

**The effectiveness of sacral neuromodulation on a patient with a previous successful cystoplasty augmentation: a case report**

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## **Abstract**

This report is about the effectiveness of sacral neuromodulation in a 32-year-old woman with a history of augmented cystoplasty who required clean intermittent catheterization. She had referred to our center with a medical history of bilateral vesicoureteral reflux because of neuropathic lower urinary tract dysfunction. We successfully did a sacral neuromodulation on her which lead to a promising result.

**Keywords:** clean intermittent catheterization, cystoplasty, sacral neuromodulation

## **Introduction**

Sacral neuromodulation is a minimally invasive approach, which has been approved officially as a well-established procedure in the treatment of refractory urinary urge incontinence, non-obstructive urinary retention, urgency, and frequency <sup>(1,2)</sup>. It has been reported to have promising results in the treatment of chronic disorders resistant to the conventional therapy, including interstitial cystitis and women's sexual dysfunction. However, none has been approved officially <sup>(3,4)</sup>. This report is about the effectiveness of sacral neuromodulation in a patient with a history of augmented cystoplasty who required clean intermittent catheterization (CIC).

## **Case report**

A 32-year-old woman referred to our center with a past medical history of bilateral high grade vesicoureteral reflux(VUR) ,two times failure of endoscopic and open surgical repair of VUR. With an obvious low back dimple sign and very low capacity,low compliance bladder and evidence of several episodes of high amplitude Detrusor over activity (according to multi channel urodynamic study)and urinary incontinence ,she was finally diagnosed as a case of neuropathic lower urinary tract dysfunction. She underwent augmentation cystoplasty with a segment of ileum about 15 years before referring to us. The patient was in need of CIC to empty the bladder. However, she refused to perform regular daily CIC and had been admitted to hospital several times. The reasons had been bladder over-distention and residual urine, abdominal pain, symptomatic urinary tract infection or increased level of serum creatinine. She even had committed suicide due to her mood changes related to the mentioned chronic urinary problems (this was mentioned in her psychologic and psychiatric consultation reports). All procedures done in this study were in accordance with the principles of the Declaration of

Helsinki. The patient insisted to have a more natural way of voiding. She signed a written informed consent before undergoing sacral neuromodulation to increase the ability of voiding. The preoperative evaluations including the genitourinary physical examination and cystourethroscopy results were within normal limits. Voiding cystourethrography showed that she had a large augmented bladder, low-grade left vesicoureteral reflux and high residual urine (Figure 1). Multichannel urodynamic study showed a high capacity bladder (>800 mL), high compliance, acontractile detrusor with a very weak sensation (just the first sensation at 400 mL). She was undergoing self-catheterization once every day. There was no evidence of volitional voiding or urinary incontinence in her three-day frequency volume chart.

She underwent unilateral peripheral nerve evaluation (PNE) by placing temporary wire (305765SC, Medtronic, Minneapolis, Inc.) in the right S3 foramen which was connected directly to the external pulse generator (Brown Box, Verify 3531, Medtronic, Minneapolis, Inc.). According to the second frequency volume chart during the first week of PNE, the patient stated that she had regained the ability to void. The first PNE period lasted ten days. PNE test was repeated in the contralateral S3 foramen for eight days (Table 1). According to the three-day frequency volume chart, the response rate to the PNE test phase for both sides was more than 50%. Therefore, she underwent implantation of quadripolar tined lead (3889-28, Medtronic, Minneapolis, Inc.) and implantable pulse generator (3058, Medtronic, Minneapolis, Inc.) in a one stage surgery.

At the time of writing this report, that is 12 months after the surgery, she voids volitionally and does CIC once every night in case of need. She is very satisfied with the clinical results (Figure 2). There has been no incidence of symptomatic urinary tract infection or abdominal pain and she has not stayed at the hospital since the operation. The urodynamic study four months after the surgery revealed regaining more bladder sensations at lower volumes. The detrusor pressure at the maximum flow rate was 10 cmH<sub>2</sub>O.

## **Discussion**

Sacral neuromodulation's exact mechanism of action is unclear. A few studies suggest an effect on the afferent sensory nerve fibers mainly corresponding to the S3 root, modulating the filling and voiding phase of the bladder <sup>(1)</sup>. Rasmussen and colleagues <sup>(5)</sup> reported the successful use of sacral neuromodulation in two women with intractable urinary frequency, urgency and urgency-incontinence following bladder augmentation with ileum. Symptoms of both cases had improved after sacral neuromodulation. Our case had no continence and lower urinary tract symptoms, which is typically what we would expect from a successful augmented bladder. But

she became intolerant to CIC. Her urodynamic study result in follow-up revealed only 10 cmH<sub>2</sub>O increase in the augmented detrusor pressure during the void. So, it is not clear whether sacral neuromodulation works by increasing the contractility of neo-bladder or decreasing the muscle resistance of bladder outlet (pelvic floor muscles or external sphincter) in this case; especially since women have a different anatomy of the pelvic floor, shorter urethra with weaker compressor muscles compared to men.

To our knowledge, this is the first report of a successful sacral neuromodulation in a patient with a successful augmented bladder who was dependent on CIC with a promising result.

### **Conflict of Interest**

The author has no conflicts of interest.

### **Acknowledgement**

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### **Figure Legends**

**Figure 1:** Voiding cystourethrography of the patient demonstrating the augmented bladder with a high capacity.

**Figure 2:** a) voiding cystourethrography of the patient, full bladder with implanted tined lead and implantable pulse generator; b) her voiding cystourethrography demonstrating the residual urine after implanting the pulse generator.

**Table 1.** Uroflowmetry and voiding pattern of the patient after right and left peripheral nerve evaluation (PNE) of S3 foramen.

<b>PNE session</b>	<b>Maximal flow rate (mL/s)</b>	<b>Voided volume (milliliter)</b>	<b>Residual volume (milliliter)</b>	<b>Voiding pattern</b>
<b>First PNE (Right S3)</b>	8	180	150	intermittent and prolonged
<b>Second PNE (Left S3)</b>	10	200	115	intermittent and prolonged