

Restorative Proctocolectomy with Ileal W Pouch for Ulcerative Colitis and Familial Adenomatous Polyposis

Katsuyoshi HATAKEYAMA, Kensuke YAMAI, Yuichiro INOUE, Yasuo SAKAI and Terukazu MUTO

Department of Surgery (I), Niigata University School of Medicine, Asahimachi 1, Niigata 951, Japan

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Summary. Restorative proctocolectomy with an ileal pouch has become an accepted, standard form of surgical treatment for ulcerative colitis and familial adenomatous polyposis. This operation has two aims: to completely resect all of the diseased area and to preserve the anal function, thus avoiding a permanent ileostomy. Five types of pouches have been developed: the S-shaped, J-shaped, H-shaped, W-shaped and the Kock pouch. Of these pouches, the W pouch using 4 loops of terminal ileum provides the largest reservoir volume. Since 1984, we have performed ileal W pouch-anal anastomosis for 25 patients with ulcerative colitis and familial adenomatous polyposis. We have found that the W pouch can maintain both spontaneous defecation and normal anal function without fecal incontinence. There were no patients with serious postoperative complications necessitating the removal of the pouch. Our current operative techniques and the results from these 25 patients are described in this paper.

INTRODUCTION

Restorative proctocolectomy with ileoanal anastomosis for ulcerative colitis and familial adenomatous polyposis not only removes all diseased mucosa but also avoids a permanent ileostomy. The straight ileoanal anastomosis, however, results in severe urgency, a high frequency of defecation, night evacuation and perianal excoriation. If a pouch is constructed proximal to the anus, better functional results are achieved.¹⁾ Thus, restorative proctocolectomy with an ileal pouch has become an accepted, standard form of surgical treatment. Since Parks et al. reported on a three-loop (S) pouch,²⁾

several other types of the pouch have been devised including the J-shaped,³⁾ H-shaped,⁴⁾ W-shaped,⁵⁾ and Kock pouches.⁶⁾ Development of a two-loop (J) pouch eliminated the need for catheter evacuation³⁾ but is associated with a significantly higher frequency of defecation and night evacuation.⁵⁾ Creation of a four-loop (W) pouch made spontaneous defecation possible and also provided improved function.⁵⁾

Since 1984, we have performed ileal pouch-anal anastomosis utilizing this four-loop, W configuration on 25 patients. It is the aim of this report to describe our current operative techniques and results.

OPERATIVE TECHNIQUE

Principle

This operation has two aims: to completely resect all areas of the disease and to preserve the anal function. The procedure is divided into six phases, including: 1) removal of the colon and proximal rectum; 2) construction of an ileal W pouch; 3) perianal resection of the mucosa of the anorectal stump; 4) ileal W pouch-anal anastomosis; 5) construction of a temporary diverting ileostomy; and 6) closure of the ileostomy. For patients with ulcerative colitis who are on steroid hormones, we carry out a three-stage operation: 1) total (or subtotal) colectomy, Brooke's ileostomy (or ascending colostomy) and mucus fistula of the rectosigmoid junction; 2) proximal full-thickness proctectomy, distal mucosal proctectomy, ileal W pouch-anal anastomosis and diverting ileostomy; and 3) closure of the diverting ileostomy. For patients

