Biofeedback is an effective treatment for patients with dyssynergic defaecation

Dennis Koh[1], MBBS, FRCS, *Jit-Fong Lim*[1], MBBS, FRCS, *Hak-Mien Quah*[1], MBChB, FRCS, *Choong-Leong Tang*[1], MBBS, FRCS

INTRODUCTION Constipation is a common affliction affecting the general population, with dyssynergic defaecation accounting for a large proportion of tertiary referrals. We sought to review the results of our patients with dyssynergic defaecation treated with biofeedback therapy in order to determine its efficacy.

METHODS All patients who were referred to the anorectal physiology laboratory of our tertiary unit for biofeedback therapy for dyssynergic defaecation were reviewed. Patients diagnosed with secondary constipation and slow-transit constipation were excluded. A defaecating proctogram was used to exclude anatomical abnormalities causing outlet obstruction. Patients underwent a four-session, structured biofeedback exercise programme under the supervision of trained nurses. The effectiveness of biofeedback treatment was assessed using the validated Eypasch's Gastrointestinal Quality of Life Index (GIQLI).

RESULTS 226 patients (85 male, 141 female; median age 48 years) underwent biofeedback treatment. Post treatment, improvement was observed in the overall total score of the GIQLI, with gastrointestinal symptom (68.6%), emotion (61.0%) and physical function (57.9%) components showing the most improvement. These improvements were also reflected in the mean scores of each component and the mean total score. All components, except for social function and medication, and the overall total score showed significant improvement post treatment. At the one-year follow-up, 160 (71%) patients reported that improvements were maintained.

CONCLUSION Biofeedback is an effective treatment for patients with dyssynergic defaecation. Patients with chronic constipation not improved by fibre and laxatives should be referred to a tertiary centre with facilities for further anorectal physiological assessment.

Keywords: biofeedback, constipation, manometry, puborectalis paradoxus
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INTRODUCTION

Constipation is a common affliction that affects nearly everyone in the general population at some point in their life. It has an understandably profound impact on a patient's quality of life (QOL), and is a major social and psychological disability. Constipation is reported to affect 2%–30% of the Western population, with the majority improving with fibre or fluid supplementation and laxatives.[1] Constipation can be classified as secondary constipation (due to colorectal cancer, hypothyroidism, hyperparathyroidism, diabetes mellitus, medications, Parkinson's disease or other organic pathologies) and primary functional constipation.[2] The latter can be further classified into three categories – slow-transit constipation, normal-transit constipation and obstructed defaecation.

Dyssynergic defaecation, which has also been called anismus, puborectalis paradoxus or spastic pelvic floor, is a type of obstructed defaecation characterised by a failure in chronically constipated patients to relax the puborectalis muscle and external anal sphincter, which are required for successful defaecation. Among non-responders to primary care treatment, dyssynergic defaecation seems particularly common and accounts for up to 50% of tertiary referrals to colorectal surgeons and gastroenterogists.[3] Dyssynergic defaecation is commonly considered to be a form of maladaptive behaviour, as there is no discernable neurological or anatomical defect in these patients and because it can be eliminated by behavioural training.[4] Treatment with high dietary fibre and laxatives is usually not effective in this group of patients.

Biofeedback has been shown to be effective in treating functional pelvic floor disorders such as constipation and faecal incontinence.[5-7] In patients with dyssynergic defaecation, the role of biofeedback is directed at teaching patients to relax their pelvic floor muscles while simultaneously applying a downward intra-abdominal pressure to generate a propulsive force toward the anus. This is done with the aid of visual or auditory feedback to the patients, with information from either electromyography (EMG) sensors or anal manometry sensors. We sought to review the results of our patients with dyssynergic defaecation treated with biofeedback in order to determine the efficacy of the treatment.

