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NERVE GROWTH FACTOR BLADDER TISSUE LEVELS IN PATIENTS WITH NEUROGENIC DETRUSOR OVERACTIVITY BEFORE AND AFTER BOTULINUM –A TOXIN INJECTIONS INTO THE DETRUSOR MUSCLE

Hypothesis / aims of study

Experimental studies indicate that Nerve Growth Factor (NGF) is involved in inducing neuroplasticity which underlies the emergence of detrusor overactiviy after spinal cord injury. While a state of NGF deprivation has been recently found to arise in bladder sensory neurons after intravesical administration of vanilloids, it is not known what is the influence of Botulinum-A toxin (BTX-A) injections into the detrusor muscle on NGF bladder tissue levels.
We measured the concentrations of NGF in bladder tissue biopsies taken from patients affected by neurogenic detrusor overactivity before and after BTX-A injections into the detrusor muscle. We also compared NGF content with urodynamic data.

Study design, materials and methods

12 spinal cord injured patients underwent urodynamics with recording of uninhibited detrusor contractions (UDC) threshold, UDC maximum pressure, and maximum cystometric capacity before and 1 month after BTX-A injections into the detrusor muscle. At the same time points they underwent endoscopy with biopsy specimens drawing.
NGF levels were measured in tissue homogenate by means of enzyme linked immunosorbent assay (ELISA, Promega, Madison-WI) following immunoprecipitation of IgG by the addition of IgM (1/10 by vol). The sensitivity was 15.6 pg/ml of NGF. Data were expressed as ng/mg protein (mean of duplicate samples).

Results

We detected a significant increase in UDC threshold ($p<0.01$) and in maximum cystometric capacity ($p<0.01$), and a significant reduction in UDC maximum pressure 1 month after BTX-A treatment, as compared to baseline. Furthermore, it was detected a significant reduction ($p<0.05$) in NGF bladder content (see Table below).

	Basal	1 month	p
UDC threshold (ml)	163.2 ± 61.4	372.8 ± 92.3	$p<0.01$
UDC max pressure (cmH_20)	55.1 ± 18.5	32.7 ± 20.5	$p<0.01$
Bladder capacity (ml)	228.6 ± 75.6	437.4 ± 76.1	$p<0.01$
NGF (ng/mg)	141.8 ± 63	90.8 ± 52.6	$p<0.05$

Interpretation of results

These preliminary results indicate that the inhibition of the release of acetylcholine from nerve endings and the decrease of detrusor contractility, as induced by BTX-A, induce a reduction of NGF bladder tissue levels in spinal cord injured patients. Thus, they suggest that BTX-A could have a inhibitory effect at the level of both the efferent and afferent arms of the micturition reflex.

Concluding message

BTX A is safe and effective in treating detrusor overactivity of neurogenic origin. Further studies are needed to investigate possible and different mechanisms of action of the drug direct to the afferent arm of the micturition reflex.

References

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