

## PDF hosted at the Radboud Repository of the Radboud University Nijmegen

The following full text is a publisher's version.

For additional information about this publication click this link.

<http://hdl.handle.net/2066/23439>

Please be advised that this information was generated on 2017-12-05 and may be subject to change.

# Biofeedback Treatment is Ineffective in Neurogenic Fecal Incontinence

W. F. van Tets, M.D.,\* J. H. C. Kuijpers, M.D., Ph.D.,\* G. Bleijenberg, Ph.D.†

*From the Departments of \*Surgery and †Medical Psychology, University Hospital, Nijmegen, The Netherlands*

**PURPOSE:** This study was undertaken to assess biofeedback treatment (active sphincter exercises under direct electromyography vision) in neurogenic fecal incontinence. **METHODS:** Twelve patients with neurogenic fecal incontinence have been studied prospectively. External sphincter contractions were exercised under direct electromyographic vision twice per day for 30 minutes during 12 weeks. Manometry was done at the beginning and after 12 weeks of training to evaluate objectively changes in sphincter functions. **RESULTS:** No patient experienced any improvement in fecal control. Mean resting pressure increased from 7 to 9 kPa and mean squeeze pressure from 3.9 to 4.9 kPa, which was of no statistical significance ( $P = 0.20$  and  $P = 0.46$ , respectively). **CONCLUSIONS:** External sphincter contraction exercises under direct electromyographic vision are not effective in neurogenic fecal incontinence. Degree of continence does not improve, and external sphincter function is not increased significantly. [Key words: Neurogenic fecal incontinence; Biofeedback]

van Tets WF, Kuijpers JHC, Bleijenberg G. Biofeedback treatment is ineffective in neurogenic fecal incontinence. *Dis Colon Rectum* 1996;39:992-994.

Biofeedback<sup>1</sup> treatment for fecal incontinence is becoming increasingly popular among physicians and physiotherapists. Principle of treatment is to exercise external sphincter contractions under direct electromyographic vision<sup>1</sup> or synchronized with rectal distention<sup>2</sup> to improve function. Good results have been reported by several authors and are obtained within a few weeks, which makes it an interesting option. Because its role has not been assessed yet in neurogenic fecal incontinence, we have studied the effects of biofeedback on continence and anal sphincter functions in patients with neurogenic fecal incontinence.

## PATIENTS AND METHODS

Twelve patients with neurogenic fecal incontinence have been studied. All were women. Ages varied between 29 and 64 (mean, 48) years. No patient was able to retain solid stool. The feeling of urge was absent in all. None had a history of previous anorectal surgery. Symptoms varied from 3 to 12 (mean, 7) years.

Digital examination of the pelvic floor demon-

strated a continuous sphincter complex without a dehiscence, a lax and patulous anal canal, and an increased anorectal angle. During squeezing, no or hardly any contraction of the external sphincter and the pelvic floor could be felt. Signs of rectal prolapse or intussusception were absent.

Electromyographic investigation of the pelvic floor muscle revealed severe denervation. Anal manometry showed low values compatible with incontinence (Table 1). Endosonographic investigation of the anal canal revealed no sphincter defects.

## Biofeedback Training

External sphincter contractions were exercised under direct electromyographic vision using a PerMyMeter<sup>®</sup> (Synectics Medical Inc., Irving, TX). The device consisted of an anal plug that recorded the electrical activity of the external sphincter and was connected to a circularly shaped light bar microvoltmeter. The more intensively patients contracted their pelvic floor, the more lights were activated on the light bar. Patients were instructed to contract pelvic floor muscles for 10 seconds at 10-second intervals with the anal plug in place and to try to increase the intensity of consecutive contractions during a session as visualized by the light bar.

Exercises were done twice a day for 30 minutes during 12 weeks. Patients were seen in the outpatient clinic every three weeks. Manometry was repeated after 12 weeks of biofeedback training to evaluate objectively changes in sphincter functions.

## RESULTS

All patients were able to comply to the 12-week period of training. None experienced any improvement in fecal control, and all remained incontinent (Table 1).