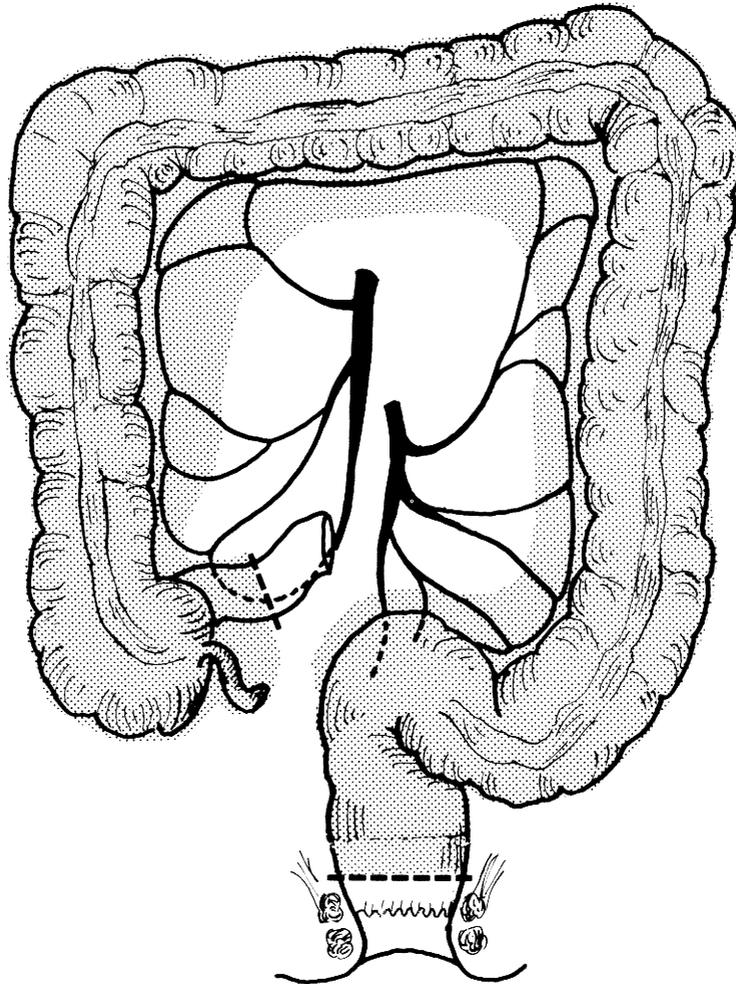


Fig. 1. Total colectomy and proximal full-thickness proctectomy. Dotted area indicates the area to be resected. A rectal cuff 1-2 cm from the dentate line is left.

receiving no steroid hormones, this operation is carried out in two stages: 1) total colectomy, proximal full-thickness proctectomy, distal mucosal proctectomy, ileal W pouch-anal anastomosis and diverting ileostomy; and 2) closure of the diverting ileostomy.

We shall describe here the techniques comprising the two-stage operation.

Removal of the colon and proximal rectum

The patient is placed in the lithotomy-Trendelenburg position for both abdominal and peranal procedures. The abdomen is opened through a long mid-line incision. The colon is initially removed in the usual way, namely by dividing the terminal ileum 1-2 cm proximal to the ileocecal valve. The preservation of ileocolic vessels is necessary to maintain the blood

flow to the ileal pouch which is prepared later. Below the rectosigmoid junction, the dissection is carried out close to the rectal wall to avoid damage to autonomic nerves (hypogastric nerve and pelvic plexus). The lateral ligaments are divided on both sides. After a crushing right-angled clamp is applied, the anorectal stump is irrigated with povidone-iodine. In earlier cases, division of the rectum was done at the level of the midprostate in male or the vagina in female, leaving a rectal cuff of 4-5 cm from the dentate line. However, in recent cases the rectum has been transected at the level of the anorectal junction, leaving a short rectal cuff of 1-2 cm in length. The resected area is shown in Fig. 1. Hemostasis in the rectal stump is securely performed.

