CLINICAL PAPER

The efficacy of a multidisciplinary approach to the management of constipation: a case series

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Abstract

The aim of this study was to evaluate a rehabilitative programme including biofeedback training for the treatment of chronic constipation. A prospective series of patients with constipation, as defined by the Rome II diagnostic criteria, were assessed by a clinician, a dietitian and a physiotherapist. Anorectal physiology investigations and defecography were performed prior to and after the programme. The treatment involved consultation by the dietitian, postural re-education and pelvic floor re-education regarding the proper pattern of defecation. The subjects were followed up in alternate weeks for the first 3 months and then monthly for another 3 months. Twenty patients have been recruited into the programme since 2005. Ten subjects have completed the course of treatment and three have defaulted; the remaining seven were still undergoing treatment at the time of writing. On completion of the programme, there was a significant improvement in fibre intake (pre-treatment = 12.919 ± 1.06 g; post-treatment = 20.266 ± 1.064 g; $P = 0.001$), average straining effort (pre-treatment = 6.36 ± 0.391; post-treatment = 3.72 ± 0.391; $P = 0.001$) and average straining time (pre-treatment = 17.61 ± 2.172 min; post-treatment = 6.00 ± 2.172 min; $P = 0.004$). The subjects reported a >50% improvement in their symptoms. A rehabilitative programme for constipation can significantly ameliorate the problem of constipation. The method of anorectal manometry was employed to assess the paradoxical response of the anorectum during attempted defecation.

Keywords: anorectal physiology, constipation, multidisciplinary approach.

Introduction

The prevalence of constipation has been determined to be >30% in the general population (Andromanakos *et al.* 2006). Studies have reported that this condition occurs more frequently in both women and older subjects (Everhart *et al.* 1989; Sonnenberg & Koch 1989). Constipation is defined by the present authors according to the Rome II diagnostic criteria (Bassotti & Whitehead 1997) (Box 1).

Box 1. Rome II diagnostic criteria for constipation: (IBS) irritable bowel syndrome

At least 12 weeks, which need not be consecutive, in the preceding 12 months of two or more of:
(1) straining in >¼ defecations;
(2) lumpy or hard stools in >¼ defecations;
(3) sensation of incomplete evacuation in >¼ defecations;
(4) sensation of anorectal obstruction/blockade in >¼ defecations;
(5) manual manoeuvres to facilitate >¼ defecations (e.g. digital evacuation, support of the pelvic floor); and/or
(6) <3 defecations/week.
Loose stools are not present, and there are insufficient criteria for IBS.

Pathophysiology

Functional constipation is classified into two subtypes: slow transit constipation and

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obstructive defecation (Vrees & Weiss 2005). Slow transit constipation is caused by abnormal colonic motility. The diagnosis is made by performing a colonic transit study. Obstructive defecation is a condition that can be referred to as anismus, pelvic floor dyssynergia or anorectal dysmotility (Andromanakos *et al*. 2006). To fully evaluate a patient with obstructive defecation, anorectal manometry, defecography and electromyography (EMG) should all be utilized (Vrees & Weiss 2005).

Pelvic outlet obstruction has been recognized as a cause of chronic constipation. Failure of relaxation of the puborectalis and the external anal sphincter muscles, or paradoxical contraction of these muscles during straining to defecate is called anismus (Preston & Lennard-Jones 1985). The basic mechanism behind persistent constipation is the failure of the anorectal angle to straighten and the anal canal to shorten as a result of sustained contraction of the puborectalis muscle (Andromanakos *et al*. 2006).

Management

The management of chronic obstructive defecation has been well documented and investigated. Biofeedback therapy improves the function and coordination of the abdominal, rectal and anal sphincter muscles, as well as rectal sensory perception. The patient's posture and diaphragmatic breathing are also corrected using verbal reinforcement technique (Rao *et al*. 1997). Surgery should be considered as a last resort for constipated patients (Rao 2003).

Currently, there is no well-defined intervention programme for patients with constipation in Hong Kong. The purpose of the present study was to evaluate a multidisciplinary approach to the management and rehabilitation of patients with constipation that includes dietary modification, bowel habit adjustment and physiotherapy intervention with biofeedback therapy.

Subjects and methods

Patient histories

The following case series describes three typical subjects with constipation.

Case 1. The subject was 50-year-old woman who had suffered from constipation for 4 years. She defecated twice a week, her hard stools meaning that she had to strain during bowel motions, and took laxatives once a week. The constipation problem had made her frustrated and anxious.

