

Intraoperative enteroscopy detects more lesions but is not predictive of postoperative recurrence in Crohn's disease

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Abstract

Background: The aim of this investigation was to elucidate the clinical value of intraoperative enteroscopy (IOE) for Crohn's disease, and to determine the value of IOE in predicting recurrent disease.

Methods: In this study 27 patients requiring surgery were examined by both preoperative radiography and IOE. The findings obtained by these procedures in the remnant small intestine were compared. In 19 patients, the clinical course and colonoscopic or radiographic findings after surgery were analyzed.

Results: Intestinal lesions were identified in 23 patients by IOE, and in 19 patients by radiography. Longitudinal ulcers were equivalently detected by IOE (63%) and radiography (56%), whereas small ulcers and inflammatory polyps were less frequently detected by radiography than by IOE (37% vs 74% and 19% vs 33%, respectively). Neither the presence nor the distribution of IOE findings was related to postoperative recurrence.

Conclusions: Whereas IOE demonstrates small intestinal lesions in detail, the procedure alone cannot predict postoperative recurrence in Crohn's disease.

Key words: Crohn's disease — Intraoperative enteroscopy — Radiography — Recurrence — Surgery

by double-contrast radiography of the small intestine [11], but preoperative radiography in patients who require surgery occasionally is inadequate for precise evaluation because of poor conditions.

Intraoperative enteroscopy (IOE) has been applied for various intestinal diseases [14, 18], but the clinical value of the procedure in CD has been investigated in only a limited number of articles [9, 17]. Lescut et al. [9] reported that with the application of IOE, diminutive areas of inflammation in the small intestine were confirmed in CD. Smedth et al. [17] subsequently described IOE as valuable in decision making concerning the intestine to be resected.

Because IOE seems to be more valuable than preoperative radiography for the assessment of small intestinal involvement in CD, and because no detailed analyses of findings have been obtained by IOE, as compared with radiography, we compared IOE findings with preoperative radiography in our patients with CD. In addition, possible correlation of lesions in the remnant small intestine with postoperative recurrence also was investigated to elucidate the efficacy of IOE.

Materials and methods

Patients

From 1987 to 1998, we treated 31 patients with the established diagnosis of CD of the ileitis or ileocolitis type, in whom IOE was performed during surgery. Four of these patients were excluded because small intestinal radiography had not been performed before surgery. In the remaining 27 patients (21 men and 6 women) findings obtained by IOE and radiography were comparatively investigated. The mean age at surgery was 31 years (range, 17–59 years). The mean time from the initial diagnosis of CD until surgery was 9 years (range, 0–17 years). The operation was the primary surgery in 20 patients and the secondary surgery in seven patients. The indications for surgery were decided by preoperative clinical course, radiography, computed tomography (CT) scan, and abdominal ultrasonography. Of the 27 patients, 11 underwent surgery for severe intestinal stenosis, 12 for intestinal fistula, and 4 for intraperitoneal abscess. Before surgery,

Crohn's disease (CD) is a chronic enterocolitis of an unknown etiology [12]. The disease frequently develops into intestinal complications, which necessitate surgical resection [16]. Whereas involvements of the duodenum and colon are readily assessed by endoscopy, radiography has been the main procedure for the assessment of small intestinal involvement [11]. Minute mucosal lesions can be detected

