

## Sexual Function in Women with Urinary Incontinence Treated by Pelvic Floor Transvaginal Electrical Stimulation

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[Correction added after online publication 11-Oct-2006: Order of author names has been modified]

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DOI: 10.1111/j.1743-6109.2006.00318.x

### ABSTRACT

**Introduction.** Women's sexual dysfunctions (WSD) have been commonly associated with urinary incontinence (UI). Women with UI and who scored low on the Female Sexual Function Index (FSFI) showed an improvement in urinary leakage and also in their sexual life following treatment by transvaginal electrical stimulation (TES).

**Aims.** To determine the effects of TES in 37 women complaining of UI, of whom 23 also had WSD, and to compare the FSFI scores of women with UI and 43 women not affected by UI who underwent routine urologic evaluation.

**Methods.** Thirty-seven women complaining of UI were evaluated by voiding diary and with FSFI before and after 3 months of TES. All had a urogynecologic evaluation and urodynamic study.

**Main Outcome Measures.** In the voiding diary the women reported the types of liquid they ingested, urinary frequency, and episodes of urgency and urine leakage. The domain scores of the FSFI, including desire, arousal, lubrication, orgasm, satisfaction, and pain, were calculated. TES was conducted for 15–30 minutes, twice a week for 3 months, using biphasic intermittent current with a frequency of 50 Hz for stress UI (SUI) and 20 Hz for urge UI (UUI), and the most tolerable intensity of stimulation.

**Results.** After TES, only two of the 10 women with UUI experienced a few leakage incidents; patients with SUI were completely dry during TES; and only three reported a few episodes of UI during intense activities. The five patients with mixed UI improved mainly as regards urgency. The FSFI scores of patients complaining of UI showed significantly lower desire and sexual satisfaction, and higher sexual pain than controls. After 3 months, the 23 women affected by WSD, of the 37 participants with UI, reported a remarkable improvement in their sexual life.

**Conclusions.** TES was found to be a safe and effective therapy for selected patients affected by mild to moderate UI. Because women with UI also complain of WSD compared with the general female population, an investigation of female sexuality is suggested for these patients. **Giuseppe PG, Pace G, and Vicentini C. Sexual function in women with urinary incontinence treated by pelvic floor transvaginal electrical stimulation. J Sex Med 2007;4:702–707.**

**Key Words.** Transvaginal Electrical Stimulation; Female Sexual Dysfunction; Urinary Incontinence

### Introduction

The prevalence of urinary incontinence (UI) in women is about 20% and increases to 35% among women more than 60 years old [1–4]. According to the U.S. Department of Health and Social Services Clinical Guidelines Panel, “the initial treatment of urinary incontinence should not to be very invasive, with few side-effects and avoiding future approaches” [5]. Several conservative treatment options are available for the management of UI, such as physical therapies,

behavioral modifications, pharmaceutical interventions, and hormone replacement therapies. Among physical therapies, pelvic floor muscles exercises, biofeedback, and electrical stimulation are the mainstays of the conservative treatment and prevention of UI.

Transvaginal electrical stimulation (TES) is a conservative treatment option, which does not make it difficult to use a surgical approach later, if necessary [6,7]. TES can be used to stimulate nerve fibers and muscles by modifying the frequency on the basis of conduction velocity of the

nerve fiber type. At 35–40 Hz, the pelvic floor muscles (PFMs) are stimulated through a pudendal nerve reflex loop. At 5–10 Hz, TES can also affect the detrusor muscle by reflex inhibition with a pudendal to pelvic reflex activation. TES is a conservative treatment option described more than 40 years ago. Randomized clinical trials about TES advocate the use of 50 Hz for stress urinary incontinence (SUI) and 10–20 Hz for urge UI (UUI). No side effects have been reported. A cure rate and clinical improvement of 60–80% have been reported [8]. According to some studies, 43% of patients were continent after treatment, with a significant decrease in daytime frequency and nocturia [9]. So TES is commonly recommended as a conservative therapy for women with UI, especially in less severe conditions; recently, TES has been proposed in the treatment of women's sexual dysfunctions (WSD), but its curative effects are yet to be investigated [10–13].

Transvaginal electrical stimulation may improve the efficacy of the sphincteric action around the urethra and support the pelvic organs through the strengthening of the PFMs. It can also result in the hypertrophy of the muscles, increasing the external mechanical pressure on the urethra as regards SUI. Electrical stimulation of PFMs is suggested to induce a reflex contraction of the striated para- and peri-urethral muscles, with a simultaneous reflex inhibition of the detrusor muscles. To produce a therapeutic effect in women with UUI, peripheral innervations of the PFMs must, at least, be partly intact. Electrical stimulation permits an effective reduction or inhibition of detrusor activity by stimulating afferents of pudendal nerves. TES also increases maximum bladder capacity, through reactivation of the inhibitory reflexes of the detrusor with consequent bladder relaxation. Recent reviews on the conservative management and prevention of SUI show promising short-term and long-term results.

