

Clinical outcomes of enteroscopy using the double-balloon method for strictures of the small intestine

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Abstract

AIM: To evaluate the clinical outcome of enteroscopy, using the double-balloon method, focusing on the involvement of neoplasms in strictures of the small intestine.

METHODS: Enteroscopy, using the double-balloon method, was performed between December 1999 and December 2002 at Jichi Medical School Hospital, Japan and strictures of the small intestine were found in 17 out of 62 patients. These 17 consecutive patients were subjected to analysis.

RESULTS: The double-balloon enteroscopy contributed to the diagnosis of small intestinal neoplasms found in 3 out of 17 patients by direct observation of the strictures as well as biopsy sampling. Surgical procedures were chosen for these three patients, while balloon dilation was chosen for the strictures in four patients diagnosed with inflammation without involvement of neoplasm.

CONCLUSION: Double-balloon enteroscopy is a useful method for the diagnosis and treatment of strictures in the small bowel.

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Key words: Double-balloon enteroscopy; Strictures; Small intestine

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INTRODUCTION

Stricture is one of the important pathological conditions in the small intestine that may require urgent and adequate treatments. Strictures of the small bowel can be induced by various kinds of diseases. One of the most important factors for the choice of treatment of the stricture of the small bowel is to determine whether neoplasm is involved in the stricture. Indeed, endoscopic observation as well as biopsy sampling, if available before treatment, would be very helpful regarding the choice of treatment for the strictures in the small bowel.

While endoscopy provides visualization of the most proximal and distal end of gut, small bowel is among the most difficult part of the gastrointestinal tract to reach, because only a small part of the terminal ileum can be observed by intubation of the ileocecal valve after total colonoscopy. After the advent of a wireless-capsule endoscopy, this revolutionary diagnostic tool is likely to play an important role in the diagnosis of small bowel disorders^[1,2]. However, the currently available Given M2A capsule endoscopy is no longer useful in patients with bowel stricture or bowel obstruction.

To overcome the limitation of the insertion depth with a conventional push method, we have developed a new method of enteroscopy using two balloons^[3-5]. The double-balloon method is a new technique capable of accessing the entire small intestine with intervention capabilities. This study evaluated the clinical outcomes of enteroscopy using the double-balloon method for strictures of the small intestine specifically focusing on the involvement of neoplasms in the strictures.

MATERIALS AND METHODS

Instruments

A new endoscopic system of the double-balloon method was prepared as described elsewhere^[3-5]. In brief, a specifically designed videoendoscope (outer diameter: 8.5 mm, working length: 200 cm) with an attachable balloon at its tip and a soft overtube (length: 140 cm) with another balloon at the distal end were used. For safety and simplification of the insertion procedures, latex soft balloons were used for both the endoscope and the overtube, and a specifically designed pump was also developed, which can inflate or deflate the balloons with one-touch while accurately monitoring the balloon pressure.

Patients

Enteroscopy using the double-balloon method was performed

in 62 patients between December 1999 and 2002 at Jichi Medical School Hospital, Tochigi, Japan. Full and informed consent was obtained from each patient before the procedure. Strictures of the small intestine were found in 17 patients and these consecutive 17 patients were subjected to analysis. The average age of 17 patients (9 men and 8 women) was 45.0 (23-68) years. Characteristics of the patients are listed in Table 1. The procedures were performed under the fluoroscopic guidance in all cases studied. Indications of the examinations included bowel obstruction in 12 patients (71%), hematochezia in 1 patient, severe anemia in 1 patient, abdominal mass in 2 patients, and protein-losing gastroenteropathy in 1 patient.

RESULTS

Enteroscopy was performed in 8 patients through the mouth, 7 patients through the anus, and 2 patients through both mouth and anus as shown in Table 1. The double-balloon enteroscopy was well tolerated and no complication was found in all patients studied. Neoplasms were suspected in 3 patients (18%) based on the endoscopic observation alone. Biopsies were taken in these 3 patients and neoplasm was pathologically confirmed in all 3 patients. By contrast, inflammatory disorders were suspected by the endoscopic observation in 8 patients (47%) including 3 Crohn's diseases. Neoplasm was ruled out in these 8 patients by biopsy sampling and/or endoscopic observation. By contrast, endoscopic observation of the narrowing lumen showed normal mucosa in the remaining 5 patients (24%), suggestive of adhesion from outside or postoperative stricture. Neoplasms found in 3 patients included inflammatory myofibroblastic tumor^[6], lymphoma^[7], and undifferentiated cancer. Laparoscopic treatment was chosen for the first patient and open surgery for the other two patients because the diagnoses were pathologically confirmed before surgical operation. By contrast, a balloon dilation was performed after the exclusion of neoplastic diseases in 4 patients including

Crohn's diseases^[8], posttraumatic stricture (Yano *et al*), and inflammatory stricture. Their symptoms were relieved after endoscopic dilation of the strictures in all 4 patients studied.

