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Treatment of fecal incontinence by temporary sacral nerve stimulation

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Die Behandlung der fäkalen Inkontinenz mit temporärer Sakralnervenstimulation

Zusammenfassung. *Grundlagen:* Die Sakralnervenstimulation ist eine etablierte Therapieform bei Patienten mit fäkaler Inkontinenz mit herabgesetztem Tonus des äußeren Schließmuskels ohne strukturellen Defekt.

Methodik: Eine temporäre Sakralnervenstimulation wurde bei 10 Patienten durchgeführt. Zwei Patienten hatten eine Inkontinenz nach chirurgischem Eingriff, ein Patient nach traumatischem inkomplettem Querschnittssyndrom und 7 Patienten eine idiopathische Inkontinenz. Patienten wurden angehalten vor und nach SNS ein Inkontinenztagebuch zu führen. Ebenso wurden der Inkontinenzscore und Ergebnisse der anorektalen Manometrie vor und nach Stimulation erhoben.

Ergebnisse: Eine suffiziente Stimulation konnte intraoperativ bei 90 % der Patienten erzielt werden. Bei 50 % der Patienten war die Teststimulation erfolgreich. In dieser Patientengruppe stieg der Ruhedruck um 100,1 % und der Kontraktionsdruck um 84,5 % an.

Schlussfolgerungen: Die SNS ist eine effektive Behandlungsmethode für ausgewählte Patienten mit fäkaler Inkontinenz. Ein positives Testergebnis ist in 50 % der Patienten zu erwarten. Bei diesen Patienten ist die Implantation eines permanenten Stimulationsgerätes sinnvoll.

Schlüsselwörter: Fäkale Inkontinenz, Sakralnervenstimulation.

Summary. *Background:* Sacral nerve stimulation (SNS) is an option for the treatment of fecal incontinence in patients with morphologically intact, but weak external anal sphincter.

Methods: In ten patients a percutaneous test-SNS was performed. Two patients suffered from fecal incontinence after surgery, one patient after incomplete leg palsy after traumatic spine injury and seven patients from idiopathic incontinence. Incontinence score, anorectal manometry and patient diary were performed before and after test-SNS

Results: Intraoperative response (Bellows action) could be achieved in 90 % of patients. Test-SNS was successful in 50 % of patients. In these patients, resting pressure was increased by 100.1 % and squeeze pressure by 84.5 %.

Conclusions: SNS is an effective therapy in a subset of patients with fecal incontinence. Fifty percent of patients tested are eligible for implantation of a permanent stimulation device.

Key words: Fecal incontinence, sacral nerve stimulation.

Introduction

Patients with defects of the external anal sphincter have a very high surgical success rate [1, 2, 8]. Many patients, however, have defects or degeneration of the internal anal sphincter or a weak external sphincter. These patients are not amenable to surgical treatment. Conservative treatment (antidiarrheal agents, dietary manipulation) can achieve some improvement, but this is not a satisfactory long term solution.

Sacral nerve stimulation was used to treat urinary incontinence for the first time by Tanagho in 1982 [9]. It was observed that these patients not only reported an improvement in urinary, but also fecal incontinence. In 1995, SNS was used to treat fecal incontinence for the first time by Matzel et al. [7]. Since then, a number of proctological centres have used this technique to treat fecal incontinence due to a variety of disorders.

In this paper we report the findings after test sacral nerve stimulation in our first ten patients.

Patients and methods

Patients referred to our department on account of fecal incontinence were evaluated by anorectal physiological studies, anal endosonography and a patient diary. Patients were considered suitable for sacral nerve stimu-

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lation if they fulfilled the following criteria: (1) significant fecal incontinence with at least one episode of voiding within a three week period, (2) no morphological defects of the external anal sphincter on anal endosonography, (3) reduced external or internal sphincter function on anorectal manometry and (4) fitness for surgery. Degree of incontinence was determined with the incontinence score described by Vaizey et al. [10]. Patients were asked to note bowel action and voiding in a diary for a period of three weeks and were also asked about urinary incontinence.

Between November 2002 and July 2003, a test sacral nerve stimulation was performed in ten patients (one man, nine women, 46–77 years) (Table 1). Seven patients suffered from idiopathic incontinence. Two of these patients had normal resting pressures and reduced squeeze pressure. In the other patients resting and squeeze pressure were reduced. One patient suffered from incontinence due to an incomplete palsy after traumatic spine injury. Resting pressure was only slightly reduced and minimal voluntary contractions of the external sphincter were detected on anorectal manometry. Recto-anal-inhibitory and anocutaneous reflex were present. Two patients were incontinent after surgery. In one patient, haemorrhoids were treated by stapled haemorrhoidectomy. No abnormalities were found on endoanal ultrasonography. The other patient became incontinent after repeated surgery for anorectal abscesses. Anal ultrasonography showed a partial disruption of both sphincters that was treated by sphincter repair. Due to persistent fecal incontinence and reduced resting and squeeze pressure the patient was referred to sacral nerve stimulation. Seven of the ten patients also suffered from urinary incontinence.