METHODS

Data on all patients who were referred to our tertiary unit's anorectal physiology (ARP) laboratory for biofeedback training for dyssynergic defaecation from 2001 to 2008 were reviewed. All patients with a clinical history of chronic constipation were included for assessment at the ARP laboratory. Causes of

[1]Department of Colorectal Surgery, Singapore General Hospital, Singapore
Correspondence: A/Prof Tang Choong-Leong, Senior Consultant, Department of Colorectal Surgery, Singapore General Hospital, Outram Road, Singapore 169608. tang.choong.leong@sgh.com.sg

secondary constipation, such as underlying structural or metabolic diseases, were excluded by colonoscopy or barium enema examinations, as well as haematological, biochemical and thyroid function tests. After a diagnosis of functional constipation was made, the patients underwent a colonic transit marker study, anorectal manometry and EMG to further subclassify the constipation. Transit marker studies excluded patients with slow-transit constipation. A defaecating proctogram (DP) was performed to identify patients with anatomical obstructions, and these patients were excluded from the study. Patients with obvious clinical features of irritable bowel syndrome were also excluded. The study was approved by the hospital's institutional review board.

Patients were deemed to have dyssynergic defaecation if they fulfilled all of the following criteria: (a) puborectalis paradoxus or animus on DP and/or anal manometry; (b) more than 20% of total markers in the pelvis on colonic transit marker study; (c) history of excessive straining on defaecation with normal bowel frequency; (d) absence of secondary causes of constipation; (e) absence of surgically treatable causes of dyssynergic defaecation, such as rectocoele and rectal prolapse; and (f) absence of colonic pathology mimicking constipation by colonic imaging, such as colorectal cancer. All patients diagnosed with dyssynergic defaecation and resistant symptoms despite dietary fibre and laxatives therapy were offered biofeedback treatment.

At our centre, biofeedback was performed with the aid of an EMG-based Dobbhoff Biofeedback Monitor machine (Biosearch Medical Products Inc, Somerville, NJ, USA) using visual feedback. Patients underwent a structured four-session biofeedback exercise programme supervised by one of two trained nurses. The first two sessions focused on teaching the patients exercises to tighten and relax abdominal and pelvic muscles. Patients were then advised to practice the exercises 40 times a day, ten times each in the morning, noon, evening and night. A stool chart was given to record stool consistency, use of laxatives, number of times the exercises were done and any other medication taken. For the third and fourth sessions, patients returned for assessment on their performance of the exercises with the help of the same Dobbhoff Biofeedback Monitor machine. The machine gave visual feedback to patients and helped correct any problems during the exercise. The stool chart was also reviewed. The whole process usually took up to one month or longer, depending on each patient's performance.

Patients' QOL scores were obtained via a questionnaire before and after the biofeedback treatment using the validated Eypasch's Gastrointestinal Quality of Life Index (GIQLI).[8] This questionnaire contained 36 questions that explored the impact of the disease on five areas of the patient's life: gastrointestinal symptoms, emotion, physical function, social function and medication. Responses to questions were summed up to give a numerical score, with a higher score indicating a better QOL. On completion of biofeedback treatment, patients were followed up in our outpatient clinic at an interval of 3–6 months in the first two years and yearly thereafter. During each outpatient follow-up, patients were asked about their bowel functions and laxative usage. The GIQLI score was deemed to have improved if the score post biofeedback treatment was better than pre-treatment by one or more points. All patients were interviewed one year after biofeedback treatment to check whether the effectiveness (if any) of the treatment was sustained. Paired analysis using the Wilcoxon signed-rank test was performed to compare pre- and post-treatment values of the GIQLI score. We adjusted for multiple comparisons by using $p < 0.01$ (0.05/5) for the five GIQLI questionnaire domains. All statistical analysis was performed using the Statistical Package for the Social Sciences version 16.0 (SPSS Inc, Chicago, IL, USA).

Table I. Demographic data and baseline anorectal physiological scores of patients (n = 226) treated with biofeedback.

Demographic/anorectal manometry measurement	Mean ± SD
Gender*	
Male	85 (37.6)
Female	141 (62.4)
Age; range (yrs)	48; 8–85
Male	48; 14–85
Female	49; 8–79
Maximal resting tone (mmHg)	65.61 ± 19.85
Male	68.45 ± 21.15
Female	63.89 ± 19.06
Maximal squeeze pressure (mmHg)	158.50 ± 29.17
Men	170.65 ± 33.87
Women	151.17 ± 26.34
Volume of first sensation (ml)	21.04 ± 8.37
Men	21.23 ± 9.84
Women	20.92 ± 7.51
Threshold volume (ml)	153.17 ± 40.39
Men	175.23 ± 39.18
Women	139.87 ± 41.12

