

## Case Report

# Pelvic Floor Muscle Strengthening Using Biofeedback for Treatment of Fecal Incontinence in a Patient with Multiple Sclerosis

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## Keywords

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- Fecal incontinence
- Multiple sclerosis
- Physical therapy
- Home exercise

## Abstract

**Background:** Fecal incontinence (FI) affects a large and growing number of US adults, particularly women 65 years of age and older. Although rectal prolapse is rare, up to 75% of individuals with rectal prolapse have FI. FI can profoundly affect people's quality of life and daily functioning.

**Method and findings:** Conservative therapy, medications, dietary fiber intake, and pelvic floor muscle strengthening, is considered the first-line approach. This case report features a 70-year-old woman with FI due to rectal prolapse, whose efforts to control her FI are complicated by muscle weakness due to multiple sclerosis. The multiple sclerosis affects her ability to strengthen her pelvic floor muscles, which is a key component for the treatment of FI. The case report follows her introduction to a novel pelvic floor muscle training system that uses a Smartphone application to allow the patient to observe the strength and duration of her pelvic muscle contractions and a web portal to allow the physical therapist to monitor the patient's progress.

**Conclusions:** A course of PFMT with real-time biofeedback can combine motivation and reassurance toward the goal of symptom relief and control of FI. In this case, an older woman with reduced voluntary muscle control was able to use a smart phone app driven device to improve pelvic floor muscle strength and control. Demonstrating the benefit for patients with fecal incontinence and rectal prolapse.

## ABBREVIATIONS

FI: Fecal Incontinence; PFMT: Pelvic Floor Muscle Training; MS: Multiple Sclerosis; PFM: Pelvic Floor Muscles; SEMG: Surface Electromyography

## INTRODUCTION

Fecal incontinence (FI) is estimated to affect approximately 20 million adults, with the incidence and prevalence increase with age. Approximately 20% of community-dwelling women aged 65 years or more experience FI [1] with an estimated average per-patient annual costs of \$4110 [2]. Although the actual incidence of rectal prolapse is not known it is estimated to impact 0.5% of the general population [3], occurring more often in females, between 50% and 75% of individuals with rectal prolapse has FI [4].

FI can have a profound effect on an individual's quality of life, causing embarrassment, anxiety, and limitations of activity [1]. Almost 40% of women with FI in the Mature Women's Health

Study reported that their quality of life was reduced by their FI [5].

Multiple sclerosis (MS) affects approximately 400,000 individuals in the United States, with women more likely than men to develop the disease [6]. Up to 69% of people with MS experience FI [7]. In patients with MS, conduction times of central motor pathways to striated muscle such as the pelvic floor muscles (PFM) and the external anal sphincter can be prolonged [8]. This can cause reduced voluntary muscle activity and sensitivity [9].

In a stepwise approach to treatment that minimizes harm to patients [11], first-line therapy for FI usually comprises conservative interventions. These include drugs to improve the consistency of the feces (eg, antimotility and antidiarrheal agents), dietary modifications (including a potential increase in dietary fiber intake), nonsurgical electrical nerve stimulation, pelvic floor muscle-strengthening exercises, and biofeedback [10]. Biofeedback and pelvic floor muscle training (PFMT) are used both alone and in combination [2].

This report describes the case of a patient with MS who has FI in conjunction with rectal prolapse and the results of a course of PFMT using a novel system to monitor results and motivate the patient. PeriCoach is a home-use PFMT system that incorporates a smartphone application, which displays real-time information on the squeeze force, and duration applied by the patient to the device during their PFM contractions (Figure 1). This visual queue guides a patient through a series of exercise regimens to reinforce proper technique, in this case taught by the physical therapist (Figure 2). Clinicians may connect to patients via a web portal to monitor patients' progress and activity remotely [13]. This system was approved by the US Food and Drug Administration for use in urinary incontinence [12] however, PFMT is an accepted component of therapy for FI as well, suggesting utility of this device for this condition.