The subject was diagnosed with constipation under the Rome II diagnostic criteria by a colorectal surgeon. The obvious clinical features of irritable bowel syndrome and other causes of constipation secondary to medical disorders such as thyroid dysfunction were excluded. Her constipation was managed by an anorectal physiology team, who adopted a multidisciplinary approach to the treatment.

Case 2. The subject was 55-year-old woman who had suffered from constipation for 2 years. She had also had symptoms of stress urinary incontinence for 5 years. According to her obstetric history, her labour and delivery had been complicated, involving an episiotomy and vacuum extraction of her baby. The baby's birth weight was 4.1 kg. The subject presented with urinary incontinence when coughing, sneezing and running. She defecated twice a week and took laxatives twice a week. She had to spend 20–30 min in the toilet in order to defecate, and had to strain considerably during bowel motions. The symptoms of constipation and urinary incontinence made her housebound.

Case 3. The subject was 45-year-old man who had suffered from constipation for 3 years. He had also presented with haemorrhoids for one year. He defecated once a week, and had to strain during bowel motions, which caused him pain. For ease of defecation, he took laxatives twice a week. The subject dined out most of the time, and was reluctant to eat fruits or vegetables.

He consulted a colorectal surgeon at the Colorectal Clinic of Kwong Wah Hospital, Hong Kong, regarding the management of his haemorrhoids and constipation. The haemorrhoids were treated conservatively, and his constipation was managed by an anorectal physiology team, who adopted a multidisciplinary approach to the treatment.

Assessment

The assessment of patients with constipation who experience obstructive defecation includes specialized tests of colonic transit and anorectal physiology, i.e. anorectal manometry, EMG and defecography. These tests have been demonstrated to be useful in accurately diagnosing the cause of the problem, identifying anatomical or functional anorectal abnormalities, and directing treatment.

Figure 1. Colonic transit study with the markers shown.

Colonic transit test. The colonic transit test is a measure of the time required for the intestinal contents to pass (Fig. 1). It is designed to differentiate between slow-transit and normal-transit constipation. A colonic transit study consists of administering a capsule containing 24 radiopaque markers on day 1 and obtaining a plain radiograph of the abdomen on day 6. By examining the radiograph performed on day 6 and counting the number of markers left in the large colon, one of the three patterns may be observed (Stessman 2003).

Anorectal manometry. Anorectal manometry quantifies the anal sphincter muscle tone and the anorectal sensory response to different stimuli (Fig. 2). It is a useful test in the diagnosis of obstructive defecation (Vrees & Weiss 2005). It was performed using a water perfusion system (Zinetics® Anorectal Manometric Catheter, Medtronic Inc., Copenhagen, Denmark) with the patient in the left lateral decubitus position. A complete manometric evaluation consists of maximum resting pressure, maximum squeezing pressure, the length of the high-pressure zone, the compliance of the rectum, the rectoanal inhibitory reflex and the ability of the sphincter to relax with straining.

Figure 2. Anorectal manometry setting in a laboratory.

Electromyography. Surface EMG placed around the anus helps to diagnose the disturbed patterns of anal sphincter and pelvic floor muscle (PFM) dysfunction that are associated with constipation (Fig. 3) (Vrees & Weiss 2005). It is of great clinical significance in cases of constipation with pelvic outlet obstruction (spastic pelvic floor syndrome of the anismus) (Halverson & Orkin 1998).

Defecography. Defecography is used to visualize the anal canal and rectum at rest and during defecation (Fig. 4). A paste mixed with barium sulphate and porridge oats is injected into the rectum to simulate stool. Plain X-rays are taken under fluoroscopic control with the patient at rest, during voluntary anal contraction and during defecation. The anorectal angle and pelvic floor descent can be measured at rest and during defecatory manoeuvres. In subjects with outlet obstruction, there is a failure of puborectalis muscle relaxation during defecation. Pelvic floor dyssynergia, intersuception or rectocele can also be diagnosed.

The subjects presented with pelvic muscle dyssyngeria or anismus. In the colonic transit test, the transit time was normal. Anorectal manometry revealed paradoxical anal contraction, there was augmentation of EMG activity during straining, and defecography indicated a lack of pelvic floor and puborectalis muscle relaxation during defecation.

