Short-term effect of a negative colonoscopy in patients with functional constipation

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ABSTRACT

The yield of colonoscopy for neoplasia among patients with chronic constipation is very low. However, a negative colonoscopy may benefit these patients by decreasing anxiety and thereby alleviating constipation symptoms. We performed a prospective study to characterize the effect of a negative colonoscopy in patients with functional constipation. Seventy-five patients with chronic constipation were enrolled, and 69 patients were diagnosed with functional constipation through the Rome III criteria. After excluding patients whose constipation symptoms were affected by medications (e.g., laxatives, prokinetics), 45 patients were included in the study. Among the 45 patients, the average health-related anxiety score decreased from 21.0 to 15.6 at 1 week after colonoscopy ($P < 0.01$). Sustained improvement was observed in anxiety scores at 1 month (14.0), 2 months (12.4), and 6 months (11.2). Mean constipation symptom score was also decreased at 1 week (8.7), 1 month (8.0), 2 months (7.6), and 6 months (6.8) compared with the precolonoscopy period (11.5; $P < 0.01$). These results suggest that a negative colonoscopy in patients with functional constipation is associated with a decline in health-related anxiety and constipation symptom scores. (Registration number: ChiCTR-00h-16008488)

KEYWORDS Colonoscopy; functional constipation; health-related anxiety

Functional constipation is one of the most common functional gastrointestinal disorders in the general population, with a prevalence as high as 26.9%, accounting for 2.5 million annual physician visits with an added health care cost of approximately \$7522 per patient in the USA.^{1–4} Functional constipation has been considered a result of a combination of sociopsychological factors (e.g., anxiety).^{5,6} About 35% of patients with chronic constipation are anxious about potential colon cancer or other serious illnesses.⁷ In these patients, colonoscopy is often carried out to exclude serious colon lesions, thereby providing reassurance to the patients. A prior study in this area demonstrated that upper endoscopy could decrease health-related anxiety and symptom scores in patients with dyspepsia despite their lack of significant pathology.⁸

However, the effect of a negative colonoscopy on anxiety in patients with functional constipation has not been reported. The aim of this study was to characterize the short-term effect of a normal colonoscopy in terms of reassurance value and alleviation of constipation symptoms.

METHODS

The study was conducted in the endoscopy center of West China Hospital of Sichuan University (Chengdu, Sichuan, China). The endoscopy center provides primary-, secondary-, and tertiary-level care, and the Department of Gastroenterology offers open-access colonoscopy. The study was reviewed and approved by the ethics committee of clinical trial and biomedicine and registered in the Chinese Clinical Trial Registry (Registration Number: ChiCTR-00h-16008488).

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Between September 2015 and August 2016, consecutive patients aged ≥ 18 years with confirmed Rome III criteria of functional constipation⁹ referred for colonoscopy for evaluation of chronic constipation were enrolled in the study. Information on demographic characteristics (e.g., age, gender) and medication for constipation (e.g., laxatives, prokinetics, fiber supplements, stool softeners) in the past 6 months was obtained for each patient at the time of enrollment. Patients with secondary constipation¹⁰ and individuals who had previously undergone colorectal surgery were excluded. All enrolled patients completed a validated health-related anxiety questionnaire and constipation scoring questionnaire about 1 week before the colonoscopy. Based on the World Gastroenterology Organization's global guideline on constipation,¹¹ only patients without those colorectal diseases and with negative endoscopic findings continued into follow-up. In this study, hemorrhoids and diverticulosis were not considered endoscopic abnormalities. Colorectal polyp/adenoma with diameter >6 mm was excluded and underwent endoscopic polypectomy.¹²

After colonoscopy, the patients met with an endoscopic physician and were explicitly informed that no abnormalities had been detected. After follow-up, medications for constipation before and after colonoscopy were compared, and patients were divided into five groups: (1) no medication before and after colonoscopy; (2) the same medication before and after colonoscopy; (3) medication before colonoscopy, but no medication after colonoscopy; (4) different medication before and after colonoscopy; (5) no medication before colonoscopy but medication after colonoscopy. Patients whose constipation symptom assessments were not affected by the medicines for constipation (groups 1, 2, and 3) were included in the statistical analysis.

