Obstruction After Ileal Pouch-Anal Anastomosis: A Preventable Complication?

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Small bowel obstruction is a common complication after ileal pouch-anal anastomosis. This review of 460 patients examines the frequency of small bowel obstruction and determines potential risk factors. The leading indication for ileal pouch-anal anastomosis was ulcerative colitis (83 percent). In 142 patients (31 percent), loop ileostomy was rotated 180° to facilitate emptying of the ileostomy. Ninety-four patients (20 percent) had 109 episodes of obstruction. Obstruction occurred after creation of the pouch (40 episodes), closure of the ileostomy (29 episodes), or developed during the subsequent follow-up period (40 episodes). Operative intervention was required in 39 percent of the episodes (7 percent of all patients). At operation, the most common point of obstruction was at closure of the ileostomy (n = 22/42, 52 percent). In 16 of these patients, the ileostomy had been rotated. Multiple risk factors, including age, sex, primary diagnosis, surgeon incidence, pouch type, prior colectomy, steroid usage, stomal rotation, technique of closure of the ileostomy, and prior obstruction, were examined by univariate and multivariate analysis. Of all factors, only stomal rotation was statistically significant (P = 0.0005, chi-squared analysis). Rotation of the loop ileostomy during ileal pouch-anal anastomosis, although an apparent technical refinement, is unnecessary and predisposes to obstruction. [Key words: Ileal pouch-anal anastomosis; Postoperative complications; Obstruction; Loop ileostomy]

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The ileal pouch-anal anastomosis has become an established alternative to proctocolectomy for many patients with ulcerative colitis and familial adenomatous polyposis. Most patients who undergo this procedure remain continent and are usually pleased with their quality of life.[1–3] Although increased surgical experience and refinements in technique have lowered the incidence of some complications, such as pelvic cellulitis,[4,5] the incidence of small bowel obstruction has stayed relatively constant and remains one of the most common complications after ileal pouch-anal anastomosis.[6–9]

This study was designed to examine the frequency of small bowel obstruction after ileal pouch-anal anastomosis and to identify potential risk factors for obstruction.

MATERIALS AND METHODS

The records of 460 patients undergoing proctocolectomy with ileal pouch-anal anastomosis at the Lahey Clinic Medical Center from June 1980 through December 1991 were reviewed. Follow-up data were obtained by office visit, telephone conversation, or postal questionnaire. Patient data were prospectively entered into a computerized registry. The median follow-up time was 36 months (range, 1 to 132 months). Four patients were lost to follow-up review.

Patients with small bowel obstruction presented with complaints of crampy abdominal pain, nausea, vomiting, or altered bowel function. Results of physical examination and radiologic studies were consistent with obstruction. Patients were managed initially with bowel rest, nasogastric tube decompression, and intravenous hydration. Surgical intervention was reserved for patients whose condition did not improve with medical management or who had evidence of complete obstruction.

Statistical analysis was performed using chi-squared analysis and Fisher's exact test (BMDP4F Statistical Software, Los Angeles, CA). Age was analyzed with the Shapiro-Wilk test and unpaired t-test (BMDP3D). In all instances, probability values were two-tailed, with $P < 0.05$ regarded as statistically significant.

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A multivariate analysis was performed using a logistic regression model. Independent variables were selected for the model using a forward stepwise regression model (BMDPLR).

RESULTS

A total of 460 patients underwent construction of an ileal pouch-anal anastomosis. Of these patients, 251 (55 percent) were men and 209 (45 percent) were women, with a median age of 30 years (range, 14 to 64 years). The indication before surgery was ulcerative colitis in 382 patients (83 percent), familial adenomatous polyposis in 44 patients (9.6 percent), indeterminate colitis in 32 patients (7 percent), and Crohn's disease in 2 patients (0.4 percent). In 272 patients (59 percent), prior colectomy was performed. At the time of construction of the reservoir, 130 patients (28 percent) were taking oral steroids. A J-pouch was constructed in 434 patients (94 percent), an S-pouch was constructed in 24 patients (5 percent), and a straight ileoanal anastomosis was constructed in 2 patients (<1 percent).

