

INTERMITTENT VERSUS CONTINUOUS ELECTRICAL STIMULATION OF THE DORSAL PENILE NERVE ON BLADDER CAPACITY IN SPINAL CORD INJURY.

Aims of Study

Electrical stimulation of the dorsile penile nerve (DPN) or sacral nerve roots has been shown to increase bladder capacity and suppress hyperreflexic contractions of the bladder in spinal cord injury¹⁻². Such stimulation is usually applied continuously, giving rise to habituation or shortening battery life in some implanted devices. Intermittent stimulation has been used in the past to improve stress urinary and urge incontinence as well as suppressing hyperreflexia and improving bladder capacity in spinal cord injury³⁻⁴. However, a comparison with continuous stimulation has never been evaluated with DPN stimulation. The aim of this study was to compare intermittent with continuous DPN stimulation on bladder capacity and compliance in patients with spinal cord injury.

Methods

5 patients with spinal cord injury were studied using dorsal penile nerve stimulation, applied with a pulse-width of 200 μ s, a frequency of 15Hz and an amplitude equal to at least twice that needed to produce a pudendo-urethral reflex. Stimulation was either continuous or intermittent, using a 5 second on 5 second off paradigm. Bladder capacity was compared with controls (no stimulation) by means of serial slow-fill cystometrograms, at an infusion rate of 10ml/min. These results were also compared with bladder volumes achieved at home with anti-muscarinic treatment. A two-tailed Mann-Whitney U-test was used to analyse the results, where a *P* value of <0.05 was considered significant.

Results

Figure 1 shows that compared with controls, intermittent stimulation showed a mean improvement in bladder capacity of 243% (\pm Standard Deviation 103%, *P*=0.0002) or 120.8 ml (\pm 61.09 ml), compared with a 289% improvement with continuous NM (\pm 136%, *P*=0.0003) or 135ml (\pm 80.57). The improvement in capacity between the two forms of NM was not significant (*P*=0.4441). The improvement in capacity with intermittent NM was comparable to anti-muscarinic treatment (*P*=0.1439; Figure 2).

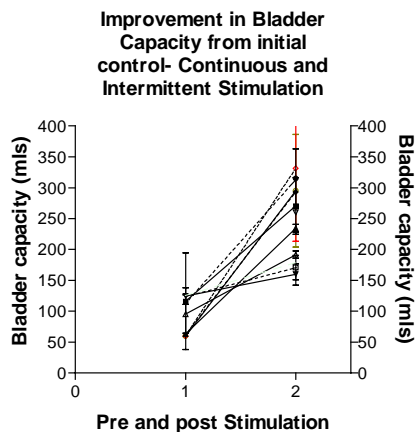


Figure 1: Improvement in bladder capacity with intermittent and continuous stimulation from controls. (Intermittent= solid lines, Continuous=dashed lines).

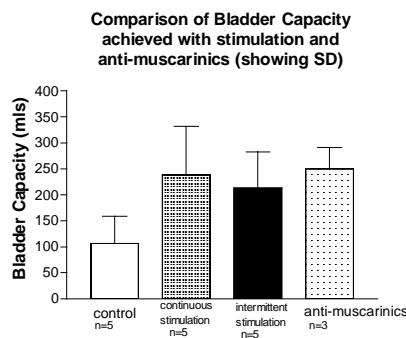


Figure 2: Comparison of Bladder Capacity between stimulation & anti-muscarinics (SD= standard deviation).

Conclusions

Intermittent stimulation via dorsal penile nerve is as efficacious as continuous stimulation or anti-muscarinic treatment in improving bladder capacity in patients with spinal cord injury. It may be useful as a means of reducing habituation as well as conserving battery life in implanted devices. Further studies are being performed to assess the effectiveness of intermittent neuromodulation in home use by means of a non-invasive technique.

- ¹ *Spinal Cord* 2001; 39:420-428.
- ² *Eur Urol* 1998; 33(Supp 1): 60.
- ³ Abstracts form *ICS*, 2001.
- ⁴ *Spinal Cord* 2002 (in press).