Evaluation of Percutaneous Tibial Nerve Stimulation for Treatment of Refractory Painful Bladder Syndrome

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OBJECTIVE To evaluate the efficacy of intermittent percutaneous tibial nerve stimulation (PTNS) as a treatment modality for patients with refractory interstitial cystitis/bladder pain syndrome (IC/BPS).

PATIENTS AND METHODS Twenty female patients with IC/BPS (mean symptom duration of 4.5 ± 2.4 years) each had a 30-minute session of PTNS per week for 12 successive weeks and the symptoms were assessed before, during, and after the treatment sessions by voiding diary, visual analog scale (VAS) for pain, interstitial cystitis symptom and problem indices (ICSI and ICPI), and global response assessment (GRA) scale. The scores of the previous questionnaires were evaluated at weeks 0, 6, and 12.

RESULTS At week 0, the VAS, day time frequency, nocturia, and average voiding volume were 5.6 ± 1.1, 14.5 ± 4.0, 3.0 ± 0.9, and 131.8 ± 35.3 mL, respectively, meanwhile at week 12 these scores were 5.2 ± 1.5, 12.15 ± 3.7, 2.6 ± 0.7, and 141.0 ± 36.2, respectively. There was no statistically significant difference between the scores of the ICPI between weeks 0, 6, and 12 ($P = .937$). As regards the GRA score after the 12th session, 17 patients (85%) reported having no effect, 1 patient (5%) reported as having worse symptoms, and 2 patients (10%) reported having a mild good response.

CONCLUSION Intermittent PTNS is not a satisfactory treatment for refractory IC/BPS. However, it is recommended to perform more studies with other treatment protocol (maybe closer sessions) to confirm these results. UROLOGY 86: 707–711, 2015. © 2015 Elsevier Inc.

Interstitial cystitis/bladder pain syndrome (IC/BPS) is a frustrating condition for both patients and doctors.[1] It is defined as "an unpleasant sensation (pain, pressure, discomfort) perceived to be related to the urinary bladder, associated with lower urinary tract symptoms (LUTS) of more than 6 weeks duration, in the absence of infection or other identifiable causes."[2]

The etiology of IC/BPS is not completely understood; it may be because of infection, autoimmune inflammation, mast cell activation, leaky epithelium, and neurogenic inflammation or combination. The diagnosis of IC/BPS is based mainly on clinical symptoms; meanwhile, cystoscopy and/or urodynamics might be considered when the diagnosis is still doubtful.[3,4]

Many types of therapy have been employed in treatment of IC/BPS including dietary and behavioral modification, physical therapy, oral pharmacotherapy, intravesical and intradetrusor injection therapy, hydrodistension, neuromodulation, and rarely surgery as a last resort.[5]

Neuromodulation has captured the interest of urologists and its application has been widened to include lower urinary tract dysfunctions. Sacral, pudendal, and tibial nerve stimulation have been used in treatment of IC/BPS with superior results being with sacral neuromodulation (SNM). However, it is an invasive technique and needs certain skills and specialized well-equipped centers to be performed.[6]

Percutaneous tibial nerve stimulation (PTNS) provides a simple, minimally invasive, and easy-to-perform alternative to SNM as it modulates the innervation of the bladder, urinary sphincter, and pelvic floor. This technique was previously described for patients with overactive bladder, nocturnal enuresis, fecal incontinence, and, in few studies, for patients with IC/BPS.[7-10]

In light of this evidence, we performed a prospective cohort study to evaluate the effects of PTNS as a treatment modality for patients with refractory IC/BPS.

PATIENTS AND METHODS

After approval of the local ethical committee, 20 patients meeting the strict NIDDK (National Institute of Diabetes,

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Digestive and Kidney Diseases) criteria for IC[11] were selected for this prospective study from the outpatient clinic of Urology Department in Tanta University and Tanta Insurance Hospitals.

