Functional constipation in children: investigation and management of anorectal motility

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Background: **Constipation is a common disease in children. Despite many causes, constipation is most often functional. This study was undertaken to investigate the anorectal motility in children with functional constipation as compared with healthy children and to determine the efficacy of management based on the results of anorectal manometry.**

Methods: **A multi-functional manometry was used to detect the anorectal manometry indexes of 8 patients with functional constipation (11.4±4.8 years) as well as those of 10 healthy children (10.5±3.5 years) from May 2004 to June 2005. The patients received a combined treatment regimen including probiotics (bifid triple viable bacterial tablet), prebiotics (lactulose) and regular defecation according to the results of anorectal manometry. The efficacy of these conservative measures was estimated during the course of treatment.**

Results: **No statistical difference was found in the indexes of effective length of the anal sphincter, anal tract maximal systolic pressure and the duration of more than 50% maximal systolic pressure between the two groups. But minimal sensitivity and maximal tolerated volume between the two groups were different significantly. Seven of the eight patients got better with the conservative treatment.**

Conclusions: **Abnormalities exist in the anorectal motility of the children with functional constipation. Conservative treatment regimen based on the results of anorectal manometry is significantly effective.**

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Key words: **constipation; manometry; motility; rectum**

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Introduction

Constipation is a common symptom caused by different gastrointestinal (GI) diseases in children; its prevalence in the general population ranges from 0.7% to 29.6%.[1] About 90% of children with constipation are non-organic.[2-4] Despite of its high incidence in children, constipation is not widely concerned and studied because of its less impact on growth and development, failure of short-term conventional treatment, and loss of confidence in persistent therapy of the parents, etc. Consequently, constipation has become a significant problem influencing physical and mental health of children. In this study, we investigated the characteristics of anorectal motility in patients with functional constipation from May 2004 to June 2005 and the treatment regimen for constipation in children.

Methods

Subjects

Eight children with constipation (5 females and 3 males; age range 5-16 years) were recruited from outpatients at the Pediatric Department of PUMC. All of them met the Rome II criteria[5] for childhood functional constipation: (1) pebble-like hard stools for a majority of bowel movements for at least 2 weeks, or firm stools ≤3 times per week for at least 2 weeks; and (2) no evidence of structural, endocrine, or metabolic disease. They also met the national criteria[6] for childhood functional constipation: (1) dry hard stools, straining or squeezing to try to pass bowel movements, fewer bowel movements (once/more than 2 days), or feeling the need to defecate but not able to; and (2) outlet obstruction constipation (OOC) shown by the gastrointestinal transit time (GITT) test. Bowel movements of the 8 patients were normal

in their babyhood. Ten healthy children (5 females and 5 males; 5-15 years) with normal results of the GITT test, normal defecation habit, and without any gastrointestinal diseases were recruited as controls in the study. There was no significant difference in age between the constipation group and the control group (t=0.46; P>0.5).

Methods

The multi-functional GI manometry designed by Switzerland CDT Corporation was used. At the beginning of the study, both groups received the anorectal manometry (ARM) test, and any drugs that may affect the GI motility were forbidden within a week before the test. The test data included maximal resting pressure of the anal sphincter, effective length of the anal sphincter, maximal systolic pressure (MSP), duration of more than 50% of MSP, minimal sensitivity and maximal tolerated volume. The patients were treated conservatively with a combined regimen including probiotics (bifid triple viable) 1 g twice per day, prebiotics (lactulose) 5-15 ml once per day and regular defecation once every 1-2 days according to the results of the ARM test. Therapeutic effects were evaluated respectively at the end of the 1st, 4th and 8th week. Therapeutic effects were evaluated as: (1) excellent response: stool frequency and characteristics turned to be normal within 1-week treatment; (2) good response: defecation frequency and characteristics turned to be normal after 1-week treatment; and (3) no response: no changes in defecation frequency and characteristics with 2-week treatment.

Data analysis

Data were analyzed with SPSS statistical software. All data are reported as means ± standard deviation (SD). Data between groups were analyzed with Student's t test. A two-tailed P value <0.05 was considered statistically significant.

Results

No statistical difference was found in the indexes of effective length of the anal sphincter, MSP and the duration of more than 50% MSP between the two groups (Table). Both minimal sensitivity and maximal tolerated volume of the constipation group were larger than those of the control group (P<0.05) (Table). Of the 8 patients, 5 had excellent response to the treatment, 2 had good response, and 1 had no response.