Women's sexual dysfunction increases with age and, according to the most recent statistics, affects 30–50% of women [14–17]. The disorder of one of the three phases (desire, arousability, orgasm) has to be responsible for personal distress to be considered a dysfunction, according to the recent classification of female sexual disorder [18]. Four categories of female sexual disorders are reported: hypoactive sexual desire disorders, sexual arousal disorders, orgasmic disorders, and sexual pain disorders (dyspareunia, vaginismus). Recently, Bas-

son [19] published a revision of the definition of WSD to improve it and to highlight some important elements such as interpersonal, contextual, and personal psychological factors that impact on a woman's sexual life. Definitions of dysfunction continue to reflect phases of sexual response but emphasize the tendency of the phases to overlap, because desire, arousal, and expectation often contribute to dysfunction [19–21]. Data found in the literature report that WSD have been commonly associated with UI [22–25].

### Aims

The aims of this study were to assess the efficacy of TES in women affected by UI and to compare sexual function scores of women before and after TES.

### Methods

Between May 2002 and September 2005, 37 sexually active women with stable heterosexual relationships (mean age 57 years; range 44–63) and complaining of UI were examined. All satisfied the following inclusion criteria: grade 1 cystocele or less (according to the Halfway system classification), affected by different forms of UI: SUI, UUI, or mixed UI (MUI) diagnosed through symptomatic and urodynamic criteria. The exclusion criteria were: patients with a cardiac pacemaker, pregnancy, urinary tract infection, genitourinary surgery during the previous 6 months, and patients under medication for UI in the past 2 months. All patients had a urogynecologic evaluation, which included history, physical examination, testing for SUI (abdominal leak point pressure), urine analysis, and a urodynamic study. PFM function and strength, to document changes throughout intervention with TES, was examined by digital vaginal palpation, which also measured the force and duration of each contraction. The registered muscle strength was graded by the modified Oxford Grading Scale by Laycock: grades 0–1 if patients were not able to contract their PFMs; grade 2 if patients performed only an insufficient contraction; and grades 3–4 if patients were able to contract their PFMs properly. All muscles of the pelvic floor were investigated (levator ani, puborectalis). Urodynamic techniques, measurements, terms, and diagnostic criteria complied with the recommendations of the International Continence Society [26]. For urodynamics, Urobenchmark 200/3 SI. EM. was used.

All patients signed the letter of consent after reading it and hearing a verbal explanation of the relevant questions.

Electrical stimulation was conducted for 15–30 minutes, twice a week for a period of 3 months. Selected parameters included biphasic intermittent current, frequency 50 Hz for SUI and 20 Hz for UUI, 15 Hz for MUI, a pulse width of 300  $\mu$ s, and an adjustable current intensity (0–100 mA) with individual-adapted cycles on the basis of each woman's sensitivity, reaching, in the presence of a urologist, who manipulated the stim unit, the most individually tolerable intensity of stimulation that does not cause pain [27]. "On time" ranged from 0.5 to 10 seconds and "off time" ranged from 0 to 30 seconds. TES can be used to stimulate nerve fibers and muscles, the optimal stimulus frequency being based on the conduction velocity of the targeted nerve fiber types. At 35–50 Hz, the PFMs can be stimulated through a pudendal nerve reflex loop, which converts fast- into slow-twitch fibers. At 5–20 Hz, the detrusor muscle can also be affected by reflex inhibition with a pudendal to pelvic nerve reflex activation. The vaginal stimulation probe, the same size for all the patients, was made as a longitudinal cone with two electrodes shaped like rings at the end and in the middle of the probe itself (Figure 1) [8,28,29]. The equipment used for TES was an electrical stimulator with a microprocessor named "Le Reeducateur."

#### Main Outcome Measures

The voiding diary recorded the types of liquid ingested, urinary frequency, episodes or urgency to void, episodes of urine leakage, and the circumstances in which they occurred in a period of 24 hours. They were completed at the beginning and at the end of treatment.

All the women completed the Female Sexual Function Index (FSFI) questionnaire before and after 3 months' treatment with TES, and each



**Figure 1** Vaginal stimulation probe.

domain score, including desire, arousal, lubrication, orgasm, satisfaction, and pain, was calculated. The FSFI was completed in the presence of a urologist, who helped each woman with a verbal explanation of the relevant questions.

A group of 43 women (mean age 53 years, range 39–62), who had a urologic visit but were not suffering from UI, were enrolled in the study as cross-sectional controls and investigated with the FSFI.

