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Biofeedback therapy for rectal intussusception

Abstract Background Surgery for isolated internal rectal intussusception is controversial due to high morbidity. Therefore, there is interest in other forms of treatment that are safe and effective. The aim of this study was to determine outcome and identify predictors for success of biofeedback therapy in patients with rectal intussusception. **Methods** We retrospectively evaluated the results of electromyography (EMG)-based biofeedback in 34 patients with rectal intussusception without any other major pelvic floor or colonic physiologic disorder. **Results** A total of 34 patients (7 men) had undergone at least 2 biofeedback sessions. The patients had a mean age of 68.5 years (SD=11.4 years). In the 27 patients with constipation, the frequency of weekly spontaneous bowel movements (mean±SD) was 2.0±6.8 before and 4.1±4.6 after biofeedback ($p<0.05$). The frequency of weekly assisted bowel movements decreased from 3.8±3.5 before to 1.5±2.2 after therapy ($p<0.005$). The number of patients who experienced incomplete evacuation decreased from 17 (63%) to 9 (33%) ($p<0.05$). Thirty-three percent of patients had complete resolution of the symptoms, 19% had partial improvement, and 48% had no improvement. Patients with constipation lasting less than nine years had a 78% success rate vs. 13% in patients who were constipated more than 9 years ($p<0.01$). In seven patients with incontinence, the frequency of daily incontinence episodes decreased from 1.0±0.7 before to 0.07±0.06 after biofeedback ($p<0.05$). The fecal incontinence score decreased from 13.1±4.2 before to 4.6±3.6 after treatment ($p<0.005$). Two patients (29%) were completely continent following biofeedback, 2 had partial improvement, and 3 (43%) had no significant improvement. There was no mortality in either group. **Conclusions** Biofeedback is a safe and effective treatment option for constipation and fecal incontinence due to rectal intussusception in patients who are willing to complete the course of treatment. Long-standing constipation is less effectively cured by biofeedback.

Key words Rectal intussusception • Constipation • Fecal incontinence • Biofeedback therapy

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Introduction

Rectal intussusception, first described by Allingham in 1873 [1], is a clinical condition that has been subsequently noted by many authors [2–4]. The most common initial symptom is difficult evacuation and patients often describe a sensation of incomplete emptying of the rectal ampulla. This is combined with a sensation of obstruction and pressure towards the sacrum, which increases with more forceful straining. Another common symptom is fecal incontinence; some of these patients have no urge to evacuate and presumably lack rectal sensation [4, 5]. The frequency with which obstructed evacuation is associated with internal rectal intussusception is unknown. However, one researcher reported a 40% incidence in patients referred to defecography because of symptoms of obstructed evacuation [6]. Comparatively, rectal intussusception was diagnosed in 10% of patients referred to defecography because of fecal incontinence.

Internal rectal intussusception (RI) represents the first stage of a dynamic anomaly that may eventually lead to rectal prolapse [3, 4, 7–9], therefore therapy has been proposed to include rectopexy [6]. However, surgery for isolated internal RI is controversial and poorly supported because postoperative functional outcome is frequently unsatisfactory despite resolution of the anatomic problem [6, 10]; additionally, one long-term follow-up study showed that only a minority of patients with RI develop overt rectal prolapse [11]. Given the potentially high morbidity of surgery, other types of treatment are preferred. Unfortunately, other than surgery, the options have been limited to the "three D's": diet, drugs including enemas, laxatives, and suppositories, and digitation.

Biofeedback therapy is a specific form of behavior modification that aims to control bodily functions [12]. Biofeedback therapy has been successfully used to treat fecal incontinence [13–18], constipation [19–26], and even rectal pain [27]. Furthermore, the morbidity of biofeedback therapy is virtually non-existent. The aim of this study, therefore, was to determine the outcome and identify predictors of success of biofeedback for RI.

Patients and methods

The medical records of patients who attended at least two sessions of electromyography (EMG)-based biofeedback therapy for constipation or fecal incontinence due to RI were retrospectively reviewed. RI was confirmed by videoproctography; all other evacuatory problems were excluded by anal ultrasound, video-proctography, colonic transit study, and manometry [28–30]. The patients were divided into two groups as having either constipation or incontinence. The dominant symptoms of constipation were straining during defecation, a sensation of incomplete evacuation and rectal pain.