DISCUSSION

It is difficult to evaluate small bowel disorders because the small bowel is located quite far from the mouth and anus. Stricture is a common disorder of the small bowel. Once the presence of strictures is suspected in the small intestine, precise description and diagnosis are necessary for adequate treatment^[9]. However, diagnosis is often delayed because of the difficulty in examining the small bowel. Conventional push enteroscopy is a popular method but the entire small bowel is not accessible^[10-14]. The novel video capsule endoscopy system has the potential to view the entire gastrointestinal tract^[15-23]. Capsule endoscopy was reported to be superior to push enteroscopy^[1] and small bowel radiograph^[2] for the evaluation of small bowel diseases. However, capsule endoscopy is no longer available when strictures are suspected in the gastrointestinal tract.

The new method of enteroscopy, namely double-balloon method, is a useful procedure, which enables deep insertion of an endoscope to the small intestine while preventing over-stretching of the intestinal tract. This method could be used either from mouth or anus, and allows for endoscopic observation in almost all parts of the small intestine. Moreover, to and fro observation of an affected area with controlled movement of the endoscope with an accessory channel enables interventions such as biopsies and dilatations. Thus, this new method has the potential to contribute to the diagnosis and treatment of the diseases in the small intestine where endoscopic approach has been difficult so far. It allows for viewing mucosal lesions of the small intestine, and tissue samples are also available for pathological diagnosis with biopsy through the enteroscope. Balloon dilation technique at the site of stricture is also available whenever necessary^[8].

Table 1 Clinical feature of the patients

Case	Indication	Age (yr)	Sex	Approach route	Endoscopic findings	Histological findings	Intervention
1	bowel obstruction	48	M	oral	narrowing anastomosis with normal mucosa ¹	NA	
2	bowel obstruction	40	F	oral	edematous change of the lumen ²	non specific inflammation	dilation
3	low protein	28	F	anal	annular constriction ³	non specific inflammation	
4	bowel obstruction	41	M	oral	narrowing lumen with normal mucosa ⁴	NA	
5	abdominal tumor	65	M	anal	tumor	lymphoma	
6	bowel obstruction	56	M	anal	multiple strictures	non specific inflammation	
7	bowel obstruction	47	M	oral	narrowing lumen with normal mucosa ⁴	no remarkable change	
8	bowel obstruction	29	M	oral	mild inflammatory change ⁵	NA	
9	bowel obstruction	50	F	anal	tumor	inflammatory fibroid polyp	
10	anemia	68	F	anal	multiple strictures ³	non specific inflammation	
11	hematochezia	41	F	both	multiple strictures with ulceration ³	non specific inflammation	
12	bowel obstruction	47	F	oral	longitudinal ulcerations ⁵	NA	dilation
13	bowel obstruction	62	M	oral	narrowing anastomosis with normal mucosa ¹	NA	
14	abdominal tumor	52	M	both	tumor	undifferentiated cancer	
15	bowel obstruction	23	F	anal	narrowing lumen with normal mucosa ⁴	NA	
16	bowel obstruction	27	F	oral	edematous change of the lumen ⁵	NA	dilation
17	bowel obstruction	42	M	anal	course and red-colored lumen with ulceration ⁶	non specific inflammation	dilation

NA: not assessed. ¹Postoperative stricture was suspected. ²Lung sarcoidosis was found in this patient. ³Intestinal tuberculosis was suspected based on the feature of stricture or ulceration and other clinical features. ⁴Intestinal adhesion was suspected. ⁵Crohn's disease was suspected based on the feature of strictures or ulcerations along with other clinical features. ⁶Posttraumatic stricture was suspected.

By using this new method, we were able to observe the stricture lesions of the small intestine in 17 patients. This procedure was very useful for the diagnosis of neoplasms in 3 out of 17 patients. It is important to note that biopsy samples taken from these three patients were useful for the confirmation of pathological diagnosis before surgical operations. Indeed, thanks to the pre-operative diagnosis, one patient with a benign tumor was subjected to laparotomy with minimal incision. Exact locations of the stricture lesions in these patients were marked with Indian ink beforehand by using the double-balloon enteroscope so that the lesion could be easily identified in the surgical procedure.

Balloon dilation was performed in four patients including two with Crohn's diseases, one with posttraumatic stricture, and one with inflammatory stricture after exclusion of the involvement of neoplasm. Their symptoms were relieved after dilation of the strictures in all four patients studied.

In conclusion, enteroscopy using the double-balloon method is very useful for the diagnosis and therapeutic interventions against strictures of the small intestine.

DISCLOSURE STATEMENT

Hironori Yamamoto has applied for the patent in Japan on the double-balloon system described in this article and presented in part at the annual meeting of the American Society for Gastrointestinal Endoscopy, May 2003.

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