Treatment

The present authors' colorectal team have pioneered the use of a multidisciplinary approach to the management of patients with constipation in Hong Kong. Members of various disciplines, such as colorectal surgeons, nurse specialists, physiotherapists and dietitians, participated in

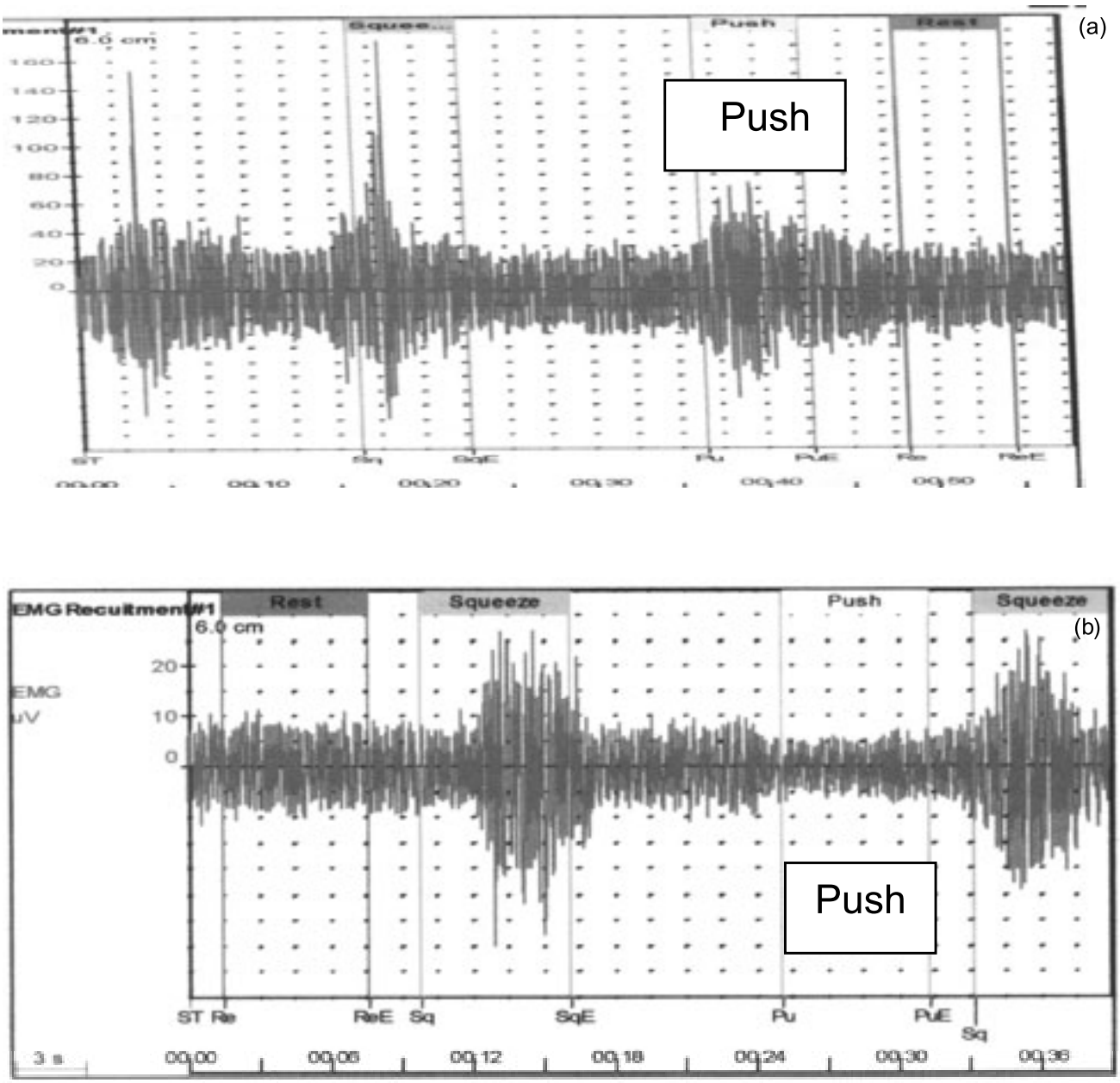

Figure 3. Electromyography registering the contraction and relaxation of the anal sphincter and pelvic floor muscle during defecation: (a) before treatment; and (b) after treatment.

this unique rehabilitation programme. The programme lasted for 6 months. The patients' progress and treatment plans were evaluated at monthly meetings between all the professionals involved.

