
Research

The Treatment of Nonobstructive Urinary Retention with High-Frequency Transvaginal Electrical Stimulation

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Nonobstructive urinary retention can be a difficult management problem for health care providers. This condition often results in frustration for both patients and health care providers due to the limited available treatment options, compounded by poor patient acceptance of and compliance with these options. It is important to note that urinary retention itself is usually a symptom of another medical condition.

Symptoms of this condition include bladder pressure or pain, difficulty emptying the bladder, and often a history of repeated urinary tract infections. In this study, urinary retention is defined as a post-void residual of greater than 60 ml in the absence of obstruction at the level of the bladder neck or urethra during voiding. Left untreated, this con-

The usefulness of timed voiding, cholinergic medications, and high-frequency electrical stimulation in women with symptomatic urinary retention was evaluated. Results indicated that symptomatic urinary retention can be treated with behavioral modification and high-frequency electrical stimulation. Optimal results were found in younger women with stable bladders.

dition carries the risk of chronic upper and lower urinary tract infections and upper urinary tract damage due to vesicoureteral reflux and hydronephrosis.

The most common treatment options for urinary retention are limited to (a) clean, intermittent, self-catheterization; (b) Credé or valsalva voiding; (c) a single pharmacologic agent - bethanechol (Urecholine®); (4) behavioral modification; and (5) "a tincture of time" hoping for resolution of the symptoms. Some patients may require an indwelling catheter with gravity drainage for short or long-term use.

Much controversy surrounds the use of Urecholine. This cholinergic medication is thought to increase bladder resting tone, which in turn should improve bladder emptying. Although most clinicians feel that this medication has a poor response rate, positive clinical responses are frequently seen. Side effects, such as nausea, vomiting, and increased gastrointestinal motility (with associated distress), further limit its use.

Although the use of transanal or transvaginal electrical stimulation has been used in clinical practice for this condition, electrical stimulation has not been fully evaluated as a treatment option for urinary retention.

Background

Transvaginal or transanal electrical stimulation is a commonly used treatment option for urinary incontinence (Fantl et al., 1996). It is known to cause a passive contraction of the pelvic floor musculature. For patients with weak or absent voluntary pelvic floor contractions, electrical stimulation helps to re-educate the pelvic floor muscles (Bernier, Jenkins, & Davila, 1997a & b). Electrical stimulation can also relieve symptoms in the treatment of urge incontinence and other painful voiding syndromes.

Electrical stimulation units for home or office use are programmed to deliver stimulation at pre-set frequencies. Commonly used frequencies used to treat bladder dysfunction are usually limited to lower frequencies. For detrusor instability and the other

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Table 1.
Protocol

1. Timed voiding (2-3 hour schedule)
2. Transvaginal electrical stimulation:
 - 200 Hertz on the InCare 8900 PRS or InCare 9300 PRS
 - 3 seconds work: 6 seconds rest
 - 1-2 treatment sessions per week
3. Voiding modifications:
 - Double voiding
 - Position changes (squatting over toilet, bending over while sitting, sitting and facing the back of the toilet)
 - Suprapubic Credé
4. Medication offered:
 - Of the 18 patients, 9 took Urecholine
 - Dose of Urecholine 25-50 mg po TID
5. PVR rechecked at 4 weeks and every 3-4 weeks thereafter.
6. Weekly 7-day bladder diaries were kept by all patients.

Table 2.
Demographics

1. 18 women enrolled in the program.
2. Symptoms included complaints of:
 - Inability to empty bladder completely with or without complaints of urinary incontinence.
 - Recurrent UTIs.
 - Bladder fullness.
 - Frequency and urgency.
 - Slow, intermittent stream when voiding.
3. Average age: 61.8 (25-87)
4. Surgical history:
 - Hysterectomy = 14
 - Bladder suspension = 8
5. Atrophic changes = 9
 - Topical estrogen encouraged
6. Bladder capacity
 - Average = 615 ml (150 ml - 1,050 ml)
7. Visits required
 - Average = 6.5 (4-12)

symptoms related to urge incontinence, 10 or 12.5 Hertz is used (Lindstrom, Fall, Carl-Axel & Bjorn-Erik, 1983). Frequencies of 50 or 100 Hertz are used for stress incontinence (Sand et al., 1995). Mixed incontinence, a combination of urge and stress incontinence, responds to 20 Hertz (Fall

& Lindstrom, 1991). To date, no published clinical research has involved the use of high-frequency electrical stimulation to improve the symptoms associated with nonobstructive urinary retention.