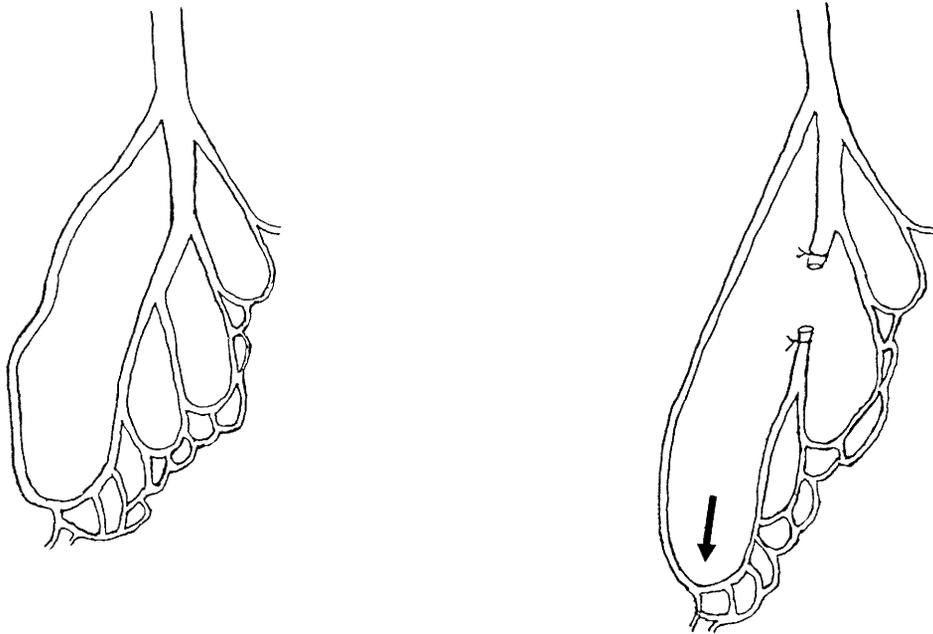


Fig. 2. Extension of the terminal ileum to the anal canal. If the branches of the superior mesenteric vessels are divided to elongate the ileal mesentery, the terminal ileum can be pulled down. It is brought further down when the ileocolic vessels are also divided.

Construction of the ileal W pouch

Before constructing the ileal pouch, a trial descent of the ileum to the symphysis pubis is undertaken. The terminal ileum is folded into two loops, each 12 cm long, with the apex lying towards the most descending point. If the apex of the pouch reaches 6 cm below the inferior margin of the symphysis pubis, the pouch can be anastomosed with the anus without unacceptable tension.⁷⁾ It is usually necessary to mobilize the mesentery upwards to the point of the appearance of the superior mesenteric artery from the pancreas. If the last branches of the superior mesenteric vessels are divided to elongate the ileal mesentery, the ileal pouch can be pulled down about 10 cm³⁾ (Fig. 2). In addition, it may be necessary to divide the ileocolic vessels to bring the ileal pouch further down. In such cases, it is essential that an arcade of vessels to the ileum is preserved.

A construction of ileal W pouch is shown in Fig. 3. The terminal ileum is folded into four equal loops, each measuring 12 cm so as to create a W shape. After stay sutures are placed, adjacent loops are joined along the antimesenteric border by a continuous seromuscular suture by 3-0 polyglactin (Vicryl®). The lumen of each loop is then opened along each side of this suture line using diathermy to minimize bleeding. A continuous all-layer suture using Vicryl is

placed between adjacent loops after setting the stay sutures. The opposing free edges of the pouch are also sutured in two layers, and the W pouch is then completed.

Peranal resection of the mucosa of the anorectal stump

In the peranal procedure, it is convenient to use a headlight in order to observe the anorectal stump. An anal retractor is passed through the anus, and the anorectal stump which should be only 1-2 cm in length is gently displayed. A solution of normal saline containing adrenaline in a dilution of 1/300000 is injected submucosally to lift the mucosa from the internal sphincter. The mucosa is then excised from the level of the dentate line to the edge of the rectum using Metzenbeum sharp-pointed scissors, while care is taken to avoid damage to the internal sphincter (Fig. 4). It is important to remove it completely and to make adequate hemostasis in the anorectal cuff.

Ileal W pouch-anal anastomosis

The ileal W pouch is pulled down through the muscular cuff, and an incision about 2 cm in length is made peranally to the apex of the most descending point of the pouch (Fig. 5). One layer anastomosis is then made between the opening of the pouch and the anal canal at the dentate line, placing interrupted sutures

