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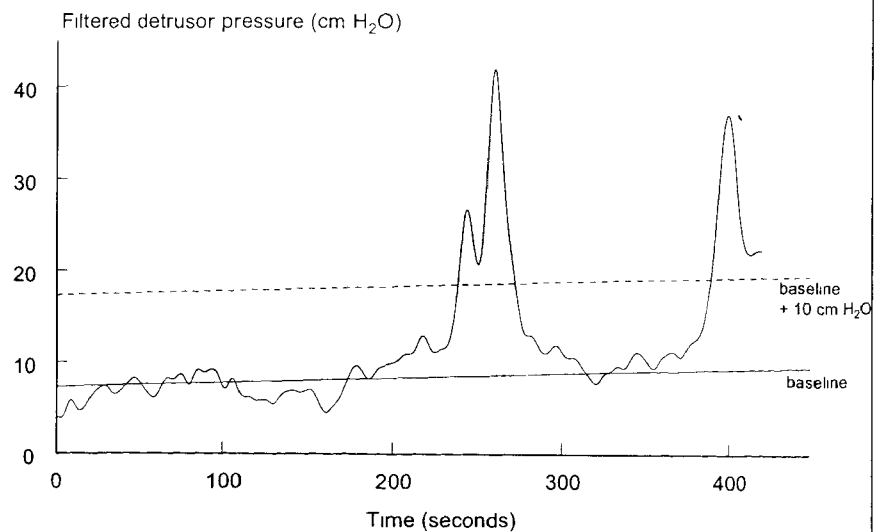
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COMPUTERIZED ASSESSMENT OF DETRUSOR INSTABILITY  
IN PATIENTS TREATED WITH SACRAL NEUROMODULATION

**AIMS** We previously described a computerized algorithm that diagnosed and graded detrusor instability [1] To further validate this method, we applied it to patients treated with sacral neuromodulation The instability parameters calculated from the cystometric studies of implanted patients before and 6 months after the operation were compared In addition, the changes in the parameter values were correlated with symptomatic changes as derived from voiding / incontinence diaries

**METHODS** Neuromodulation is applied at our department since 1990 Voiding / incontinence diaries and cystometric studies at baseline and after 6 months are part of the evaluation. Cystometry is done in the supine and standing position and, after implantation, with the stimulator on and off From 1993 onwards, cystometric data is sampled and stored using PC's Only those patients in whom the cystometric studies at baseline as well as after 6 months were stored were included in the present study

The data was processed as follows (Figure) Two points of the filtered (0.10 Hz low pass filter) detrusor pressure signal were selected manually and a straight line representing the passive detrusor pressure baseline was drawn The active detrusor pressure was defined as the total detrusor pressure minus the baseline pressure value All detrusor pressure values exceeding the baseline by more than 10 cm H<sub>2</sub>O were added and



divided by the sample frequency to approximate the area between the detrusor pressure signal and the baseline This area was called the area of instability (shaded area in figure) Other parameters derived included the total duration of the unstable episodes, the amplitudes of the first and the maximum unstable contraction and the corresponding

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bladder volumes, the mean active pressure during the unstable episodes and the bladder capacity. When no instability was found with this procedure, that is, when the constructed detrusor pressure baseline was not exceeded by more than 10 cm H<sub>2</sub>O, the area of instability was set equal to 0

The pretreatment measurements in the standing position were compared with the posttreatment measurements in the standing position with the neurostimulator on. Three categories of symptomatic success were defined a more than 90% decrease in the number of pads used per day or the number of incontinence episodes per day was considered a cure, a decrease between 50 and 90% was considered a partial success and a decrease of less than 50% was considered a failure

**RESULTS** The filling phase was sampled and stored on computer disk before and after treatment in 26 consecutive patients (22 women and 4 men) with a mean age of 44 years. The program and the urodynamic report (ICS criteria for the definition of instability were used) agreed on the presence or absence of unstable contractions in 51 out of the 26x2 measurements considered. All the above-mentioned parameters responded favourably to neuromodulation, but statistical significance (paired t-test) was only achieved for the amplitudes of the first and the maximum unstable contraction, the mean active pressure during unstable episodes and the maximum detrusor pressure. The bladder was stable at follow-up in 7 women and 1 man. Of these patients, 5 (63%) were symptomatically cured, 1 (13%) was a partial success and 2 (25%) were failures. In the 18 patients whose bladder remained unstable, these numbers were 10 (56%), 5 (28%) and 3 (17%). These distributions were not significantly different (Pearson chi-square  $p=0.67$ ). On average, the baseline cystometric parameters were more favourable in the females whose bladder became stable than in the ones whose bladder remained unstable, but the difference was only significant (unpaired t-test) for the amplitude of the maximum unstable contraction and the mean active pressure during unstable episodes. No significant differences (Kruskal-Wallis test and Mann-Whitney U test) between any of the baseline parameters in the 3 groups of females with a varying degree of symptomatic success were found. The changes in the cystometric parameters and those in the number of incontinence episodes per day and the number of pads used per day did not correlate significantly.

**CONCLUSIONS** The described algorithm accurately diagnoses bladder instability. The responses of the calculated parameters to neuromodulation support its validity. In our patient group, neuromodulation on average reduced the amplitudes of the unstable contractions but did not change the volumes at which they occurred. Females who had a stable bladder at follow-up on average initially suffered from a less severe grade of instability. Cystometric parameters could however not predict the symptomatic outcome of treatment, which is apparently also dependent on factors unrelated to the urodynamic status.

[1]. J.Urol 159 1669-1674, 1998.