Lindstrom et al. (1983) successfully used a low-frequency

electrical stimulation at 5 Hertz to eliminate bladder spasms in cats. Because humans poorly tolerate 5 Hertz, 10 or 12.5 Hertz has been the frequency settings on most devices offering electrical stimulation. Many similar studies have also demonstrated successful resolution of (or a significant decrease in) urge of incontinence symptoms using the 10 or 12.5 Hertz setting.

Fifty and 100 Hertz have been used successfully to treat genuine stress incontinence. These frequencies can improve sphincteric closure pressures during stimulation (Sand et al., 1995).

The clinical use of electrical stimulation is increasing. Although clinicians use electrical stimulation for many bladder and pelvic floor conditions, the application of this treatment modality may be underused and underappreciated. In one study, 200 Hertz was demonstrated to induce a passive pelvic floor contraction (Bernier et al., 1997a). Currently this frequency is not commonly accepted for use in clinical practice.

Purpose

The aim of this study was to evaluate the usefulness of transvaginal electrical stimulation at 200 Hertz in women with symptomatic, nonobstructive urinary retention and compare the results to transvaginal electrical stimulation at 200 Hertz with concomitant Urecholine administration.

Materials and Methods

Subjects diagnosed with nonobstructive urinary retention (post-void residual >60 cc) as the primary cause of their urinary symptoms were included in the study. Diagnostic testing included history and physical examination and a urogynecologic evaluation that included urine culture, prolapse evaluation, and multi-channel urodynamics. Multi-channel urodynamic testing included cystometrics, urethral pressure profilometry, uroflowmetry, and a pressure voiding study. A cysto-urethroscopy was

also performed to evaluate the lower urinary tract for anatomic bladder outlet obstruction or any abnormal bladder pathology. Urinary outflow destruction was ruled out in the presence of normal urethral pressure profile and uroflowmetry parameters.

Study protocol (see Table 1) included patient instruction in voiding modifications such as double voiding, positional changes (squatting over toilet, bending over while sitting, voiding while facing the toilet), and suprapubic Credé. Subjects were asked to begin timed voiding starting on a 1 to 2 hour schedule. In-office transvaginal electrical stimulation at 200 Hz (to induce a passive pelvic floor muscle contraction) for 15 minutes, 1 to 2 times per week was performed at 3 seconds of stimulation and 6 seconds of no stimulation at 0.3 millisecond. A Hollister InCare PRS 8900 or 9300 was used for electrical stimulation therapy. No home stimulation was used, as home units are not available to deliver this high frequency. Nine subjects took Urecholine 25 to 50 mg, orally 3 times per day. Seven-day bladder diaries were completed at baseline and weekly throughout the study period. Episodes of urgency, frequency of voids, post-void residuals, and fluid intake levels were recorded. Post-void residuals (PVR) were measured either by catheterization or bladder scan, and were performed every 3 to 4 weeks.

