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# PREVENTION OF AFFERENT BLADDER HYPERSTIMULATION TO PREVENT POLYURIA IN EARLY PHASE OF SPINAL INJURY

Hypothesis / aims of study

The aim of the study was to investigate whether, in spinal cord injury (SCI) patients (from C1 to T1 lesion) with polyuria and resulting frequent bladder overdistension episodes, a temporary continuous nocturnal catheterisation could determine an improvement in diurnal urinary bladder balance. In clinical practise incontinence and problems in bladder management in SCI patients are often related to bladder overdistension, and from theoretical point of view overdistension episodes are responsible for detrusor myogenic failure which in turn becomes the engine of polyuria. Since there are no practical solution for polyuria and moreover the use of drugs such as desmopressin whose site of action is the efferent pathway is not sufficient we considered how to act on the afferent component.

Study design, materials and methods

Ten SCI patients, 8 male and 2 female, aged from 18 to 53 (mean 38,6 years) in acute phase (10-40 days from trauma) after the resolution of spinal shock phase, parenteral therapy withdrawn and with a diuresis over 24 hours not superior to 2500 ml. underwent intermittent catheterisation.

After some bladder overdistension episodes and compatibly with the subject's compliance, a nelaton tube after the last evening catheterism was kept in place for the nocturnal phase. The subjects maintained omogeneous life-style and dietary habits in both phases. Due to the small number of subjects enrolled, a non-parametric test (Wilcoxon test with sign) was applied to estimate the significance of the results obtained.

Results

The effect of nelaton positioning was immediate since the overdistension episodes reduced from the very first day of use. The frequency of episodes (from 2 to 0.5 episodes/die average percentage of 75) and the yield of overdistension (from an average of filling of 750 to one of 650 ml) significantly decreased .

| PRE Nelaton | | | | | INTRA Nelaton | | | |
|---|---|---|---|---|---|---|---|---|
| Name | Total number of events | Average | Days | Daily events | Total number of events | Average | Days | Daily events |
| D.G. | 126 | 728 | 55 | 2,3 | 98 | 661 | 122 | 0,8 |
| T.S. | 124 | 692 | 70 | 1,8 | 20 | 741 | 52 | 0,4 |
| F.V. | 15 | 880 | 7 | 2,1 | 48 | 614 | 144 | 0,3 |
| G.A. | 20 | 643 | 8 | 2,5 | 14 | 650 | 22 | 0,6 |
| A.B. | 2 | 975 | 1 | 2,0 | 80 | 731 | 150 | 0,5 |
| G.C. | 20 | 598 | 10 | 2,0 | 13 | 615 | 12 | 1,1 |
| K.G. | 22 | 750 | 16 | 1,4 | 1 | 500 | 4 | 0,3 |
| R.L. | 129 | 691 | 89 | 1,4 | 2 | 700 | 10 | 0,2 |
| A.S. | 18 | 851 | 6 | 3,0 | 20 | 648 | 52 | 0,4 |
| P.T. | 109 | 704 | 71 | 1,5 | 34 | 635 | 75 | 0,5 |

Tab.1

Nonetheless the predisposition to overdistension in some patients unchanged even if reduced in frequency and intensity.

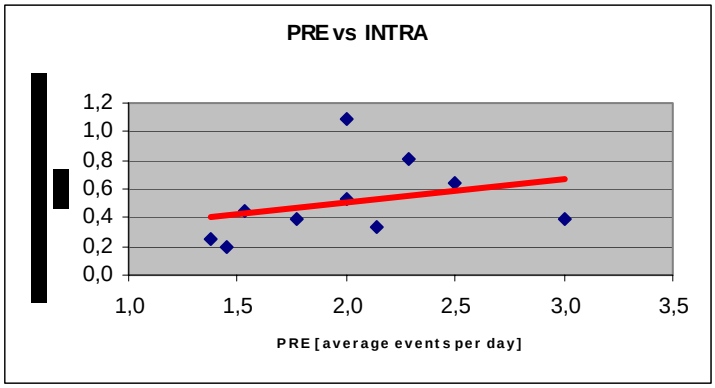


Fig.1 Correlation between the average number of sovradistentions pro die before and during nelaton positioning.

Interpretation of results

Our hypothesis has been validated. The use of a temporary continuous nocturnal catheterisation determined a dramatic improvement in diurnal bladder balance that the problem of polyuria and bladder overdistension phenomena in our patients can be considered almost fixed.

The mechanisms responsible for nocturnal polyuria in SCI pts may be synthesized in efferent and afferent components: as for the first one ADH secretion shows diurnal variation and sleeping increases in most normal healthy individuals, while no significant difference between day and night plasma ADH levels was found in tetraplegic individuals: the inability to increase the sympathetic activity in the erect posture causes a fall in the blood pressure and an increased release of ADH. The redistribution of extravascular fluid into intravascular space and the increase in blood pressure cause a reduction in the ADH secretion independently of plasma osmolality. The urothelium plays an intricate part in adjustments to electrolytes, osmolality and pH distal to the renal tubules. Even though the few available studies in literature suggest that desmopressin is safe and effective in the symptomatic management of polyuria in neurogenic bladder dysfunction in SCI subjects, according to our experience (not published data), such a measure is not sufficient to control polyuria and to prevent overdistention episodes. According to the dynamic urothelium concept, bladder afferents (comprising fibre types from C to Ad) detect both bladder volume and urinary composition signalling sensory information about bladder filling to the brain via the pelvic nerves, spino-bulbar pathways and peri-aqueductal grey (PAG); this information leads not only to properly coordinated control of the bladder and sphincters at the level of the so-called “micturition centre” but also to higher level processing for the perception of bladder fullness and the sensations of urge.

Concluding message

This study shows encouraging clinical results to prevent polyuria and bladder overdistension phenomena and lead us to investigate deeply its etiopathogenetic mechanism.