

Review of pelvic floor disorders rehabilitation: the impact of rehabilitative treatment on obstructed defecation and faecal incontinence

FILIPPO PUCCIANI

Department of Surgery and Translational Medicine, University of Florence, Italy

Abstract: The aim of this review is to evaluate the impact of rehabilitative treatment in patients with obstructed defecation or fecal incontinence. Pelvic floor muscle training, biofeedback therapy, anal electrostimulation and volumetric rehabilitation have been used to treat the symptoms of patients with the above disorders. Because there are no international agreements on the use of these various rehabilitative techniques, the main problem is related to the absence of standards and guidelines. In spite of these drawbacks many patients may be cured and their quality of life improves. Rehabilitative treatment can also identify those “non-responders” who should be next in line for more expensive and invasive therapeutic procedures.

Key words: Obstructed defecation; Fecal incontinence; Biofeedback; Pelvic floor disorder; Pelvic floor disorder rehabilitation.

INTRODUCTION

Rehabilitative treatment (RT) is the first-line therapy of obstructed defecation and fecal incontinence in patients who have not responded to simple dietary programs or medication.^{1,2} Once the rehabilitative option has been selected, the problem arises as to implement it. Since there are no international agreements on the use of the various rehabilitative techniques, the main problems are related to an absence of standards and guidelines. There are no universally accepted recommendations or enough evidence about how to perform rehabilitative treatment, nor are there specific criteria for evaluating eventual interventions.³ RT requires a highly trained therapist and is time consuming both for the therapist and the patient. Patients must therefore be strongly motivated. In spite of these negative factors, RT has a success rate of about 70% and the patient's quality of life is significantly better than that before treatment.^{4,5} Last but not least, even if RT fails, it will not have a deleterious effect on the patient's condition, and its results will not affect future decisions regarding therapy, including surgery.^{6,7} Nevertheless, significant anatomical damage, severe psychiatric or neurological disease, poor patient compliance, and poor patient-physiotherapist interactions can pose major obstacles to the success of RT.^{8,9}

The aim of this review is to characterize functional and clinical results of pelvic floor disorder rehabilitation. After a short description of rehabilitative techniques, the RT of obstructed defecation and fecal incontinence will be described and clinical impacts of treatment will be clarified.

REHABILITATIVE TECHNIQUES

As outlined above there is no unanimous consensus on how to implement rehabilitative techniques: the working system, exercise variety, daily or weekly rhythm, and equipping tools all differ in various clinics dedicated to pelvic floor rehabilitation. Universally standardized protocols are absent and there is thus great confusion about how to successfully carry out a rehabilitation cycle. Nevertheless, there are some cornerstones of RT in patients affected by obstructed defecation or fecal incontinence: each rehabilitative technique is aimed at a specific anatomophysiological target and therefore should be used only when the related continence stool mechanism could be impaired.

Pelvic floor rehabilitation involves biofeedback (BF), pelvicperineal kinesitherapy (PK), volumetric rehabilitation (VR) and electrostimulation (ES).

Biofeedback

Biofeedback is a conditioning method for the defecation reflex, which consists of pelvic floor coordination exercises together with visual / verbal feedback training. It is voluntary, employs a trial-and-error process whereby learning takes place and the subject must be aware of the desired response (signals). Biofeedback training is aimed at improving voluntary external anal sphincter contraction and relaxation.^{10,11} Another effect is training of synchrony for internal and external sphincter responses during rectal distension.¹² Biofeedback may make use of electromyographic or pressure devices in the office using a working station, or at home by means of portable electronics. The therapist instructs the patient in how to improve anal contraction and/or anal relaxation in order to retrain the external anal sphincter and puborectalis muscle to coordinate defecation and permit emergency continence.

Pelvipерineal kinesitherapy

Pelvipерineal kinesitherapy is a type of muscular training that is selectively aimed at the levator ani muscles to improve performance, extension, and elasticity. It is mainly used in patients with obstructed defecation who have pelvic floor dyssynergia, because it is a specific muscular re-education technique for the uncoordinated pelvic floor muscles. It is also used in patients with fecal incontinence and descending perineum syndrome¹³ or defects of the pelvic floor.¹⁴ The aim of this therapy in this setting is to teach the patient about the correct sequence of contraction and relaxation of the striated muscles that is required for defecation. Usually a cycle of pelvipерineal kinesitherapy follows a sequence of exercises performed weekly in outpatient sessions, individualized for each patient.^{15,16} The variety and sequence of pelvipерineal exercise are not standardized and each clinic dedicated to pelvic floor rehabilitation has its own treatment protocol. This implies that it is not possible to compare functional and clinical outcomes of kinesitherapeutic treatments.