* Data is presented as No. (%). SD: standard deviation

RESULTS

From 2001 to 2008, 226 patients underwent treatment with biofeedback for dyssynergic defaecation in our unit's ARP laboratory. Patients' demographic data and baseline ARP scores are shown in Table I. There were more female patients (n = 141, 62.4%), and the mean age of our patient group was 48 (range 8–85) years. Pre-treatment ARP results indicated a mean anal resting tone of 65.61 ± 19.85 mmHg and a maximal squeeze pressure of 158.50 ± 29.17 mmHg, which were essentially normal. No post-biofeedback treatment ARP was performed, as it was not part of the treatment protocol and also not an important parameter in monitoring treatment for dyssynergic defaecation.

Table II shows the proportion of patients with improvements in the absolute GIQLI scores post-biofeedback treatment when the absolute scores of the pre- and post-treatment GIQLI assessments were compared. Among the five components in the GIQLI, the scores of gastrointestinal symptoms (68.6% improvement), emotion (61.0% improvement) and physical

Table II. Improvements in the absolute Eypasch's Gastrointestinal Quality of Life Index (GIQLI) scores post biofeedback treatment.

QOL index	No. (%)	
	Improvement	No improvement
Symptoms	155 (68.6)	71 (31.4)
Emotion	138 (61.0)	88 (39.0)
Physical	131 (57.9)	95 (42.1)
Social	85 (37.7)	141 (62.3)
Medicine	75 (33.3)	151 (66.7)

QOL: quality of life.

Table III. Scores for each component of the Eypasch's Gastrointestinal Quality of Life Index (GIQLI) pre- and post biofeedback treatment.

GIQLI component	Mean score (range)		p-value
	Pre-treatment	Post-treatment	
Symptoms	56 (14–76)	61 (26–76)	0.0001*
Emotion	12 (1–20)	14 (2–20)	0.0001*
Physical	19 (0–28)	22 (2–28)	0.0001*
Social	13 (1–16)	13 (5–16)	0.19
Medicine	3 (0–4)	4 (0–4)	0.02
Total	101 (23–137)	113 (51–143)	0.0001*

* p-value was statistically significant ($p < 0.01$).

function (57.9% improvement) showed the most improvement post-biofeedback treatment. Scores of the social function (37.7% improvement) and medication (33.3%) components showed less improvement. In the social component, 37.7% of patients had improvement in the GIQLI score post-biofeedback treatment, while 34.6% of patients had worse scores and 27.7% had no change to their scores post-biofeedback treatment. Likewise, for the medicine component, the corresponding proportions of the patients were 33.3%, 18.9% and 47.8%, respectively.

These improvements were reflected in the mean scores of each of the five components of the GIQLI (Table III) when the post-biofeedback scores were compared to pre-biofeedback ones. These improvements were statistical significant for all components except for social function and medication. The mean total score of the GIQLI was significantly higher in the post-treatment group compared to the pre-treatment group (113 [range 51–143] vs. 101 [range 23–137], $p = 0.0001$). When analysed by gender, the improvements in the GIQLI scores were similar for both men and women, except that there was no improvement in the use of medication and social function for men (Table IV). Women, however, showed improved scores for medication when compared to men.

All patients were followed up for at least one year, with a median follow-up period of 20 (range 12–49) months. One year after biofeedback, 160 out of 226 (71%) patients reported that their constipation symptoms had improved significantly and that improvements were sustained. Of these 160 patients who reported sustained improvements, 85% showed improved GIQLI index scores.

Table IV. Gender-based differences in the mean scores for each component of the Eypasch's Gastrointestinal Quality of Life Index (GIQLI) pre- and post biofeedback treatment.

