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Posterior Tibial Nerve Stimulation, Is It Effective Method in Managing Overactive Bladder Symptoms?

Mostafa Shendy[1], Snigdha Komatineni[2], Mohammed Dallash[3]

[1]Urology Registrar at Leighton Hospital
Email: mostafa.shendy[at]mcht.nhs.uk
Telephone Number: +447377572959

[2]Surgical SHO at Wexham Park Hospital
Email: snigdha.komatineni[at]nhs.net

[3]Urology Registrar, Urology Department, Wexham Park Hospital, Slough

Abstract: ***Background: Posterior tibial nerve stimulation (PTNS) has emerged as a novel treatment for overactive bladder symptoms (OAB). Here we report our institute PTNS experience. The main aim of this study is to evaluate the effectiveness of PTNS and its impact on the quality of life using a validated questionnaire. Methods: This retrospective study is aiming to assess the effect of posterior tibial nerve stimulation (PTNS) in management of the overactive bladder symptoms in patients who failed conservative treatment and medical therapy, this study was conducted in Wexham Park hospital in the United Kingdom (UK) and included 41 patients who had the procedure done for them once a week for 6 weeks duration between 2016 and 2019. International Consultation on Incontinence Questionnaire overactive bladder UK version (ICIQ-OAB) was used to assess the efficacy of PTNS in this study. Results: Analysis of the results showed significant improvement of the overactive bladder symptoms as follow 23 patients (82%) in frequency and 22 patients (78%) in nocturia, in addition to 21 (75%) in urgency and 18 (64%) patients in urine in leakage with average improvement 74.4%. Conclusions: Posterior Tibial Nerve Stimulation (PTNS) can be used in the management of overactive treatment if failed conservative management and medical therapy.***

Keywords: Posterior tibial nerve stimulation, PTNS, overactive bladder, urine frequency, urine leakage, urgency

1. Background

Overactive bladder syndrome (OAB) is defined as a complex of urinary symptoms including urgency which could come with or without urinary incontinence, usually; these symptoms are associated with frequency and nocturia. Furthermore, it is often but not always associated with detrusor over activity. Increase the risk of OAB may be associated with some neurological causes (Parkinsonism disease, diabetic neuropathy multiple sclerosis, spinal cord injury, dementia, and stroke) or non-neurological causes (recurrent urinary tract infection, interstitial cystitis, and enlarged prostate). Besides, the prevalence of OAB increases with age.

2. Materials and Methods

A retrospective analysis of prospectively maintained data of 41 patients who underwent posterior tibial nerve stimulation for the management of overactive bladder symptoms after failed or contraindicated conservative management and medical therapy (antimuscarinic and beta-3 receptor) in Wexham Park hospital in the United Kingdom (UK) from 2016 to 2019. ICIQ overactive bladder questionnaire was used to assess the severity of symptoms and the degree of improvement. Focusing on four main overactive bladder symptoms; frequency, nocturia, urgency, and urine leakage. The treatment course was one session a week for 6 weeks.

3. Results

A total of 28 patients out of 41 have finished the six weeks course of PTNS and 13 patients dropped out of the study, 8 of them did not tolerate and 5 of them discontinued for other reasons. Among the remaining 28 patients, the female to male ratio was 4: 1 with an age range between (36-78) years with average age (62.3) years. The study showed that improvement in symptoms was as follows: 23 (82 %) frequency, 22 (78%) in nocturia, 21 (75%) urgency, and 18 (64%) urine leakage with an overall average improvement of 74.7%.

Sub-analysis of symptoms improvement revealed significant improvement of 46% in urgency, 42% in urine leak, and 35% in both frequency and nocturia, while moderate improvement was noted to be 14% in urgency, 21% in frequency, 25% in nocturia, and 14% in incontinence. However, no improvement was observed to be higher in the incontinence domain 35%, in contrast to 17% for frequency, while 21% and 25% did not experience improvement in their nocturia, and urgency symptoms, respectively.

The previous results are shown in this table:

Improvement Symptoms	Significant	Moderate	Mild	No Improvement
Frequency	10 (35%)	6 (21%)	7 (25%)	5 (17%)
Nocturia	10 (35%)	7 (25%)	5 (17%)	6 (21%)
Urgency	13 (46%)	4 (14%)	4 (14%)	7 (25%)
Leakage	12 (42%)	4 (14%)	2 (7%)	10 (35%)

Figure 1: Showing a table of the results of PTNS on patient with OAB symptoms.