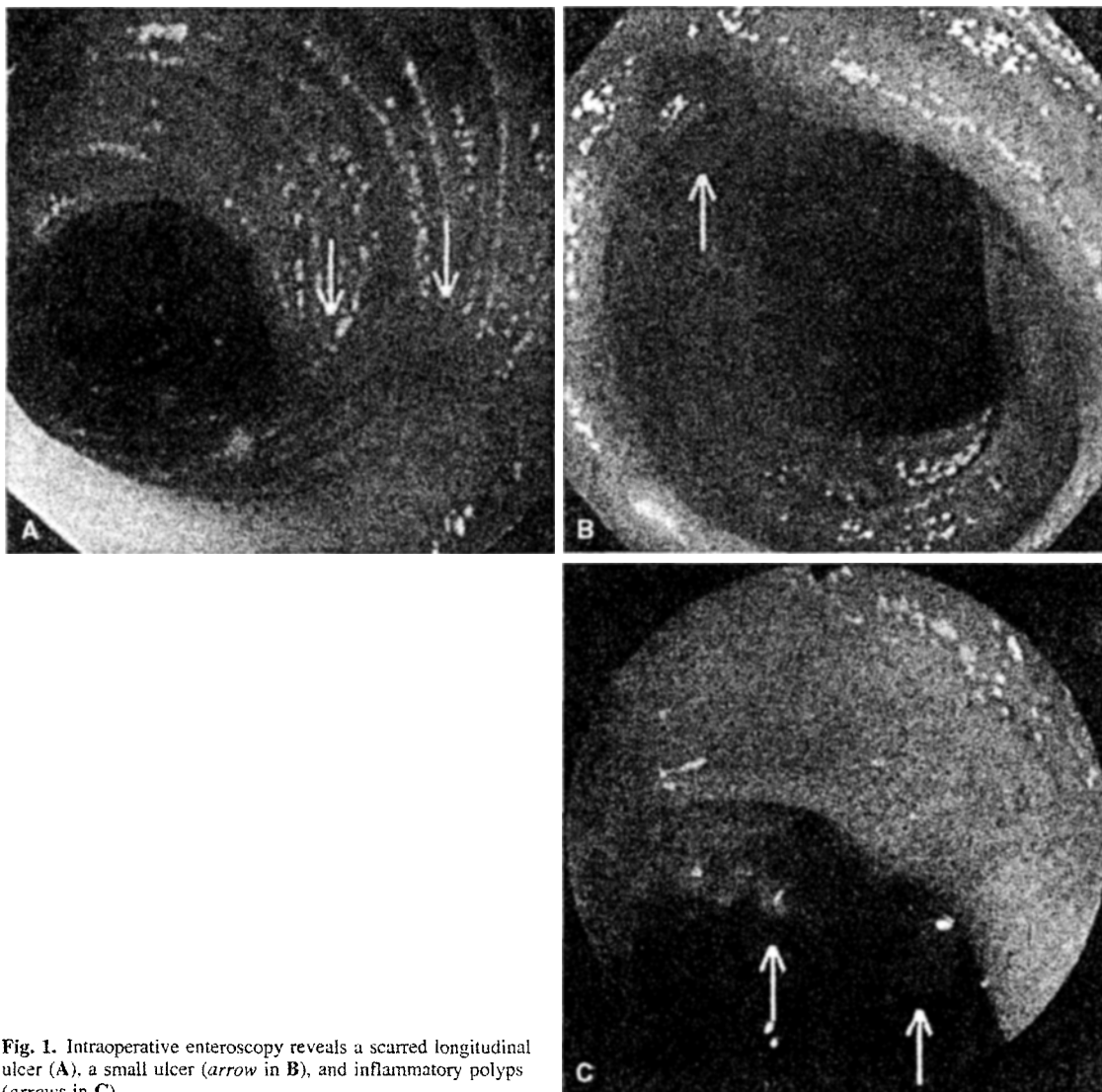


Fig. 1. Intraoperative enteroscopy reveals a scarred longitudinal ulcer (A), a small ulcer (arrow in B), and inflammatory polyps (arrows in C).

all but one patient were treated by total parenteral nutrition for a period ranging from 14 to 150 days (mean, 68 days).

Small intestinal radiography

Double-contrast study of the small intestine was performed within 4 weeks before surgery. The procedures are described elsewhere [11]. In brief, the whole small intestine was filled with 200 to 300 ml of 60% barium sulphate and a sufficient amount of air to obtain double-contrast images. To avoid peristalsis, scopolamine was injected intravenously.

Intraoperative enteroscopy and surgical procedures

All the IOEs were performed by the same procedure, as described previously [7]. After laparotomy, a forward-viewing endoscope (GIF-Q10-2000 or SIF-230, Olympus, Tokyo, Japan) was inserted through the enterotomy made in the proximal part of the severe lesion to be resected. The scope was manually pushed by the surgeons up to the ligament of Treitz. The remaining small intestine was observed carefully while the enteroscope was pulled through slowly. The distal part of the small intestine to the

ileocecal valve was investigated through the enterotomy made at the distal part of the severe lesion to be resected. In cases with involvement in the terminal ileum so severe as to require surgical resection, the enteroscopy for the distal part of the small intestine was not performed.

