

#367 Could ice water test predict long term detrusor activity in neurogenic acontractile detrusor?

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Introduction

Ice Water Test (IWT) was first described in 1957 by Bors and Blinn as a pertinent test to discriminate an upper motoneuron lesion from a lower motoneuron lesion, using human cooling bladder reflex, mediated by C-fibers cold receptors (1).

Several studies suggested that IWT could unmask Detrusor Overactivity (DO) in patients complaining about overactive bladder (OAB) or determine the neurological status of patients with DO or OAB (2), with encouraging results but not sufficient enough to install IWT in common practice.

The aim of this study was to determine psychometric properties of IWT to predict the appearance of a detrusor activity in patients with neurogenic acontractile detrusor.

Methods and Materials

We retrospectively reviewed medical files of patients followed in the neuro-urology unit of our department of Physical and Rehabilitation Medicine (PRM) between January 2008 and May 2018.

Patients older than 18y.o. presenting a neurogenic acontractile detrusor as defined by the International Continence Society (ICS) following spinal injury and cauda equina were eligible (3). We included all patients presenting no bladder contraction at first cystometry, performed in accordance with the ICS standards immediately followed by an IWT. Bladder was filled with cold water (4°C) at a 100ml/min (1).

Test was considered positive if it induced a non-inhibited detrusor contraction $\geq 15\text{cmH}_2\text{O}$, with or without leakage.

Voluntary or uninhibited contraction during yearly urodynamic follow-up was considered for the analysis. We thus considered the time elapsed between the lesion and the first appearance of detrusor activity observed in cystometry and the delay between the lesion and the last cystometry in patients without any detrusor activity.

Primary outcome was the calculation of IWT predictive values to determine appearance of a detrusor activity in patients with neurogenic acontractile detrusor.

Our database was approved by the French Data Protection Authority (agreement number 2209010 V0).

Statistics Contingency tables were drawn to determine sensitivity (Se), specificity (Sp) predictive values (positive or negative, respectively PPV or NPV), and accuracy of IWT as a predictor of the recovery of a detrusor activity.