Nursing intervention. The nurse specialist interviewed each patient. She educated them about proper bowel habit and clarified their misconceptions regarding the use of laxatives.

The subjects were asked to keep stool diaries in order to record their bowel habits, bowel frequency, use of laxatives, grade of stool consistency according to the Bristol Stool Score, straining time and degree of straining during each episode of defecation. The nurse specialist

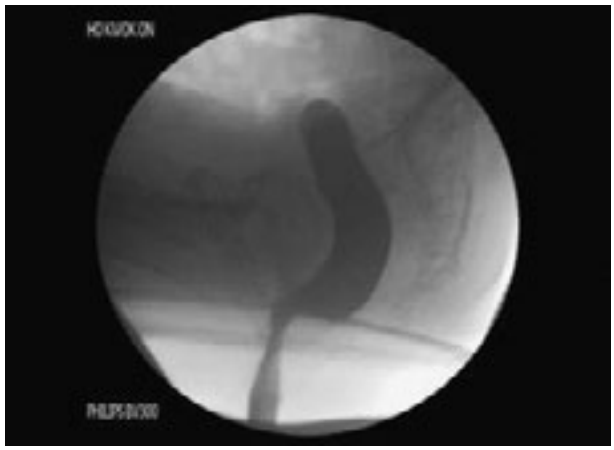

Figure 4. Defecography film during defecation.

Figure 5. (Right to left) A physiotherapist demonstrating abdominal breathing exercises to a patient.

could assess and evaluate each subject's progress from the stool diary.

At the end of the programme, the subjects were asked to rate the subjective improvement in their bowel habit and symptoms.

Physiotherapy. The physiotherapist provided an intensive rehabilitation programme for the subjects. They attended physiotherapy sessions at one- or 2-week intervals for the first 3 months, and then once a month for another 3 months. The programme included biofeedback therapy, reinforcement of proper defecation dynamics and posture, and education about abdominal breathing exercise (Fig. 5). The subjects practised the exercises at home three times a day and documented their progress on an exercise chart. The physiotherapist also taught PFM exercises to those patients who were diagnosed with PFM weakness or urinary incontinence.

Biofeedback therapy. Pelvic floor dyssynergia or anismus is one of the commonest subtypes of constipation, but conventional remedies (i.e. dietary fibre and laxative) are often unsatisfactory. Biofeedback training has recently been promoted as an effective form of treatment.

Biofeedback therapy improves the function and coordination of the abdominal, rectal and anal sphincter muscles, as well as rectal sensory perception. It uses visual or auditory feedback techniques that provide patients with input regarding their performance during attempted defecation manoeuvres (Andromanakos *et al*. 2006).

Biofeedback techniques. In pelvic floor dyssynergia, there is paradoxically increased anal pressure or EMG activity during straining (Bassotti & Whitehead 1997).

Figure 6. Electromyographic feedback machine.

The three types of biofeedback techniques used to treat pelvic floor dyssynergia are sensory training, electromyographic feedback and manometric feedback:

(1) *Sensory training*. Sensory training was the first biofeedback technique to be used in clinical practice to manage anismus (Bassotti *et al*. 2004). Defecation is simulated by means of a water-filled balloon that is inserted into the rectum. It is then slowly withdrawn and the subject is instructed to concentrate on the sensations evoked by the balloon in order to ease its passage. The use of rectal sensory retraining has been well standardized in cases of faecal incontinence (Chiarioni *et al*. 2002), but its clinical efficacy in constipation has not confirmed.
(2) *Electromyographic feedback*. Electromyography consists of recording the average electromyographic activity in a subject's PFMs for the purposes of training (Cox *et al*. 1994). Measurements are taken from surface electrodes that are taped to the perianal skin. Using visual feedback, the subject first learns to relax the PFMs during attempts to defecate, and then gradually increases straining effort to increase intra-abdominal pressure, while keeping the PFMs relaxed (Fig. 6).
(3) *Manometry*. In manometry, an anal pressure probe measures the pressure change in the anal canal during attempts to defecate. This is in order to detect the contraction and relaxation of the PFMs (Whitehead *et al*. 2002). It serves as visual feedback, helping subjects to learn how to relax their PFMs during straining.

