Successful Therapy of Overactive Bladder Syndrome with Percutaneous Tibial Nerve Stimulation: A Case Report

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ABSTRACT

Introduction: Overactive bladder syndrome is defined as urgency with or without incontinence, often with frequency and nocturia but without infection or other pathology. For the patient, overactive bladder syndrome means an essential loss of quality of life. The therapeutic concept follows a graduated, stepwise scheme. The first step consists of behavioral treatment with bladder training and pelvic floor education as well as local estrogen therapy. Following inadequate response to these measures, it is often necessary to add anti-muscarinic drugs or beta-3 agonists. In case of medical contraindication or insufficient response to pharmacologic treatment, neuromodulation, i.e. percutaneous posterior tibial nerve stimulation, should be routinely offered to overactive bladder syndrome patients.

Case Report: We present the case of an 81-year-old woman with long-lasting overactive bladder syndrome without incontinence. Behavioural treatment, local estrogen and anti-muscarinic therapy were unsatisfactory, therefore, an additional treatment employing percutaneous posterior tibial nerve stimulation was implemented. Under this regimen, the symptoms dramatically improved.

Conclusion: The reported overall success rate of percutaneous posterior tibial nerve stimulation in the literature ranges from 33 - 71%, with success being defined as more than a 50% decrease in urgency and a 25% reduction of frequency and nocturia, respectively. There is no other therapeutic option for overactive bladder syndrome patients, that reaches similar success rates. Percutaneous posterior tibial nerve stimulation should be routinely offered to overactive bladder syndrome patients and employed as an early step in the treatment of overactive bladder syndrome, sometimes in combination with or even before the introduction of medications.

Keywords: Overactive bladder syndrome, Urgency, Frequency, Nocturia, Percutaneous posterior tibial nerve stimulation, Therapeutic concept follows a graduated stepwise scheme

1. INTRODUCTION

Overactive bladder syndrome is characterized as urinary urgency with or without incontinence, usually with frequency and nocturia. Urgency is the main symptom of overactive bladder syndrome. The prevalence of overactive bladder syndrome ranges from 1.5% to 36.4% and increases in older patients[1]. For the patient, overactive bladder syndrome means an essential decrease of quality of life, an increase of social isolation and increased morbidity with a relevant risk of falls and fractures. Therapy consisting of a graduated, stepwise scheme (figure 1) is recommended. The first step involves behavioral treatment, including control and monitoring of fluid intake and regular bladder emptying, pelvic floor education and local estrogen therapy. In case of inadequate control of symptoms with these measures, it
is often necessary to begin pharmacologic treatment using anti-muscarinic drugs or beta-3 agonists, or to implement neuromodulatory treatment. Combination of these two therapies is possible. In particular, elderly or frail patients suffering from side effects due to these medications or those with medical contraindications to pharmacologic treatment can profit from percutaneous posterior tibial nerve stimulation which is a feasible, well-tolerated and highly successful therapy. Traditional neuromodulation of the sacral or pudendal nerves requires surgical implantation of a stimulating device. The development of non-invasive nerve stimulation techniques has established new and more treatment options for overactive bladder syndrome patients, such as percutaneous posterior tibial nerve stimulation.

The purpose in writing this paper is to explain this technique and to recommend its application as the second step with or without medications in the graduated, stepwise scheme (figure 1).

Following the graduated scheme, if percutaneous posterior tibial nerve stimulation and medications are unsuccessful, onabotulinum toxin A injections can be administered. In desperate cases, augmentation cystoplasty or even cystectomy can be indicated²-³.

Figure 1: Graduated, stepwise scheme for overactive bladder syndrome treatment [2, 3]

2. METHODS

Percutaneous posterior tibial nerve stimulation is a type of neuromodulation, whose therapeutic effect is explained by the modulation of reflex pathways; however, the exact mechanism behind neuromodulation is still not completely understood. The lumbar, sacral and coccygeal segmental nerves, with afferent and efferent fibres from L2-S4, innervate the lower urinary tract and the pelvic organs. With fibres from L4 to S3, the sciatic nerve descends to the lower extremities. The posterior tibial nerve is a branch of the sciatic nerve. The posterior tibial nerve shares nerve roots with the innervation of the lower urinary tract. It is assumed that there is cross-signaling between sympathetic and parasympathetic nerve terminals and synapses³⁴.