The intestinal lesions were classified into three types: longitudinal ulcers, small ulcers, and inflammatory polyps. In determining the choice of operation and extent of resection, the findings of severe stenosis or severe mucosal inflammation obtained by IOE were taken into consideration. Findings of the exterior features, such as serosal inflammation, fat-wrapping, and palpable mural thickening also were used. With the findings obtained by IOE or intestinal exterior features, the surgeons made final decisions on surgical strategies.

Comparison of IOE and radiography

All the radiographs were reviewed independently by three observers (T.M., K.H., and K.A.) who were blinded to the endoscopic findings. The observers were instructed to check eccentric deformity or longitudinal ulcer, small barium flecks, and pseudopolyps. Any abnormal findings suggested by two or more observers were considered to be positive findings.

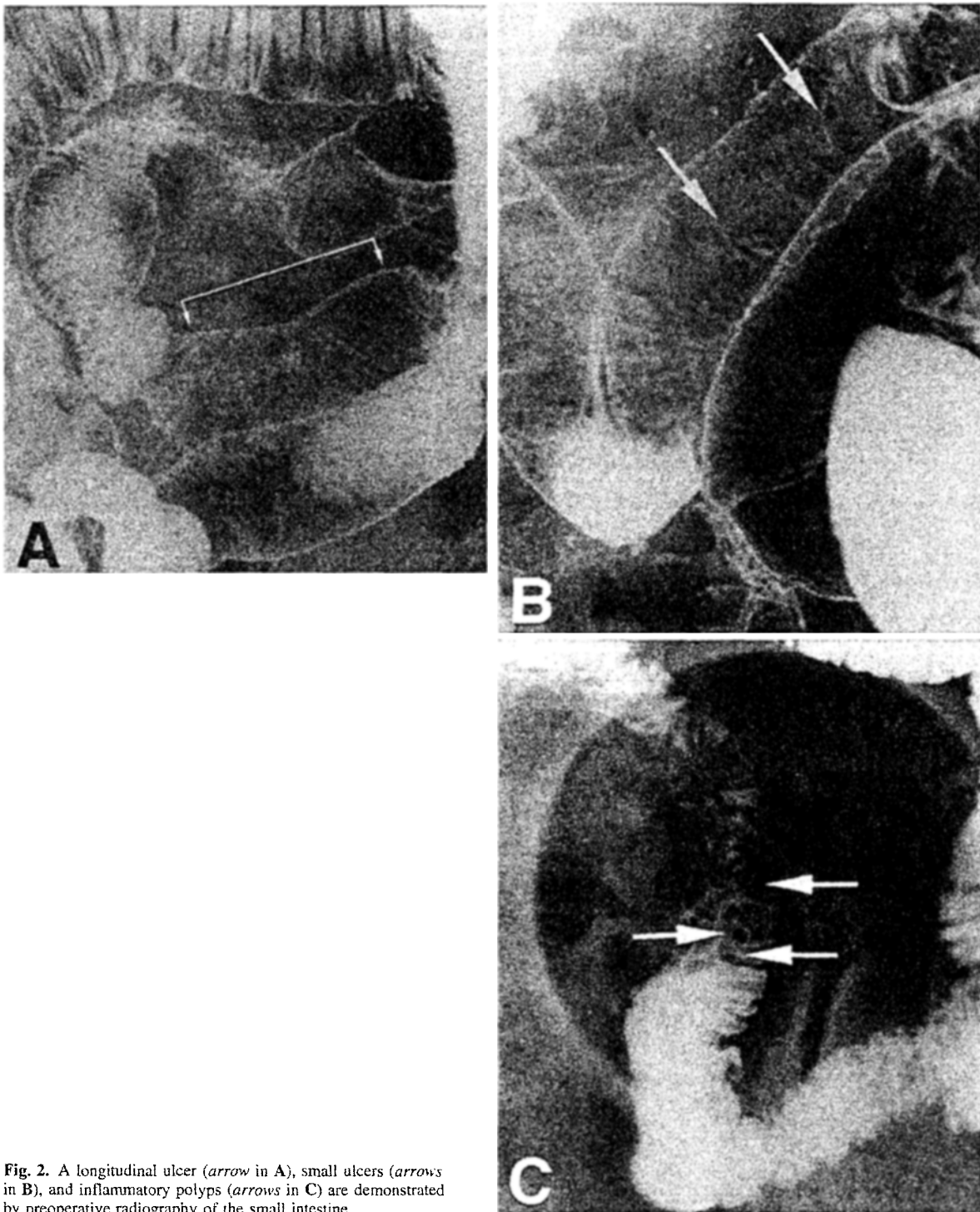


Fig. 2. A longitudinal ulcer (arrow in A), small ulcers (arrows in B), and inflammatory polyps (arrows in C) are demonstrated by preoperative radiography of the small intestine.

Follow-up study

Clinical activity and serial changes in radiographic and/or colonoscopic findings for 2 or more years after surgery were investigated retrospectively in 19 of the 27 patients. Eight patients were excluded from the analysis because their follow-up periods were shorter than 12 months. At 1 month after surgery, all the patients were examined by postoperative radiography and thereby certificated as in remission. Clinical activity was assessed by the Crohn's Disease Activity Index (CDAI) reported by Best et al. [1]. The

patients were assessed periodically by their symptoms and laboratory data, from which the CDAI was calculated. Double-contrast study of the small intestine or colonoscopy was performed when subjects complained of deterioration in abdominal symptoms. A value of CDAI greater than 150 in addition to confirmation of active intestinal lesions by radiography and/or colonoscopy as described by Rutgeerts et al. [15] was regarded as recurrence. On the basis of these follow-up data, the postoperative course of each patient was divided into remission or recurrence. The clinical features, the lesions in the remnant intestine detected by IOE, and the indications for surgery were compared between remission and recurrence groups.