Volumetric rehabilitation

Volumetric rehabilitation (sensory retraining) is indicated for disordered rectal sensation and/or impaired rectal com-

pliance. The aim is to increase the patient's ability to perceive the rectal distension induced by faeces or flatus ("rectal sensation") and to improve the elastic properties of the rectal wall. Such RT may be performed through biofeedback ("sensory retraining")¹⁷ or volumetric rehabilitation using an inflated balloon¹⁸ or water enemas of decreasing/increasing volume.¹⁴ Volumetric rehabilitation involves twice-daily administration of a tepid water enema.

If the patient's conscious rectal resting threshold is high, the initial volume is equal to the maximally tolerated manometric volume. The patient holds the liquid for 1 minute. In the following days, the enema volume (20 ml) is gradually decreased until the patient achieves a normal value of rectal sensation. On the contrary, in the presence of impaired rectal sensation with the lowest rectal sensations, the aim of volumetric rehabilitation is to restore a conscious rectal sensitivity threshold to near normal volume. The sequential order involves the step by step use of enemas with increasing cubic units (20 ml) until the patient has again achieved normal rectal sensations.

Anal electrostimulation

The purpose of anal electrical stimulation is to induce muscle contraction by direct stimulation or indirectly via peripheral nerve stimulation. A Cochrane Library review on electrical stimulation for fecal incontinence concludes that there is not sufficient evidence on which to judge the effectiveness of electrical stimulation in the management of patients with fecal incontinence, nor is there enough evidence on which to select patients suitable for this type of treatment, nor to know which modality of electrical stimulation is optimal.¹⁹ The rehabilitative cycle is performed daily for several months by the patient in a home environment. The device delivers a square wave of current alternating between a work period of a few seconds and a double rest period, according to a standard sequence of pulse (width in milliseconds; frequency in herz). This rehabilitative technique does not have any universally accepted protocol.

OBSTRUCTED DEFECACTION

Obstructed defecation is broadly defined as a patient's inability to evacuate contents from the rectum¹ with symptoms of dyschezia and a subjective sensation of anal blockage during defecation. Outlet obstruction may be caused by organic or functional diseases, and only diagnostic instruments can identify the causes. Mechanical causes include rectocele, rectoanal intussusception, descending perineum syndrome, solitary rectal ulcer syndrome, mucosal rectal prolapse, enterocele and sigmoidocele. Disorders of rectal sensation and pelvic floor dyssynergia are the functional diseases.²⁰ In clinical practice, after failure of conservative therapy with high-fibre diet and laxatives, rehabilitation is the first therapeutic option for obstructed defaecation.^{1,21} There is not universally accepted rehabilitative protocol so each centre adopts its own rehabilitation modalities. However, all RT programs aim to improve defecation-related behaviour and restore a normal pattern of defaecation through the use of both instruments and educational devices. Biofeedback is the treatment of choice for patients affected by pelvic floor dyssynergia. Three randomized controlled trials^{22,23,24} have shown a success rate of approximately 70% and a long-term success rate of approximately 50%.²⁴ In order to improve the outcomes of RT, pelviperineal kinesiotherapy may be added to biofeedback: active training of the levator ani and perineal muscles makes the work of biofeedback easier because only these muscles are

recruited for pelvic floor relaxation during defaecation.^{15,16} The success rate increases to about 90%,⁵ with subsequent improvements in the patient's quality of life occurring. RT is also an effective therapy for organic diseases.^{1,20} A multimodal rehabilitation programme, employing the four rehabilitative techniques guided by anorectal manometry, may be used.⁵ The overall mean Obstructed Defecation Syndrome score²⁵ has been shown to significantly improve after treatment. Patients with rectoanal intussusception have the worst score, even if it was significantly better than before rehabilitation.⁵ Although it is difficult to discriminate between patients with organic diseases who will derive some benefit from RT and those who instead will require surgery, the generally accepted procedure is to begin with RT and, if this proves ineffective, to then consider surgery.²⁶ One of the prerequisites for surgery to correct obstructed defaecation in patients with a rectocele and/or ano-rectal intussusception is the failure to respond to RT.²⁶ There are no clear guidelines to help the clinician to decide between the approaches of "rehabilitation-surgery" and "rehabilitation-surgery-rehabilitation". RT should certainly be prescribed if the outcome of anorectal surgery is unsatisfactory.²⁷

