

DOES ACUTE POSTERIOR TIBIAL NERVE STIMULATION SUPPRESS BLADDER CONTRACTIONS IN MS PATIENTS?

Hypothesis / aims of study

Conditional transcutaneous electrical stimulation of the dorsal penile/clitoral nerve has been shown to suppress detrusor contractions in patients with neurogenic detrusor overactivity (NDO) [1]. However, the long term use of surface electrodes in the genital region may not be well tolerated and may introduce hygienic challenges. For this reason stimulation of the posterior tibial nerve (PTN) may be a promising alternative. Previous studies on PTN stimulation have focused on the effect of weekly therapeutic stimulation [2] or continuous stimulation during urodynamics [3]. The aim of this study was to investigate whether acute electrical stimulation of the PTN could suppress detrusor contractions in MS patients with neurogenic detrusor overactivity.

Study design, materials and methods

The study was approved by the local ethical committee and informed consent was obtained from the 12 patients (7 M, 5 F) who participated in this study. The inclusion criterion was MS patients with a recent urodynamic study showing detrusor overactivity incontinence and small bladder capacity (< 300ml). Exclusion criteria were sacral nerve lesions, urinary tract infection or any serious secondary disease. The patients were asked to discontinue any pharmacological treatment of NDO a week prior to the experiments. All experiments were done with the patient in the supine position. Three successive slow fill cystometries (16 ml/min.) were carried out in each patient. The first filling served as control filling where no stimulation was applied. In the second and third filling, electrical stimulation using either 34 gauge stainless steel needles or surface electrodes was applied to the PTN. Electrical stimulation started automatically if the detrusor pressure exceeded 10 cmH₂O and stopped if the pressure remained under 10 cmH₂O for more than 10 s. Electrical stimulation was applied bilaterally using charge compensated 200 micro-second pulses with a pulse rate of 20 Hz. The stimulation amplitude was set at the maximum tolerable level according to the subject under investigation, which was usually 1.5 times the threshold for evoking plantar flexion of the toes and/or toe fanning. Patients reported the perception of the stimulation during recording together with the sensation of urgency. Recording was stopped and the bladder emptied if leakage occurred during stimulation or the patient was uncomfortable. Leaked fluid was collected in a diaper and the volume was measured by weighing the diaper. The bladder was emptied through the catheter after each filling to determine the residual volume.

Results

The control filling showed detrusor overactivity in 8 of the 12 patients. Figure 1 shows an example of the data recorded in a single patient. Conditional electrical stimulation of the PTN with either needle or surface electrodes was unable to suppress a detrusor contraction in any patient and no reduction of urgency was reported during stimulation.

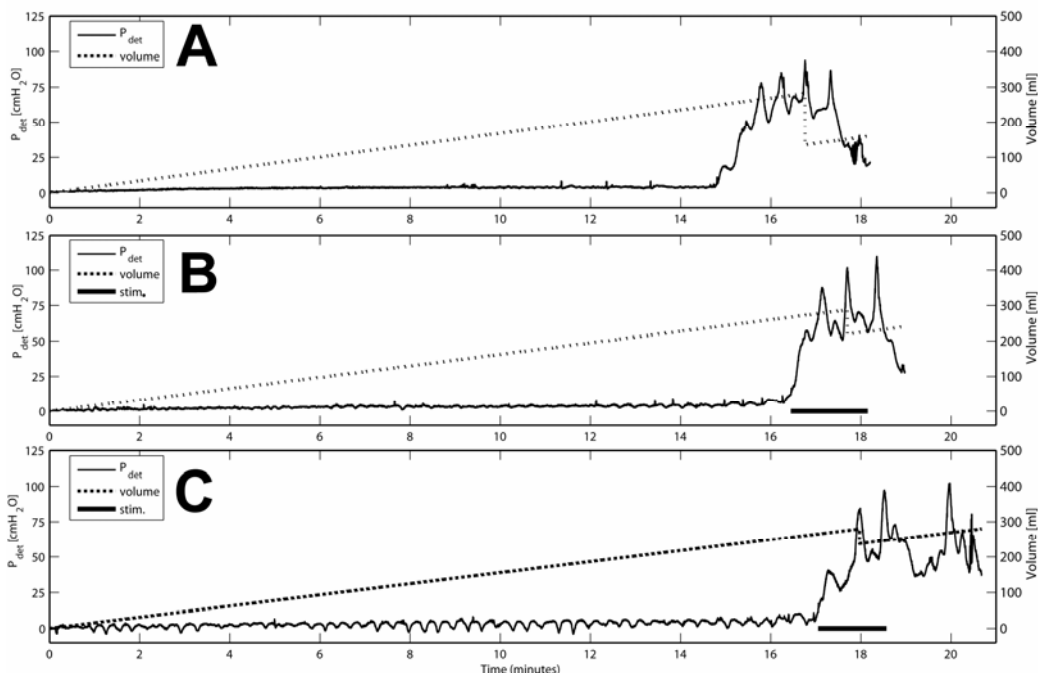


Figure 1: Detrusor pressure and estimated bladder volume in patient 1. During the control session (without stimulation), a detrusor contraction occurred that resulted in leakage (A). Bilateral stimulation of the PTN with either needle (B) or surface (C) electrodes was unable to suppress a detrusor contraction and leakage occurred during stimulation. The amplitude and shape of the time/pressure curve was similar in all three fillings, but each successive filling resulted in increased volume at first contraction.

Interpretation of results

Electrical stimulation of the PTN with either needle or surface electrodes was unable to suppress a detrusor contraction in any patient and no reduction of urgency was reported during stimulation. Our study suggests that, although a stimulation amplitude of 1.5 times the motor threshold was used, there is little or no acute inhibitory effect from stimulating the PTN. Additionally, no reduction in urgency was reported by any patient. Although inhibition through a direct route in the sacral cord may not be present, it does not rule out the possibility of a neuromodulatory effect that may provide symptomatic relief in patients with NDO when stimulation is applied therapeutically.

Concluding message

Although therapeutic effects may be present from stimulating the PTN, we were unable to demonstrate any acute effects during urodynamics in patients with MS. For this reason stimulation of the PTN is not an alternative to DPN stimulation in a system that relies on the acute inhibition of a detrusor contraction. To avoid the disadvantages of surface electrodes in the genital region one could consider implanted electrodes to stimulate the pudendal nerve.

References

1. International Continence Society 34th annual meeting, August 24th-27th 2004, abstract 56, Paris, France.
2. J Urol 2003 169(6):2429-30.
3. J Urol 2003; 169:2210-2215

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DISCLOSURES: NONE

CLINICAL TRIAL REGISTRATION: This clinical trial has not yet been registered in a public clinical trials registry.

HUMAN SUBJECTS: This study was approved by the Den videnskabetiske komite for viborg og nordjyllands amter and followed the Declaration of Helsinki Informed consent was obtained from the patients.