## CASE PRESENTATION

### Patient history

LK is a 70-year-old that had undergone reparative rectal prolapse surgery, but the prolapse had recurred within 1 week following the surgery. She underwent a second reparative surgery, which was followed by another prolapse 2 weeks later. Currently, the prolapse is reduced while she is sleeping and protrudes approximately 30 minutes after she gets up.

LK's general health is good; she had 2 pregnancies and 2 vaginal deliveries. She was diagnosed with MS in 1995. Although LK's FI is likely related to her rectal prolapse and not to her MS, the MS had affected her voluntary muscle control. She reported spasticity in her right foot, and she had been falling recently, two to three times per year.

At the time of her first visit to physical therapy, LK had been performing Kegel exercise for 7 months on her own. She was not sure, however, that she was doing them correctly, and she wanted additional help in strengthening her PFM.

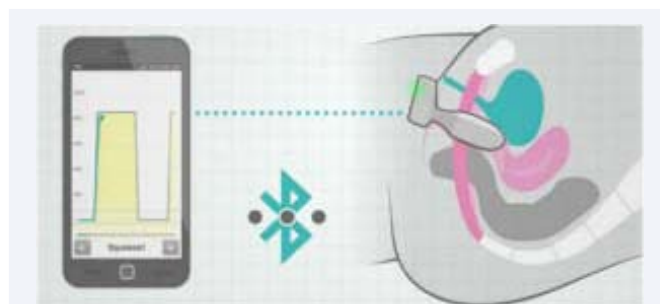
LK reported feeling rectal pressure at a level of 5/10 on a scale of 0 (best) to 10 (worst), which was worse in the evening than during the day and was relieved somewhat by lying down. She was experiencing sleep disturbance. Due to her MS she also had difficulty with daily activities and stated that she had trouble regulating defecation, sitting down and getting up from a seated position, walking up and down stairs, and bending.

LK said that she defecated three to four times daily and that her stool consistency was #7 on the Bristol Stool Scale and her bowel movements was painful. She leaked medium to large amounts of feces two to three times daily but did not have strong urges to move her bowels. She reported no symptoms of urinary incontinence. Her current prescription medications were alendronate, bupropion, methylphenidate, quetiapine, and zolpidem. In addition, she to that she was taking over-the-counter fiber capsules and ingesting flax seed, flax meal, probiotic-containing yogurt, and bran cereal.

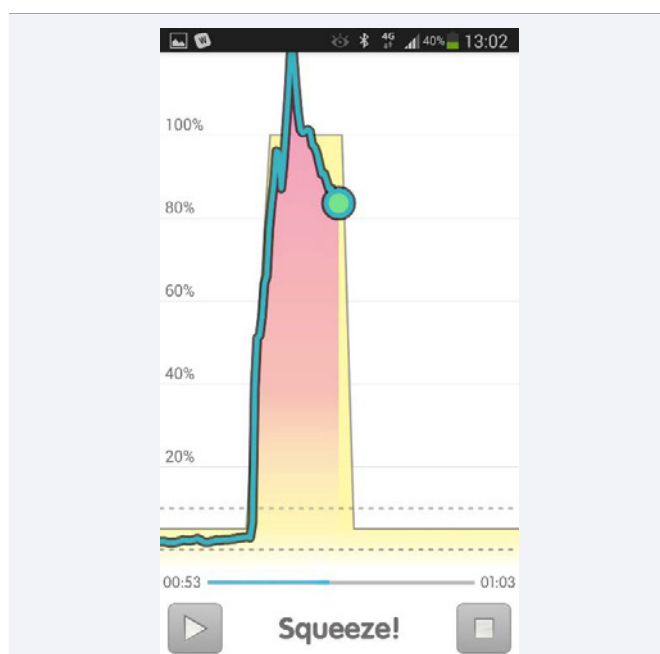
## METHOD

### Examination

LK's weight is 120 lb., and her body mass index is 21.25, so it is clear that her FI was not caused by excess weight.