Resting pressures increased in eight and decreased in four patients, whereas squeeze pressures increased in five and decreased in seven. Mean resting pressure increased from 7 to 9.2 kPa (1 kPa = 9.8 cm H<sub>2</sub>O) and

**Table 1.**Classification of Degree of Continence According to Browning and Parks<sup>20</sup>

Degree of Continence	Before	After
A Continent for solid and liquid stool and flatus	—	—
B Continent for solid and liquid stool but not flatus	—	—
C Continent for solid stool but no control of liquid stool and flatus	—	—
D Complete incontinence, continuing fecal leakage	12	12

Comparison of degree of continence before and after biofeedback treatment for neurogenic fecal incontinence.

mean squeeze pressure from 3.9 to 4.9 kPa, which was of no statistical significance (Table 2).

## DISCUSSION

Biofeedback training for fecal incontinence is simple, safe, and easy to perform. Good results have been reported in 50 to 70 percent of patients by several authors.<sup>5-10</sup> It, therefore, could be an interesting option in the treatment of neurogenic fecal incontinence because results of both conservative and operative treatment for this condition are moderate at the most.<sup>11</sup>

Objective assessment of the results in the literature, however, is difficult because the term "fecal incontinence" has been poorly defined, heterogeneous groups of patients with continence disorders have been treated, and nonspecific treatments such as medical intervention and behavior modification therapy, effective already in themselves, have been added.<sup>5, 6, 10, 12-14</sup> It has even been suggested that improvement in fecal incontinence is attributable to medical intervention, regression of symptoms with time, enhancement of rectal sensitivity, or instilling confidence rather than biofeedback training.<sup>6, 12</sup>

The pelvic floor muscle is always tonically active, even during sleep. It contracts by a reflex mechanism during activities that increase abdominal and rectal pressure such as coughing, walking, laughing, and breathing to maintain a high anal pressure zone that exceeds rectal pressure. Thus, the anal canal remains closed, and fecal continence is maintained.<sup>15</sup> Despite these continuous daily contractions, pelvic floor function progressively decreases in neurogenic fecal incontinence. It is difficult to understand how a few daily active squeeze exercises can be effective in increasing pelvic floor strength when continuous

**Table 2.**

Anal Resting and Squeeze Pressures in 12 Patients with Neurogenic Fecal Incontinence Before and After Biofeedback Treatment During 12 Weeks

Patient	Resting Pressures (kPa)		Squeeze Pressures (kPa)	
	Start	12 Weeks	Start	12 Weeks
1	4.8	4.4	5.7	7.1
2	6.5	1.0	1.2	4.4
3	7.2	9.3	2.5	4.0
4	5.2	6.8	2.3	0.0
5	6.3	6.7	3.9	3.6
6	4.1	4.0	2.2	4.1
7	1.1	8.0	5.8	3.7
8	1.2	8.4	5.5	4.6
9	7.0	7.4	4.7	3.8
10	5.1	1.2	4.8	8.8
11	5.2	1.3	2.0	5.4
12	1.0	1.1	5.6	2.1
Mean	7.0	9.2	3.9	4.9
	$P = 0.20$		$P = 0.46$	

Pressure increases were not statistically significant (paired *t*-test).

daily sphincter contractions fail to do so. Furthermore, the presumed efficacy of biofeedback treatment cannot be explained by improvement of external sphincter function because both increases and decreases in squeeze pressure have been found in patients with good results.<sup>5, 13, 16, 17</sup> Improvement in rectal sensitivity to distention is claimed to be far more important because responders had a significantly lower mean threshold of rectal sensation than did nonresponders,<sup>7, 14, 18</sup> which is another argument why biofeedback cannot be effective in patients with neurogenic incontinence, because rectal sensation is largely disturbed or completely absent in 70 percent of patients.<sup>19</sup>

In this study, no patient benefited from a three-month course of biofeedback treatment for neurogenic incontinence. All patients were seen at three-week intervals to encourage daily exercises and to monitor clinical progression. All stated that they had performed exercises according to the protocol. All remained incontinent, and there was no improvement according to the classification of Browning and Parks.<sup>20</sup> Only one patient insisted on continuing treatment but stopped after four more weeks because improvement failed to occur.

The effect of biofeedback treatment on external sphincter function in this series is difficult to assess. Squeeze pressure increased in 40 percent and mean

squeeze pressure increased with 1 kPa. The increase was not significant, but the numbers were small and data varied widely. In two patients, squeeze pressures even came within normal limits but incontinence persisted. This increase is probably the result of spontaneous variations in external sphincter function.<sup>21</sup> But even if it is the effect of biofeedback treatment, it is unlikely that the clinical results will improve. Our patients got tired of treatment and were not motivated to continue it after three months of daily exercises, because none experienced any improvement.