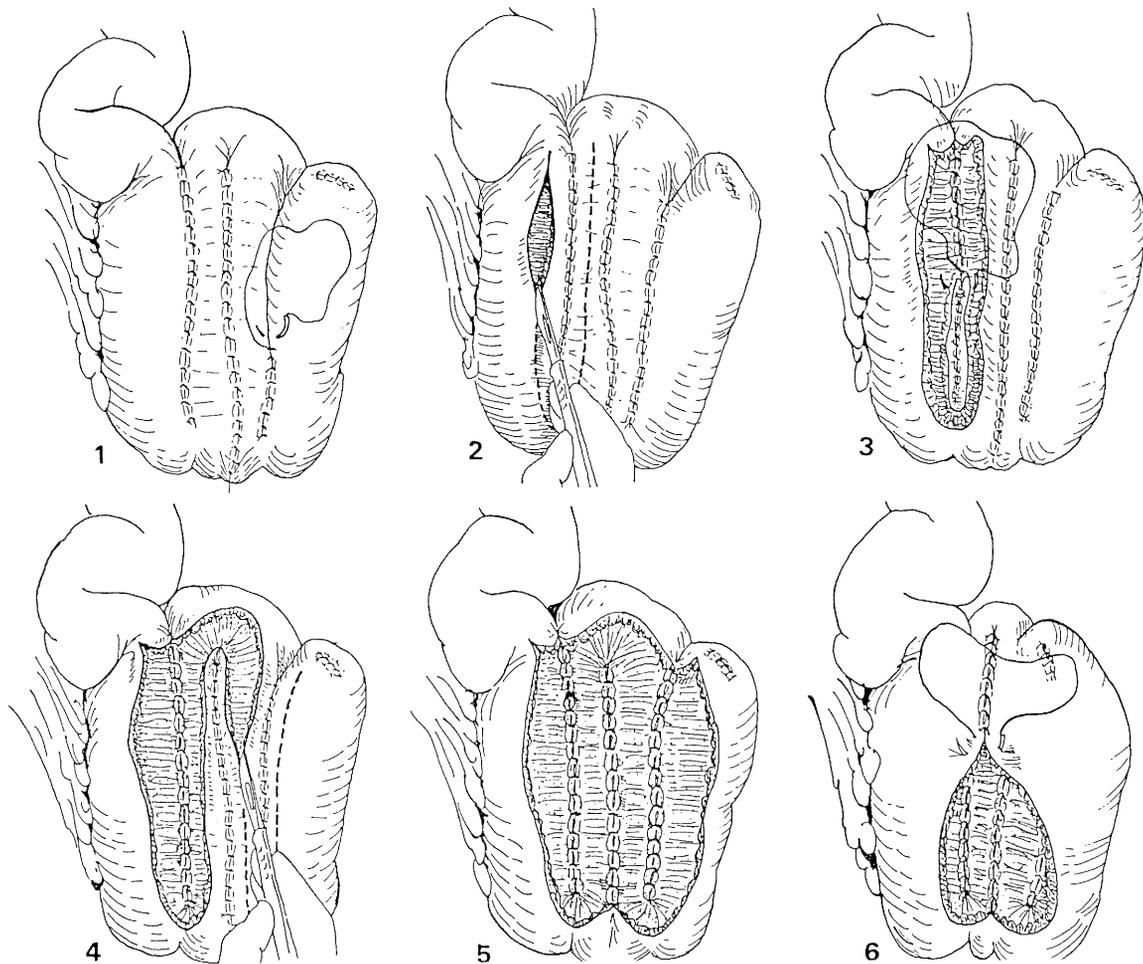


Fig. 3. Construction of the ileal W pouch. 1. The terminal ileum is folded into four loops so as to create a W shape, and continuous seromuscular sutures of 3-0 Vicryl are placed. 2. The lumen of the loop is opened along each side of this suture line. 3. A continuous all-layer suture is placed. 4. An incision is made to the next loops as well. 5. Two all-layer sutures are placed, and the posterior wall of the pouch is completed. 6. The opposing free edges are also sutured in two layers, and the W pouch is then completed.

by 3-0 Vicryl. Four such sutures are first placed on the left, right, anterior and posterior sides, and tied. It is then possible to insert the anal retractor into the lumen of the pouch. By this procedure, the edge of the pouch and the dentate line are well exposed and usually seen to be approximated. The ileal pouch-anal anastomosis is completed by inserting about 5-6 further sutures in each of the four quadrants (Fig. 6). Between 25-30 sutures are required. The sutures include the anoderm of the anal canal with a bite of the internal sphincter and the fullthickness of the opening in the pouch. A T type needle holder of Parks' modification is useful in performing this anas-

tomosis. The pelvis is drained with 2-3 Penrose A drains, which are brought out through the abdominal wall. A balloon indwelling wide-bore catheter (Foley, Fr. 30) is passed perianally into the pouch for decompression, and placed on free drainage.