According to this hypothesis, stimulation of the posterior tibial nerve causes a modulation of the lower urinary tract autonomous innervation. The transcutaneous setting is less successful than the percutaneous setting. The needle electrode is placed 1.77 inches above the medial malleolus at a 60-degree angle, and a surface electrode is placed on the calcaneous. The needle and the electrode are then connected to a low voltage (9V) stimulator (figure 2, figure 3). It is an outpatient procedure which lasts about 30 minutes and should be carried out once a week for at least 12 weeks. There are no serious sequelae. The only potential side effects are related to needle insertion⁴. In some cases, maintenance therapy with 30 minute sessions every 3-4 weeks is necessary.
Figure 2: The percutaneous posterior tibial nerve stimulation point

Figure 3: Technical details: Pulse intensity adjustable: 0-10mA, Pulse width fixed: 200ms, Frequency: 20Hz
3. CASE REPORT

We present the case of an 81-year-old woman with long lasting refractory overactive bladder syndrome without incontinence. Because of symptomatic pelvic floor prolapse with uterine prolapse, cystocele and rectocele she required vaginal hysterectomy, anterior and posterior colporrhaphy and vaginal sacrospinal fixation. Postoperatively the overactive bladder symptoms increased, with diurnal and nocturnal urinary frequency every 30 minutes with voiding volumes of 30-50ml. The daily fluid intake was about 1500ml. Her quality of life was extremely reduced and the nocturia caused severe insomnia. She was no longer able to leave her apartment. It was necessary to start her on antimuscarinic therapy with trospium chloride. Behavioral treatment including control and monitoring of fluid intake and regular voidings and pelvic floor education as well as local estrogen therapy were continued. One month after surgery, despite these measures, the patient demonstrated little improvement of her symptoms. There was still no incontinence. Her quality of life remained considerably reduced. Even additional therapy with solifenacin before leaving her apartment brought no significant relief. The symptoms were particularly severe in the mornings. For these reasons, the patient began percutaneous posterior tibial nerve stimulation which continued over the course of 12 weeks. After these 12 weeks of percutaneous posterior tibial nerve stimulation, the patients’ symptoms of urgency, frequency and nocturia decreased and the voiding volume increased significantly. The frequency of voiding during the day decreased to about 2-3 hours, with only 1-2 episodes of nocturia. At the three-month follow-up visit, the patient was still continuing behavioral treatment, local estrogen therapy and antimuscarinic drugs. There was sustained improvement of her overactive bladder syndrome symptoms and she reported a considerable increase in quality of life. The urodynamic assessment five months after percutaneous posterior tibial nerve stimulation showed a persistent and significant increase of bladder capacity of 240ml. There was no detrusor instability and she had a normotonic urethral pressure and profile. In the cystoscopy, the bladder was still trabecular, fitting to the morphologic changes occurring in overactive bladder syndrome patients. Taken together, percutaneous posterior tibial nerve stimulation resulted in a lasting therapeutic breakthrough for our overactive bladder syndrome patient.

4. DISCUSSION

Percutaneous posterior tibial nerve stimulation for overactive bladder syndrome was first described by McGuire et al. 1983 and Stoller et al. 1987. Despite very promising results of these early interventions, it took years for these to reach daily practice, as the initial focus centered on invasive neuromodulation procedures such as sacral nerve stimulation. After sacral nerve stimulation was successfully introduced and gained its place in the therapeutic spectrum not only for overactive bladder syndrome, but also for fecal incontinence and chronic pelvic pain, the next challenge was to develop more easily accessible and less invasive techniques. Overactive bladder syndrome leads to an immense loss of quality of life and to social isolation. Therefore, peripheral nerve stimulation on an outpatient basis is a beneficial and easily accessible therapeutic option for treating a widespread and chronic condition in mostly elderly, comorbid and even frail patients. Overactive bladder syndrome regularly poses a therapeutic challenge especially when refractory to first line treatments because of the frequent and limiting side effects of the pharmacologic therapy.

5. CONCLUSION

Percutaneous posterior tibial nerve stimulation is feasible, well-tolerated and highly successful as a therapeutic concept for overactive bladder syndrome. The reported overall success rate in the literature ranges from 33-71%. Success is defined as a more than 50% decrease in urgency and a 25% reduction of frequency and nocturia, respectively. There is no other therapeutic option for overactive bladder syndrome patients that reaches similar success rates. Percutaneous posterior tibial nerve stimulation should be routinely offered to overactive bladder syndrome patients and employed as an early step in the treatment of overactive bladder syndrome, sometimes in combination with or even before the introduction of medications.

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REFERENCES