintestinal manifestations, in particular arthritis,<sup>32</sup> with recurrent episodes of pouchitis, suggests that both are immune mediated. Prostaglandin E<sub>2</sub> and leukotriene B<sub>4</sub> are present both in colonic mucosa in ulcerative colitis and in ileal reservoirs.<sup>33</sup> Steroids (as membrane stabiliz-

ers) and acetylsalicylates (prostaglandin synthesis inhibitor) have been used to treat pouchitis.<sup>34</sup> Platelet activating factor<sup>35</sup> and tumour necrosis factor- $\alpha$ <sup>36</sup> are increased in pouchitis. Mucosal ischemia has also been implicated as a possible mechanism, and inhibition of oxygen free radicals by allopurinol has been attempted with 50% effectiveness but without long-term follow-up.<sup>37</sup> There was no clinical response in 3 of our patients with chronic pouchitis treated in this way.

Anastomotic stricture is common after ileoanal pouch anastomosis.<sup>7</sup> Postoperatively, before takedown of the ileostomy, digital examination and endoscopy with a 15-mm rigid proctosigmoidoscope are useful in identifying the problem, which can be solved in the office in most cases by gentle dilatation. It may be difficult to identify the lumen without combining visualization through the scope. When the anastomosis and pouch have been successfully visualized, a preoperative contrast radiograph should be obtained to identify sinuses or leaks from the anastomosis and suture lines that may have been subclinical as the pouch was defunctioned. Recurrent strictures may require repeat dilatations,<sup>38</sup> possibly under general anesthesia. Alternatively, we have used colonoscopic endoballoon dilatation under intravenous sedation to size 18 to 25 mm followed by daily self-insertion of Hegar type dilators (size 14 to 15) until an adequate lumen is maintained. Long, dense strictures are difficult to treat; some require intermittent catheterization of the pouch by the patient 3 to 4 times daily to assist emptying; 8 of our S-pouch patients were in this situation. Late obstruction may be due to scarring of the muscular anal canal and require opening of the muscular canal operatively.<sup>39</sup>

Since strictures may occur in patients with ulcerative colitis and familial multiple polyposis coli, they are not related to the underlying diagnosis.

Symptoms of outlet obstruction, such as straining, diarrhea, anal pain or abdominal pain are frequently present. In one report, 60% of strictures dilated under anesthesia recurred and required further dilatations, and of 42 patients with stricture, 6 had eventual pouch excision a mean (and standard deviation) of 69 (39) months after reoperation for stricture.<sup>40</sup> Of the remaining patients, 11 had recurrent strictures requiring intermittent dilatation and considered their function as poor, with a mean (and standard deviation) daily stool frequency decreasing from 14 (11) to 7 (3) after repeated dilatation for stricture.<sup>40</sup> In some cases, the pouch can be elevated out of the pelvis and reanastomosed.<sup>7</sup> We have experience with 3 patients who underwent reconstruction for stricture; 1 patient had a satisfactory result and the other 2 had recurrent strictures needing repeated dilatations.

Anal abscess-fistula developed in 9.6% of our patients over the study period. Perianal abscess-fistula occurred in patients with ulcerative colitis. These abscess-fistulas may precede the surgery and if successfully treated do not contraindicate the formation of a pouch. Of course, suspicion of Crohn's disease warrants caution and delay of the procedure to better define its evolution. Anal pain suggests the development of local sepsis and should be taken seriously. Endoscopic endorectal ultrasonography, when available, may suggest abnormalities, but the presence of an anastomosis may make interpretation difficult. Examination under anesthesia is suggested to assess the relationship of the septic process to the anastomosis. Internal drainage of intersphincteric abscesses is appropriate. Since we did not find a clustering of this complication in either method of anastomosis (i.e., hand sewn versus stapled) and the location of many abscess-fistulas was below the suture line, it would be difficult to imply that either technique is

associated with a higher risk of anal fistula.

Extensive ischiorectal suppuration often leads to complex fistulas frequently associated with a poor functional outcome. Anal pain, swelling, diarrhea, fever and an associated anastomotic stricture<sup>40</sup> are common presenting symptoms. Treatment includes drainage of abscesses, fistulotomy, dilatation of strictures and unroofing of internal tracts. In cases of intramural fistulization from the area of pouch suture line to the anal anastomosis, the overlying mucosa and ileal wall were divided over a probe, using electrocautery to unroof the fistula. Severe cases of sepsis require a diverting loop ileostomy.

