Sacral neuromodulation in neurogenic lower urinary tract dysfunction: results from a single surgeon cohort

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Introduction

Sacral neuromodulation (SNM) has been widely studied as a therapeutic approach in non-neurogenic overactive bladder. Recent studies have reported excellent safety and efficacy of SNM in neurogenic patients as well. However, the implantation of SNM devices in patients with neurogenic lower urinary tract dysfunction (NLUTD) is still controverse, since high quality evidence in this field is still scarce.

The aim of this study was to assess the **efficacy of SNM** therapy in a population of patients with **neurogenic lower urinary tract dysfunction** treated by a single surgeon.

Materials and Methods

We retrospectively reviewed a single surgeon experience with SNM in patients with NLUTD treated at a tertiary hospital between 2019 and 2022. All procedures, namely test-phase and 2nd stage (SNM device implantation) were performed under local anesthesia.

We compared the **Bladder Diary** data of patients before SNM and at 6-12 months after treatment. The medical records of these patients were also reviewed regarding adverse events and efficacy of the treatment. The standard ICS Bladder Diary was used, in its validated translation to Portuguese.

Study population

A total of 24 patients with neurogenic lower urinary tract dysfunction underwent implantation of a SNM device. 2 patients were excluded from the analysis due to lack of data (unavailability of Bladder Diary data). The population of analysis was comprised of **22 patients**: 13 women and 9 men, mean age of 45.3 ± 16.3 years. The neurologic conditions are shown in Table 1. 8 patients were performing intermittent self-catheterization (ISC), 2 of them twice per day and the other 6 patients 5-8 times per day (after every micturition or without spontaneous voiding). Of the 22 patients that underwent the test-phase, **17** proceeded to the implantation of the **permanent implant**, while the other 5 failed to demonstrate a reasonable improvement after the 1st stage.

Neurologic Condition	n (22)	Performing ISC (8)
Spinal cord lesion	6	4
Multiple sclerosis	3	-
Myelomeningocele	3	2
Encephalitis	2	1
Stroke	2	-
Discal hernia	1	-
Caudal regression syndrome	1	-
Glioblastoma	1	-
Parkinson's	1	-
Miastenia gravis	1	-
Cauda equina syndrome	1	1

Table 1. Neurologic condition of the study population

Results

The changes in Bladder Diary parameters are presented in Table 2. Of the 8 patients performing ISC, 5 patients proceeded to the 2nd stage of the procedure, while the other 3 did not have sufficient improvement in the test-phase. One of these **5 patients stopped performing ISC**, while the other 4 still need self-catheterization, although reporting less urinary incontinence between ISC.

Patients with **multiple sclerosis** responded very well to treatment, with a mean reduction of 5 micturitions/24h, an increase of 80 mL per micturition and a reduction to 2 incontinence episodes/24h in one patient and to 0 in two other patients. Patients with myelomeningocele, caudal regression syndrome, cauda equina syndrome and Parkinson's also responded well to SNM. In contrast, patients with **spinal cord injuries** benefited less from SNM. 4 patients failed test-phase; 1 patient, under CIC, had minor improvements regarding incontinence between self-catheterization, whereas 1 patient had a decrease of 5 micturitions/24h, increase in 25 mL/micturition and a decrease from 2 to 0 episodes of incontinence/day.

Change in Bladder Diary data was not different in males vs females, nor variable with age. Despite not assessed with the Bladder Diary, **improvement in bowel-related symptoms** was routinely reported by patients. No adverse events were reported, except minor discomfort near the gluteal incision caused by the device.

	Pre-SNM	Post-SNM	Change	*p-value*
Daily voiding episodes	9,5	6,7	-2,8	<0,001
Nocturia	1,7	0,6	-0,9	<0,001
Mean volume (mL)	181	231	50	0,013
Bladder sensation scale 3	3,6	1,8	-1,8	0,075
Bladder sensation scale 4	3,3	0,5	-2,8	<0,001
Pads/Diapers	2,3	1,1	-1,2	<0,001

Table 2. Mean values and changes in Bladder Diary pre/post-SNM

Discussion

Here, we analyze a cohort of patients with neurogenic lower urinary tract dysfunction treated with SNM. In 23% of patients did not have a sufficient improvement in test-phase to advance to the implantation of the permanent device, a figure similar to the published literature. In the patients submitted to implantation of the permanent device, a reduction in symptom severity was observed, as shown in Bladder Diary changes. Other important outcomes not measured in the Bladder Diary, such as need of ISC, bowel-related symptoms or quality of life also seem to be affected positively by SNM. Interestingly, symptoms related to bowel movements were reported to improve faster than urinary symptoms, which sometimes require reprogramming of the SNM device.

Concluding Messages

We report the results of **SNM** in a cohort of patients with **neurogenic lower urinary tract dysfunction**. This treatment proved to be **safe** and **effective** in most patients. If further confirmed in high quality trials, SNM should be formally considered as a valuable option in patients suffering from neurogenic lower urinary tract dysfunction.

References

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