The student's *t*-test was used to compare data obtained from the two groups.

#### Results

The urodynamic findings from the 37 women affected by UI showed that 12 (33%) were affected by SUI, 16 (43%) by UUI, and 9 (24%) by MUI. Twenty-nine (78%) of the 37 women were in menopause. They had not received any medication that affects reproductive hormones or hormone replacement. All 37 were sexually active.

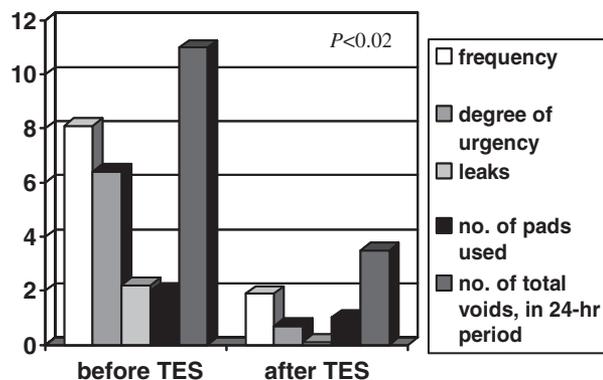
Results of the FSFI questionnaire showed that 23 (62%) of the women had WSD. We identified four sexual disorders: of desire, of arousal, of orgasm, and of sexual pain as proposed in the classification of the International Consensus Conference of Female Sexual Dysfunction [7].

Of these 23 women, eight (34%) were affected by SUI, 10 (44%) by UUI, and five (22%) by MUI. In the group with SUI, sexual pain disorder was diagnosed in six women (76%), hypoactive sexual desire in one (12%), and orgasmic phase disorder in one (12%). Three (38%) of them reported incontinence occurring during penetration, and two (25%) experienced incontinence during orgasm.

Among the women affected by UUI, six (60%) had orgasmic phase disorder, two (20%) had sexual pain disorders, and two (20%) had hypoactive sexual desire. In three (30%) of them incontinence occurred on orgasm, and one (10%) experienced urinary leakage on penetration.

One (20%) woman complaining of MUI had orgasmic phase disorder, three (60%) had sexual pain disorders, and one (20%) had sexual arousal disorder.

After 3 months of TES, a comparison of the voiding diary completed before and after treatment showed a significant reduction ( $P < 0.02$ ) in the number of total voids, number of nocturnal voids, number of urge voids, and especially in the number of episodes of urinary incontinence and pads used in a day (Figure 2). Improvements were



**Figure 2** Comparison of the voiding diaries before and after transvaginal electrical stimulation (TES).

seen in both strength and endurance characteristics of PFM, as shown by an increasing score on Laycock’s modified Oxford Grading Scale.

Among those women with UI, only two experienced a few leakage incidents as a consequence of episodes of urge incontinence; the others reported a complete improvement of all urinary symptoms. Patients with SUI acquired a better capacity to control urinary leakage under stress and were completely dry during TES, and three experienced a few episodes of UI during intense activities. In the group of five women affected by MUI, improvement was mainly related to the urgency of their UI, but they were extremely satisfied with the treatment outcome. All patients who before treatment complained of UI as well as WSD showed an improvement of their sexual function at the end, as reported by the participants themselves and as indicated by their responses to

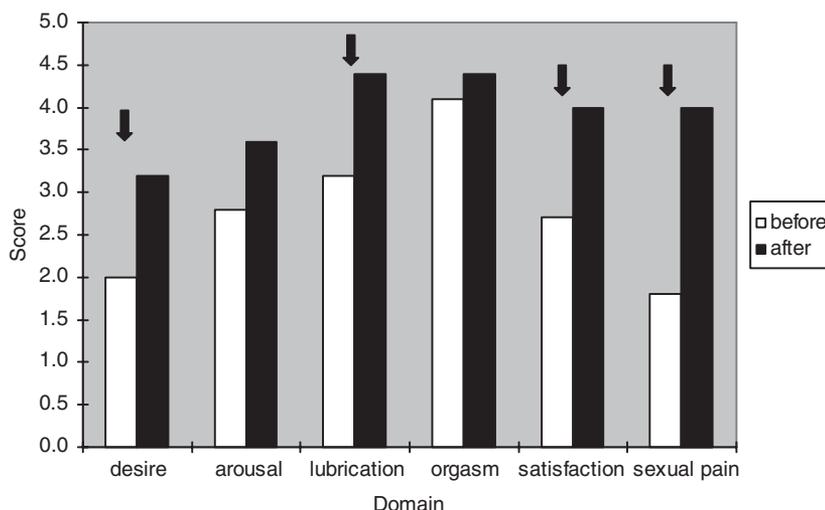
the FSFI questionnaires completed before and after 3 months of treatment. The assessment of the median score of each domain of the FSFI showed that patients had a significantly lower desire ( $P < 0.01$ ), lubrication ( $P = 0.01$ ), sexual satisfaction ( $P < 0.01$ ), and a higher sexual pain rate ( $P < 0.01$ ) before than after TES. However, differences in the arousal domain and in the orgasm domain before and after treatment were not significant (Figure 3).