Discussion

Functional constipation, a common disorder in children, usually presents with prolonged symptoms caused by gastrointestinal dysfunction in the absence of a demonstrable organic or systemic disease process. Clinical and basic researches have focused on its etiology and treatment in recent years.[1-4] Clinicians have already been acquainted with some predisposing factors of this disease including[6,7] (1) hereditary factors, ie, family history, nearly two thirds of patients' parents had an abnormal bowel habit in this study; (2) dietary habit, ie, constipation can be caused by diet bias such as improper dietary constitution, food preference or fastidiousness, lack of carbohydrate and cellulose; (3) infaust bowel habit and psychological factors, ie, inhibition of normal bowel movements or adverse life events, which may interfere with the normal defecation reflex; (4) inappropriate gut hormone secretion and regulation, which has an effect on gastrointestinal motility; (5) intestinal dysbacteriosis, ie, stool will get dry and hard if the normal internal environment in the colon is disturbed; (6) the abnormal motility of the GI tract: diverse reasons leading to abnormal motility of the GI tract can cause constipation, including intestinal neuromuscular diseases and anatomic abnormalities of the anus or rectum, which would lead to colonic slow transit constipation and outlet obstruction constipation respectively.[8]

If a child frequently avoids defecating, the rectum eventually stretches to accommodate the retained fecal mass, and the propulsive power of the rectum is diminished. The longer the fecal mass remains in the rectum, the harder it becomes. Passage of a hard or large stool may cause a painful anal fissure. The cycle of avoiding bowel movements for fear of painful defecation may progress to stool retention and infrequent bowel movements, a condition that is termed functional constipation. It is a general consideration that functional constipation in children

Table. Anorectal manometry test results of the constipation group and the control group

	n	Effective length (cm)	MSP (mmHg)	>50% MSP (s)	Sensory threshold volumes (ml)	Maximal tolerated volumes (ml)
Patients	8	4.1±1.1	157.1±36.3	4.4±0.9	50.0±29.8	147.5±35.7
Controls	10	4.0±0.9	147.3±20.0	4.2±1.2	28.0±11.4	117.0±46.2
t		0.217	0.742	0.357	2.178*	1.574*

*: P<0.05. MSP: maximal systolic pressure.

results from a decrease of rectal sensitivity to volume stimulation and an increase of rectum's maximal tolerated volume and disorder of the anal sphincter during defecation, which could be secondary to many causes.[8,9] Our research also showed that there was no significant difference in the effective length of the anal sphincter, MSP and duration of more than 50% of MSP between the constipation group and the control group, indicating that their defecation ability actually turns to be the same. In the constipation group, however, the sensitivity of the rectum to volume stimulation was significantly deceased while its maximal tolerated volume was remarkably increased. We concluded that these patients lost the supposed response to normal stool volume, and the retained fecal bolus in the colon had been too hard to expel when a response aroused.

As far as the treatment of functional constipation is concerned, conventional strategies include initial therapy[10,11] and medical therapy,[11-13] such as dietary alteration, fiber supplementation, regular defecation and use of laxatives usually fail to achieve a durable and satisfactory remission. Biofeedback therapy for adults is proved to be curative by some studies,[14-16] but has seldom been used in pediatric field. Patients in our study were of outlet obstruction type, and the results of ARM revealed that the rectum had lower sensitivity to stool stimulation but still normal contractive force. Therefore, this type of constipation could be managed as follows. First, to make stool easy to expel. Probiotics such as bifid triple viable can produce acetic acid and lactic acid, low down pH in the intestinal tract, and stimulate enterokinesia by facilitating lipidolysis which can produce short-chain fatty acid.[17] Prebiotics such as lactulose, which can not be hydrolyzed and absorbed in the upper GI tract, can soften stool both by increasing the osmotic pressure and keeping water in the gut, produce lactic and short-chain carboxylic acids as end products of the fermentation, low down pH in the intestinal tract, promote the growth of beneficial bacteria in the colon selectively and activate their metabolic effect.[18-20] The improved therapeutic effect can be achieved by the combination of the two drugs. Second, no matter whether there is an awareness of defecation, patients are supposed to defecate regularly to revive the sensitivity of the rectum. Favorable therapeutic effect can be achieved when the two strategies mentioned above are in use.

Our study demonstrated a change of gastrointestinal motility in children with functional constipation[21] and confirmed that urging regular defecation combined with probiotics and prebiotics are of definite effect. However, the favorable therapeutic effect requires further research with a larger sample and long-term follow-up. In our study, it may take a long time to achieve a complete recovery since both the anorectal movement and sensory are abnormal. The children not insisting on regular defecation had recurrence of the symptoms during follow-up. And we suggest regular ARM test to assess the therapeutic effect on the kinetics and sensitivity of the rectum.

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