RT may be useful for improving rectal sensation when anorectal manovolumetry demonstrates rectal hyposensitivity in patients with obstructed defecation.²⁸ Volumetric rehabilitation or sensory retraining restores a normal perception of faecal bolus: it is essential to triggering and maintaining defaecation.⁵ After sensory conditioning, the threshold for rectal sensation improves in about 92% of patients and is similar to that observed in normal individuals.²⁹

There is no general agreement as to which factors may predict or influence the outcome of RT. Significant anatomical damage, severe psychiatric or neurological disease, poor patient compliance, and poor patient-physiotherapist relationship can be major obstacles to the success of RT.^{30,31}

Finally, the effects of RT are long-term: lasting improvement has been observed in patients with obstructed defecation (confirmed clinically and by manometry) for up to 2 years after RT.^{22,32,33}

FECAL INCONTINENCE

Faecal incontinence means involuntary loss of liquid or solid stool, occurring for > 3 months.³⁴ It may be idiopathic or secondary to organic diseases such as rectal prolapse, post-partum incontinence, post-surgical incontinence (including after sphincter-saving surgery), descending perineum syndrome, rectocele, rectoanal intussusception, diabetes, neurological and orthopaedic diseases. There is not universally accepted therapeutic algorithm but usually RT is considered the first-line option in treating fecal incontinence in patients who have not responded to simple dietary changes or medication.^{35,36}

Functional fecal incontinence³⁷ is an indication for RT with uncontrolled studies reporting improved continence in 70% of patients with faecal incontinence after biofeedback therapy.⁴ A similar percentage is reported for RT when used in fecal incontinence secondary to organic diseases.¹⁴ In clinical practice there are no universally accepted recommendations or enough evidence about how to perform RT, nor are there specific criteria for evaluating the efficacy of this intervention.³ This implies that outcomes often vary from one centre to another, so it is virtually impossible to predict the effects of RT. Finally, there are not suitable trials on drug treatment versus any other conservative treatments including RT, and so it is not possible to state if RT is more effective than drug therapy for the treatment of fe-

cal incontinence. Similarly there are no studies on the utility of carrying out RT in patients prior to surgery. However, experience suggests that RT, even if it does not achieve satisfactory function, can improve continence mechanisms and can therefore contribute to a positive outcome in elective anal sphincter repair. Vice versa, RT after surgery may help operated patients to achieve acceptable continence with symptomatic improvement.^{38,39}

The pathophysiology of fecal incontinence is often multifactorial and this fundamental aspect should influence whatever treatment may be proposed. Each patient has his/her own specific pathogenic profile as a result of a mix of aetiological factors: for example, 48% of patients with anal sphincter lesions may have impaired rectal sensation.⁴⁰ Each patient thus requires a clinical approach that must be modulated according to his or her specific aetiology. This basic fact must be considered when planning therapy for a patient with fecal incontinence and thus rehabilitative treatment should adhere to this statement. Different training programs must be used for different patients and distinct rehabilitation techniques should be employed only when indicated by related diagnostic reports. The model of multimodal rehabilitation, performed under the guidance of anorectal manometry, may be a useful option for treating fecal incontinence.¹⁴

Biofeedback is the main technique that should be used: it is superior to pelvic floor exercises,³⁶ but when biofeedback is combined with anal electrostimulation the results are better than biofeedback alone.⁴¹ Eighteen randomized trials support the use of biofeedback in fecal incontinence.³ Negative predictive factors are sphincter lesions > 120°, previous hysterectomy, a Fecal Incontinence Severity Index score >13, adjuvant and/or neoadjuvant radiotherapy for rectal cancer.^{40,42} Positive prognostic factors are age < 50 years, Wexner Incontinence score < 10, anal resting pressure > 50 mmHg, and a maximal voluntary contraction > 80 mmHg.⁴³

