Kawasaki Journal of Medical Welfare Vol. 9, No. 1, 2003 9–14

Original Paper

Effect of Colonic Irrigation on the Bowel Habits of Constipated Young Women

Midori SAKAMOTO[*], Kiyoko FUKAI[**] and Hiroko MINE[***]

(Accepted May 23, 2003)

Key words: oral administration, colonic washout, constipation

Abstract

This study aims to evaluate bowel habits changed by colonic irrigation in the severely constipated. Ten consenting young female subjects (19.7 ± 1.8 years) participated in a pre-post test-designed quasi-experiment. The subjects took an electrolyte-compounding agent orally, Niflec® (Ajinomoto Pharma) with 2000 ml of water for colonic washout. Their bowel habits were assessed using the Constipation Assessment Scale (CAS)(Fukai, et al, 1995), the Form of Feces (FF)(Davies, et al., 1986) and a defecation diary. Both the CAS and FF scores significantly decreased for at least 12 weeks after using Niflec®. In addition, bowel frequency per day increased in all subjects except one. Based on these results, we concluded that colonic irrigation by oral administration could alleviate severe constipation. The role of indigenous intestinal microflora was also discussed in relation to constipation.

Introduction

Constipation, not very severe but habitual, is usually alleviated by supplements of dietary fiber and/or water intake, physical exercise, abdominal massage, and hot compresses on the abdominal or lower back areas [1–7]. However, these strategies are not necessarily effective in management of severe constipation. Constipated patients, who defecate less than once a week, have to use laxatives, but overuse of laxatives weakens colonic peristalsis, and often causes a constipation-diarrhea spiral [8]. Improvement of such severe constipation without drugs has been a major problem for nurses and other health professionals for many years.

It is well known that undigested fiber is fermented in the large intestine, and that short-chain fatty acids (SCFA), as the end-products of microbial anaerobic metabolism, modulate colonic motility [9–11]. In their study, Takahashi, et al. reported that the total amount of excreted, SCFA in a constipated group was statistically smaller than that in a normal group [12]. It is known empirically that bowel habits improve after large intestinal irrigation. Based on such evidence, we assumed that indigenous intestinal microflora is related to constipation. To confirm this assumption, we first carried out a longitudinal survey of outpatients who underwent colonic irrigation for cancer screening, and confirmed that the frequency of defecation increased after irrigation in 8 out of 10 patients [13]. The aim of the present study is to determine if bowel habits would improve in severely constipated subjects after taking an electrolyte-compounding agent, and if the effect would continue for months.

[*] Department of Nursing, Kawasaki College of Allied Health Professions
[**] Department of Nursing, Faculty of Health Sciences, Okayama University Medical School
[***] Department of Clinical Nutrition, Faculty of Medical Professions, Kawasaki University of Medical Welfare

Methods

1. Subjects

The Ethics Committee of Kawasaki College of Allied Health Professions approved the protocol for this study. Before the participants signed a consent form, the purpose, protocol, and risks of the study were explained.

Ten healthy young female students (19.7 ± 1.8 years) participated in this study (Table 1). The participants were questioned about constipation and their life style. The subjects were severely constipated, but had never experienced any disease of the digestive system. Two of them defecated every other day, and the other eight once or twice a week. Although they lived ordinary lives, including a balanced diet, good sleep, and some exercise, two of them used laxatives habitually, one did every four days and the other every two weeks.

Table 1 Bowel habits of the subjects

Subject	Age	Sex	Laxative use	CAS	FF	Bowel frequency per day
A	24	F	−	9	6	0.5
B	18	F	−	11	8	0.5
C	18	F	−	8	8	0.2
D	19	F	−	10	8	0.2
E	19	F	−	9	8	0.2
F	20	F	−	12	7	0.2
G	21	F	−	7	8	0.2
H	19	F	−	10	8	0.2
I	19	F	+	12	7	0.2
J	20	F	+	7	6	0.2

(n=10)

2. Evaluation of bowel habits

The bowel habits of the subjects were evaluated using the Japanese version of the Constipation Assessment Scale (CAS) [14]. The CAS was first developed by McMillan and Williams (1989) [15], and later standardized into a Japanese version. The CAS has eight items which relate to abdominal symptoms of constipation. There are three choices for each item (0–2), and the total score may range from 0 to16. When the CAS score of a subject exceeds 5, he/she may be assessed as constipated. To evaluate the stiffness of stools, Davies, et al. (1986) developed an ordinal scale, the Form of Feces (FF) [1]. It describes eight forms of feces graded from soft to hard stools, such as loose (1), mushy, flattened surface (2), mushy, heaped surface (3), collapsed (4), cylindrical with smooth surface (5), cylindrical with superficial cracks (6), cylindrical with deep cracks (7), and fragmented, pellets (8).