Construction of a temporary diverting ileostomy

A temporary diverting ileostomy is created in the right lower quadrant of the abdomen. A disk of skin is excised, the fat and fascia are incised, and the rectus abdominis muscle is separated. The posterior sheath and peritoneum are also incised so as to easily pass two fingers. The ileal loop proximal to the pouch

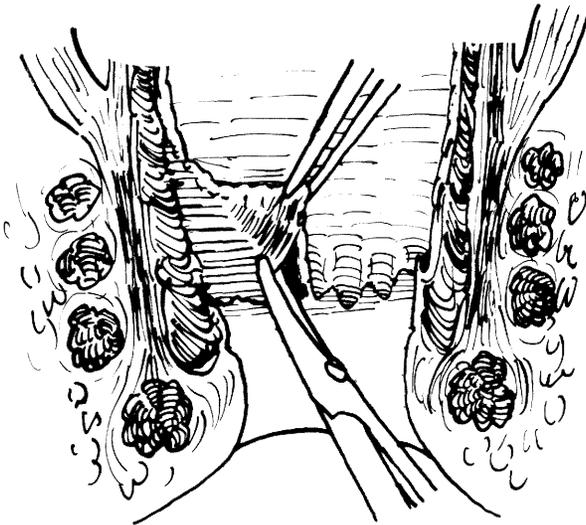


Fig. 4. Perianal resection of the mucosa of the anorectal stump. After a solution of normal saline containing adrenaline is injected submucosally, the mucosa is completely excised from the level of the dentate line to the edge of the rectum.

is brought through the abdominal wall aperture. A Kirschner's wire is penetrated through the mesentery under the loop. The wire is then pierced through the subcutaneous tissue just under the dermis. The abdomen is closed, and an incision is made in the loop on its distal side across half of its circumference. Sutures by 4-0 Vicryl are placed on both sides of the loop through the seromuscular layer of the bowel edge and then through the subcuticular layer of the skin. The sutures are then tied, and the loop ileostomy to divert the fecal stream above the pouch is completed (Fig. 7). Such a procedure makes an ileostomy about 1 cm above the skin level.

Closure of the ileostomy

After confirming the satisfactory healing of the suture lines of the pouch-anal anastomosis by performing pouchography using Gastrografin®, the ileostomy can be closed. This is usually undertaken about 4-5 weeks after the operation. An incision is made around the edge of the ileostomy taking a small fringe of the skin approximately 2-3 mm wide. If