We found no patients with low vitamin B<sub>12</sub> or folate levels at long-term follow-up, and Schilling tests were normal in the 38 patients tested. Similarly, Sandborn and colleagues<sup>18</sup> also found no gross abnormalities. In the study of M'Koma and colleagues,<sup>41</sup> up to 37% of patients at 36 months had impaired cobalamin absorption test results and did not respond to the addition of intrinsic factor. Interestingly, in that study, 38% of the patients had abnormal absorption preoperatively but not postoperatively. Since the distal 60 cm of ileum are the site of vitamin B<sub>12</sub> absorption, the finding that 10% of patients in M'Koma's study required long-term vitamin B<sub>12</sub> substitution whereas none of our patients did is difficult to explain by other than dietary mechanisms or test interpretation.

The decision to revert to a permanent ileostomy is often difficult for surgeon and patient alike. Factors leading to this outcome include: chronic intractable pelvic sepsis, fibrosis and high complex pouch-cutaneous fistulas, associated in most cases with an anastomotic leak.<sup>42</sup> In a study by Koltun and associates,<sup>43</sup> patients in whom the diagnosis was one of indeterminate colitis (defined as inflammatory colitis containing features on macroscopic and

microscopic evaluation of the colon that were consistent with both Crohn's disease and chronic ulcerative colitis) were predisposed to perineal complications and a high risk of reservoir loss. In a longitudinal study of 110 patients,<sup>44</sup> the cumulative probability of pouch failure was 12% at 5 years with half the failures occurring within 1 year and the commonest reasons being perianal or pelvic sepsis and probable Crohn's disease. Reoperation for a complication also carries the risk of eventual failure. In the study of Galandiuk and colleagues,<sup>40</sup> 69% of patients requiring several operations for pouch-related complications ultimately had the pouch excised compared with 14% of patients who had undergone only a single procedure. The probability of pouch preservation at 5 years was 70%, and those with intra-abdominal abscess-fistula were more likely to have their pouch excised over time.

Introduction of the pelvic reservoir with pouch-anal anastomosis has given patients an operative option that most consider more acceptable than a total proctocolectomy with permanent ileostomy. However, careful analysis of results reveals an overall high morbidity rate, which remains relatively stable despite increasing experience. When comparing the first half of the series with the second, we found a combined cumulative complication rate of 71% including early and late complications in the first 120 patients and 58% in the remaining 119. Nevertheless, prompt recognition and treatment of these complications results in pouch salvage, whereas neglected complications often led to pouch excision with permanent ileostomy.