RT improves continence in many patients and some of them can become symptom free. Improvement in fecal urgency and in the subjective rating of bowel control is also long-lasting: in one randomized study, at the 2-year follow-up, shows that improvement is maintained in incontinent patients who had undergone biofeedback, also with different exercise regimens.⁴⁴

CONCLUSION

In conclusion, rehabilitative treatment of faecal incontinence, when globally considered, is a good therapeutic option. It offers useful insight by identifying those “non-responder patients” who should be next in line for more expensive and invasive therapeutic procedures (sacral neuromodulation, surgery).

Conflict of Interest Statement. The Author declares that there is no conflict of interest.

REFERENCES

- Khaikin M, Wexner SD. Treatment strategies in obstructed defecation and fecal incontinence. *World J Gastroenterol* 2006; 28: 3168-73.
- Norton C, Kamm MA. Anal sphincter biofeedback and pelvic floor exercises for faecal incontinence in adults. *Aliment Pharmacol Ther* 2001; 15: 1147-54.
- Norton C, Cody JD. Biofeedback and/or sphincter exercises for the treatment of faecal incontinence in adults. *Cochrane Database Syst Rev* 2012 Jul 11; 7: CD002111. doi: 10.1002/14651858.CD002111.pub3.
- Heymen S, Jones KR, Ringel Y, Scarlett Y, Whitehead WE. Biofeedback treatment of fecal incontinence: a critical review. *Dis Colon Rectum* 2001; 44: 728-36.
- Pucciani F, Raggioli M, Ringressi MN. Obstructed defecation: what is the role of rehabilitation? *Colorectal Dis* 2012; 14: 474-9.
- Koch SM, Melenhorst J, Uluda O, Deutekom M, Stoker J, van Gemert WG, Baeten CG. Sacral nerve modulation and other treatments in patients with faecal incontinence after unsuccessful pelvic floor rehabilitation: a prospective study. *Colorectal Dis* 2010; 12: 334-41.
- Bove A, Bellini M, Battaglia E, Bocchini R, Gambaccini D, Bove V, Pucciani F, Altomare DF, Dodi G, Sciaudone G, Falletto E, Piloni V. Consensus statement AIGO/SICCR: Diagnosis and treatment of chronic constipation and obstructed defecation (part II: Treatment). *World J Gastroenterol* 2012; 18: 4994-5013.
- Chiarioni G, Heymen S, Whitehead WE. Biofeedback therapy for dyssynergic defecation. *World J Gastroenterol* 2006; 12: 7069-74.
- Bassotti G, Chistolini F, Sietchiping-Nzepa F, De Roberto G, Morelli A, Chiarioni G. Biofeedback for pelvic floor dysfunction in constipation. *BMJ* 2004; 328: 393-6.
- Marcello PW, Barrett RC, Coller JA, Schoetz DJ Jr, Roberts PL, Murray JJ, Rusin LC. Fatigue rate index as a new measurement of external sphincter function. *Dis Colon Rectum* 1998; 41: 336-43.
- Palsson OS, Heymen S, Whitehead WE. Biofeedback treatment for functional anorectal disorders: a comprehensive efficacy review. *Appl Psychophysiol Biofeedback* 2004; 29: 153-74.
- Loening-Baucke V. Biofeedback therapy for fecal incontinence. *Dig Dis* 1990; 8: 112-24.
- Harewood GC, Coulie B, Camilleri M, Rath-Harvey D, Pemberton JH. Descending perineum syndrome: audit of clinical and laboratory features and outcome of pelvic floor retraining. *Am J Gastroenterol* 1999; 94: 126-30.
- Pucciani F, Iozzi L, Masi A, Cianchi F, Cortesini C. Multimodal rehabilitation of faecal incontinence: experience of an Italian centre devoted to faecal disorder rehabilitation. *Tech Coloproctol* 2003; 7: 139-47.
- Pucciani F, Rottoli ML, Bologna A, Cianchi F, Forconi S, Cutellè M, Cortesini C. Pelvic floor dyssynergia and bimodal rehabilitation: results of combined pelviperineal kinesitherapy and biofeedback training. *Int J Colorectal Dis* 1998; 13: 124-30.
- Lewicky-Gaupp C, Morgan DM, Chey WD, Muellerleile P, Fenner DE. Successful physical therapy for constipation related to puborectalis dyssynergia improves symptom severity and quality of life. *Dis Colon Rectum* 2008; 51: 1686-91.
- Whitehead W, Wald A, Norton J. Treatment options for fecal incontinence. *Dis Colon Rectum* 2001; 44: 131-44.
- Wald A. Clinical practice. Fecal incontinence in adults. *N Engl J Med* 2007; 356: 1648-55.
- Hosker G, Cody JD, Norton CC. Electrical stimulation for faecal incontinence in adults. *Cochrane Database Syst Rev* 2009; 1. DOI: 10.1002/14651858.CD001310.pub2.
- Andromanakos N, Skandalakis P, Troupis T, Filippou D.. Constipation of anorectal outlet obstruction: pathophysiology, evaluation and management. *J Gastroenterol Hepatol* 2006; 21: 638-46.
- Camilleri M, Bharucha AE. Behavioural and new pharmacological treatments for constipation: getting the balance right. *Gut* 2010; 59: 1288-96.
- Chiarioni G, Whitehead WE, Pezza V, Morelli A, Bassotti G. Biofeedback is superior to laxatives for normal transit constipation due to pelvic floor dyssynergia. *Gastroenterology* 2006; 130: 657-64.
- Heymen S, Scarlett Y, Jones K, Ringel Y, Drossman D, Whitehead WE. Randomized, controlled trial shows biofeedback to be superior to alternative treatments for patients with pelvic floor dyssynergia-type constipation. *Dis Colon Rectum* 2007; 50: 428-41.
- Rao SS, Seaton K, Miller M, Brown K, Nygaard I, Stumbo P, Zimmerman B, Schulze K. Randomized controlled trial of biofeedback, sham feedback, and standard therapy for dyssynergic defecation. *Clin Gastroenterol Hepatol* 2007; 5: 331-38.

