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PREDICTING SUCCESSFUL OUTCOME OF TRANSANAL IRRIGATION FOR TREATMENT OF BOWEL DYSFUNCTION IN SPINAL CORD INJURY PATIENTS

Hypothesis / aims of study
Transanal irrigation improves bowel dysfunction in spinal cord injury patients by treating constipation and preventing faecal incontinence. However, the effect of transanal irrigation varies among patients. The aim of the study was to identify factors that are significantly related to successful outcome of transanal irrigation.

Study design, materials and methods
63 spinal cord injury patients with neurogenic bowel dysfunction from five specialized European spinal cord injury centres used transanal irrigation for a ten-week trial period. At baseline, explanatory variables were collected. Constipation and faecal incontinence were assessed at baseline and at termination using the Cleveland Clinic Constipation Scoring System (CCCSS) (0-30, 30 = severe symptoms) and St. Mark's Faecal Incontinence Grading System (FIGS) (0-24, 24 = severe symptoms). The response variables were calculated as the difference between the value at termination and the baseline value. Data were analysed using a general linear model, with the objective of modelling the responses as a linear function of the explanatory variables. Variable selection was carried out with a stepwise selection algorithm. The level of significance was 5%.

Results
Table 1. Baseline demographic data

Age (years), mean (SD)		47.7 (12.4)
Sex	Male	45
	Female	18
Spinal cord injury	Complete	37
	Incomplete	26
Level of injury	Supraconal	62
	Conal/cauda equina	1

The mean difference in CCCSS was -3.3 with a 95% confidence interval (CI) of -4.4 to -2.3, reflecting an improvement in constipation-related symptoms. The difference in CCCSS significantly depends on the centre, complete/incomplete injury and whether the patient experiences uncontrolled anal spasms. Positive estimates reduce the difference between termination and baseline scores, whereas negative estimates increase the difference and thus the success of treatment. Age, sex, level of injury, mobility, hand function, duration of symptoms, predominant symptom, dependency of help and total colonic transit time did not significantly influence the CCCSS response.

Table 2. Model for CCCSS

Parameter	**Group**	**Estimate**	**95% CI**
Spinal cord injury	Complete	-5.4	-7.5 to -3.2
	Incomplete	-9.1	-11.5 to -6.6
Uncontrolled anal spasms	No	2.6	0.4 to 4.9
	Yes	0	.
Centre	1	5.8	3.2 to 8.3
	2	4.5	1.7 to 7.3
	3	-2.1	-5.3 to 1.2
	4	0.6	-2.1 to 3.2
	5	0	.

The mean difference in FIGS was -4.1 with a 95% CI of -5.2 to -3.0. The difference in FIGS significantly depends on sex and mobility, whereas as the centre, complete/incomplete injury, uncontrolled anal spasms, predominant symptom, age, hand function, duration of symptoms, dependency of help and total colonic transit time did not significantly influence the FIGS response.

Table 3. Model for FIGS

Parameter	**Group**	**Estimate**	**95% CI**
Sex	Male	-4.4	-5.7 to -3.1
	Female	-1	-3.2 to 1.2
Mobility	Walking/walking with difficulty	-3.0	-5.7 to -0.3

	Wheelchair/confined to bed	0	

Interpretation of results

The model based on multivariate analysis identifies single factors significantly related to successful outcome of transanal irrigation. These significant factors can aid in predicting which patients are most likely to benefit from treatment.

As an example, an a priori estimate can be calculated for the CCCSS response in a patient from centre 3 with an incomplete injury and no uncontrolled anal spasms by adding the parameter estimates (-2.1 - 9.1 + 2.6) giving -8.6. A patient with these characteristics is likely to benefit from transanal irrigation as treatment for constipation. Patients with incomplete injuries often represent the patients with less severe bowel dysfunction and may therefore be easier to treat. Patients with uncontrolled anal spasms are likely to be the patients who have rectal hyperreactivity and may therefore experience a more successful emptying of the bowel after irrigation because of strong reflex rectal contractions induced by the irrigation procedure. The effect of transanal irrigation on constipation is significantly influenced by the centre, most likely reflecting different levels of experience with transanal irrigation among centres.

Transanal irrigation carries the risk of inducing faecal incontinence due to retained irrigation fluid. Mobile patients appear to have the highest benefit of transanal irrigation with regard to faecal incontinence. A likely explanation for this is their ability to access a toilet with only minor limitations when faecal incontinence is impending. Why male patients seem to benefit more than female patients do remains unexplained.

The low number of factors significantly related to improvement of either constipation or faecal incontinence could reflect a type II error, but may also indicate that there are no readily obtainable baseline characteristics that predict the successful outcome of transanal irrigation. The latter explanation would support the current practice of a trial and error strategy in deciding on a bowel management method for neurogenic bowel dysfunction.

Concluding message

Transanal irrigation improves constipation-related symptoms and anal continence in patients with spinal cord injury. Patients with incomplete spinal cord injury and uncontrolled anal spasms have the highest benefit with regard to constipation-related symptoms. Male patients who are able to walk or walk with difficulty have the highest benefit regarding improvement in anal continence.

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