## References

1. Parks AG, Nicholls RJ, Belliveau P. Proctocolectomy with ileal reservoir and anal anastomosis. *Br J Surg* 1980; 67:533-8.
2. Utsunomiya J, Iwama T, Imajo T, Matsuo S, Sawai S, Yaegashi K, et al. Total colectomy, mucosal proctectomy, and ileoanal anastomosis. *Dis Colon Rectum* 1980;23(7):459-66.
3. Dozois RR, Kelly KA, Welling DR, Gordon H, Beart RW Jr, Wolff BG, et al. Ileal pouch-anal anastomosis: comparison of results in familial adenomatous polyposis and chronic ulcerative colitis. *Ann Surg* 1989;210(3):268-73.
4. Wexner SD, Jensen L, Rothenberger DA, Wong WD, Goldberg SM. Long-term functional analysis of the ileoanal reservoir. *Dis Colon Rectum* 1989;32(4):275-81.
5. Fazio VW, Ziv Y, Church JM, Oakley JR, Lavery IC, Milsom JW, et al. Ileal pouch-anal anastomoses complications and function in 1005 patients. *Ann Surg* 1995;222(2):120-7.
6. Telander RL, Spencer M, Perrault J, Telander D, Zinsmeister AR. Long-term follow-up of the ileoanal anastomosis in children and young adults. *Surgery* 1990;108(4):717-25.
7. Kelly KA, Pemberton JH, Wolff BG, Dozois RR. Ileal pouch-anal anastomosis. *Curr Probl Surg* 1992;29(2): 57-131.
8. Becker JM, Raymond JL. Ileal pouch-anal anastomosis. A single surgeon's experience with 100 consecutive cases. *Ann Surg* 1986;204:315-8.
9. McMullen K, Hicks TC, Ray JE, Gathright JB, Timmcke AE. Complications associated with ileal pouch-anal anastomosis. *World J Surg* 1991;15(6): 763-7.
10. Nicholls RJ, Belliveau P, Neill M, Wilks M, Tabaqchali S. Restorative proctocolectomy with ileal reservoir: a pathophysiological assessment. *Gut* 1981;22(6):462-8.
11. Moskowitz RL, Shepherd NA, Nicholls RJ. An assessment of inflammation in the reservoir after restorative proctocolectomy with ileoanal ileal reservoir. *Int J Colorectal Dis* 1986;1(3):167-74.
12. McLeod RS, Antonioli D, Cullen J, Dvorak A, Onderdonk A, Silen W, et al. Histologic and microbiologic features of biopsy samples from patients with normal and inflamed pouches. *Dis Colon Rectum* 1994;37(1):26-31.
13. Shepherd NA, Jass JR, Duval I, Moskowitz RL, Nicholls RJ, Morson BC. Restorative proctocolectomy with ileal reservoir: pathological and histochemical study of mucosal biopsy specimens. *J Clin Pathol* 1987;40(6):601-7.
14. Setti Carraro P, Talbot IC, Nicholls RJ. Longterm appraisal of the histological appearances of the ileal reservoir mucosa after restorative proctocolectomy for ulcerative colitis. *Gut* 1994; 35(12):1721-7.
15. De Silva HJ, Millard PR, Kettlewell M, Mortensen NJ, Prince C, Jewell DP. Mucosal characteristics of pelvic ileal pouches. *Gut* 1991;32(1):61-5.
16. Harig JM, Soergel KH, Komorowski RA, Wood CM. Treatment of diversion colitis with short chain fatty acid irrigation. *N Engl J Med* 1989;320(1):23-8.
17. Shepherd NA, Hulten L, Tytgat GN, Nicholls RJ, Nasmyth DG, Hill MJ, et al. Pouchitis [review]. *Int J Colorectal Dis* 1989;4(4):205-29.
18. Sandborn WJ, Tremaine WJ, Batts KP, Pemberton JH, Phillips SF. Pouchitis after ileal pouch-anal anastomosis: a Pouchitis Disease Activity Index. *Mayo Clin Proc* 1994;69(5):409-15.
19. Nasmyth DG, Godwin PG, Dixon MF, Williams NS, Johnston D. Ileal ecology after pouch-anal anastomosis or ileostomy. A study of mucosal morphology, fecal bacteriology, fecal volatile fatty acids, and their interrelationship. *Gastroenterology* 1989;96(3): 817-24.
20. Luukkonen P, Valtonen V, Sivonen A, Sipponen P, Jarvinen H. Fecal bacteriology and reservoir ileitis in patients operated on for ulcerative colitis. *Dis Colon Rectum* 1988;31(11):864-7.
21. Heppell J, Belliveau P, Taillefer R, Dube S, Derbekyan V. Quantitative assessment of pelvic ileal reservoir emptying with a semisolid radionuclide enema. A correlation with clinical outcome. *Dis Colon Rectum* 1987;30(2):81-5.
22. O'Connell PR, Rankin DR, Weiland LH, Kelly KA. Enteric bacteriology, absorption, morphology and emptying after ileal pouch-anal anastomosis. *Br J Surg* 1986;73:909-14.
23. Kmiot WA, Hesselwood SR, Smith N, Thompson H, Harding LK, Keighley