25. Altomare DF, Spazzafumo L, Rinaldi M, Dodi G, Ghiselli R, Piloni V. Set-up and statistical validation of a new scoring system for obstructed defaecation syndrome. *Colorectal Dis* 2008; 10: 8488.
26. Lehur PA, Stuto A, Fantoli M, Villani RD, Queralto M, Lazorthes F, Hershtan M, Carriero A, Pigot F, Meurette G, Narisetty P, Villet R. Outcomes of stapled transanal rectal resection vs. biofeedback for the treatment of outlet obstruction associated with rectal intussusception and rectocele: a multicenter, randomized, controlled trial. *Dis Colon Rectum* 2008; 51: 1611-18.
27. Ayabaca SM, Zbar AP, Pescatori M. Anal continence after rectocele repair. *Dis Colon Rectum* 2002; 45: 63-9.
28. Rao SS. Biofeedback therapy for constipation in adults. *Best Pract Res Clin Gastroenterol* 2011; 25: 159-66.
29. Rao SS, Welcher K, Pelsang RE. Effects of biofeedback therapy on anorectal function in obstructive defecation. *Dig Dis Sci* 1997; 42: 2197-2205.
30. Chiarioni G, Heymen S, Whitehead WE. Biofeedback therapy for dyssynergic defecation. *World J Gastroenterol* 2006; 12: 7069-74.
31. Bassotti G, Chistolini F, Sietchiping-Nzema F, de Roberto G, Morelli A, Chiarioni G. Biofeedback for pelvic floor dysfunction in constipation. *BMJ* 2004; 328: 393-96.
32. Wiesel PH, Dorta G, Cuypers P, Herranz M, Kreis ME, Schnegg JF, Jornod P. Patient satisfaction after biofeedback for constipation and pelvic floor dyssynergia. *Swiss Med Wkly* 2001; 131: 152-56.
33. Rao SS, Valestin J, Brown CK, Zimmerman B, Schulze K. Long-term efficacy of biofeedback therapy for dyssynergic defecation: randomized controlled trial. *Am J Gastroenterol* 2010; 105: 890-96.
34. Pucciani F. Faecal soiling: pathophysiology of post-defecatory incontinence. *Colorectal Dis* 2013; doi: 10.1111/codi.12236.
35. Norton C, Kamm MA. Anal sphincter biofeedback and pelvic floor exercises for faecal incontinence in adults. *Aliment Pharmacol Ther* 2001; 15: 1147-1154.
36. Heymen S, Scarlett Y, Jones K, Ringel Y, Drossman D, Whitehead WE. Randomized controlled trial shows biofeedback to be superior to pelvic floor exercises for fecal incontinence. *Dis Colon Rectum* 2009; 52: 1730-37.
37. Bharucha AE, Wald A, Enck P, Rao S. Functional anorectal disorders. *Gastroenterology* 2006; 130: 1510-18.
38. Jensen LL, Lowry AC. Biofeedback improves functional outcome after sphincteroplasty. *Dis Colon Rectum* 1997; 40: 197-200.
39. Maris A, Devreese AM, D'Hoore A, Penninckx F, Staes F. Treatment options to improve anorectal function following rectal resection: a systematic review. *Colorectal Dis* 2013; 15: e67-e78.
40. Pucciani F, Raggioli M, Gattai R. Rehabilitation of fecal incontinence: What is the influence of anal sphincter lesions? *Tech Coloproctol* 2013; 17: 299-306.
41. Schwandner T, Hemmelmann C, Heimerl T, Kierer W, Kolbert G, Vonthein R, Weinel R, Hirschburger M, Ziegler A, Padberg W. Triple-target treatment versus low-frequency electrostimulation for anal incontinence: a randomized, controlled trial. *Dtsch Arztebl Int* 2011; 108: 653-60.
42. Pucciani F, Ringressi MN, Redditi S, Masi A, Giani I. Rehabilitation of fecal incontinence after sphincter-saving surgery for rectal cancer: encouraging results. *Dis Colon Rectum* 2008; 51: 1552-58.
43. Boselli As, Pinna F, Cecchini S, Costi R, Marchesi F, Violi V, Sarli L, Roncoroni L. Biofeedback therapy plus anal electrostimulation for fecal incontinence: prognostic factors and effects on anorectal physiology. *World J Surg* 2010; 34: 815-21.
44. Bartlett L, Sloots K, Nowak M, Ho YH. Biofeedback for fecal incontinence: a randomized study comparing exercise regimens. *Dis Colon Rectum* 2011; 54: 846-56.