Test sacral nerve stimulation was performed under general anaesthesia in a prone jack knife position. Foramina needles (Foramina needle 041828-004, Medtronic Minneapolis, MN) were inserted through the sacral foramina and the nerves responsible for contraction of the pelvic floor muscles (Bellows action) were identified by stimulation with a hand-held neurostimulator (Model 3625 screener, Medtronic Minneapolis, MN). Preferably the third sacral foramina (S3) on both sides were punctured first. If satisfactory Bellows action could be achieved, an external pacemaker lead was inserted through the foramina needle. If no or only insufficient response was achieved, stimulation through the second or fourth sacral foramen was attempted. Two to three external pacemaker leads were inserted per patient to determine the most effective point for stimulation and to ascertain whether stimulation could be continued in the event of lead displacement. These were covered with a transparent wound dressing.

Test-stimulation was begun the day after wire placement. Stimulation was performed with a pulse width of 210 μsec and a frequency of 10 pulses per second as described previously [7].

During the test-SNS period patients were asked again to keep a diary. Test-SNS was stopped after four weeks or if success was evident. At the end of the test period anorectal manometry was performed and the incontinence score was determined again. The patients were also asked about any changes in urinary incontinence and their personal opinion about improvement in the quality of life.

Results

Satisfactory bellows action could be achieved intraoperatively in all but one patient (10 %). This was for the patient with fecal incontinence after traumatic spine injury. No complications were observed during surgery. Test stimulation was performed for 2 to 4 weeks (average 2.9 weeks).

In three patients (33.3 %) lead displacement occurred but test-SNS could be continued on a different lead. In no patient did test-SNS have to be interrupted due to technical reasons. No infection at the insertion sites was observed.

Table 1. Patient characteristics

	Patient	Age	Duration	Disease	SAI (mm Hg)		SAE (mm Hg)		Incontinence score		Weekly episodes		Urinary incontinence	
					pre	post	pre	post	pre	post	pre	post	y/n	improvement
no success	1	46		palsy	30		20		17	17	2	2	y	
	2	50	3	surgery	25	28	37	45	12	11	1	1	n	
	3	52	3	idiopathic	42	44	26	29	4	4	1	1	n	
	4	60	4	idiopathic	24	27	23	32	8	6	2	1	y	n
	5	52	4	surgery	30	34	20	22	24	24	4	3	n	
	avg				30	33	27	32	12	11	2	2		
success	6	57	2	idiopathic	22	32	39	53	15	3	2	0	y	y
	7	58	2	idiopathic	10	51	25	57	16	8	2	0	y	y
	8	77	2	idiopathic	40	55	17	48	8	0	2	0	y	y
	9	49	3	idiopathic	18	45	29	60	13	0	2	0	y	y
	10	54	3	idiopathic	23	44	38	55	16	2	3	0	y	y
	avg				23	45	30	55	14	3	2	0		

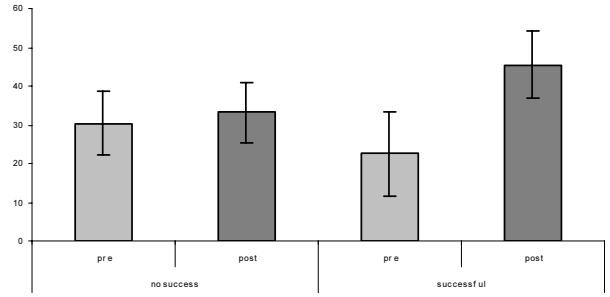

Fig. 1. Resting pressure (mm Hg)

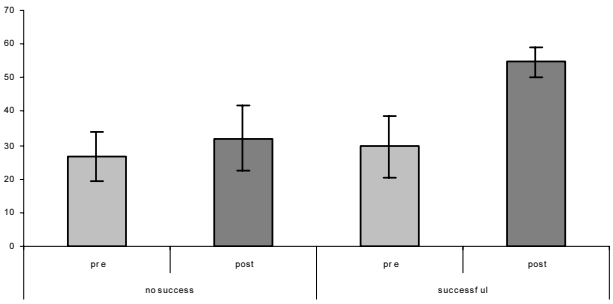

Fig. 2. Squeeze pressure (mm Hg)