Table 1. Comparison of clinical features between Crohn's disease with and without recurrence

	Recurrence (+) (n = 10)	Recurrence (-) (n = 9)	Significance
Gender (M/F)	8/2	6/3	NS
Age (years) (mean ± SD)	28.6 ± 8.7	29.8 ± 6.9	NS
Disease duration ^a (years) (mean ± SD)	9.3 ± 5.4	8.8 ± 5.0	NS
Site of involvements			
Ileum	3	3	NS
Ileum and colon	7	6	
Indication for surgery			
Stenosis	1	6	<i>p</i> < 0.05
Fistula or abscess	9	3	
Surgical procedure			
Small bowel resection	4	6	NS
Ileocelectomy	6	3	

^a Duration from diagnosis of Crohn's disease until surgery
NS, not significant

Statistics

Statistical differences were evaluated using Fisher's exact probability test and the Mann-Whitney *U* test (two-tailed). A *p* value less than 0.05 was considered significant.

Results

Comparison of IOE and radiography

In 23 of the 27 patients, IOE identified small intestinal lesions outside the resected area. Endoscopic findings included longitudinal ulcers (Fig. 1A) in 17 patients, small ulcers (Fig. 1B) in 20 patients, and inflammatory polyps (Fig. 1C) in 9 patients. Preoperative radiography showed small intestinal lesions in 19 patients. These findings proved to be longitudinal ulcers (Fig. 2A) in 15 patients, small ulcers (Fig. 2B) in 10 patients, and inflammatory polyps (Fig. 2C) in 5 patients.

When the differences in lesion detection were compared between IOE and preoperative radiography, longitudinal ulcers were equivalently detected by radiography (56%) and IOE (63%). However, small ulcers and inflammatory polyps were less frequently detected by radiographs (37% vs 74%) than by IOE (19% vs 33%).

Correlation between IOE findings and clinical course

Intestinal lesions in the remnant small intestine confirmed by IOE were restricted to the proximal side of the anastomosis in 14 of 19 patients. They were distributed at both the proximal and distal sides of the anastomosis in one patient. In the remaining four patients, no residual intestinal lesions were found. The IOE findings proved to be longitudinal ulcers in 12 patients (63%), small ulcers in 11 patients (58%), and inflammatory polyps in 8 patients (42%).