The subjects kept a defecation diary, in which they wrote down the frequency of defecation each day, stool stiffness (soft, moderate, hard), laxative use, abdominal complaints and menstrual cycle. They did not use the FF scale in keeping a diary in order to reduce their workload. They kept the diary from at least a week before irrigation to four weeks after.

3. Colonic irrigation

An electrolyte-compounding agent (Niflec®; Ajinomoto Pharma, 137.155g) was used for colonic irrigation, because it is commonly used in pretreatment for endoscopy or surgery. The subjects consumed

Niflec® with 2,000 ml of water over two hours. They were always able to consult with us about their physical condition by cellular phone throughout the research period. No one experienced any side effects after taking Niflec®. Colonic washout was safely accomplished in all the subjects.

4. Protocol

Bowel habits were measured regularly (Fig. 1). First, we interviewed each subject and collected data on bowel habits. This interview included the CAS and FF. After that, the subjects began to write their defecation diaries. Then they took Niflec® on a convenient day, one or two weeks after the interview. They continued to keep the defecation diary for five weeks, a week before and four weeks after the irrigation. As in the initial interview, the same data was collected 2, 3, 4, 8 and 12 weeks after irrigation. When they completed the diary, they sent it to us with the data for the initial four weeks.

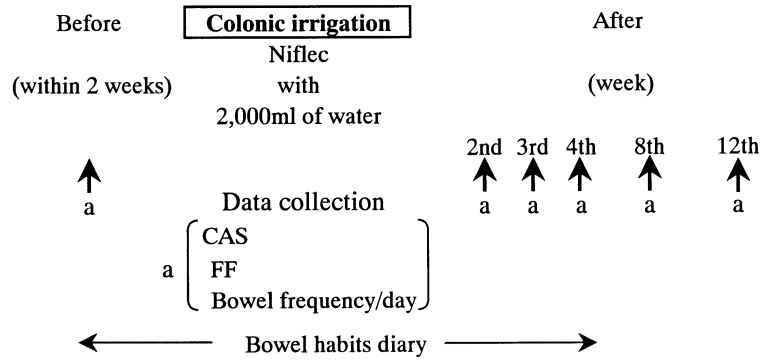

Fig. 1 Study protocol

5. Data analysis

The average CAS scores were compared using the paired-t test, and the FF scores using the Wilcoxon's test. $P<0.05$ was considered to indicate a statistically significant difference.

Results

1. Colonic irrigation and laxative use

Niflec® is not an easy agent to take so the subjects drank it little by little with 2,000 ml of water over a two-hour period. All our subjects were able to excrete Niflec® completely within two hours, and had no serious physical problems because of the irrigation.

Two of the subjects were laxative users before irrigation. One stopped using laxatives afterwards, but the other continued to use them. The other eight subjects did not use laxatives before or after irrigation.

2. Change in bowel habits of the subjects

Daily bowel habits were investigated minutely from the defecation diary. The subjects defecated only from one to three times a week before the colonic irrigation, but from three to 17 times one week after the irrigation. Accumulated bowel frequencies of the 10 subjects per week increased remarkably after colonic irrigation (Fig. 2), and the stool became softer than before irrigation. We disregarded the data taken from

the first seven days after irrigation because most of the defecations were in response to Niflec®.

Both the CAS and FF scores significantly decreased after irrigation ($P<0.05$) (Table 2). Individual data showed that the bowel frequency of five subjects increased until 12 weeks after irrigation (Table 3). CAS scores decreased in seven subjects, and the FF decreased in nine. The subjects of this study originally could defecate only once a week or every other day. However, frequency of defecation increased in five out

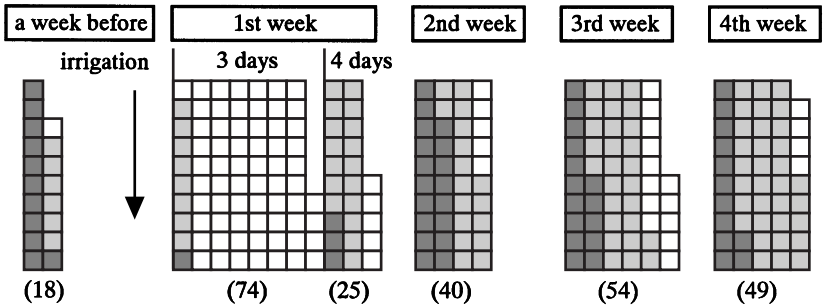

Fig. 2 Change in bowel habits before and after colonic irrigation in 10 subjects
Every square represents a stool. The depth of color shows the stool stiffness: dark grey, hard; grey, moderate; white, soft. The numbers in each of the parentheses indicate accumulated defecation frequencies per week or days in ten subjects.