A general improvement as regards urinary incontinence is observed after TES. So we can suppose a remarkable impact on sexual function mainly with regard to desire, lubrication, satisfaction, and the sexual pain rate, which improved concurrently after treatment. With regard to the arousal and orgasmic spheres, according to our results, we obtained only few effects.

In the comparison of sexual life of the 23 patients complaining of UI and a general female population that had undergone routine urologic evaluation and not affected by UI, the FSFI scores showed that patients with UI had significantly lower desire and sexual satisfaction, and higher sexual pain than controls. The results from between-group analysis of variance revealed significant differences among women with WSD and controls on each domain of the FSFI and related to total scores. Means for each of the FSFI domains by subject group are presented in Table 1.

**Discussion**

According to our results, women with UI reported a higher prevalence of WSD than others.



**Figure 3** FSFI score comparison before and after TES in women suffering from UI and WSD. ↓ It is related to a significantly different value before and after treatment; the differences in the other domains were not significant after treatment.

**Table 1** Means of the FSFI domains of women with WSD and the control group

	Patients (N = 23)	Controls (N = 43)	P value
Desire domain	2.0	3.88	<0.01
Arousal domain	2.8	4.17	<0.01
Lubrication domain	3.2	4.77	<0.01
Orgasm domain	4.1	4.41	<0.01
Satisfaction domain	2.7	4.08	<0.01
Sexual pain domain	1.8	4.92	<0.01

FSFI = Female Sexual Function Index; WSD = women's sexual dysfunctions.

There are several reasons for the increase in sexual dysfunction in incontinent women, such as dyspareunia resulting from urinary dermatitis. Depression and decreased libido, with a consequent reduction of interest in sexual activity, is mainly due to embarrassment and fear of urinary incontinence occurring during intercourse.

Patients attributed disinterestedness toward sexual intercourse to a strong uncontrollable desire to void, followed by a frequent leakage of urine. They also complained of reduced vaginal sensitivity and reduced vaginal lubrication, with lower localized pleasure during intercourse. UI occurring during penetration is more likely with SUI, whereas those women experiencing incontinence on orgasm alone have an increased incidence of UUI. All domain scores of the FSFI were significantly lower in incontinent women. Women affected by SUI complain more frequently of sexual pain disorders, particularly dyspareunia and pain during penetration; those complaining of orgasmic phase difficulties were affected mainly by UUI. They reported fear of reaching orgasm because of the risk of having an episode of leakage during intimacy [30].

All patients treated with TES improved significantly in their urinary leakage and sexual life. With regard to UUI, TES increases maximum bladder capacity in patients treated through the reactivation of the inhibitory reflexes of the detrusor, with consequent bladder relaxation [31,32]. Also, in women complaining of SUI, we found TES to be a safe and effective therapy, as shown by an improvement in PFM strength. The comparison of voiding diaries completed before and after treatment showed a better effect of TES, especially in younger patients. This could be attributed to the integrity of their anatomical and muscular structures, with greater benefit from electrical stimulation.

After electrical stimulation, we noted, on the basis of the FSFI scores, an improvement in sexual function of the women treated. It was evident in

the case of painful sexual disorders and orgasmic disorders, with a reduction in the number of leakage incidents during intercourse. The tendency to avoid sexual activity because of fear of urinary incontinence during intercourse had a remarkable progress. All women reported being satisfied with both urinary and sexual function enhancements, which result in an improvement of their quality of life.

As we focused on the impact of UI on sexual life and how the resolution of urinary leakage or the improvement of urinary symptoms had a positive effect on WSD, we can only suppose a direct beneficial effect of TES on sexual function only, because it acts on multiple neurological components of the pelvic floor (i.e., sacral and pudendal nerves). Furthermore, we cannot actually ensure the possible impact of TES on sexual function independent of the improvement on UI, which can be investigated in a more specific trial.

## Conclusions

Urinary incontinence significantly reduces sexual function in sexually active women.

The improvement or resolution of UI leads to a better sexual life in women treated with TES and, as a consequence, an improvement in their quality of life.

Transvaginal electrical stimulation is a practical alternative, with few side effects, and is effective for treating selected patients with mild to moderate symptoms of UI.

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*Conflict of Interest:* None declared.

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