Results

Eighteen subjects were enrolled (see Table 2). Symptoms included urinary incontinence (9), urgency/frequency (14), recurrent UTIs (7), or a combination. Average age was 61.8 (range 25-87). No anatomic outflow obstruction was identified on physical exam, pressure voiding study, urethral pressure profilometry, or cysto-urethroscopy. All had low flow uroflowmetry curves (mean of <15 ml/sec). Cystometric capacity averaged 615 ml (range 150-1,050). All subjects demonstrated a reduction in post-void residuals. Post-

Table 3.
Post-Void Residuals with Electrical Stimulation Therapy

	Baseline (ml)	After Treatment (ml)
All (18)	154 (65 - 435)	47 (10-125)
Age < 65 (9)	151 (65-280)	42 (14-80)
Age > 65 (9)	157 (65-435)	56 (10-125)

Table 4.
**Voiding Frequency in Urinary Retention Subjects
(voids per day)**

	Baseline	After Treatment
All (18)	10 (5-17)	7.8 (5-11)
Age < 65 (9)	9.8 (5-14)	8.0 (5-11)
Age > 65 (9)	10.2 (6-17)	7.6 (6-10)
Stable CMG (3)	10.8 (8-13)	8.4 (7-10)

Table 5.
Urinary Retention Treatment with Electrical Stimulation

		Baseline (ml)	After Treatment (ml)
Urecholine + Functional Electrical Stimulation + Behavioral Management	(9 patients)	164 (65-435)	56.7 (10-125)
Functional Electrical Stimulation + Behavioral Management	(9 patients)	144 (65-280)	36.3 (17-70)

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void residuals decreased from a mean of 154 ml before treatment (range 65-435) to a mean of 47 ml after treatment (range 10-125) (see Table 3). Number of daily voids decreased from 10 (range 5-17) to 7.8 (range 5-11) (see Table 4). Breakdown of responses to therapy by age group demonstrated an equal response by those >65 (9) and those <65 (9) years of age.

Administration of oral Ure-choline did not influence the decrease in PVR measurement. Average PVR measured in the group taking Urecholine decreased from 164 to 56.7 ml; average PVR in the group not taking Urecholine was 144 ml pretreatment and fell to 36.3 ml following treatment (see Table 5). Subjectively, 16 women (80%) significantly improved symptomatically and reported a decrease in the feeling of bladder fullness, and a stronger stream when voiding. Two subjects who did not respond had detrusor instability diagnosed in pretreatment urodynamics.

Conclusion

In this study, symptomatic nonobstructive urinary retention responded favorably to transvaginal electrical stimulation at 200 Hertz. The addition of a cholinergic drug did not improve patient outcomes. Transvaginal electrical stimulation at the high-frequency setting of 200 Hertz should be considered for use in treating patients diagnosed with a neurogenic bladder and urinary retention. Additional frequencies should be investigated to evaluate their efficacy in the clinical setting. ■

References

- Bernier, F., Jenkins, P., & Davila, G.W. (1997a). *Does functional electrical stimulation elicit a pelvic floor muscle contraction?* Presented at the Annual SUNA Conference. New Orleans, Louisiana.
- Bernier, F., Jenkins, P., & Davila, G.W. (1997b). *The evaluation of pelvic floor muscle contractions at 20, 30, 50, 100, and 200 Hertz.* Presented at the International Urogynecologic Association Annual Meeting, Amsterdam, The Netherlands.
- Fall, M. & Lindstrom, S. (1991). Electrical stimulation: A physiologic approach to the treatment of urinary incontinence. *Urologic Clinics of North America*, 18, 393-407.
- Fantl, J.A., Newman, D.K., Colling, J. et al. (1996). *Urinary incontinence in adults: Acute and chronic management.* Clinical Practice Guideline, No. 2, 1996 Update. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service, Agency for Health Care Policy and Research. AHCPR Publication No.96-0682.
- Lindstrom, S., Fall, M., Carl-Axel, C., & Bjorn-Erik, E. (1983). The neurophysiological basis of bladder inhibition in response to intravaginal stimulation. *Journal of Urology*, 129, 409-410.
- Sand, P.K., Richardson, D.A., Staskin, D.R., Swift, S.E., Appell, R.A., Whitmore, K.E., & Ostergard, D.R. (1995). Pelvic floor stimulation in the treatment of genuine stress incontinence: A multicenter placebo-controlled trial. *American Journal of Obstetrics and Gynecology*, 173, 72-79.