**Figure 1** Depiction of device position and connectivity to the Smartphone app.



**Figure 2** Smartphone app general screen shot of guided muscle activation.

On supine examination, perineal bulging was apparent, and her prolapse was elicited in response to the Valsalva maneuver. She could perform four quick contractions in 10 seconds, and her vaginal palpation pelvic floor strength was at a level 1 of 5. Mild increase in tone was palpated on the left side of her PFM. Voluntary contraction was absent.

LK scored 81 out of 300 possible points on the Pelvic Floor Distress Inventory Short 20, a brief outcome measure on which a higher score indicates a greater amount and/or severity of distress regarding symptoms.

### Assessment

This patient presented with signs and symptoms of FI, likely due to diarrhea, PFM weakness and a lack of coordination between contraction and relaxation. It was thought that she would benefit from a physical therapy program that included education on pelvic floor muscle, bowel, and bladder function as they relate to each other and exercises aimed at improving PFM strength and coordination. It was theorized that this program

would not cure her rectal prolapse, but her PFM weakness and FI could be reduced with PFMT.

## Interventions

LK's therapeutic program incorporated neuromuscular reeducation of the PFM using digital palpation and SEMG, breathing with PFM activation, learning to reduce accessory muscle activation while isolating the PFM with the assistance of the visual screen from her PeriCoach device. She was then able to utilize the internal correlates she learned from her PeriCoach for other functional activities such as lifting, bending, squatting, to prevent leakage for her home-exercise program. Physical therapy visits would take place once weekly for 12 weeks.

## RESULTS

### Interim (Visits 2 through 10)

During the first few visits, LK expressed concern that she might not be doing her exercises correctly. She demonstrated improved lifting contraction but with accessory muscle substitution and breath holding. By Visit 4, she was able to demonstrate proper use of the PeriCoach, but she required multiple verbal cues to avoid breath holding and observing the device for evidence she was doing this. By Visit 6, she did not need visual or verbal cues to place the unit, however verbal cues with the PeriCoach in place were required to do a proper PFM contraction. At Visits 7 and 8, LK was not sure she was strengthening the correct muscle however she was able to demonstrate appropriate PFM contraction and use of the PeriCoach (Figure 3&4). By Visit 10, although she expressed frustration regarding home setup of the device, related to cognitive deficits that were not apparent at the initial evaluation, she demonstrated proper use and required much less cuing.

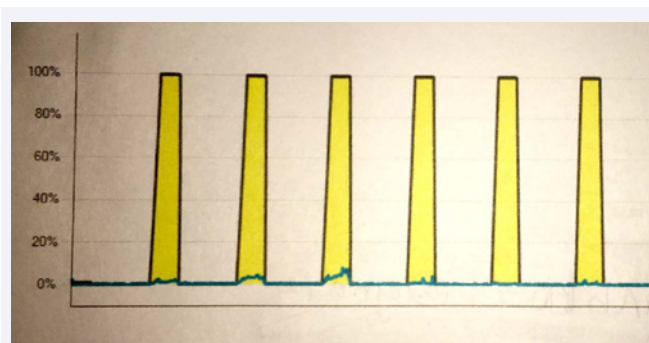
Initially, LK reported noticing that her prolapse was less apparent right after she did her exercises and now not noticeable until evening.

During this time, LK began working with a registered nurse to balance her fiber intake, reducing her intake of insoluble fiber and increasing her intake of soluble fiber. Eventually, LK's stool consistency changed from type 7 to type 5 or 6 (Bristol Scale) and her amount of leakage began to diminish.