Table 1. Bowel habit and fibre changes

Variable	Pre-treatment	Post-treatment	*P*-value
Bowel motions per week (*n*)	5.7 ± 8.7	6.1 ± 8.1	0.04
Straining time (min)	17.61 ± 2.172	6.00 ± 2.172	0.004
Straining effort	6.3660 ± 0.391	3.72 ± 0.391	0.001
Fibre (g)	12.919 ± 1.06	20.266 ± 1.064	0.001
Bristol Stool Score	2.13 ± 0.127	3.39 ± 0.127	0.006

Table 2. Manometry changes

Manometric parameter	Pre-treatment	Post-treatment	*P*-value
External anal sphincter pressure (cmH_2O)	26.09 ± 4.014	24.15 ± 4.014	0.4
First sensation volume (mL)	85.5 ± 33.0	92.5 ± 34.6	0.5
First urge volume (mL)	141.3 ± 55.6	141.7 ± 58.4	1.0
Maximum tolerable volume (mL)	198.6 ± 87.4	186.6 ± 72.3	0.6

A study by Heymen *et al.* (2003) determined that the mean success rate achieved with manometric biofeedback was superior to that attained with electromyographic feedback (78% versus 70%).

In the present authors' rehabilitative programme, both electromyographic feedback and manometry (Myomed, Enraf-Nonius B.V., Delft, the Netherlands) were used for biofeedback therapy. The training was done when the subjects were seated on a commode in front of a monitor showing the visual feedback.

Dietitian intervention. Fibre intake was calculated before and after the treatment programme. Dietary modification was tailored to the individual subject's medical condition and preferences.

Statistical analysis

Using the SPSS® statistical software package (SPSS Inc., Chicago, IL, USA), a paired *t*-test was employed to analyse the results before and after the rehabilitation programme.

Results

The subjects completed the 6–month programme that employed anorectal manometry and defecography for assessment. The details of their fibre intake, stool diaries and subjective improvements were also analysed.

Twenty patients have been recruited into the programme since 2005. Ten have completed the programme and three have defaulted; the remaining seven were still undergoing treatment at the time of writing. On completion of the programme, there was a significant improvement in fibre intake (pre-treatment = 12.919 ± 1.06; post-treatment = 20.266 ± 1.064; $P = 0.001$), decreased average straining effort (pre-treatment = 6.36 ± 0.391; post-treatment = 3.72 ± 0.391; $P = 0.001$) and decreased average straining time (pre-treatment = 17.61 ± 2.172; post-treatment = 6.00 ± 2.172; $P = 0.004$) (Table 1).

There was no significant difference between any of the anorectal physiology findings, although the subjects achieved a decrease in straining at the external anal sphincter, but this was not statistically significant (pre-treatment = 26.09 ± 4.014 mmHg; post-treatment = 24.15 ± 4.014 mmHg) (Table 2).

The subjects reported a >50% improvement in their bowel habit and symptoms. All of them demonstrated coordinated pelvic muscle relaxation during defecation. No paradoxical anal contraction on manometry or augmentation of activity on EMG during a pushing effort were recorded (Figs 7 & 8).

Discussion

Kwong Wah Hospital has a pioneered a multidisciplinary approach to managing the treatment of patients with constipation in Hong Kong. The present authors' anorectal physiology team consisted of a colorectal surgeon, a nurse specialist, a physiotherapist and a dietitian. This group of professionals all contributed to this comprehensive rehabilitative programme for individuals with constipation. The programme employed investigations such as the colonic transit test, anorectal physiology and defecography to per-