Out-patient EMG-based biofeedback therapy was performed by a certified therapist as a series of 2–13 one-hour sessions. Biofeedback was performed with a 12-mm diameter, 45-mm long PerryMeter anal EMG sensor EPS-21 (PerryMeter Systems, Strafford, USA) connected to an Orion 8600 (Self Regulation Systems, Redford, WA, USA) biofeedback computer [31].

Outcome was divided into three categories: in the constipation group, patients were considered as having complete resolution of constipation if they passed three or more spontaneous bowel movements per week without the aid of cathartics or digitation. Partial improvement was defined as the passage of fewer than three spontaneous bowel movements per week with a reduced dependence on assistance. Patients who had no improvement in either of these parameters were considered as failures of treatment. In the incontinence group, complete success was defined as a fecal incontinence score of 0 (0=perfect continence, 20=complete incontinence; Cleveland Clinic Florida Incontinence Scoring System [32]). Partial success was noted if the incontinence score decreased to 5 or less after biofeedback therapy. Patients who remained with an incontinence score more than 5 after biofeedback therapy were rated as failures of treatment.

Statistical analysis

Statistical analysis was performed using Student's t test, descriptive statistics, and chi-square test, using commercially available software (Analysis TookPak, Microsoft Excel 97; Microsoft, Seattle, USA). Statistical significance was considered as $p<0.05$.

Results

The study enrolled 34 patients (7 men) who had attended at least 2 sessions of EMG-based biofeedback therapy for fecal incontinence (n=7) or constipation (n=27) due to internal rectal intussusception (RI). The patients had a mean age of 68.5 years (SD=11.4). The median duration of symptoms was 6 years (range, 1 year to lifelong) in the constipation group and 2.3 years (range, 6 months to 40 years) in the fecal incontinence group. Twelve patients had 16 comorbid conditions, with diabetes mellitus, cardiac problems, and hypothyroidism being the most prevalent. Twenty-eight patients had 46 previous surgical procedures, with abdominal (13 patients), anorectal (13 patients) and gynecologic (12 patients) procedures being the most prevalent, followed by genitourinary procedures (3 patients), laminectomy (2 patients), hip replacement (1 patient) and other orthopaedic procedures (1 patient). The median number of sessions of biofeedback therapy was five for each group (range, 2–13 in the constipation group and 3–8 in the fecal incontinence group).

The results of biofeedback therapy in the 27 patients with constipation are summarized in Table 1. Nine (33%) patients had complete resolution of constipation, 5 (19%) had partial improvement, and 14 (48%) failed to improve. Interestingly, patients with constipation lasting less than nine years (n=15) had a 78% success rate versus 13% in patients who were constipated more than nine years (n=12) ($p<0.01$). The success of treatment for constipation was not significantly related to age (mean age, 68.4 years for success versus 65.9 years for failure; $p<0.6$), gender (male patients, 29% for success versus 15% for failure; $p=0.41$), or the number of sessions of biofeedback therapy (mean, 8.9 sessions of biofeedback therapy for success and 7.8 for failure; $p=0.38$). The 16 constipated patients who self-discharged attended a median of 4 (2–11) sessions; these patients had a 19% (3 patients) success rate. Eleven patients who completed the prescribed course of biofeedback to the satisfaction of the therapist attended a median of 6 (2–13) sessions; six (55%) of these patients had complete success ($p=0.53$). EMG recorded at rest, squeeze, and push before, during, and after biofeedback therapy and differences between before and after biofeedback therapy in each phase were not significantly related to success.