- MR. Evaluation of the inflammatory infiltrate in pouchitis with <sup>111</sup>In-labeled granulocytes. *Gastroenterology* 1993; 104(4):981-8.
24. Dube S, Heyen F. Pouchitis and gastric hyosecretion: Cause or effect? *Int J Colorectal Dis* 1990;5:142-3.
  25. Sagar PM, Taylor BA, Godwin P, Holdsworth PJ, Johnston D, Lewis W, et al. Acute pouchitis and deficiencies of fuel. *Dis Colon Rectum* 1995;38(5):488-93.
  26. Luukkonen P, Jarvinen H, Tanskanen M, Kahri A. Pouchitis — recurrence of the inflammatory bowel disease? *Gut* 1994;35(2):243-6.
  27. Shepherd NA, Healey CJ, Warren BF, Richman PI, Thomson WH, Wilkinson SP. Distribution of mucosal pathology and an assessment of colonic phenotypic change in the pelvic ileal reservoir. *Gut* 1993;34(1):101-5.
  28. Clausen MR, Tvede M, Mortensen PB. Short-chain fatty acids in pouch contacts from patients with and without pouchitis after ileal pouch–anal anastomosis. *Gastroenterology* 1992; 103(4):1144-53.
  29. De Silva HJ, Ireland A, Kettlewell M, Mortensen N, Jewell DP. Short-chain fatty acid irrigation in severe pouchitis. *N Engl J Med* 1989;321(20): 1416-7.
  30. Wischmeyer P, Pemberton JH, Phillips SF. Chronic pouchitis after ileal pouch–anal anastomosis: response to butyrate and glutamine suppositories in a pilot study. *Mayo Clin Proc* 1993;68:978-81.
  31. Breuer NF, Rampton DS, Tammar A, Murphy GM, Dowling RH. Effect of colonic perfusion with sulfated and non-sulfated bile acids on mucosal structure and function in the rat. *Gastroenterology* 1983;84:969-77.
  32. Lohmuller JL, Pemberton JH, Dozois RR, Ilstrup D, van Heerden J. Pouchitis and extraintestinal manifestations of inflammatory bowel disease after ileal pouch–anal anastomosis. *Ann Surg* 1990;211:622-9.
  33. Gertner DJ, Rampton DS, Madden MV, Talbot IC, Nicholls RJ, Leonard-Jones JE, et al. Increased leukotriene B<sub>4</sub> release from ileal pouch mucosa in ulcerative colitis compared with familial adenomatous polyposis. *Gut* 1994; 35(10):1429-32.
  34. Keighley MR. Review article: the management of pouchitis. *Aliment Pharmacol Ther* 1996;10(4):449-57.
  35. Chaussade S, Denizot Y, Valleur P, Nicoli J, Raibaud P, Guerre J, et al. Presence of PAF-acether in stool of patients with pouch ileoanal anastomosis and pouchitis. *Gastroenterology* 1991; 100(6):1509-14.
  36. Murch SH, Braegger CP, Walker-Smith JA, MacDonald TT. Location of tumour necrosis factor alpha by immunohistochemistry in chronic inflammatory bowel disease. *Gut* 1993;34(12):1705-9.
  37. Levin KE, Pemberton JH, Phillips SF, Zimmerman AR, Pezim ME. Role of oxygen free radicals in the etiology of pouchitis. *Dis Colon Rectum* 1992;35:452-6.
  38. Francois Y, Dozois RR, Kelly KA, Beart RW Jr, Wolff BG, Pemberton JH, et al. Small intestinal obstruction complicating ileal pouch–anal anastomosis. *Ann Surg* 1989;209(1):46-50.
  39. Santos MC, Thompson JS. Late complications of the ileal pouch–anal anastomosis. *Am J Gastroenterol* 1993;88:3-10.
  40. Galandiuk S, Scott NA, Dozois RR, Kelly KA, Ilstrup DM, Beart RW Jr, et al. Ileal pouch–anal anastomosis. Reoperation for pouch-related complications. *Ann Surg* 1990;212(4):446-54.
  41. M'Koma AE, Lindquist K, Liljeqvist L. Biochemical laboratory data in patients before and after restorative proctocolectomy. A study on 83 patients with a follow-up of 36 months. *Ann Chir* 1994;48:525-34.
  42. MacRae HM, McLeod RS, Cohen Z. Risk factors for pelvic pouch failure. *Dis Colon Rectum* 1997;40:257-62.
  43. Koltun WA, Schoetz DJ Jr, Roberts PL, Murray JJ, Collier JA, Veidenheimer MC. Indeterminate colitis predisposes to perineal complications after ileal pouch–anal anastomosis. *Dis Colon Rectum* 1991;34(10):857-60.
  44. Setti-Carraro P, Ritchie JK, Wilkinson KH, Nicholls RJ, Hawley PR. The first 10 years' experience of restorative proctocolectomy for ulcerative colitis. *Gut* 1994;35(8):1070-5.

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