At the time of construction of the pouch, a loop ileostomy was formed in all but one patient. All stomas were matured over a plastic rod. In 142 patients (31 percent), the loop ileostomy was rotated 180°, as described by Turnbull and Weakley[10] (Fig. 1). At the time of this study, the ileostomy was closed in 445 patients. Twelve patients are awaiting closure of the ileostomy, two patients did not undergo closure, and one patient did not have an ileostomy. Technical details of closure of the ileostomy were identified in 438 patients. Seven patients (2 percent) underwent closure of the ileostomy at another institution. A parastomal incision was used for closure of the ileostomy in 411 patients (92 percent) and a midline incision was used in 27 patients (6 percent). A midline incision was reserved for patients who had a history of prior obstruction or in whom mobilization of the ileostomy through a parastomal incision was difficult. The stoma was resected in 229 patients (51 percent). A stapled functional end-to-end anastomosis was used in 341 patients (77 percent), a handsewn anastomosis was used in 91 patients (20 percent), and a combination stapled and handsewn anastomosis was used in 6 patients (1 percent).

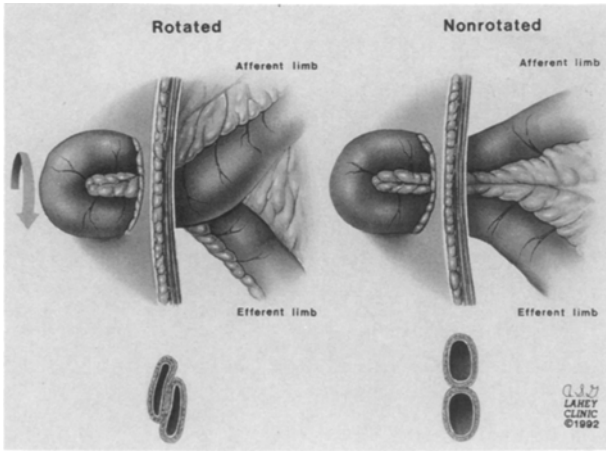

Figure 1. Rotated and nonrotated loop ileostomy. Reproduced with permission from the Lahey Clinic, Burlington, Massachusetts.

Obstruction

Ninety-four patients (20 percent) had 109 episodes of obstruction. Most patients had one episode, nine patients had two episodes, and three patients had three episodes of obstruction each. Forty episodes occurred after creation of the pouch; half of these episodes developed after initial discharge from the hospital and required a separate admission. Closure of the ileostomy was delayed for more than three months in four patients secondary to an episode of obstruction. Obstruction followed closure of the ileostomy (<30 days after operation) in 29 patients. An additional 40 episodes of obstruction occurred in subsequent follow-up study (median, 12 months after closure; range, 2 to 84 months). The median length of stay in the hospital related to the obstruction was eight days (range, 3 to 57 days).

Patients were seen because of abdominal pain (90 percent), nausea (93 percent), vomiting (77 percent), or all three in 70 percent. Of the 40 patients with obstruction after creation of the pouch, 31 patients (77 percent) had an alteration in output from the ileostomy. In most patients, the output was diminished; however, seven patients initially had a high ileostomy output (>3 liters).

Radiologic studies were obtained in 102 episodes of obstruction (94 percent). A plain film of the abdomen was obtained in all but four episodes (4 percent). The interpretation of the plain film was consistent with obstruction in 89 episodes, it was nondiagnostic in 12 episodes, and a normal gas pattern was seen in 1 episode. Additional contrast studies were obtained in 34 episodes of obstruction. An upper gastrointestinal tract series was

obtained in 19 episodes, and a retrograde pouch or ileostomy study was obtained in 17 episodes (both studies in two episodes). The interpretation of these studies was consistent with obstruction in 18 episodes, it was nondiagnostic in 7 episodes, and it was "normal" in 11 episodes.

Medical Management

Of the 109 episodes of obstruction, 67 (61 percent) were managed without surgical intervention. Nonoperative therapy was successful in 30 of 40 episodes (75 percent) of obstruction after creation of the pouch, in 18 of 29 episodes (62 percent) of obstruction after closure of the ileostomy, and in only 18 of 40 episodes (45 percent) of obstruction in the subsequent follow-up period (Fig. 2). Obstruction that occurred in the follow-up period was less likely to be managed nonoperatively compared with obstruction that occurred after creation of the pouch. This shift from medical to surgical management between these two groups was statistically significant ($P = 0.01$, Fisher's exact test). Hyperalimentation was instituted in 31 percent of the episodes. The length of stay in the hospital relative to the episode of obstruction was similar for both medically and surgically managed patients.

