

Short-term electrical stimulation: home treatment for urinary incontinence

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Summary. Treatment results with short-term electrical stimulation therapy in 310 incontinent patients are reported. Cure or improvement was obtained in 56% of cases. This therapeutic method was well-accepted, especially as a home treatment program.

Electrical stimulation is used clinically to improve or cure the symptoms of urinary incontinence by enhancing the activity of the weakened urethral closure mechanism and/or by inhibiting the overactive detrusor [4, 5, 13], as well as to reduce or cure the symptoms of urgency and frequency of micturition. Clinical experience with external electrical prostheses in incontinent patients, has shown that, in some patients, the desired therapeutic effects have outlasted the actual stimulation (the so-called carry-over effect). Short-term treatment modalities have emerged which rely on this "carry-over" therapeutic effect [7, 9, 11, 12] to make the external stimulation techniques more effective. For example, the need to carry the stimulator for hours at a time, day and night, was eliminated. As a modification of such a technique [9, 12], we developed an even more convenient and practical home treatment program for patients. We report on our experience with this method in 310 patients.

Material and methods

Description of the therapeutic method

In the short-term electric therapeutic program, vaginal or anal (Fig. 1) electrodes are applied for 20 min/day for 30 days. The patients are shown how to introduce the stimulating electrodes, and are instructed to adjust the stimulation strength continuously by a control knob to just below the level of discomfort. Vaginal electrodes are used preferentially in females, anal electrodes in males and children. Female patients are instructed not to use the stimulator during menstruation.

Description of the stimulator

The therapeutic device consists of a battery-powered electric stimulator connected by a cable to the plug electrodes (Fig. 2). The stimulator has a current-controlled (constant current) output-stage generating charge-balanced electric pulses with a frequency of 20 Hz, 0.75 ms pulse duration, and a variable pulse strength from 0 to a maximum of 90 mA. The stimulator switches off automatically after 20 min of stimulation.

Patients. A total of 310 patients (aged 5–67 years, mean 42 years), suffering from incontinence of various types, were treated with short-term electrical stimulation. In 215 patients the short-term daily stimulation was applied in the clinic; in 95 patients the first stimulation was given in the clinic and treatment continued at home. Patients were followed-up at the end of the 30-day treatment program and again 12 months later. All patients had fulfilled the following criteria: (i) absence of urinary infection and/or vaginal discharge prior to stimulation, (ii) ability to cooperate and manipulate the device (children under 12 years of age were performing self-stimulation under the control of an adult), (iii) satisfactory retention of electrodes in vagina or anal canal, (iv) absence of larger pathomorphological changes such as ectopic ureter, various genitourinary fistulas, etc., and (v) absence of pregnancy or demand pacemaker implanted.

Investigations. All patients were examined cystometrically prior to treatment and, except for the group of enuretics, their incontinence classified according to the presence of urethral weakness and/or detrusor instability (Table 1). The following groups were obtained: genuine stress incontinence (GSI) (80 females), incontinence due to idiopathic detrusor instability (DI) (67 females), mixed GSI and DI (51 females), incontinence due to detrusor hyperreflexia (reflex neurogenic incontinence) (12 females, 23 males), postprostatectomy incontinence due to urethral weakness (12 males), postprostatectomy incontinence due to detrusor instability (12 males), and enuresis (diurnal, nocturnal, mixed; 34 girls, 19 boys, 5–16 years of age, mean age 10 years).

In the group of 34 patients with detrusor instability, the acute effect of test stimulation was assessed cystometrically, with the aim of studying the possible correlation between test stimulation and the effect of treatment. For the same reason the acute effect of stimulation was assessed by measuring the urethral closure pressure profile in 54 patients with genuine stress incontinence.

Effect of treatment was assessed by questioning the patient as to frequency and severity of incontinence. The patient was considered improved if (s)he was satisfied with the improvement achieved by

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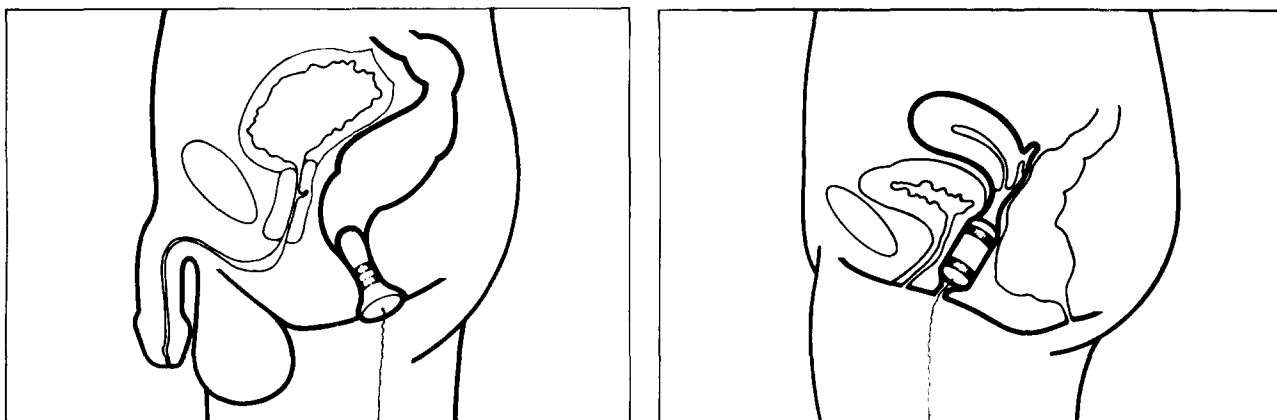


Fig. 1. Short-term electrical stimulation: placement of anal and vaginal electrodes



Fig. 2. Electrical stimulator for short-term treatment of urinary incontinence using vaginal or anal electrodes. (Conmax, Lectromed Ltd., Jersey Channel Islands)

stimulation and did not request further surgical and/or pharmacotherapeutic treatment.