GIQLI component	Mean score (range)		p-value
	Pre-treatment	Post-treatment	
Symptoms			
Male	56 (27–76)	59 (26–76)	0.002*
Female	56 (14–76)	62 (39–76)	0.0001*
Emotion			
Male	11 (1–20)	14 (4–20)	0.0001*
Female	12 (1–20)	14 (2–20)	0.001*
Physical			
Male	20 (2–28)	23 (2–28)	0.007*
Female	18 (0–28)	21 (6–28)	0.0001*
Social			
Male	12 (1–16)	12 (8–16)	0.26
Female	13 (4–16)	14 (5–16)	0.43
Medicine			
Male	3 (0–4)	4 (1–4)	0.32
Female	3 (0–4)	4 (0–4)	0.036
Total			
Male	104 (31–137)	112 (51–143)	0.0001*
Female	101 (23–136)	114 (66–140)	0.0001*

* p-value was statistically significant ($p < 0.01$).

DISCUSSION

This study showed that biofeedback treatment for dyssynergic defaecation is effective. The subjective improvement rate was 71% and compared favourably with previously published rates.[9,10] Symptomatic improvement in constipation following biofeedback treatment has been reported to vary (44%–100%),[9] and most uncontrolled studies have reported success rates of 50% or better.[10] The large variation in the reported improvement rates may be due to differences in the biofeedback protocol, patient selection criteria and measured endpoints between the various studies. Patients with constipation due to dyssynergic defaecation tend to respond better to biofeedback, as the primary problem is an inability to relax the puborectalis muscle and the pelvic floor, which can be addressed by biofeedback treatment.[11]

In the past few years, several randomised controlled trials of adults with dyssynergic defaecation have been reported. All these studies concluded that biofeedback therapy was superior to controlled treatment such as sham feedback therapy or laxatives,[12] the use of polyethylene glycol,[13] diazepam or a placebo[14] and balloon defaecation therapy.[15] The patients in these studies were shown to have predominantly pelvic floor disorders or dyssynergic defaecation type of constipation. Some of these studies reported long-term follow-up of up to a year or more and showed that improvements with biofeedback were sustainable.

In our study, biofeedback treatment was offered to patients who were found to have dyssynergic defaecation after various radiological, endoscopic, biochemical and anorectal physiological studies, and who did not respond to dietary fibre and laxatives. At the end of the biofeedback treatment, there was

improvement across most areas in the QOL scores. However, there was no significant improvement in the social function and medication components of the GIQLI scores. The reason for this is unclear, but a possible explanation could be that functional constipation may also have psychosocial components that were not fully addressed by biofeedback treatment. Despite the differences in pelvic anatomy, biofeedback appears to have similar potential in treating dyssynergic defaecation in both genders, as both our male and female patients showed comparable improvements.

All our patients were followed up for at least a year, with a median follow-up period of 20 (range 12–49) months. At the end of the treatment and one-year follow-up, a majority of patients (71%) were happy with the biofeedback treatment and reported improvement in their constipation symptoms. We did not repeat anorectal manometry for our patients post-biofeedback treatment, as their baseline results were normal and would likely have remained unchanged after therapy. Furthermore, as improvement of function would have been better assessed by QOL and patient satisfaction scores, we did not compare the anorectal physiological scores pre- and post-biofeedback treatment in this study.

Biofeedback therapy is a labour-intensive treatment modality, although it has not been shown to have adverse effects. It also requires motivation to prevent dropout and requires multiple hospital visits. Dedicated biofeedback therapists and a multi-disciplinary approach are essential, but such facilities are not widely available and are offered only at specialised centres. In order to make biofeedback treatment cost-effective, careful evaluation of the patient's constipation as well as appropriate patient selection are important. A home-based, self-training programme would also be valuable for treating the large number of constipated patients in the community. A multicentre, state-wide study that used home trainers demonstrated the feasibility of home training,[16] and another European study reported significant improvement in most subjects receiving home therapy.[17]

To the authors' knowledge, this is the first local study on the effectiveness of biofeedback treatment in local patients with dyssynergic defaecation conducted in such a large number of patients. Most medical practitioners are not aware of this common condition that causes constipation, and know even less about the role of biofeedback as a treatment modality for dyssynergic defaecation. This study has shown not only the effectiveness of biofeedback as a treatment modality for this common cause of constipation but also that its effectiveness is replicable in our local population. Biofeedback treatment is an effective treatment for patients with constipation due to dyssynergic defaecation. Patients with chronic constipation not improved by dietary fibre and laxatives should be referred to a specialised centre that has facilities for further anorectal physiological assessments.

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