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COMPARISON OF TWO KINDS OF SPECIAL TEST MEALS FOR BARIUM-ENEMA STUDY

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There are many special diets that have been developed for the colonic preparation for barium-enema study. To select the better diet for colonic radiological study, prospective randomized study was performed. Sixty consecutive patients visited for colonic examinations were randomly assigned to Boncolon® diet group and Enimaclin® diet group. The patients were questionaired for taste of the given diet and their satisfaction with it. Colonic preparation for barium-enema radiological study was compared in Boncolon® and Enimaclin® diets. The patients accepted Enimaclin® diet as a more favorable and satisfactory diet. Although amount of food contained in Enimaclin® was larger than that in Boncolon® diet, colonic preparation status was similar in Enimaclin-administered and in Boncolon-administered cases when the diet was prescribed to patients without chronic constipation. In summary, Enimaclin® was similar to Boncolon® diet in respect of colonic preparation while showed a better acceptability by patients in terms of the taste.

Keywords: barium-enema study, colonic preparation, amenity

INTRODUCTION

Malignant neoplasm is a most important disease in Japan and one third of the Japanese who died recently were killed by some malignant tumors. A colon cancer is a most frequently diagnosed neoplasm and its frequency continues to increase in these days (1). The detection of colon cancer in its early stage is the only useful way for successful treatment of the cancer (2). Therefore, various tests for the detection of small amount of blood in stool are used as initial tests for the population-based screening of a colon cancer. For those individuals who showed positive result of the screening tests, a barium-enema study or a colonoscopy is recommended as a precise examination (3). Complete preparation of the colon without remaining fecal contents in the colonic lumen is essential for these precise examinations, and thus, combinations of several methods including laxatives have been developed. The most basic and important method is an administration of special test-meals on the day before the examination. For this purpose, several kinds of test-meals are developed and are available on the market. Boncolon® diet, a test-meal for colonic preparation, had been used for the patients who underwent a barium-enema study up to August 2000 in Shimane Medical University Hospital. However, a large percentage of these patients complained that the amount of this diet was too little. Enimaclin® diet, which was also developed for colonic preparation, has higher volume of food and calories than Boncolon® diet. The higher volume of food intake before barium-enema study was thought to induce the poorer colonic preparation with resulting insufficient barium-enema study. Therefore, we performed randomized, prospective study to compare the acceptability by the patients and usefulness for colonic preparation between Boncolon® diet and Enimaclin® diet.

MATERIALS AND METHODS

Sixty consecutive patients, who visited Shimane Medical University Hospital from September 2000 to February 2001 and whose colonic examinations were performed by barium-enema study, were enrolled in this study, which was carried out in accordance with

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Table 1. Nutritional contents of Boncolon® and Enimaclin® diets

	Boncolon®				Enimaclin®			
	protein (g)	fat (g)	carbohydrate (g)	energy (kcal)	protein (g)	fat (g)	carbohydrate (g)	energy (kcal)
breakfast	5	1	23	120	4.3	0.9	38	178
lunch	5	0	22	110	4.2	0.3	43	188
snack					1.5	3.7	79	355
supper	3	2	38	180	2.7	7.9	13	136
total	13	3	83	410	12.7	12.7	173	857

the Helsinki Declaration. After obtaining informed consent from each patient, they were randomly allocated to two groups. One group of patients was administered Boncolon® diet (Otsuka Pharmaceutical Co., Ltd. Tokyo, Japan) and the other was administered Enimaclin® diet (Glico Co., Tokyo, Japan) on the day before barium-enema study. The nutritional contents of these two diets are shown in Table 1. After eating all the meals (breakfast, lunch, snack, and supper), the patients were requested to fill the questionnaires concerning the acceptability of the diet. All the patients were administered 24 mg senna and 34 g magnesium citrate at bedtime on the day before the rentogenological study. Barium-enema study was done according to the standard method to get the double contrast radiogram of all the segments of the colon (4, 5). The three gastroenterologists (T. K., K. Ad., and K. Am.) reviewed all the radiological films independently in the blinded fashion to check the quality of the double contrast radiogram. The quality of the radiogram was evaluated by emphasizing the remaining fecal fluid and the clarity of the mucosal network pattern. To evaluate the usefulness of test-meals for the patients with chronic constipation (less than one stool per 2 days), we also analyzed the quality of the radiogram by dividing the subjects into the cases with chronic constipation and those without.

RESULTS

Acceptability of the Diet

Thirty patients (19 males and 11 females) were administered with Boncolon® diet and other 30 patients (15 males and 15 females) were administered with Enimaclin® diet. The mean ages of each group of patients were not significantly different (53.5 ± 15.8 and 55.8 ± 16.3 years old, respectively).