Table 2 Change of the CAS and FF scores after colonic irrigation

Scores	Before	After irrigation (week)				
		2nd	3rd	4th	8th	12th
	Mean ± SD	Mean ± SD				
CAS	9.5 ± 1.8	4.8 ± 3.4a	3.8 ± 3.3a	4.3 ± 3.3a	4.3 ± 3.8a	6.4 ± 3.5a
FF	7.4 ± 0.8	5.5 ± 0.8b	5.3 ± 1.1b	5.4 ± 0.8b	5.9 ± 1.6b	5.2 ± 1.3b

a, b indicate the significant difference ($P<0.05$, n=10); a, paired-t test; b, Wilcoxon's test.

Table 3 Change of bowel frequency after colonic irrigation

Subject	Bowel frequency per day					
	Before	After irrigation (week)				
		2nd	3rd	4th	8th	12th
A	0.5	0.5	0.5	1	0.7	1
B	0.5	1	0.5	0.5	0.5	0.5
C	0.2	1	1	0.7	1	0.2
D	0.2	1	1	1	1	1
E	0.2	0.7	0.5	0.5	0.5	0.5
F	0.2	0.2	0.5	0.5	0.5	0.5
G	0.2	0.2	0.2	0.5	0.2	0.2
H	0.2	0.2	0.2	0.2	0.7	0.7
I	0.2	0.7	0.2	0.7	0.2	0.2
J	0.2	0.2	0.2	0.2	0.2	0.2

(n=10)

of 10 subjects after two weeks, and in seven out of 10 after four weeks. After eight weeks, the defecation frequencies in six subjects out of 10 increased, and after twelve weeks, those of five subjects out of 10 did.

All the subjects complained of constipation at the beginning of this study, but only four felt constipated four weeks after irrigation, and only three did eight weeks after that. Finally, eight out of 10 subjects reported that they were not constipated 12 weeks after irrigation.

On the other hand, regarding the data from the measurement tools, the scores of the CAS and FF scales in half of the subjects decreased, and stool frequency increased over 12 weeks. These subjects reported that they were no longer constipated, and that they would never need laxatives. Irrigation seemed ineffective in only one, whose bowel frequency and CAS score did not change, but her FF scores decreased during the 12 experimental weeks.

Discussion

Constipation is an inevitable problem for humans. Many strategies for dealing with constipation, such as dietary fiber, additional fluid intake, exercise, hot compresses, and abdominal massage have been tried by nurses for a long time. It is true that these methods are safe and can alleviate constipation, but the effects are usually moderate, not dramatic. Such methods can diminish the CAS score by 1–3 points [4, 5, 7], which is enough for the moderately constipated, but not for the severely constipated.

In our previous paper, we reported that the bowel habits of outpatients who underwent colonoscopy after colonic washout improved remarkably [13]. Furthermore, our present data supported our belief that colonic irrigation by oral administration could alleviate severe constipation for at least 12 weeks. After the irrigation, their bowel frequency increased much more than before, and the stiffness of the stool became softer. Furthermore, half of the subjects in this study, whose CAS scores were 9–12 points before, recognized that they were no longer constipated after irrigation. The colonic irrigation method decreased CAS scores by five points or more. Moreover, the effect continued for months. This is an epoch-making finding in the management of severe constipation.

Our results indicate that colonic irrigation is an extremely effective method for improving bowel movements. But there are three points to keep in mind when using colonic irrigation. First, the drug, e.g. Niflec®, should be prescribed by doctors. Second, extreme care should be taken regarding the drug's side effects. Lastly, a person who tries the irrigation method must maintain a regular diet. This is very important to get good results. For both this and previous studies, we selected subjects who had three meals per day [13]. We assume that this is a basic rule of management, and the base of this assumption is as follows: Dietary fiber and carbohydrates, usually contained in balanced meals, ferment in the large intestine [3, 11, 16]. Then short-chain fatty acids (SCFA) produced in indigenous intestinal microflora accelerate ileo-colonic peristalsis and decrease the bowel transit time [9, 10]. Constipated persons are known to excrete smaller amounts of SCFA into feces than normal ones [12]. Therefore, we suppose that constipation might be caused by less intestinal microflora in SCFA production.