Results

Patients cooperated well during treatment and found no difficulty in using the device. In most patients with preserved sensation it was noted that they achieved their threshold of tolerance in several steps during the stimulation session. After the first adjustment of the maximum tolerable stimulation strength, the feeling of stimulus strength usually decreased slowly. This allowed for a further increase in stimulation intensity. The new level of stimulation was again adapted to, making a further increase in intensity possible.

An overall success rate of 56% was achieved, i.e., in 174 cases, cure or improvement was established. The results of treatment of various groups of incontinent patients with short-term electrical stimulation are given in Table 1.

Table 1. Results of treatment. (Number of patients: 310)

Type of incontinence	Cured	Improved	Failed
Genuine stress incontinence (GSI)	25	13	42
Idiopathic detrusor instability (DI)	20	15	32
Mixed GSI and DI	14	10	27
Detrusor hyperreflexia	13	10	12
Postprostatectomy incontinence (urethral weakness)	3	1	8
Postprostatectomy incontinence (DI)	6	2	4
Enuresis	19	23	11
Total	100 (32%)	74 (24%)	136 (44%)

In a significant proportion of successfully treated patients (53 cases, 31%), cure was observed after the first few stimulation sessions. In a small number of patients (15 cases, 8%), improvement was only temporary, i.e., it lasted from 2 weeks to 6 months after one month of stimulation. These patients are included in the group of successfully treated patients (Table 1), but require repeated courses of short-term stimulation.

The effects of test electric stimulation (anal or vaginal) on the detrusor (i.e., the presence or absence of the vesico-inhibitory effect: diminution of uninhibited detrusor contractions and/or increase of maximum bladder capacity), correlated poorly with the success of electric therapy in patients with incontinence due to detrusor instability. A false-negative prediction rate of 61% and a false-positive prediction rate of 37% can be calculated from the results given in Table 2. Similarly, the effects of treatment could not be predicted reliably in patients with incontinence due to urethral weakness. An 80% false-negative and 56% false-positive prediction rate was obtained by measuring the urethral pressure profile during a test stimulation.

In 7 female patients stimulation had to be discontinued temporarily because of vaginal irritation. Obstipation was noted in 5 patients. No other side effects were reported.

Discussion

Short-term electrical stimulation is more practical than chronic electrical stimulation, as it is not necessary to carry the stimulator day and night. On the other hand, the fact that stimulation sessions had to be given in the clinic (to outpatients) certainly represented a drawback, thus prompting us to devise the home treatment program. Cooperation of selected patients in this program was very good. The "self-stimulation" principle [9] proved practicable and was more readily accepted than stimulation controlled by a physician or nurse, the method used in our earlier studies [12].

Demonstration of the presence or absence of the acute vesico-inhibitory or acute sphincter-activating effect of a test stimulation did not prove to be a reliable predictor of treatment success or failure. Similar findings with urethral pressure profile measurements have been observed by others [8].

Success of treatment was similar to our previous groups of patients treated with short-term electrical stimulation [12] and comparable to the "average" success rate as reported by various authors using chronic electrical stimulation [1, 2, 4]. In all, treatment seems to be slightly more effective if detrusor instability is the cause of incontinence, which has also been observed by others [1, 2, 4, 10].

The fact that some patients get most of the improvement after the first few stimulation sessions was reestablished [12], but the empirically introduced 30-day treatment program was found to be a practical choice, rendering most of the successfully treated patients symptom-free or improved during the 1-year follow-up period. A minority of successfully treated patients relapsed, but could conceivably profit from a repeated (or periodic) course of short-term electrical stimulation.

As the effects of electrical stimulation are probably dependent on the activation of pudendal motor and sensory fibers [3], electrophysiologic proof of intactness of these structures was thought to be important in selection of patients [6]. It has been our experience, however, that some of our incontinent patients with severe if not complete denervation of perineal muscles on EMG nevertheless showed improvement after electrical stimulation (Janež et al., unpublished).

Side effects of treatment were few and mild and were not reported at an increased rate in patients stimulating themselves without supervision at home.

In conclusion, the short-term electrical stimulation home treatment program proved to be practical, well accepted, successful and without significant side effects in our group of both child and adult patients with the common urinary incontinence syndromes. There seems to be no value in trying to select patients on the basis of a "positive" test stimulation procedure. In our opinion a course of stimulation should be offered to any incontinent patient if (s)he fulfills the general criteria. A 30-day treatment program seems to be a practical choice for the

Table 2. Results of treatment related to pre-treatment test stimulation effect

Type of incontinence	Investigation	Effect of treatment	
		Success	Failure
Idiopathic detrusor instability	Electrical stimulation test - Cystometrical changes: vesico-inhibitory	10	6
	none	11	7
Genuine stress incontinence	Electrical stimulation test - Urethral pressure profile changes: increase in pressure	19	15
	none	16	4

majority of patients, but a periodically repeated course of stimulation may be needed in some. Better definition of these patient groups will have to be attempted in future clinical trials.

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