Operative Management

Thirty-three patients (7 percent of all patients) underwent 42 exploratory laparotomy procedures for obstruction, 3 of which were performed elsewhere. The area of the ileostomy or its closure was the most common point of obstruction at operation (n = 22, 52 percent), followed by multiple areas (n = 9, 21 percent), the distal small bowel (n = 8, 19 percent), and miscellaneous areas (n = 3, 7 percent). In 16 of these 42 procedures, the ileostomy had been rotated. Adhesions were the leading cause of obstruction (n = 27, 64 percent), followed by small bowel volvulus (n = 7, 17 percent), stenosis of the ileostomy closure (n = 6, 14 percent), and not specified (n = 2, 5 percent). The operative procedures performed included enterolysis in 25 (60 percent), small bowel resection in 14 (33 percent), and strictureplasty of a stenotic ileostomy closure in 3 (7 percent). Resection was required in two patients with necrotic bowel; one patient, treated elsewhere, required extensive resection for small bowel volvulus. After resection, the blood supply to the pouch was compromised, requiring excision of the pouch and construction of a Brooke ileostomy. This was the only instance of failure of the pouch in the group of patients with obstruction. One patient with obstruction proximal to a loop ileostomy underwent conversion to a Brooke ileostomy.

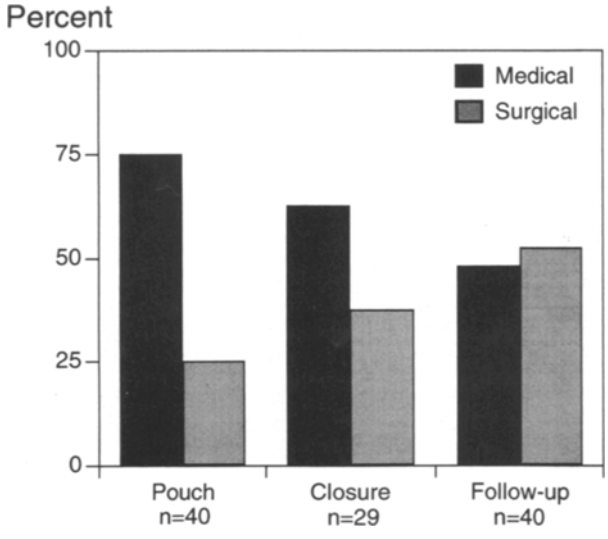

Figure 2. Management of episodes after creation of the pouch, closure of the ileostomy, and in subsequent follow-up observations. A shift toward operative intervention between pouch and follow-up groups was significant ($P = 0.01$, Fisher's exact test).

Recurrent Obstruction

Recurrent obstruction developed in 12 patients. During the first episode, nine patients were treated conservatively and three patients required laparotomy. At the second episode, six patients required operation, of whom five patients had previously been managed nonoperatively. Three patients had a third episode of obstruction. One patient with familial adenomatous polyposis required three separate operations for recurrent obstruction. In each episode, the obstruction was secondary to adhesions. No patient with familial adenomatous polyposis had a desmoid tumor as the cause of obstruction.

Risk Factors

Twelve risk factors were subjected to univariate and multivariate analysis. These included age, sex, surgeon incidence, preoperative diagnosis, prior colectomy, steroid dependency at the time of creation of the pouch, stomal rotation, pouch type, prior obstruction, technique of ileostomy closure, including type of incision used and handsewn or

stapled closure, and whether or not the stoma was resected (Table 1).

Univariate Analysis

Of all factors analyzed, only stomal rotation was statistically significant ($P = 0.0005$, chi-squared analysis). Patients with rotated stomas had nearly twice the incidence of obstruction compared with patients whose ileostomy was not rotated (Table 2). Although management of obstruction between these two groups was similar, the point of obstruction identified at the time of operation was not similar ($P = 0.005$, chi-squared analysis). Of the 22 obstructions that occurred at the ileostomy, 16 occurred in patients with a rotated stoma whereas only 6 occurred in patients with a nonrotated stoma.