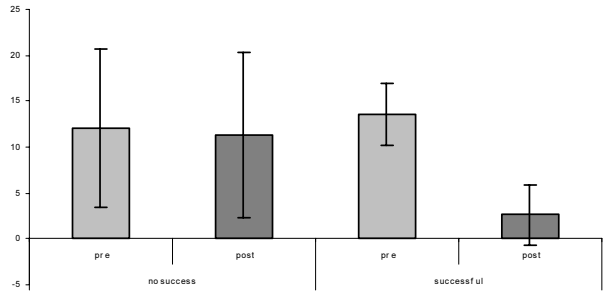

Fig. 3. Incontinence score (Vaizey)

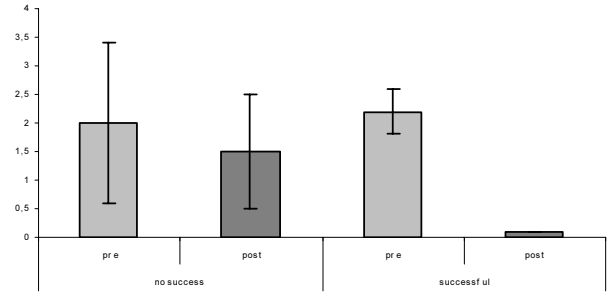

Fig. 4. Weekly episodes of incontinence (number)

Symptoms

Of the nine patients finishing the test period, five (55.6 %) considered SNS successful and had complete cessation of incontinence for solid and liquid stool. Weekly episodes of voiding in these patients were reduced from 2 to 0 (Fig. 4). All five patients with successful test stimulation reported an improvement in urinary incontinence as well (Table 1).

Five (71.4 %) of seven patients with idiopathic incontinence reported an improvement in fecal incontinence. In the two patients that had undergone anal surgical procedures SNS was not successful. In total, SNS was successful in 50 % of patients tested.

Manometric findings (Figs. 1 and 2)

In patients considering SNS successful resting pressure was increased from 22.6 mm Hg to 45.4 mm Hg (+100,1 %) and squeeze pressure from 29.6 mm Hg to 54.6 mm Hg (+84.5 %). In patients considering SNS not successful resting pressure was increased from 30.2 mm Hg to 33,3 mm Hg (+10.1 %) and squeeze pressure from 25.2 mm Hg to 32.0 mm Hg (+27.0 %).

Incontinence score and weekly episodes (Figs. 3 and 4)

Incontinence score was reduced from an average of 14 to 3 in patients considering SNS successful. In these patients weekly episodes were reduced from 2 to 0. In patients considering SNS unsuccessful incontinence score was reduced from an average of 12 to 11. Weekly episodes of voiding stayed the same.

Conclusion

In this paper we report our findings in the first ten patients evaluated with SNS. As earlier reports [7, 11] have already shown, SNS increases anal squeeze pressure by facilitating voluntary striated muscle activity of the external anal sphincter. In our study the increase was doubled.

Sacral nerve stimulation does not only act by increasing squeeze pressure. The mechanisms of action are likely to be more complex, by modulating reflexes that involve parasympathetic afferent and efferent fibres. SNS has already been shown to affect rectal sensory threshold, sensation of urgency and maximum tolerated volume [6] and it also seems to increase peristalsis in the left colon. In contrast to other published series, we could also observe a significant increase in anal resting pressure, which is probably also due to activation of autonomous reflex mechanisms. This finding is due to the longer stimulation period in our series.

Permanent implantable stimulators are expensive and the possibility of percutaneous stimulation to test effect is useful. Placing the leads with foramina needles is practical and has no morbidity at all. However, keeping percutaneous leads in place is difficult. If stimulation is performed over several weeks, wound dressing has to be changed repeatedly. Vaizey et al. [11] reported lead displacement in 16.7 % and some centres have started to place test leads by surgery. We have overcome this problem by placing at least two test leads and covering them with a transparent wound dressing. This facilitates changing.

The overall success rate of test stimulation in our study was 50 %. This number is somehow lower than in other published series reporting an overall success rate of

89 % [3, 5]. As shown in our study test stimulation was most successful in patients with idiopathic incontinence (70 %). SNS failed in patients with fecal incontinence after anal surgery and spine injury. However, successful results after these diagnoses have been published [3, 5]. At the moment the field of SNS is expanding and various other indications tested. Successful sacral nerve stimulation has been published for syringomyelia [3], systemic sclerosis [4], anal atresia [11] and chronic constipation [6].

Options for patients with morphologically normal, but weak external anal sphincter have been poor. In most of these patients conservative treatment was not sufficient, or only for a limited period of time. In case of severe fecal incontinence these patients were faced with a permanent stoma. Sacral nerve stimulation seems to be a new option for these patients. Its value and exact indications have to be evaluated in further studies.

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