Patient follow-up by telephone at 1 week, 1 month, 2 months, and 6 months postcolonoscopy included administration of the health-related anxiety questionnaire and constipation scoring questionnaire and record of medication for constipation.

The health-related anxiety questionnaire is a validated measure of health-related anxiety.¹³ The questionnaire has 21 items, with a four-point Likert scale for each item, and has been shown to have high internal consistency (Cronbach's $\alpha = 0.92$), test-retest reliability ($r = 0.94$),

and evidence of discriminative ability.¹⁴ We assigned a score of 0 to 3 for each item response, with 0 representing *never/rarely* and 3 representing *most of the time*. The maximum total anxiety score was 63. The questionnaire consists of four components: worry and preoccupation with health, fear of illness and death, reassurance-seeking behavior, and interference with life.

Constipation symptoms were evaluated using a Constipation Scoring Questionnaire.¹⁵ The questionnaire has eight items, including frequency of bowel movements, painful evacuation, incomplete evacuation, abdominal pain, length of time per attempt, assistance for defecation, unsuccessful attempts for evacuation per 24 hours, and duration of constipation. A scoring range of 0 to 4 (with the exception of assistance for defecation, which is 0 to 2) was derived. The global score was 30, obtained by adding each individual score. Higher scores correlate with increasing degree of constipation.

Patients were divided into low- and high-anxiety groups based on their composite scores on the health-related anxiety questionnaire before colonoscopy. Results were expressed as mean ($\pm$ SE). Mean scores of the health-related anxiety questionnaire and constipation scoring questionnaire were compared before and after endoscopy using a paired t test. A P value <0.05 was considered statistically significant.

RESULTS

A total of 75 patients with chronic constipation were enrolled, with written informed consent provided for all patients. Sixty-nine patients were eligible for enrollment. Six patients were ineligible; among them, two had colon cancer and four had colonic polyp/adenoma with diameter >6 mm. Unfortunately, among the 69 patients, 8 patients were lost to follow-up after their colonoscopy. Finally, 61 patients with functional constipation completed the pre- and postcolonoscopy questionnaires. Among the 61 patients, 20 patients did not take any medicines for constipation before and after colonoscopy (group 1), 16 patients took the same medicine before and after colonoscopy (group 2), 9 patients took medicine before colonoscopy but no medicine after colonoscopy (group 3), 9 patients took different medicines before and after colonoscopy (group 4), and 7 patients did

Table 1. Baseline demographic features of the patient cohort ($n = 45$)^a

	Total	Anxiety		P value
		Low (<21) ($n = 24$)	High (>21) ($n = 21$)	
Mean age (years)	42.8 $\pm$ 13.8	44.4 $\pm$ 12.7	41.0 $\pm$ 15.1	0.43
Female	38 (84.4%)	3 (87.5%)	4 (81.0%)	0.69
Mean anxiety score	21.0 $\pm$ 7.8	14.9 $\pm$ 3.4	27.9 $\pm$ 4.9	—
Constipation symptom score	11.5 $\pm$ 2.4	10.5 $\pm$ 2.3	12.6 $\pm$ 1.9	0.002

^aData are shown as mean $\pm$ SE or n (%).

not take medicine before colonoscopy but did after colonoscopy (group 5). Therefore, only 45 patients (groups 1, 2, and 3) were included in the statistical analysis. Demographic features of this patient cohort are shown in *Table 1*.

The mean overall score in the health-related anxiety questionnaire was 21.0 (SE=7.8). As illustrated in *Figure 1*, mean anxiety scores decreased significantly 1 week after colonoscopy ($P<0.01$), and a sustained improvement was observed in anxiety scores at 1 month, 2 months, and 6 months. All four parts of the health-related anxiety questionnaire demonstrated improvement (*Figure 1*).

Based on the anxiety score before colonoscopy, patients were categorized into low- and high-anxiety groups. *Table 1* shows the demographic data of patients with low and high anxiety scores. As demonstrated, there was no remarkable difference between the two groups in age or gender. *Figure 2* reveals that the decline in anxiety scores in the high-anxiety group was more significant than that in the low-anxiety group.