Table 1 The effect of biofeedback therapy on constipation symptoms in 27 patients with rectal intussusception

	Before biofeedback	After biofeedback	p
Spontaneous bowel movements per week, n[a]	2.0 (0–35)	4.1 (0–18)	<0.005
Assisted bowel movements per week, n[a]	3.8 (0–14)	1.5 (0–7)	<0.005
Enema use per week, n[a]	1.2 (0–7)	0.4 (0–6)	<0.05
Laxative use per week, n[a]	7.4 (0–42)	3.2 (0–28)	<0.05
Digital evacuation per week, n[a]	0.6 (0–7)	0.4 (0–1)	<0.05
Patients with sensation of incomplete evacuation, n (%)	17 (63)	9 (33)	<0.05
Patients with complaints of straining, n (%)	17 (63)	11 (41)	NS
Patients with rectal pain, n (%)	8 (30)	4 (15)	NS

[a] Values are mean (SD)

NS, not significant

In the seven patients with fecal incontinence, the frequency of daily incontinence episodes (mean±SD) reduced from 1.0±0.7 pre-biofeedback to 0.07±0.06 post-biofeedback ($p<0.05$), while the incontinence score decreased from 13.1±4.2 pre-biofeedback to 4.6±3.6 post-biofeedback ($p<0.005$). Twenty-nine percent of patients had complete success, 29% had partial success, and 43% were considered as failures of treatment. The success of treatment was not significantly related to age ($p=0.51$), gender ($p=0.3$), duration of symptoms ($p=0.74$), or the number of biofeedback sessions ($p=0.6$). The results of 3 patients who completed the prescribed course of biofeedback therapy to the satisfaction of the therapist were reported as success. However, only one of the 4 patients who self-discharged before the completion of therapy had successful outcome. EMG activity recorded at rest and during push before and after biofeedback therapy and during squeeze after biofeedback therapy was not significantly related to success.

Discussion

The treatment of rectal intussusception (RI) is more difficult than is making a correct diagnosis. Conservative treatment including laxatives, suppositories, and enemas has been associated with improvement in 34% of patients, worsening in 20%, and no effect in 46% [8]. Internal RI may represent a precursor of rectal prolapse; therefore, rectopexy has been suggested by some authors [4, 8], although others disagree with this concept [11]. Ihre and Seligson [4] and Johansson et al. [5] performed a Ripstein rectopexy after which 77%–79% of patients with incontinence improved, however only 43%–53% of patients with constipation showed similar improvement; furthermore, 14%–35% of patients with constipation had symptomatic exacerbation. Berman et al. [33] reported a 71% success rate after Delorme's transrectal excision for constipation

due to RI. McCue and Thomson [34] performed polyvinyl alcohol sponge abdominal rectopexy, and improvement was noted in two-thirds of patients with incontinence for solid stool, but rectal discomfort and evacuatory difficulties persisted. Specifically, half of the patients continued to strain at stool and in 25%, the straining was worsened by the operation. Thus, the authors concluded by advising a conservative approach towards surgery in patients with symptoms of obstructed defecation. Graf et al. [35], in a retrospective study, assessed the functional outcome after abdominal suture rectopexy in 33 patients with rectal prolapse and in 19 patients with RI. Thirty percent reported less constipation in the prolapse group compared with 16% in the RI group. Rectal emptying improved in 42% and 5%, respectively, and incontinence in 36% and 16%, respectively. The authors concluded that there was a reasonable chance of improved rectal emptying and continence in patients undergoing suture rectopexy for rectal prolapse, whereas bowel symptoms commonly worsen after surgery in patients treated for RI. Christiansen et al. [6] treated 24 patients with obstructed defecation due to RI with rectopexy either by the Wells technique or by Orr's operation. The radiographic findings of RI were corrected in 22 patients, but none of the patients were completely relieved of their symptoms. However, in follow-up, one patient with solitary rectal ulcer syndrome improved with eradication of the ulcer and four patients with incontinence became continent. The authors concluded that intussusception was a secondary phenomenon in patients with obstructed evacuation. Kodner [36] confirmed that whenever internal intussusception is radiographically demonstrated concurrently with symptoms of solitary rectal ulcer of the rectum, incontinence, pain, or even a very significant rectocele, correction of the intussusception does improve these symptoms. However, postoperative recurrence of constipation was reported in 50% of patients with RI treated by a variety of surgical procedures (mostly rectopexy) after 4 years of follow-up [37]. Tsiaoussis et al. [38] evaluated the outcome of

