

## **EFFECTIVENESS OF PERIURETHRAL BOTULINUM TOXIN INJECTION IN THE TREATMENT OF VOIDING DYSFUNCTION DUE TO DETRUSOR UNDERACTIVITY AND NON-RELAXING URETHRA**

### **Aims of Study**

Voiding dysfunction is the main therapeutic challenge to urologists. Among the various etiology of voiding dysfunction, neurogenic detrusor external sphincter dyssynergia (DESD), dysfunctional voiding due to spastic urethral sphincter, non-relaxing urethral sphincter and detrusor underactivity are the most commonly encountered pathology that result in difficult urination, large residual urine, and upper urinary tract deterioration. The therapeutic modalities for these diseases include transurethral sphincterotomy, alpha-blockers, skeletal muscle relaxants, and recently nitric oxide donors. Pelvic floor rehabilitation using biofeedback or electrical neuromodulation have also been developed in order to re-educate the pelvic floor muscles and achieve a relaxed urethral sphincter. However, the therapeutic results are not satisfactory to every patient. The purpose of this study is to treat the patients with detrusor underactivity and non-relaxing urethral sphincter who are refractory to the conventional treatment by botulinum toxin.

### **Methods**

20 patients with dysuria or urinary retention due to detrusor underactivity and non-relaxing urethral sphincter who were refractory to conservative treatment were subjected to periurethral botulinum toxin A injection. Before this treatment was given, detailed physical examination, videourodynamic study, and cystoscopy were performed. Conservative treatment including clean intermittent self-catheterization, urethral dilatation, pelvic floor muscle biofeedback, and medication by alpha-blocker, striated muscle relaxant, or nitric oxide donors were tried. Periurethral botulinum toxin A 50- 100 units was injected at 12, 3, 6, and 9 o'clock position of the urethral sphincter. The botulinum toxin was divided into 4 doses and was injected by cystoscopic guide in men or directly around urethral meatus in women. After injection, Foley catheter was indwelled for 1 day, then was removed. The urethral pressure profilometry and videourodynamic study were repeated at 7-14 days, and 3 months after injection.

### **Results**

The patients enrolled in this study included 5 patients with cauda equina lesion, 6 patients with peripheral neuropathy after radical hysterectomy, 5 patients with dysfunctional voiding combined with low detrusor contractility, and 4 patients with detrusor failure of unknown cause. After botulinum toxin injection, spontaneous voiding was resumed in 11 patients and significantly improved in 5 patients who could not urinate before treatment or who had severe dysuria. In these 16 patients with effective results, residual urine volume reduced from  $320 \pm 232$  mL to  $130 \pm 77$  mL, maximal flow rate increased from  $7.1 \pm 5.3$  to  $13.5 \pm 11.3$  mL/s, and bladder volume increased from  $277 \pm 215$  to  $359 \pm 155$  mL. The maximal urethral closure pressure also decreased from  $97 \pm 31$  to  $51 \pm 23$  cm water. Four patients had no response, 2 of them had cauda equina lesion, 1 had detrusor failure, and 1 had peripheral neuropathy. One patient had high fever lasting for 2 weeks after the injection, the other patients had no specific adverse effects after botulinum toxin injection. Among the 16 patients responded to botulinum injection, 4 complained of mild overflow incontinence and 2 had to use adjuvant clean intermittent catheterisation to evacuate urine before bedtime. All 16 patients who had response to botulinum toxin injection had improved quality of life after treatment.

### **Conclusions**

The results of this study demonstrate that botulinum is effective in reducing urethral resistance and facilitate voiding efficiency in 80% of the patients who had either cauda equina lesion or peripheral neuropathy as well as in those with detrusor failure and poor relaxing urethral sphincter. Patients with detrusor underactivity may have a chance to urinate by abdominal straining after botulinum toxin injection. Although in 4 patients, mild overflow incontinence might occur, patients enjoyed the improved quality of life without medication and catheter.