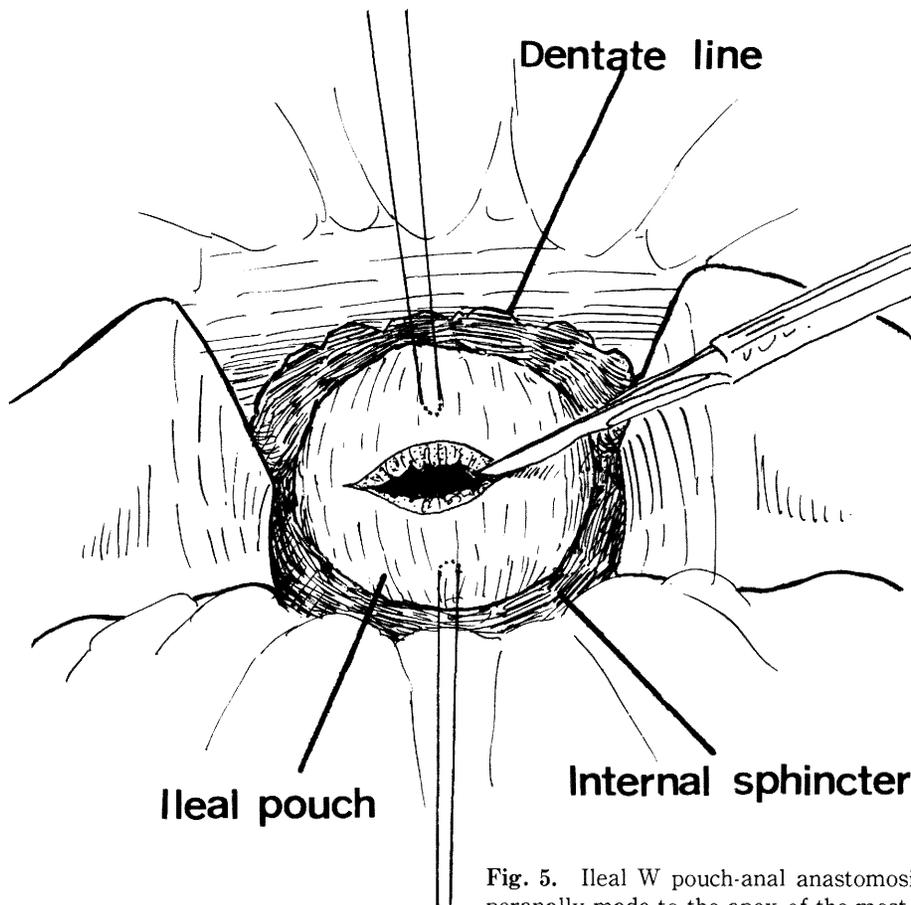


Fig. 5. Ileal W pouch-anal anastomosis. An incision is perianally made to the apex of the most descending point of the pouch.

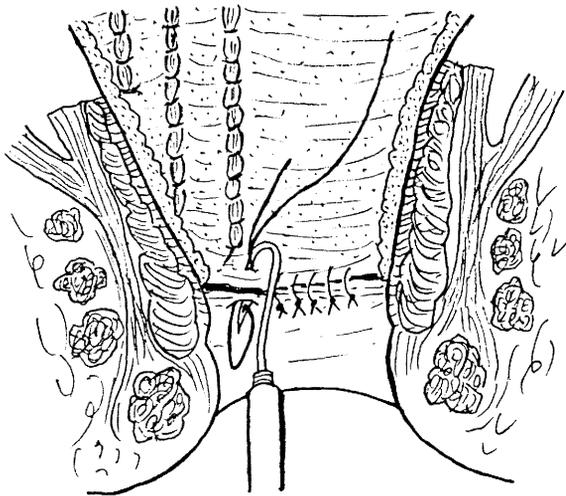


Fig. 6. Ileal W pouch-anal anastomosis. One layer anastomosis is made between the opening of the pouch and the anal canal at the dentate line.

necessary, the incision may be enlarged at either end of the ileostomy (Fig. 8a). Eight silk sutures are placed around the mucocutaneous junction of the ileostomy. With the traction of the stay sutures, the ileal loop is freed from the tissue of the abdominal wall (Fig. 8b). Great care must be taken to remain on the correct plane and to avoid damage to the ileum. The skin edge is removed and the ileostomy edge unrolled (Fig. 8c). After all the scar tissue has been removed, the ileostomy closure is performed. This is usually done in two layers: first all layers, then the seromuscular layer (Fig. 8d). Closure of the abdominal wound is done in three layers using braided nylon sutures. If necessary, a drain is placed into the subcutaneous space. This prevents both any hematoma and wound infection. With this procedure, the stage operation is completed.