resection rectopexy in patients with RI and symptoms of obstructed defecation; 27 female patients were enrolled in the study, over a period of 10 years. All of the patients had symptomatic large RI and underwent resection rectopexy (23 laparoscopy; 4 laparotomy). The postoperative follow-up period ranged from 1 to 5 years. RI was reduced in all cases, anal sphincter tone recovered (p=0.002), perineal descent decreased (p<0.001), and colonic transit was accelerated (p<0.001). The authors concluded that resection rectopexy improves symptoms of obstructed defecation attributed to large RI. More recently, Boccasanta et al. [39] introduced stapled transanal rectal resection (STARR) as an innovative, alternative procedure for treatment of outlet obstruction caused by rectocele and RI. Short-term results were encouraging, but subsequent reports described severe postoperative complications and early recurrence of symptoms in one-third of patients [40]. In a retrospective study conducted at the Cleveland Clinic Florida [41], we evaluated patients with large RI for the risk of full-thickness rectal prolapse and compared different methods of treatment. The patients were divided into 3 groups according to the treatment received: group 1, conservative dietary therapy; group 2, biofeedback; and group 3, surgery. We concluded that the risk of full-thickness rectal prolapse occurring in patients who were medically treated for large RI was small. Furthermore, biofeedback was beneficial in improving the symptoms of both constipation and incontinence in these patients; thus, it should be considered as the initial therapy for large RI.

Numerous reports have demonstrated the success of biofeedback therapy for obstructed evacuation ranging from 37% to 100% [42]. Gilliland et al. [43] reported the results of EMG-based biofeedback therapy for obstructed evacuation: 35% of patients had complete success, 13% had partial success, and 51% had no improvement. Dahl et al. [44] reported an overall success rate of 50% at the 6-month follow-up, whereas Loening-Boucke [45] reported overall success in only 37% of patients after 12 months of therapy. In our current study, 33% of patients had complete success, 19% had partial success, and 48% had no improvement after biofeedback therapy for symptoms of constipation. We previously reported that patients who have had symptoms for many years are particularly resistant to treatment [28]. In this study, the duration of constipated symptoms was related to the outcome of treatment. The reported success rates of biofeedback for fecal incontinence vary between 50% and 90% [46].

We conclude that biofeedback is a safe and effective option for patients with constipation or fecal incontinence associated with RI. The patient's willingness to complete the course of treatment as prescribed by the therapist, and, in case of constipation, the duration of symptoms are critical predictors of success.

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Invited comment

There has been a resurgence of interest in obstructed defaecation syndrome (ODS) following Longo's description of stapled transanal rectal resection (STARR). By resecting the lower rectum, STARR aims to correct the anatomical defects associated with ODS, namely rectocele, rectal intussusception, and mucosal prolapse. These abnormalities frequently co-exist but their individual contributions to evacuatory dysfunction is largely unknown. Whilst protagonists claim excellent results [1], the indications for STARR remain unclear, and others have warned about its safety [2].

With the enthusiasm for a surgical cure, it is easy to forget that the majority of patients with ODS can be managed by conservative means. Biofeedback is advocated as a safe, first-line treatment, but the results are not universally successful. The evidence base is of limited quality, with a lack of randomized trials, the use of differing techniques, unclear patient selection, and limited long-term follow-up [3]. Initial success rates of 50%–70% are reported, but efficacy declines with length of follow-up [4].

Hwang et al. [5] assessed the efficacy of biofeedback in patients with isolated rectal intussusception. This is a worthy effort to dissect out a frequent cause of ODS and to assess its response to biofeedback. However, the study is retrospective, involving small numbers of patients with no control arm and no long-term follow-up. Patients are classified into two groups, those with constipation and incontinence symptoms, but the criteria are unclear and there is no data regarding the size of intussusception or its level of

descent. Approximately 50% of patients in both groups derived some benefit from biofeedback, but compliance rates were low with less than half completing the course. Success was related to completion, underlining patient motivation as a critical factor in outcome. The lack of correlation between outcome and pre- and post-biofeedback EMG values again brings into question the *modus operandi* of biofeedback. As the authors point out, medical management alone is associated with an improvement in 34% of patients.

Further clarification of the importance of rectal intussusception in ODS and its preferred mode of treatment is required. This must take the form of large, prospective, well-designed studies which demand multicentre, international collaboration [6].

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