In 10 patients, the disease recurred within 2 years after surgery. The site of recurrence was above the anastomotic site in seven patients, and exactly at the surgical anastomosis in three patients. The endoscopic or radiographic find-

Table 2. Comparison of intraoperative endoscopic (IOE) findings between Crohn's disease with and without recurrence

	Recurrence (+) (n = 10)	Recurrence (-) (n = 9)	Significance
IOE findings			
Longitudinal ulcers	6/10 (60)	6/9 (67)	
Small ulcers	5/10 (50)	6/9 (67)	
Inflammatory polyps	5/10 (50)	3/9 (33)	
None	2/10 (20)	2/9 (22)	NS
Distributions of IOE findings			
None or scarce	7/10 (70)	5/9 (56)	
Multiple	3/10 (30)	4/9 (44)	NS

NS, not significant

ings of the recurrence were active longitudinal ulcers or small ulcers in six patients, intestinal stenosis in three patients, and both in one patient.

Table 1 compares clinical features between patients with and without postoperative recurrence. No statistical significance associated with gender, age, disease duration, or site of involvement was detected. However, a difference in indications for surgery was found between the two groups. Of 10 patients with postoperative recurrence, 9 underwent surgery for intestinal fistula or abscess, whereas intestinal stenosis was the indication of surgery in six of nine patients without recurrence. Table 2 compares the IOE findings between the two groups of patients. Neither the type nor the distribution of residual intestinal lesions confirmed by IOE was different between the two groups.

Discussion

Although various enteroscope prototypes have been developed previously [19], the small intestine remains a difficult area for endoscopic investigation [5]. Whereas IOE has been suggested as a useful procedure for patients with occult intestinal bleeding [14] or Peutz-Jeghers syndrome [18] the necessity of the procedure remains inconclusive for patients with CD. [9, 17].

Radiography has been a widely accepted procedure for the investigation of small intestinal involvement in CD [2, 10, 20]. Although small bowel follow-through study is convenient, it involves a substantial risk of overlooking obvious lesions because of the loops of the small intestine [20]. On the other hand, double-contrast barium-air examination and enteroclysis are procedures that can depict intestinal lesions precisely [20]. Although Bernstein et al. [2] recently concluded that the small bowel follow-up study is the first choice of radiography, double-contrast examinations have been considered preferable for evaluation of intestinal involvement in CD [10, 20].

The reliability in detection of intestinal lesions by double-contrast radiography is easily influenced by various factors, and the results fluctuate from patient to patient. In patients with CD who have severe intestinal stenoses, the contrast material often is diluted by intestinal fluid, and intestinal lesions are poorly depicted with the radiography. Actually, small ulcers and inflammatory polyps were demonstrated more frequently by IOE than by preoperative ra-

diography in this study. In this regard, IOE is considered a reliable procedure for assessing small intestinal lesions during the perioperative period.

Previous literatures have suggested that the use of IOE to assess patients with CD can provide precise information, which reduces unnecessary resection of the small intestine [9, 17]. Chardavoine et al. [4] investigated microscopic involvement at the resected margin in CD and reported that the presence of active inflammation did not affect the postoperative recurrence rate. It also has been confirmed that recurrence rates were not different between patients treated by radical resection and those treated by nonradical resection [13]. On the basis of these observations, it has been accepted generally that nonradical resection is the treatment of choice for patients with CD who are indicated for surgery. Because our results indicate that mucosal lesions identified by IOE do not correlate with postoperative recurrence, specification of minute lesions within the remnant area of the small intestine is not necessary for all patients with CD.

Although it has been suggested that various risk factors such as site of involvement [4] and surgical procedure applied for anastomosis [3] affect postoperative recurrence rates, clinical values of these factors still remain controversial. The current results indicate that indication for surgery rather than IOE findings significantly influenced postoperative recurrence within 2 years. Greenstein et al. [6] advocated that CD can be classified into an aggressive "perforating" type and an indolent "nonperforating" type. The former has been characterized clinically by fistula or abscess formation, and the latter by intestinal stenosis. The current results are compatible with the notion that the perforating type relapse more frequently than the nonperforating type [8]. Because our study was small in number of patients, further study with more patients is necessary.

In conclusion, our study indicated that IOE was more accurate than radiography for the assessment of intestinal lesions in CD that require surgery. However, because no IOE findings were related to postoperative recurrence, this procedure alone is unlikely to be valuable for predicting the subsequent clinical course.

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