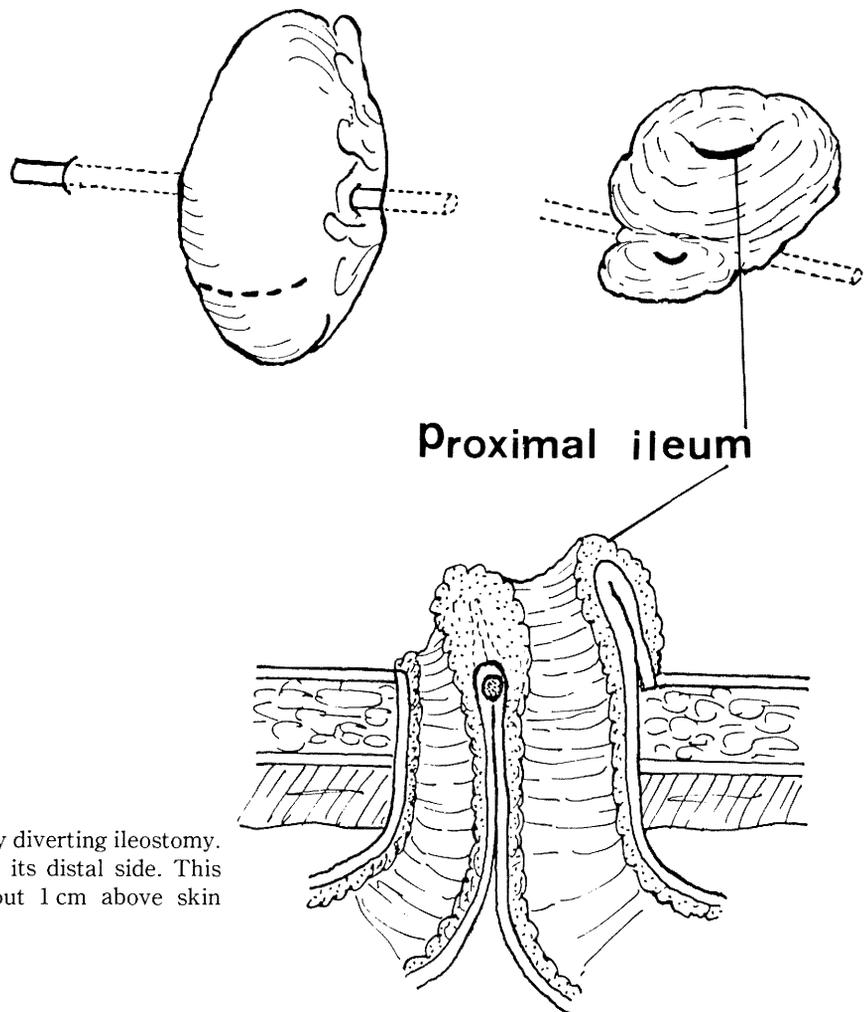


Fig. 7. Construction of a temporary diverting ileostomy. An incision is made in the loop on its distal side. This procedure forms an ileostomy about 1 cm above skin level.