Table 1.
Risk Factors for Obstruction

Risk Factor	All Patients (n = 460)	Obstructed Patients (n = 94)	%	*P*
Age (median), yr	30	30		NS
Sex				
Men	251	51	20	NS
Women	209	43	21	NS
Surgeon*			11–26	NS
Diagnosis				
Ulcerative colitis	382	78	20	NS
Familial adenomatous polyposis	44	10	23	NS
Indeterminate colitis	32	6	19	NS
Crohn's disease	2	0	0	NS
Prior colectomy	272	54	20	NS
Steroid dependent	130	32	25	NS
Stomal rotation	142	43	30	0.0005†
Pouch type				
J-shaped	434	90	21	NS
S-shaped	24	4	17	NS
Ileostomy closure‡				
Incision				
Parastomal	411	80	19	NS
Midline	27	10	37	0.06†
Closure				
Stapled	341	70	21	NS
Handsewn	91	19	21	NS
Both	6	1	17	NS
Ileostomy resected	229	48	21	NS

NS = not significant.
* Incidence among five surgeons.
† Chi-squared analysis.
‡ Operative details available on 438 of 445 of all patients and on 90 of 91 patients with obstruction who underwent closure of the ileostomy.

Table 2.
Effects of Stomal Rotation

Effects	Rotated	Nonrotated	*P*
Incidence of obstruction	43/142	51/317	0.0005*
	(30%)	(16%)	
Point of obstruction at surgery			0.005*
Ileostomy	16	6	
Multiple	3	6	
Distal small bowel	1	7	
Miscellaneous	0	3	
	20	22	

* Chi-squared analysis.

Multivariate Analysis

We used two-way contingency tables controlling for stomal rotation; none of the remaining risk factors was identified as significant, and a forward-stepwise regression model recognized all risk factors as being independent. Only one risk factor, stomal rotation, met the criteria for inclusion into the logistic regression model, which was weakly predictive of obstruction. No other risk factor was predictive.

DISCUSSION

Small bowel obstruction continues to be one of the most common complications after ileal pouch-anal anastomosis. The incidence of obstruction after this procedure ranges from 13 to 35 percent, 3 to 19 percent of patients requiring operation for relief of the obstruction (Table 3). Our results are comparable to reports published previously,[2, 9, 11–18] with an overall incidence of small bowel obstruction of 20 percent and an incidence of obstruction requiring laparotomy of 7 percent.

The management of obstruction varied significantly in our study according to when the obstruction developed. Obstruction that developed after creation of the pouch was managed nonoperatively in 75 percent of the episodes. By comparison, only 48 percent of obstruction that occurred in subsequent follow-up periods was managed similarly. This may, in part, be the result of difficulty in distinguishing small bowel obstruction from prolonged ileus in the early postoperative period. To address this concern, patients with a coexisting condition that might mimic obstruction, such as

Table 3.
Obstruction After Ileal Pouch-Anal Anastomosis

Study	No. of Patients	Obstruction (%)	Require Operation (%)	Risk Factor for Obstruction
Miller *et al.*[11]	50	16	8	Brooke ileostomy
Poppen *et al.*[12]	69	13	10	
Skarsgard *et al.*[2]	75	13	3	
Öresland *et al.*[13]	100	NS	6	
Vasilevsky *et al.*[9]	116	35	19	
Feinberg *et al.*[14]	117	24	5	Nonresected stoma and handsewn ileostomy closure
Nicholls *et al.*[15]	152	NS	13	No difference between two-stage and three-stage procedure
Fonkalsrud *et al.*[16]	184	NS	9	
Francois *et al.*[17]	626	16	8	Brooke ileostomy and three-stage procedure
Galandiuk *et al.*[18]	851	13	NS	Two-stage procedure
Present study	460	20	7	Rotated ileostomy

NS = not stated.

pelvic sepsis, pancreatitis, or intestinal perforation, were excluded from the study. Also excluded were patients with adrenal insufficiency secondary to steroid withdrawal because this condition may produce a clinical picture consistent with ileus or obstruction.[6,19] A trial of nonoperative management would still be recommended for patients with obstruction that develops soon after creation of the pouch. If a prolonged episode of obstruction occurs more than six weeks after the initial operation, early closure of the loop ileostomy through a midline incision is recommended when proper healing of the pouch and ileoanal anastomosis has been documented. Six patients presenting with late obstruction after construction of the pouch were managed in this manner. Obstruction that develops in the subsequent follow-up period is likely to have a mechanical component and often requires operative intervention.

Numerous risk factors for small bowel obstruction after ileal pouch-anal anastomosis have been studied previously.[14,15,17] Age, sex, steroid usage, and diagnosis do not appear to be important variables. This study did not show an increased frequency of obstruction in patients with familial adenomatous polyposis (22.7 percent) compared with patients with ulcerative colitis (20.4 percent) or indeterminate colitis (18.7 percent), nor were intra-abdominal desmoids identified as a cause of obstruction in patients with familial adenomatous polyposis. No difference was seen in obstruction with a J-shaped or S-shaped reservoir.