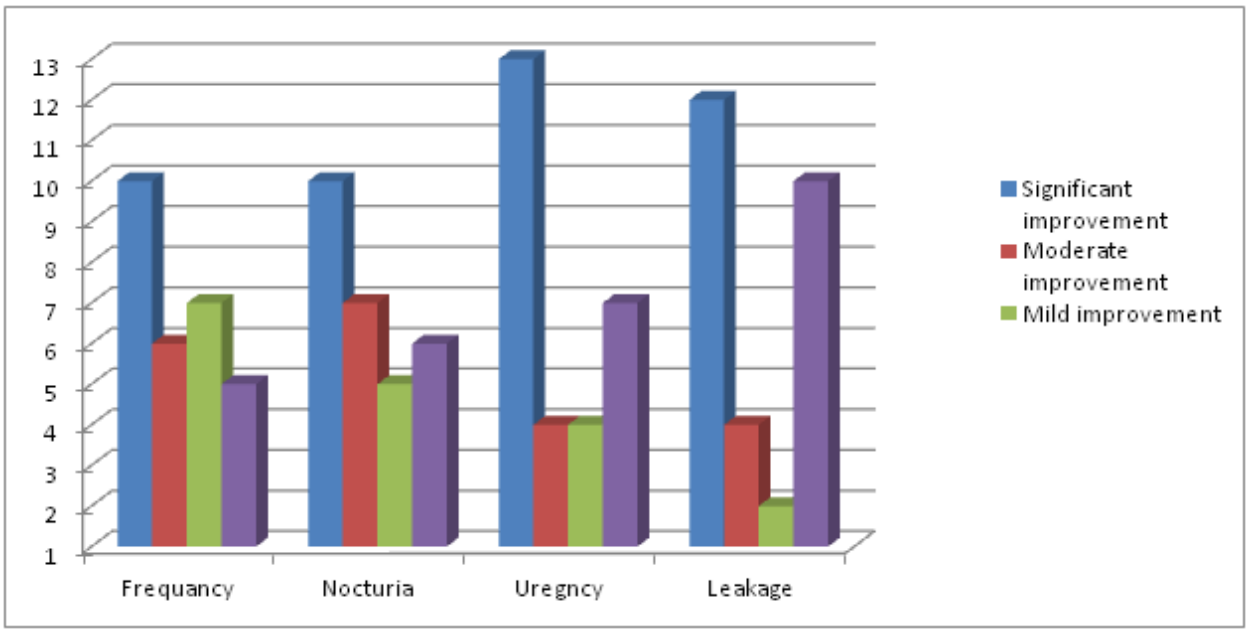

Figure 2: Showing a graph of the relation between the improvements in the four main symptoms of the overactive bladder after performing the PTNS once a week for 6 weeks.

4. Discussion

Management of overactive bladder syndrome should start by proper assessment of the causes first and careful local examination in men and women to detect any local causes which could lead to OAB like weak pelvic floor muscles, uterine prolapse or vaginal atrophy in females, and enlarged prostate in males. The first instance of managing overactive bladder should be treating the cause if possible, secondly conservative management like pelvic floor exercise, if it doesn't give the desired improvement medical therapy like antimuscarinic or beta-3 agonist, is recommended. And if medical Therapy failed or contraindicated more invasive procedures like PTNS, intravesical Botox injection, catheter insertion up to ileal conduit urinary diversion could be considered [1]. Posterior tibial nerve stimulation is considered a minimally invasive procedure. According to the national institute for health and care excellence (NICE) guidelines, the trial of posterior tibial nerve stimulation (PTNS) percutaneously recommended being offered to patients who failed conservative management and refused intravesical Botox injection. On the other hand, the European associations of urology guidelines don't recommend PTNS for men or women who seek a cure for urge incontinence but only should be used for women who didn't benefit from anticholinergic medication. [2]

How to perform the Posterior tibial nerve stimulation (PTNS):

Posterior tibial nerve stimulation could be performed transcutaneous or percutaneous, in our institute, we perform it percutaneous.