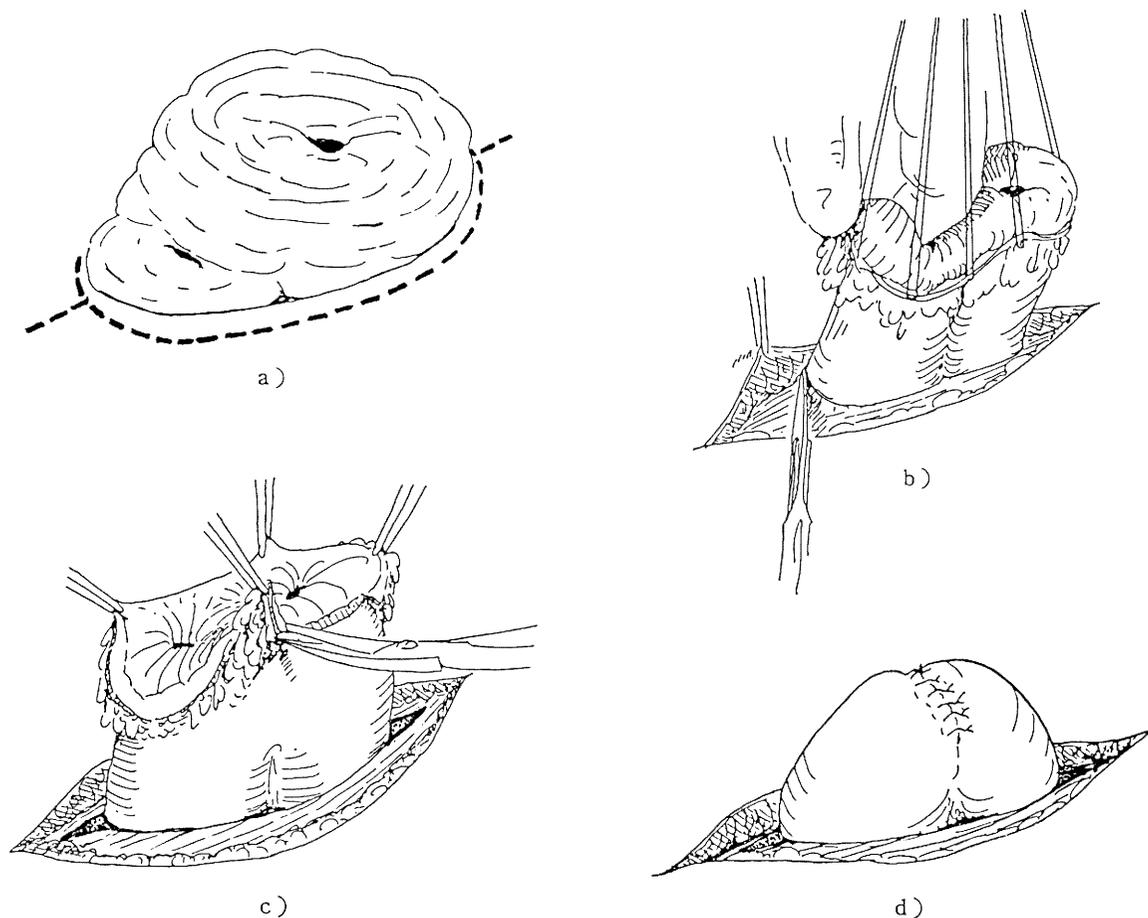


Fig. 8. Closure of the ileostomy. This procedure is carried out about 4-5 weeks after the operation.

Table 1. Postoperative complications in 25 patients

Postoperative complications	No. of patients (percentage)
Ileoanal anastomosis	
Dehiscence	1 (4%)
Stricture requiring dilatation	3 (12%)
Pelvic infection	2 (8%)
Intestinal obstruction requiring laparotomy	2 (8%)
Anovaginal fistula	1 (4%)

RESULTS

Between January, 1984 and March, 1990, 25 patients underwent ileal W pouch-anal anastomosis. There were eleven males and fourteen females. Twenty-two

had ulcerative colitis and three familial adenomatous polyposis. The mean age was 35 years (range 15-61 years). There were no deaths.

Mean daily stool frequency immediately after ileostomy closure was about 10 times. This, however, gradually decreased with the passage of time. Mean frequency at 6 months after ileostomy closure is 4.3 ± 1.2 , at 12 months 3.8 ± 1.2 , and at 24 months 3.3 ± 1.0 .

Postoperative complications are indicated in Table 1. There was one patient (4%) with a partial dehiscence of the ileoanal anastomosis. Healing occurred spontaneously without operative intervention. An anastomotic stricture requiring dilatation occurred in three patients (12%). Intestinal obstruction due to adhesions requiring laparotomy occurred in two patients (8%), and there was one patient with an anovaginal fistula which necessitated an operation. There were no patients with clinical evidence of pouchitis or who needed removal of the pouch.

DISCUSSION

Ileal pouch-anal anastomosis in restorative proctocolectomy preserves intestinal continuity with acceptable defecatory function. However, a catheter is needed in evacuation in patients with the S pouch in more than half of the cases.⁵⁾ The J pouch is most widely used in restorative proctocolectomy. Dozois⁹⁾ reported the ileal J pouch-anal anastomosis as being an ideal procedure for adult patients less than 50 years of age. However, the mean stool frequency of the J pouch was 6.0 ± 2.6 during the day and 1.2 ± 1.3 at night. This is more frequent than in our series utilizing the W pouch. Nicholls et al. reported that the number of daily evacuations in patients with the W pouch (mean 4.1 ± 1.3) was significantly less than those with the J pouch.⁵⁾ There is an inverse relationship between mean daily frequency and maximal tolerated ileal reservoir volume.^{5,8)} The W pouch using 4 loops can be expected to have a larger volume than the J pouch using only two loops.

Frequency of postoperative complications of our patients was similar to that reported by Nicholls and Lubowski,¹⁰⁾ and Dozois.⁹⁾ We had no patients with serious complication necessitating the removal of the pouch. These favorable results may be attributed to the fact that none of our patients were on steroids at the time their pouches were constructed. So far, no serious metabolic disorders have been encountered in our patients, though it is necessary to maintain a long-term follow-up. Continued assessment in defecatory function is also needed.

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