### CONCLUSION

We concluded from this study that a three-month course of biofeedback treatment does not improve degree of continence in patients with neurogenic fecal incontinence. There was no significant improvement in external sphincter function.

### REFERENCES

1. MacLeod JH. Management of anal incontinence by biofeedback. *Gastroenterology* 1987;93:291-4.
2. Engel BT, Nikoomanesh P, Schuster MM. Operant conditioning of rectosphincteric responses in the treatment of fecal incontinence. *N Engl J Med* 1974;290:646-9.
3. Berti-Riboli E, Frascio M, Pitto G, *et al.* Biofeedback conditioning for fecal incontinence. *Arch Phys Med Rehabil* 1988;69:29-31.
4. Whitehead WE, Burgio KL, Engel BT. Biofeedback treatment of fecal incontinence in geriatric patients. *J Am Geriatr Soc* 1985;33:320-4.
5. Chiarioni G, Scattolini C, Bonfante F, *et al.* Liquid stool incontinence with severe urgency; anorectal function and effective biofeedback treatment. *Gut* 1993;34:1576-80.
6. Miner PB, Donnelly TC, Read NW. Investigation of mode of action of biofeedback in treatment of fecal incontinence. *Dig Dis Sci* 1990;35:1291-8.
7. Wald A. Biofeedback for neurogenic fecal incontinence: rectal sensation is a determinant of outcome. *J Pediatr Gastroenterol Nutr* 1983;2:302-6.
8. Cerulli MA, Nikoomanesh P, Schuster MM. Progress in biofeedback conditioning for fecal incontinence. *Gastroenterology* 1979;76:742-6.
9. Enck P, Daublin G, Lubke HJ, Strohmeier G. Long-term efficacy of biofeedback training for fecal incontinence. *Dis Colon Rectum* 1994;37:997-1001.
10. Guillemot F, Bouche B, Gower-Rousseau C, *et al.* Biofeedback for the treatment of fecal incontinence: long-term clinical results. *Dis Colon Rectum* 1995;38:393-7.
11. Kuipers JH, ed. *Colorectal physiology: fecal incontinence*. Boca Raton: CRC Press, 1994.
12. Loening-Baucke V. Effects of biofeedback training in improving fecal incontinence and anorectal physiologic function. *Gut* 1990;31:1395-402.
13. Whitehead WE, Parker LH, Bosmajian L, *et al.* Treatment of fecal incontinence in children with spina bifida: comparison of biofeedback and behavior modification. *Arch Phys Med Rehabil* 1986;67:218-24.
14. Latimer PR, Campbell D, Kasperski J. A component analysis of biofeedback in the treatment of fecal incontinence. *Biofeedback Self Regul* 1984;9:311-24.
15. Duthie GS, Bartolo DC. Faecal continence and defecation. In: Henry MM, Swash M, eds. *Coloproctology and the pelvic floor*. 2nd ed. London: Butterworth Heinemann, 1992:86-97.
16. Koltai JL, Omaha K, Hofmann S, *et al.* Optisch-akustisch analoges biofeedback-conditioning zur behandlung der stuhlinkontinenz im kindesalter. *Z Kinderchir* 1984;39:389-91.
17. Loening-Baucke V, Desch L, Wolraich M. Biofeedback training for patients with myelomeningocele and fecal incontinence. *Dev Med Child Neurol* 1988;30:781-90.
18. Wald A, Tunuguntla AK. Anorectal sensorimotor dysfunction in fecal incontinence and diabetes mellitus; modification with biofeedback therapy. *N Engl J Med* 1984;310:1282-7.
19. Scheuer M, Kuipers HC, Jacobs PP. Postanal repair restores anatomy rather than function. *Dis Colon Rectum* 1989;32:960-3.
20. Browning GG, Parks AG. Postanal repair for neurogenic fecal incontinence; correlation of clinical results and anal canal pressures. *Br J Surg* 1983;70:101-4.
21. Felt-Bersma RJ, Klinkenberg-Knol EC, Meuwissen SG. Anorectal function investigations in incontinent and continent patients: differences and discriminatory value. *Dis Colon Rectum* 1990;33:479-85.