

EFFECTS OF CHINESE BOTULINUM TOXIN A TO TREAT PATIENTS WITH NEUROGENIC DETRUSOR OVERACTIVITY

Hypothesis / aims of study

The physiologic alterations that accompany spinal cord injury (SCI), myelomeningocele (MMC) or multiple sclerosis (MS) can lead to significant bladder dysfunction. Prevention of upper urinary tract damage and renal failure is the ultimate goal of any urological treatment, but urinary incontinence and Urinary tract infection (UTI) in a young paraplegic with neurogenic detrusor overactivity (NDO) can greatly reduce quality of life. Recently, injection of botulinum toxin A (BTX-A) into the detrusor smooth muscle has been proven to be effective to treat NDO and neurogenic incontinence ^[1] and significantly decreased UTI ^[2]. This study explored the effects of Chinese BTX-A, Lantox (Lanzhou Institute of Biological Products, China) injection into the detrusor muscle to manage incontinence and UTI in patients with NDO.

Study design, materials and methods

Between 2002 and 2013, three hundred units of BTX-A were injected cystoscopically into the detrusor muscle of 218 patients with neurogenic DO who used CIC to empty the bladder. Evaluations were performed before the injections and 6 and 12 weeks after treatment, and they included determination of bladder urinary continence status, frequency/volume chart of CIC, urine culture and the patient perception of bladder condition scale (PPBC-S). UTIs occurring in the 6 months before and the 6 months after injection were recorded. Incontinence was defined as any episode of urinary voiding between two CICs and was quantified with an absorbent pad. UTI was defined as a colony count of 10⁵ colony-forming units per millilitre or greater, with a fever of 38°C and two symptoms including, over distention of the bladder, lower abdominal pain, increased urinary incontinence, increased spasticity, autonomic hyperreflexia and increased sweating or malaise ^[2].

Results

A total of 218 patients with NDO were treated with BTX-A injection. The patient characteristics are shown in Table 1. Clinical data before, and at 6 and 12 weeks after treatment were analyzed. The data are shown in Table 2. Before injection the mean number of UTI over 6 months was 1.56±1.25, it significantly decreased to 0.81±0.86 after injection, (P=0.023). No adverse events were found in the group.

Interpretation of results

1. This report presents the data of 218 patients treated with Chinese BTX-A. In patients with NDO, high bladder pressure frequently leads to structural bladder damage with restricted capacity and compliance. In these difficult cases, BTX-A was injected into the detrusor muscle. The neurotoxin binds to the presynaptic nerve endings of cholinergic neurons and enters the neuron by receptor-mediated endocytosis. This results in the inhibition of neuronal acetylcholine secretion, which ultimately leads to a temporary chemodenervation and the loss or reduction of neuronal activity at the detrusor. In general, this chemodenervation is fully reversible.
2. In NDO patients, high bladder pressure is a risk factor for renal failure and symptomatic UTI. It promotes vesicoureteral reflux and ischemic injury to the bladder walls, creating favorable conditions for infection. It is speculated that detrusor BTX-A injection induced inhibition of DO and decrease of detrusor pressure were responsible for the decrease of symptomatic UTI. In addition, urine microorganism is the root of UTI. As bacteria that cause UTI have been found colonizing the urethra and perineal skin of male patients with NDO, improving incontinence and less usage of urine pads or condom-catheters after detrusor BTX-A injection might influence the microorganism's perineal colonization, thus change the urine microorganism and reduce the occurrence of UTI.

Concluding message

This retrospective study showed Chinese BTX-A injection into detrusor is effective and safe to treat NDO. It is not only improved the incontinence statue but also decreased the UTI episodes in patients with NDO.

Table 1. The patients' characteristics

| Variable | N |
|---|-------------|
| Number of patients | 218 |
| Male/female | 152/66 |
| Mean(range)age, years | 40.1(16-78) |
| Distribution of the neurological diseases | |
| Myelomeningocele | 34 |
| Spina bifida | 17 |
| Incomplete spinal cord injury | 39 |
| complete spinal cord injury | 128 |

Table 2 Clinical data before and 6 and 12 weeks after detrusor BTX-A injection

| | Baseline | 6 weeks later | 12 weeks later |
|--|--------------|----------------|-----------------|
| Clinical parameters | | | |
| Mean number of catheterizations/24 h | 6.6 ± 1.1 | 4.2 ± 0.7* | 4.0±0.9* # |
| Mean urine volume per catheterization (ml) | 184.2 ± 74.9 | 371.1 ± 103.0* | 351.1 ± 89.0* # |
| Incontinence between CIC | | | |
| Yes | 162 (74.1%) | 38 (17.4%) * | 57 (26.9%)* # |
| No | 56 (25.9%) | 180 (82.6%) * | 161 (73.1%)* # |
| PPBC-S | 5.2±0.1 | 4.6±0.1* | 4.4±0.1* # |

* compare to baseline (p<0.05)

compare to 6 weeks later (p>0.05)

References

1. Soljanik I. Efficacy and Safety of Botulinum Toxin A Intradetrusor Injections in Adults with Neurogenic Detrusor Overactivity/Neurogenic Overactive Bladder: A Systematic Review. *Drugs*. 2013 Jul;73(10):1055-66.
2. Jia C, Liao LM, Chen G, Sui Y. Detrusor botulinum toxin A injection significantly decreased urinary tract infection in patients with traumatic spinal cord injury. *Spinal Cord*. 2013 Jun;51(6):487-90.

Disclosures

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