Correspondence to:

Prof. Filippo Pucciani M.D.
Department of Surgery and Translational Medicine
Largo Brambilla 3
50134 Firenze, Italy
E-mail: pucciani@unifi.it
Phone 0039-055-7947083
Fax 0039-055-4220133

Translational medicine (N.d.R., from Wikipedia)

Translational medicine (also referred to as translational science) is a discipline within biomedical and public health research that aims to improve the health of individuals and the community by “translating” findings into diagnostic tools, medicines, procedures, policies and education.

Translational medicine is a rapidly growing discipline in biomedical research and aims to expedite the discovery of new diagnostic tools and treatments by using a multi-disciplinary, highly collaborative, “bench-to-bedside” approach. Within public health, translational medicine is focused on ensuring that proven strategies for disease treatment and prevention are actually implemented within the community. One prevalent description of translational medicine, first introduced by the Institute of Medicine’s Clinical Research Roundtable, highlights two roadblocks (i.e., distinct areas in need of improvement): the first translational block (T1) prevents basic research findings from being tested in a clinical setting; the second translational block (T2) prevents proven interventions from becoming standard practice.

The National Institutes of Health (NIH) has made a major push to fund translational medicine, especially within biomedical research, with a focus on cross-functional collaborations (e.g., between researchers and clinicians); leveraging new technology and data analysis tools, and increasing the speed at which new treatments reach patients. In December 2011, The National Center for Advancing Translational Science (NCATS) was established within the NIH to “transform the translational science process so that new treatments and cures for disease can be delivered to patients faster.” The Clinical and Translational Science Awards, established in 2006 and now funded by NCATS, supports 60 centers across the country that provide “academic homes for translational sciences and supporting research resources needed by local and national research communities.” According to an article published in 2006 in *Science Career Magazine*, the European Commission is targeting a majority of its 6 Billion budget to further translational medicine.