Concerning the taste of the diet, 30-33% of the cases reported that Boncolon® diet was very good or good in taste, while 51-60% of the cases reported Enimaclin® diet as very good or good (Fig. 1). Seventy-seven percent of the Boncolon-administered patients complained of hunger and 47% claimed that the total amount of diet was too little. On the other hand, 57% of the Enimaclin-administered patients complained of hunger and only 28% claimed that the amount of diet was too little (Fig. 2). These results suggested that Enimaclin® diet was accepted more favorably by the patients than was Boncolon® diet.

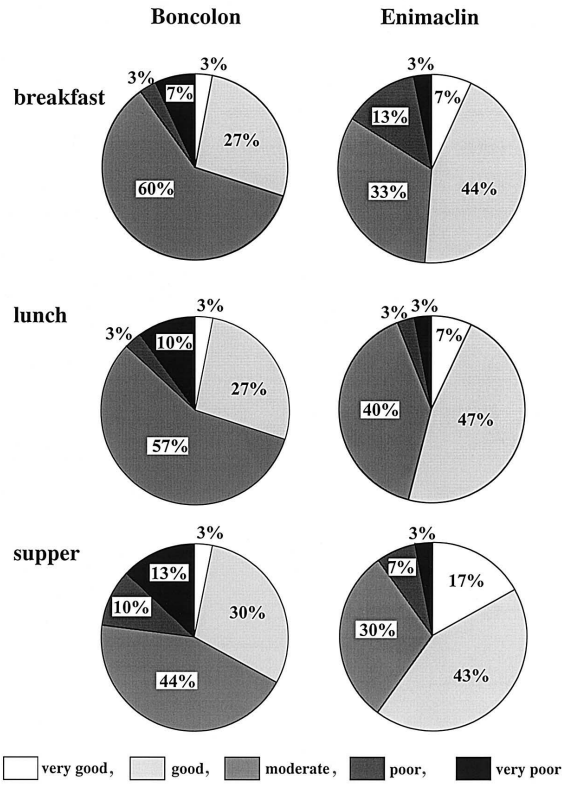

Fig. 1. Evaluation of the taste of Boncolon® and Enimaclin® diets reported by the administered patients.

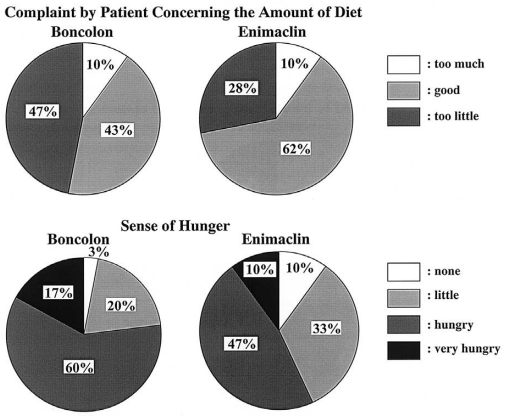

Fig. 2. Complaint by patients concerning the amount of diet. A half of the patients administered with Boncolon® diet complained that the amount of the diet was too little and 77% of them felt hunger during the day of preparation.

Quality of the Colonic Preparation for Barium-enema Study

Barium-enema study revealed an advanced colonic cancer, which caused colonic stenosis, in 3 cases (2 cases in Boncolon-administered and 1 case in Enimaclin-administered cases). These three cases were excluded from the assessment of radiological films. Therefore, radiological films of 28 cases in Boncolon-administered and 29 cases in Enimaclin-administered cases were investigated. Nine out of 28 Boncolon-administered and 13 out of 29 Enimaclin-administered patients complained chronic constipation. When the remaining liquid contents in right-sided and left-sided colons were compared in Boncolon-administered and Enimaclin-administered patients, large amounts of liquid which bothered radiological examination tended to be more frequently observed in Enimaclin-administered patients with chronic constipation (Fig. 3a, b). However, Enimaclin- and Boncolon-administered non-constipated patients showed similar colonic preparation. When we focused on the radiologically expressed colonic mucosal network pattern which was important for the detection of early colonic cancers, it was found that a large percentage of patients did not show good images of the network pattern. The percentages of the patients, in whom clearly imaged network pattern was available, were not different between the two groups (Fig. 4a, b).