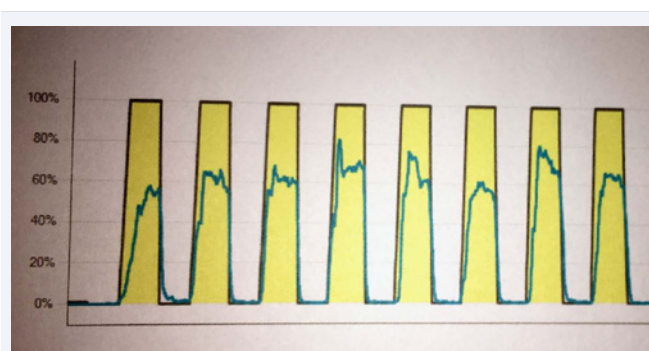
### Final (Visit 12)

At her final visit, LK reported that she only experienced FI if she had loose stools which occurred 1-2 times per week. Since she had been decreasing the amount of fiber in her diet and normalizing the type of fiber, her stool consistency is a type 4 on the Bristol Scale. Her rectal prolapse does not become apparent until mid-afternoon or early evening. Her bowel movements are no longer painful, and she experiences a normal urge.

On re-examination, LK's contraction response showed visible lift with some minimal gluteal activation. Her Valsalva response showed pelvic floor muscle reflex tightening with minimal rectal bulge. Voluntary contraction was isolated, and she could perform 10 quick contractions in 10 seconds. Her vaginal palpation pelvic floor strength level was 3 out of 5, and she was able to hold six 10-second contractions without fatigue.



**Figure 3** Portal screen shot of patient first full session performance during office visit. Limited muscle activity visible with little to no difference between work and rest periods.



**Figure 4** Portal screen shot of patient final full session performance during last office visit with proper muscle recruitment and relaxation.

LK's Pelvic Floor Distress Inventory Short 20 score had decreased from 81 to 38 of a possible 300, a 53% improvement. She still had some difficulty coordinating her breathing with her exercises however with proper use of the PeriCoach she was able to correct that independently. She was concerned about discontinuing her home use of PeriCoach, as it gave her confidence that she was contracting correctly. Because she demonstrated correct contraction technique without the device, she was advised to taper her use, performing some contractions with and some without PeriCoach each day. She was reassured that she always has the option to resume use if her confidence wanes. LK also was encouraged to add more soluble fiber to improve the balance of soluble versus insoluble fiber to maintain a Type 4 stool consistency.

## DISCUSSION

This case illustrates the benefits that this patient gained from persistent use of a PFMT system for a patient suffering from FI. The fact that LK had some initial trouble using the unit secondary to her cognitive deficits, she was ultimately able to utilize the system effectively. LK's comorbidities (MS and cognitive deficits) necessitated more than the usual number of visits for her to achieve this outcome. The ultimate result of this course of therapy is that a woman who had 1 out of 5 PFM strength now has functioning PFM because of her ability to learn how to contract these muscles correctly with neuromuscular reeducation guided by the app based visual biofeedback of PeriCoach at home to

support her learning. Use of the PeriCoach portal, to supplement the education process of proper technique during office visits, assisted her clinician in reassuring patient of progress in muscle functionality. The ability to see the previous session performance from patient allowed the therapist to progress and adjust exercise regimen accordingly.

The combination of PFMT and biofeedback has proven effective in several studies. Meyer and Richter found that only 44% of patients with FI to whom biofeedback was recommended finished the full course, however of the 44% that did use it 80% had positive responses [1]. Rao reported that 44% and 21% of patients with FI using PFMT with biofeedback and PFMT alone, respectively, achieved continence at 3 months [2]. In the study by Bordeianou et.al. Patients experienced symptom relief at rates of 76% using PFMT with biofeedback and 41% using PFMT alone [2]. Thus, although PeriCoach is not approved specifically for treating FI, it is an intuitive choice.

As illustrated by LK's outcomes, a course of PFMT with real-time biofeedback can combine motivation and reassurance while patients work steadily toward the goal of symptom relief and control of FI. In this case, an older woman with reduced voluntary muscle control was able to use the device. PFMT with biofeedback using PeriCoach can benefit patients with fecal incontinence and rectal prolapse.

## ACKNOWLEDGEMENTS

Development of case report was assisted by unaffiliated medical writer Stef Stendardo.

## CONFLICT OF INTEREST

Dawn Sandalcidi is a clinical advisor for Analytica, Ltd. The opinions expressed here are those of the author and do not necessarily reflect the positions of Analytica, Ltd.

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