Comparison between two-stage and three-stage procedures, previously a controversial point, was not significant in the present study. In an earlier report from the Mayo Clinic,[17] the incidence of obstruction was higher in three-stage procedures (8.5 percent *vs.* 2.2 percent). A later report from the same group[18] showed the opposite, with a lower incidence among patients having a three-stage procedure (7 percent *vs.* 15 percent). A study by Nicholls *et al.*[15] showed no difference in the incidence of obstruction among patients who had a two-stage or three-stage procedure. Currently, colectomy before ileal pouch-anal anastomosis does not appear to increase the risk for obstruction.

Ambroze *et al.*[20] reported on the beneficial effects of an intact omentum in patients after ileal pouch-anal anastomosis. In their study, the incidence of pelvic sepsis was appreciably lower in patients whose omentum was not resected (10 percent *vs.* 4 percent) whereas the incidence of obstruction did not vary among patients who did (32 percent) or did not (29 percent) undergo omentectomy. We have not routinely preserved the omentum at the time of colectomy and construction of the pouch and therefore cannot assess the role of the omentum in the development of obstruction. Further evaluation of the intact omentum after ileal pouch-anal anastomosis is warranted.

The technique of construction of the ileostomy and closure has been examined previously as risk factors for small bowel obstruction after ileal pouch-anal anastomosis. Miller *et al.*[11] and Francois

et al.[17] reported a higher incidence of obstruction in patients with an end ileostomy compared with loop ileostomy. We cannot comment on this finding because loop ileostomy was routinely used for temporary fecal diversion. Feinberg *et al.*[14] reported a higher rate of obstruction in patients whose ileostomy was not resected at the time of closure or who underwent closure with a handsewn anastomosis. In the present study, no specific technique of closure of the ileostomy was a significant risk factor, although a midline incision approached significance ($P = 0.06$, chi-squared analysis). This result might be expected because a leading indication for midline incision at closure was a history of obstruction after construction of the pouch. More important than technique of closure is full mobilization of the ileostomy at the time of closure, especially when performed through a parastomal incision. Usually, numerous filmy adhesions of the ileostomy to the fascia and peritoneum are present. Unless adhesions are adequately mobilized, kinking of the bowel may occur when it is placed back within the abdominal cavity.

Rotation of the loop ileostomy was originally described by Turnbull and Weakley.[10] Rotation of the ileostomy 180° permits the afferent limb of bowel to lie caudad to the efferent limb, a more dependent position (Fig. 1). Stomal rotation was believed to facilitate emptying into the appliance and prevent spillage into the efferent limb, protecting the distal anastomosis. Fasth and Hultén[21] reported an appreciably higher incidence of stomal irritation in patients whose ileostomy was not rotated. In our study, the loop ileostomy was rotated in 142 patients (31 percent). In 317 patients whose ileostomy was not rotated, stomal irritation was not a significant problem, and the incidence of clinically significant leakage into the newly constructed reservoir was not higher. Winslet *et al.*,[22] using radioisotope and dye techniques, stated that rotated and nonrotated loop ileostomies were equally effective in diversion of the fecal stream. Stomal rotation does not appear to offer any functional advantage.

Rotation of the loop ileostomy as a risk factor for intestinal obstruction has not been examined previously. In our study, the incidence of obstruction in patients with a rotated stoma was nearly twice that of patients whose ileostomy was not rotated (30 percent *vs.* 16 percent). This finding was independent of the other variables analyzed. In addition, of the 42 episodes of obstruction that required surgical intervention, 22 involved the ileostomy or its closure. Of these episodes, 16 occurred in patients with a rotated stoma whereas only 6 occurred with a nonrotated stoma ($P = 0.005$, chi-squared analysis). Rotation of the ileostomy may cause kinking of the bowel wall at or below the fascial level. Although avoidance of stomal rotation will not prevent all obstructions, it does lower the frequency of obstruction that occurs in association with the ileostomy or its closure.

CONCLUSIONS

In summary, small bowel obstruction after ileal pouch-anal anastomosis continues to be one of the most common complications. Small bowel obstruction that develops after construction of the pouch is more likely to be managed without surgical intervention, and a trial of nonoperative management is recommended in most instances. Although an apparent technical refinement, rotation of the loop ileostomy is not necessary and predisposes to obstruction.

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