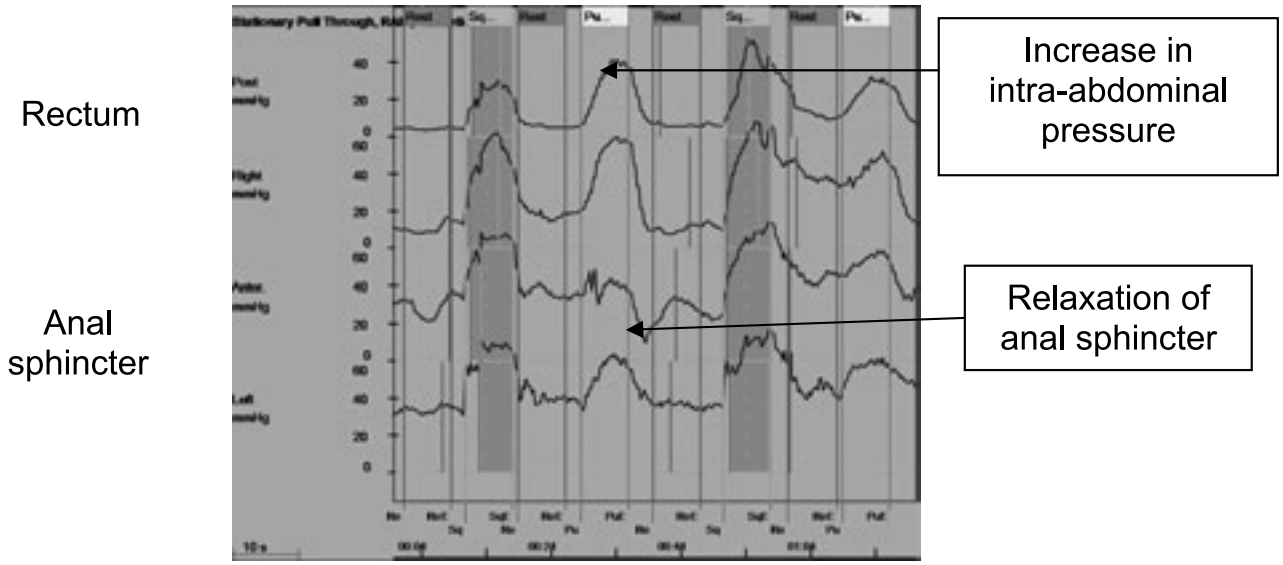

Figure 7. Normal pattern of defecation in manometry.

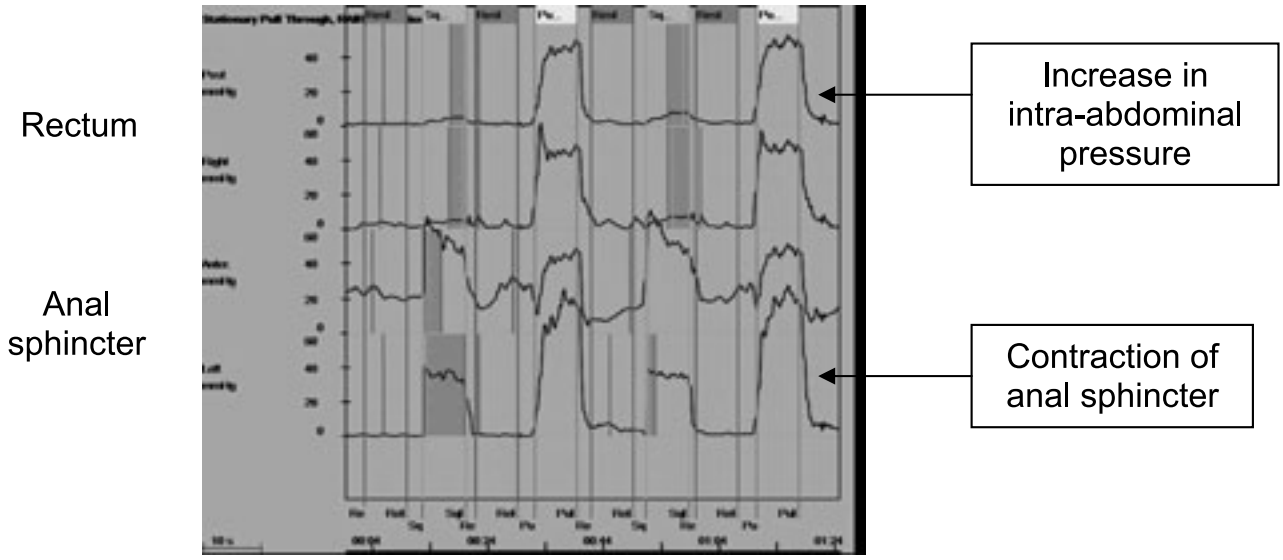

Figure 8. Paradoxical pattern of defecation in manometry.

form an accurate diagnosis of the type of constipation suffered by the patients and observe the efficacy of their treatment. The nurse specialist used education to reinforce good bowel habits and the proper use of laxatives. The physiotherapist introduced the patients to biofeedback therapy, proper defecation posture and abdominal breathing exercises. The dietitian was responsible for dietary modification according to individual needs. A monthly meeting between all members of the team provided an excellent opportunity to discuss the patients' condition, progress and treatment plan.

All three case histories described above involved obstructive defecation with normal transit time, as shown by the colonic transit test. The present authors' programme also catered for slow-transit constipation with anismus, but the efficacy of the treatment for this form of constipation has still to be investigated in future studies.