As shown in *Table 1*, the mean overall baseline constipation symptom score was 11.5 (SE=2.4). In addition, baseline constipation symptom scores were significantly higher among those patients with a higher baseline anxiety score ($P=0.002$). As illustrated in *Figure 3*, the mean overall constipation symptom score declined significantly 1 week after colonoscopy ($P<0.01$), and a persistent improvement was observed in overall constipation symptom scores at 1 month,

2 months, and 6 months. The sustained improvement in constipation symptom scores was still evident at 6 months (*Figure 3*).

DISCUSSION

This is the first study to characterize the reassurance value of a negative colonoscopy in patients with functional constipation and to evaluate the impact of this reassurance on constipation symptoms. The findings demonstrate that the reassurance of a negative colonoscopy for these patients was associated with a decrease in health-related anxiety scores, which was more marked among those patients who had higher baseline anxiety levels. This reassurance persisted for at least 6 months. More important, constipation symptom scores also improved continuously over time.

The mean baseline anxiety levels that we observed in our patient cohort were slightly higher than those recorded by Esfandiyari et al using the same health-related anxiety questionnaire in patients undergoing colonoscopy who had non-specific gastrointestinal symptoms.¹⁶ Unlike the research of Esfandiyari et al, our study did not immediately assess the patient's anxiety after colonoscopy but at 1 week after colonoscopy, to avoid the impact of emotional relaxation after having completed the procedure. Interestingly, however, we observed a similar reassurance value of negative colonoscopy in the decline of health-related anxiety scores. Specifically, the most significant effect in both studies was in patients with higher baseline anxiety levels compared with patients with lower levels. In the study by Quadri et al there was no significant change in the low-anxiety group of patients with dyspepsia. The main reason may be the different classification methods of patients in the studies.⁸

The baseline average score of constipation symptoms was 11.5, and the sustained improvement in constipation symptoms score at 1 week, 1 month, 2 months, and 6 months was significant. However, the study by Esfandiyari et al showed that the improvement in constipation symptom score after colonoscopy was only sustained for 2 months.¹⁶ This may be due to the difference of symptom rating scale (constipation scoring questionnaire vs Gastrointestinal Symptom Rating Scale). Interestingly, although the studies by Esfandiyari et al

Figure 1. Change in health-related anxiety scores over 6 months postcolonoscopy for the total anxiety questionnaire and its individual components. * $P<0.05$ compared to precolonoscopy values.

Figure 2. Change in health-related anxiety scores over 6 months postcolonoscopy based on baseline anxiety scores, low (<21) and high (>21). * $P<0.05$ compared to precolonoscopy values.

Figure 3. Change in symptom scores for constipation over 6 months postcolonoscopy. * $P<0.05$ compared to precolonoscopy values.

and Quadri et al used the same symptom rating scale, Quadri et al⁸ concluded that the improvement in constipation symptom score after upper endoscopy was sustained for 6 months. The reason may lie in the difference in the definition of constipation and types of endoscopic evaluation (upper endoscopy vs colonoscopy).

Several limitations of our study should be mentioned. First, this study was a prospective cohort study, which is not the optimal setting in which to address this study question. The lack of a control group (i.e., patients with similar anxiety and constipation symptom scores not undergoing colonoscopy) leads to some question regarding the extent to which we should ascribe the improvement of anxiety and constipation symptom scores to colonoscopy. However, in fact, the ideal study design, a prospective randomized controlled study that randomly divides patients with chronic constipation into colonoscopy and no colonoscopy groups, would be infeasible because of the ethical issues related to denying a colonoscopy to these patients. As shown in our study, two patients with chronic constipation were diagnosed with colonic cancer. Moreover, although our study roughly eliminated the influence of drugs (e.g., laxatives, prokinetics, fiber supplements, stool softeners), some of these patients did have other interventions (e.g., diagnostic tests, increased water intake, increased dietary fiber intake) that may have influenced the study results. Second, this study is not a multicenter study, which limits the generalizability of its outcomes. Third, the 6-month follow-up time is relatively short, which leaves some uncertainty concerning the longer-term persistence of the reduction in anxiety and constipation symptom scores. It would be better to follow up beyond 6 months to demonstrate the continuation of this improvement more completely.

In conclusion, the study suggests that a negative colonoscopy in patients with functional constipation is associated with a decline in health-related anxiety and constipation symptom scores.

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