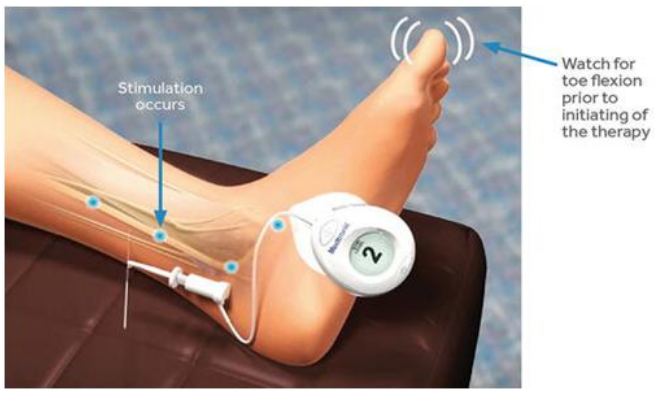

Figure 3: Showing How PTNS works

For the technique, a 34G fine-gauge needle is inserted percutaneously just above the medial malleolus behind the tibia, next to the tibial nerve. a surface electrode is placed on the foot. Both needle and electrode are connected to a low-voltage stimulator. Stimulation of the posterior tibial nerve produces sensory (tingling in the ankle, foot, or toes) and a typical motor (plantarflexion or fanning of the toes) response. [3] The procedure is contraindicated in

patients who had implantable cardiac devices (pacemakers and defibrillators), pregnancy, and active urinary tract patients.

Mechanism of Posterior tibial nerve stimulation:

The exact mechanism of action of PTNS on the bladder is unclear, but it is thought to be mediated by retrograde stimulation of the sacral nerve plexus (neuromodulation) as The posterior tibial nerve mixed sensory-motor nerve fibers forming the posterior tibial nerve originate from the same spinal segments as the nerves to the bladder and pelvic floor. [3]

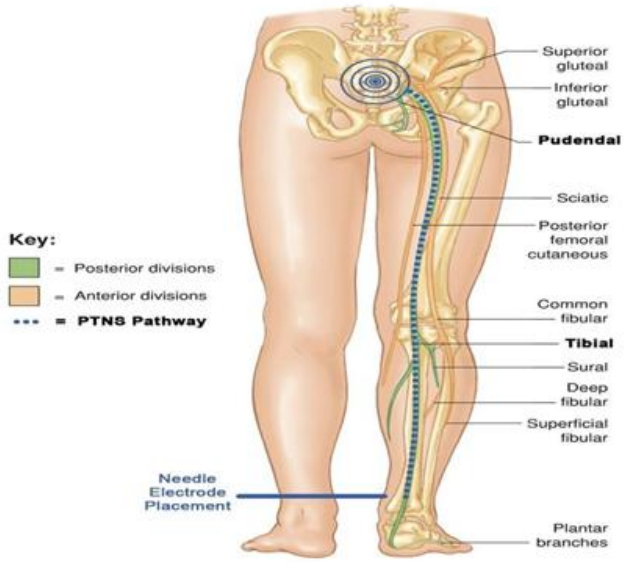

Figure 4: Showing the pathway of PTNS impulse

Although our study is retrospective, we were able to assess the patients' symptoms before the procedure by using the ICIQ-OAB as we are using the questionnaire is part of our hospital routine before managing the overactive bladder (OAB) patients which made us able to compare the results pre and post the procedure. Moreover, most of the previous studies showed the effect of PTNS in 12 weeks duration [4]and 6 months duration [5]. As one of the main issues facing the PTNS procedure is patient compliance, in this study we were trying to prove that performing PTNS for a short duration (once a week for 6weeks) could be effective in improving the OAB symptoms. Differentiation between neurogenic and non-neurogenic patients isn't included in our retrospective study, however; we think that PTNS would be effective in both kinds of patients. After analysis of our study, we can say that there aren't significant side effects for PTNS apart from mild pain, skin redness, tingling, and numbness of the toes.

5. Conclusion

Our results showed that posterior tibial nerve stimulation (PTNS) results in remarkable improvement in OAB symptoms mainly frequency, urgency, and nocturia and to a lesser extent a urine leakage.

Abbreviations

PTNS: posterior tibial nerve stimulation.

OAB: overactive bladder.

UK: United Kingdom.

ICIQ-OAB: International Consultation on Incontinence Questionnaire overactive bladder.

NICE: national institute for health and care excellence

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