In these three cases, the present authors observed that constipation could be complicated by urinary incontinence or haemorrhoids. Weakness of the PFMs and haemorrhoids can be correlated with excessive straining during defecation by patients with constipation. Therefore, managing constipation in conjunction with treating urinary incontinence and haemorrhoids is potentially a holistic way of treating patients with these problems.

A crucial element of any successful intervention is patient commitment to the treatment plan. The present authors emphasized the role of patient education, and the importance of adherence to a home programme of exercise, self-

monitoring and dietary modification, which were vital to the success of the treatment regime.

Biofeedback therapy, which provides a visual aid for subjects, was a good means of assisting the patients to isolate and improve their PFM control. It could also be beneficial in motor training for individuals who have difficulty in achieving this form of control. The subjects practiced coordinated relaxation of the PFMs with an effective increase in intra-abdominal pressure so that they could achieve an effective push instead of excessive straining during defecation.

Literature review on biofeedback therapy

Biofeedback therapy has been investigated in various studies. It is still open to some criticism, but approximately two-thirds of patients with pelvic floor dyssynergia should benefit from this approach.

Seven studies have reported that 84% of patients show an improvement in the symptoms of obstructive defecation following biofeedback therapy (Tjandra & Lubowski 2002). Three other studies have shown that biofeedback therapy is associated with an overall success rate of 68.5% in cases of constipation attributable to paradoxical puborectalis contraction (Jorge *et al*. 2003). The success rate improved significantly after five or more treatment sessions, with a complete resolution of symptoms being reported in 63% of patients who finished the full treatment course, as compared to only 25% in those who defaulted (Jorge *et al*. 2003). Another study demonstrated a success rate of 43% for biofeedback therapy for patients with paradoxical puborectalis contraction, with a treatment effect lasting at least one year (Karlbom *et al*. 1997).

Only a limited number of studies have investigated the long-term effect of biofeedback training in patients with constipation. Most studies of biofeedback training have reported good short-term efficacy, with improvements in the subjects' psychological state and quality of life (Mason *et al*. 2002). A few follow-up studies have indicated a fading effect over time (Battaglia *et al.* 2004); nevertheless, up to 50% of patients have reported satisfaction even at 12–44 months after biofeedback therapy (Wang *et al*. 2003).

A small number of controlled trials have reported the use of biofeedback therapy as one part of a treatment regime for children with chronic constipation, and a recent study of this patient group compared biofeedback therapy with conventional treatment, showing that biofeedback therapy was effective in the short term (Sunic-Omejc *et al*. 2002). However, the efficacy of biofeedback therapy did not seem to increase the long-term recovery rate above that achieved with conventional treatment alone, and the results have proved to be controversial (Loening-Baucke 1995; Van der Plas *et al*. 1996).

Despite the conflicting results reported in the various studies described above, it can be concluded that biofeedback therapy is simple and cost-effective method of treating anismus that involves no risk and minimal discomfort. It is a vital element of rehabilitation programmes for the management of patients with constipation.

The fact that there was no significant change in the anal manometric parameters of the present cases suggests that biofeedback training does not change the anatomy of the anorectum. An earlier study showed that anorectal physiological parameters neither correlated with nor predicted treatment outcome (Gilliland 1997). A future study with a larger sample size will be necessary in order to verify the above statement.

The significant improvements recorded in the present subjects' bowel habits, fibre intake, and straining effect and time, as well as the subjective improvements in their symptoms demonstrate that the multidisciplinary approach to treating constipation was successful.

Conclusions

This multidisciplinary approach for managing constipation constituted a new but effective programme in Hong Kong. Biofeedback therapy was a vital component in the treatment and rehabilitation of patients with constipation. The present case series demonstrates that such a rehabilitative programme for constipation can significantly improve the symptom of constipation. A larger sample size could be used in further studies to verify these results. Anorectal manometry was introduced to assess the paradoxical response of the anorectum during attempted defecation.

Acknowledgments

We would like to express our deepest gratitude to: our physiotherapist, Ms Sandy C. N. Chan; our dietitians, Ms Winnifred Kwan, Ms Vanessa W. S. Lam, Ms Doris Chan and Ms Wendy Ma; as well as our colorectal nurses, Ms W. S. Lee, Ms Celia S. P. So, Ms Queenie S. Y. Lee and Ms S. F. Tang.

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