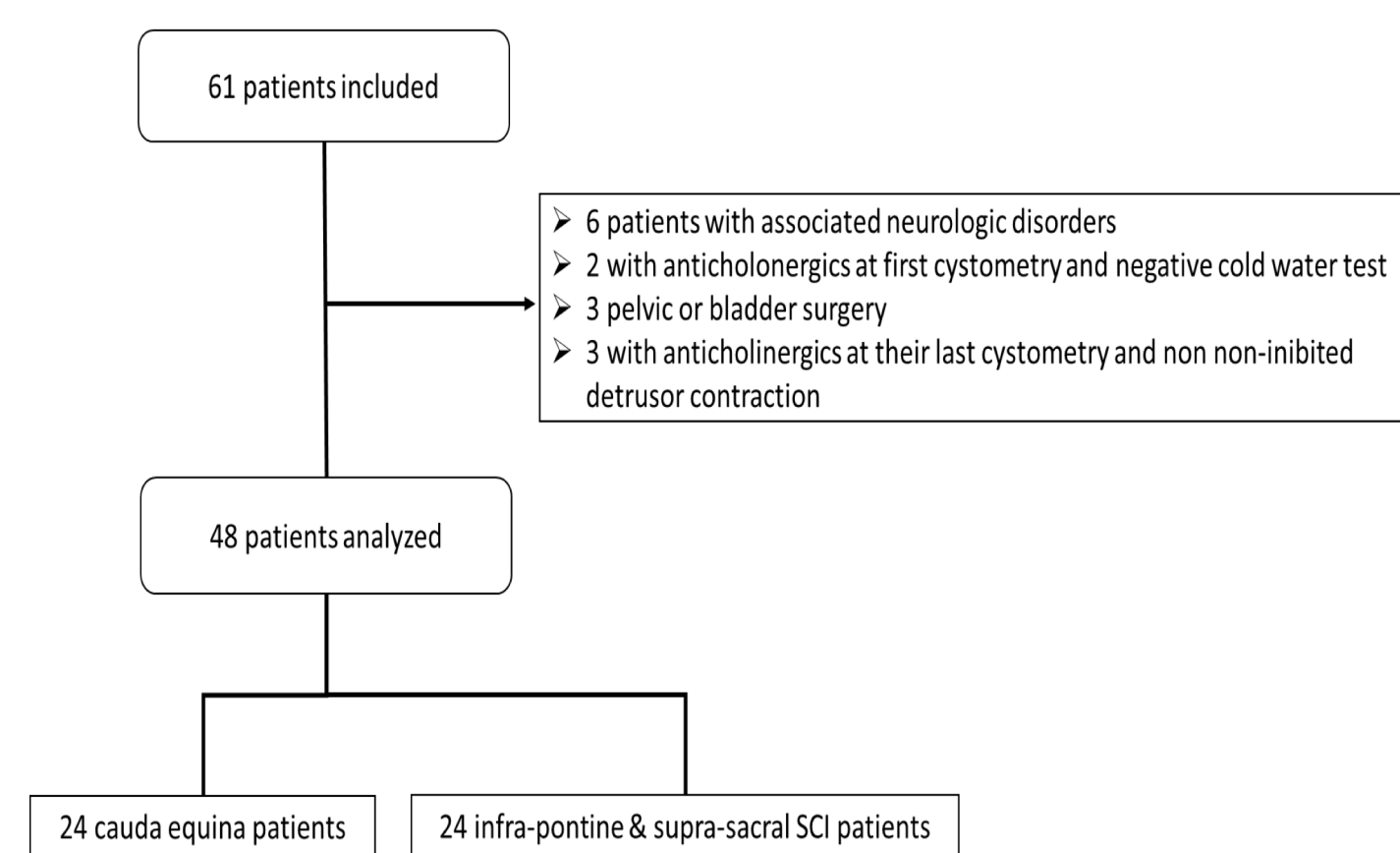


Figure 1. Flow Chart

Sex (% of male)	58,3
Age at neurological lesion (mean; SD) (years)	42 ±18
Time elapsed between lesion and IWT (Median [1 st – 3 rd quartile]) years	1,51 [1-4,3]
Positive IWT (%)	33,3
Detrusor contractility at end of the follow up (%)	29,2
Time elapsed between lesion and detrusor activity appearance in cystometry (Median [1 st – 3 rd quartile]) years	2,03 [1,4-4,5]
Time elapsed between lesion and the last cystometry in patients with no detrusor activity (Median [1 st – 3 rd quartile]) years	7,2 [3,5-13,1]

p=0,023

Table 1. Main results for the whole population. IWT = Ice Water Test.

Results

Forty-eight patients were included in final analysis (Figure 1). Their baseline characteristics are presented in Table 1. Suprasacral spinal cord/pontine lesion (SSL) (level of injury assessed with the ASIA scale) either cervical (n=3), thoracic (n=10), lumbar (n=8), conus (n=2) or undefined (n=1).

Fourteen patients regained a detrusor activity, among whom 13 had a positive IWT at first cystometry. Among the 32 patients with negative IWT, only one recovered a spontaneous detrusor activity 5,2 years after the lesion and 3,7 years after the initial IWT with an annual cystometry follow-up.

In this study, psychometric properties of IWT are* :

-Sp of 0.91 IC_{95%}[0.76-0.98]

-Se of 0.93 IC_{95%}[0.66-1]

-PPV of 0.81 IC_{95%}[0.59-0.93]

-NPV of 0.97 IC_{95%}[0.82-1]

*With a 0.92 IC_{95%}[0.80-0.98] accuracy (Table 2).

	Positive IWT	Negative IWT
Detrusor activity	13	1
No detrusor activity	3	31
Total	16	32

Table 2. Contingency table for overall population.

Values are number of patients in each category. IWT = Ice Water Test.

Three had spontaneous micturition without significant post voiding residue, 3 had spontaneous micturition associated with ISC and 2 had reflex micturition and surgical sphincterotomy. Among the 32 patients with negative IWT, only one recovered a spontaneous detrusor activity 5,2 years after the lesion and 3,7 years after the initial IWT with an annual cystometry follow-up and was treated with antimuscarinics. All these patients used intermittent catheterization.

Discussion

This study is the first to demonstrate the relevance of IWT to predict the detrusor activity in patients with initial neurogenic acontractile detrusor with relevant clinical outcome and good psychometric properties.

Time elapsed between the lesion and detrusor activity appearance was 2,03 [1,4-4,5] years post lesion, underlining the need of an intensive follow-up in patients with positive IWT at least the 2 first years following the lesion to treat NDO and to adapt patient micturition mode.

Remarkably, NPV of IWT was very high, allowing clinician to decrease the follow-up of these patients. These results suggest that a positive IWT could indicate a change in the threshold of provoking afferent fibers in patients with emerging C-fiber function following SCI, still insensitive to conventional cystometry.

Limitations

IWT has been demonstrated to be positive in other conditions such as Bladder Outlet Obstruction (1). We did not record BOO, in this population. However, no statistical differences between male and female (data not shown) was found in our study suggesting that positivity of IWT was solely related to the neurogenic condition.

This was a retrospective study with a small number of patients. However, in order to increase strength of this study, we only included patients with isolated and non-evolutive lesion who were naïve of any antimuscarinic treatment at first urodynamics.

Finally, we have to consider an inclusion bias, resulting of our strict inclusion criteria to avoid confounding factors, thus generalization of our results could be limited.

Conclusions

➤ IWT could be a suitable test with robust psychometric properties to predict emergence of detrusor activity in patients with initial neurogenic acontractile detrusor.

➤ These results could lead us to an open-field of improvement of management of patients suffering from neurogenic bladder, with a proportional follow-up depending on detrusor activity emergence.

References

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