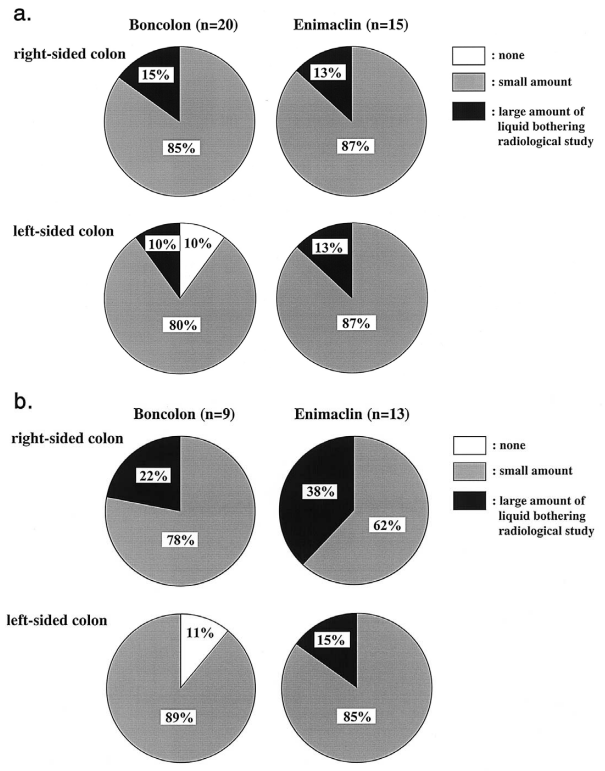

Fig. 3. Amount of remaining liquid contents in the colon in non-constipated (a) and constipated patients (b). Although Enimaclin-administered patient had larger amount of liquid content that might bother radiological examination in constipated cases, Enimaclin- and Boncolon-administered non-constipated patients showed similar colonic preparation.

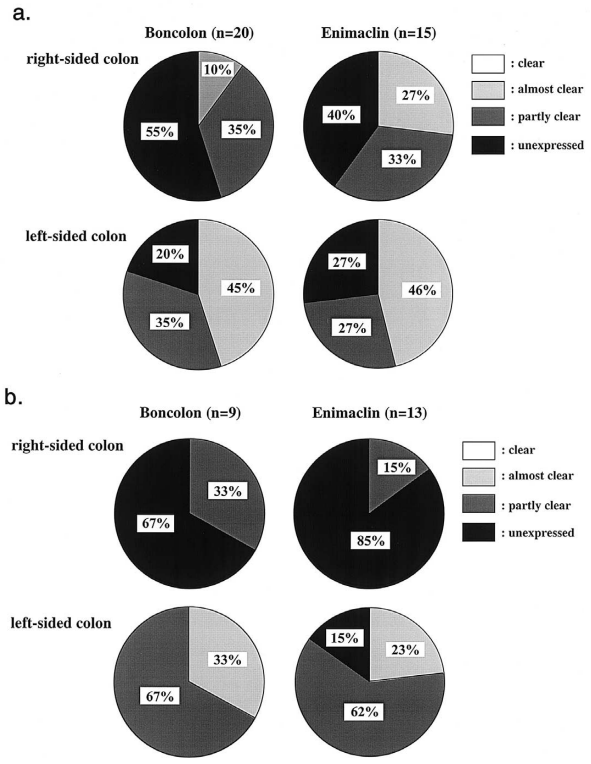

Fig. 4. Clarity of radiologically expressed pattern of mucosal network in non-constipated (a) and constipated patients (b). Enimaclin-administered patients showed the similar colonic preparation to Boncolon-administered patient.

DISCUSSION

Appropriate colonic preparation is essential for the accurate investigation of colonic diseases (6, 7). For the preparation, several kinds of special diets have been developed. Since all such kinds of meals are restricted in their total caloric intake and ingredients for the easy digestibility and fast passage through the lower gastrointestinal tract, the taste and the satisfaction after meals were not necessarily good enough. With the increasing expectation of the medical examination-related amenity (7), we have tried to select the better meal not only for the good colonic preparation but also for the easy acceptability by the patients. Therefore, we have selected Enimaclin® diet as a test-meal as this meal has larger amount of food reaching 857 kcal. Since this diet has larger amount of food, it may bother the complete defecation and preparation of the colon. In particular, Enimaclin® has higher content of fat and may delay the gastric emptying and gastrointestinal transit.

Our present prospective, randomized study clarified that Enimaclin® diet with 857 kcal was favored than Boncolon® diet with 410 kcal since Enimaclin® provided better taste and satisfaction. Concerning the colonic preparation, patients treated with Enimaclin® diet tended to have larger amount of liquidized stool in the colon, when the diet was administered to the patients with chronic constipation. However, when Enimaclin® and Boncolon® diet were given to the patients who had no chronic constipation, the two types of test-meal did not show any difference in their performance for colonic preparation. Radiologically expressed pattern of the colonic mucosal network is a radiological representation of the colonic mucosal fine structure. Therefore, the radiological photograph of the barium-enema study should show this pattern for radiologists to easily find the early colorectal cancers (4). Thus, the objective of all the colonic preparation for barium-enema study is the precise imaging of this network pattern. Although Enimaclin® and Boncolon® diets showed similar results, a large percentage of patients did not show good images of the network pattern. The improvement of the methods for colonic preparation, including the alternation in dose volume and kinds of laxative drugs, may be necessory to obtain the precise imaging of colonic network pattern. Consequently, Enimaclin® diet is thought to be superior in the acceptability by patients and similar in the quality for colonic preparation to Boncolon® diet. Therefore, we have chosen Enimaclin® diet for the patients who need to be examined by barium-enema study. Further study is required to determine more useful test-meal to obtain high-quality images of roentgenogram.

In summary, Enimaclin® diet showed the similar quality in the colonic preparation for radiological study to Boncolon® diet and Enimaclin® diet is superior to Boncolon® diet from the standpoint of acceptability by the patients.

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