It is easy to suppose that a large part of intestinal microflora may be washed out by intestinal irrigation. Intestinal microflora is known to recover with a normal diet in a few days [17]. Therefore, our present results may suggest that intestinal irrigation changes intestinal microflora to produce enough SCFA to accelerate ileo-colonic peristalsis and to improve bowel movements. However, further research into the change of intestinal microflora and its metabolic products after colonic irrigation will be necessary to prove the relationship between constipation and SCFA.

Our pioneering studies proposed corroborative evidence in management of severe constipation by colonic irrigation. In the future, research that investigates the mechanism by which colonic irrigation improves

severe constipation is expected. In addition, we propose that nurses and other health-related professionals try and evaluate colonic irrigation for the severely constipated in various clinical settings.

Acknowledgements

This research was supported by a Grant-in-Aid for An Interdepartmental Research Fund at the Kawasaki University of Medical Welfare in 1997 and RYOBITEIEN FOUNDATION in 2000.

References

1. Davies GJ, Crowder BR, Dickerson JWT: Bowel function measurements of individuals with different eating patterns. *Gut* **27**:164–169, 1986.
2. Ishii C, Azuma R: Effect of dietary fiber in defecation. *J Jpn Acad Nurs Sci* **12**(1):16–22, 1992.(in Japanese)
3. Wenk C: The role of dietary fibre in the digestive physiology of the pig. *Animal Feed Sci and Technol* **90**(1–2):21–33, 2001.
4. Fukai K, Hitomi H, Tsukahara T: Effects of fluid intake on bowel habits in the elderly. *Kawasaki J Med Welfare* **1**(1):109–116, 1995.
5. Fukai K, Sakamoto M, Tanaka M: Effect of oral water intake, exercise and hot compresses on bowel sounds in healthy women. *Kawasaki Med Welfare J* **6**(1):99–106, 1996.(in Japanese)
6. Hishinuma M, Hiramatsu N, Kasuga M, Ooyoshi M, Kaharu C, Misao H, Kawashima M: The effect on bowel sounds of very hot compresses applied to the lumbar region. *J Jpn Acad Nurs Sci* **17**(1):32–39, 1997.(in Japanese)
7. Okazaki K, Yoneda Y, Fukai K, Shimizu K, Doi F, Iida Y: Effect of abdominal massage on bowel sounds and bowel habit. *Adv Nurs Art Sci* **12**:113–117, 2001.(in Japanese)
8. Kruck F, Jahnecke J, Lockenhoff J: Cellular sodium transport and laxative abuses. *Verh Dtsch Ges Inn Med* **73**:1042–1045, 1967.
9. Yajima T: Contractile effect of short-chain fatty acid on the isolated colon of the rat. *J Physiol* **368**:667–678, 1985.
10. Yajima T: Chemical specificity of short-chain fatty acid-induced electrogenic secretory response in the rat colonic mucosa. *Comp Biochem Physiol* **93A**(4):851–856, 1989.
11. Mortensen PB, Andersen JR, Arffmann S, Krag E: Short-chain fatty acids and the irritable bowel syndrome: the effect of wheat bran. *Scand J Gastroenterol* **22**(2):185–192, 1987.
12. Takahashi T, Murakami H, Kato H, Fukuda S, Higuchi S, Baba T, Yoshida Y: The excretion of short-chain fatty acids (SCFAs) in feces of females with constipation. *Digestion & Absorption* **12**(2):24–27, 1989.(in Japanese)
13. Fukai K, Sakamoto M, Shimizu K, Kayahara M, Horio H, Doi F, Akazawa M, Ohkura M, Hirano Y: Effect of colonic irrigation on human bowel habits. *Adv in Nurs Art Sci* **12**:109–112, 2001.(in Japanese)
14. Fukai K, Sugita A, Tanaka M: A developmental study of Japanese version of the constipation assessment scale. *Jpn J Nurs Res* **28**(3):201–208, 1995.(in Japanese)
15. McMillan SC, Williams FA: Validity and reliability of the constipation assessment scale. *Cancer Nurs* **12**:183–189, 1989.
16. Malkki Y, Virtanen E: Gastrointestinal effects of oat bran and oat gum: a review. *Lebensmittel-Wissenschaft und-Technologie* **34**(6):337–347, 2001.
17. Chebut C: Effect of short-chain fatty acids on gastrointestinal motility in *Physiological and clinical aspects of short-chain fatty acids*, edited by Cummings GH, Rombeau JL, Sakata T, Cambridge, Cambridge University Press, 1995, 191–207.