Patients' Selection and Evaluation

The inclusion criteria were symptomatic female patients (>12 months with inadequate response to other forms of therapy) with any 2 positive factors from the following: painful bladder filling relieved by voiding, pain (suprapubic, urethral, vaginal, or perineal), decreased bladder compliance on awake cystometry or glomerulations, and/or Hunner's lesions on cystoscopy.

Exclusion criteria were patients <18 years, those who had symptoms <12 months, diurnal frequency <5 times per 12 hours, nocturnal frequency <2 times per night, and bladder capacity >350 mL in awake cystometry or pregnancy. Urologic diseases including obstructive, neurogenic, inflammatory, neoplastic diseases or detrusor overactivity were excluded. Likewise, patients with previous urogenital surgery, pelvic irradiation, and chronic diseases such as diabetes mellitus, hepatic problems, peripheral neuropathy, or degenerative conditions of the spinal cord were also excluded. In addition, cardiac patients with defibrillators or pacemakers and patients with bleeding tendency were excluded.

All patients were subjected to full medical history taking: complete physical examination including general, abdominal, pelvic examinations and bimanual examination, routine laboratory and radiological investigations (plain X-ray urinary tract, abdominopelvic ultrasound, and computed tomography urography on suspicion of other pelvic lesions), urodynamic studies including uroflowmetry and filling cystometry, and urethrocystoscopy. Each patient was asked to record voiding diary and to complete the following Arabic-translated questionnaires: visual analog scale (VAS) for pain, O'Leary-Sant interstitial cystitis symptom index (ICSI), O'Leary-Sant interstitial cystitis problem index (ICPI),[12] and global response assessment (GRA) score. All the patients were informed verbally and in written consent for the nature of the study and were asked to stop any medication 4 weeks before and through the period of the study.

Treatment Protocol

Intermittent PTNS was performed using Urgent PC (Uroplasty Inc., Minnetonka, MN) in the same way described by Stoller.[13] The patient was asked to sit in a frog position with the legs slightly flexed and feet inverted. A 34-gauge needle was inserted percutaneously, approximately 2 inches (5 cm or 3 fingerbreadth) cephalic to the medial malleolus of the right or left ankle and about 1 fingerbreadth (2 cm) posterior to the tibia and the needle was advanced to the medial aspect of fibula at an angle about 60° to the surface of the skin. A surface electrode was then placed over the medial aspect of the calcaneous on the same leg. The lead wire was first connected to the pulse generator and then to the needle electrode.

The test mode was used at first, and the stimulation current was increased until flexion of big toe or fanning of all toes became evident. In case of no such motor response, the needle was removed, re-inserted, and the procedure was repeated. Then the therapy mode was used in which the current was set at a well-tolerable level. In most patients, the motor response was accompanied by a sensory response of a radiating sensation spreading in the sole of the foot. During a session, elevation of the current was allowed whenever fading of this sensation was experienced due to adaptation. The first treatment session of PTNS was applied after diagnostic cystoscopy by at least 1 month.

Patients underwent 12 sessions (once a week) in the outpatient clinic, each lasting for 30 minutes.

Outcome Evaluation

Our primary evaluation parameter was the pain (VAS) score changes. Meanwhile, the secondary considered evaluation parameters were the changes in ICSI and ICPI scores, frequency, nocturia and voiding volumes. The final outcome was assessed by the GRA scale according to the patients' satisfaction. The seven-point GRA was used to assess the patients' satisfaction after the treatment sessions and categorized into markedly worse, moderately worse, slightly worse, no change, slightly improved, moderately improved, and markedly improved.

All patients were evaluated at the baseline (before treatment, week 0), then after the sixth session of treatment (week 6), and after finishing the 12th session of treatment (week 12) by completing the following: a 3-day voiding diary, VAS for pain, ICSI, and ICPI. The GRA scale was used to evaluate the response of the patients after the sixth and after the end of the 12th sessions of treatment. All these indices were formerly translated into the Arabic language and the patients were asked to complete them either alone or with the help of a well-trained assisting nurse.

Statistical Analysis

Data including the voiding diary, VAS, ICSI, ICPI, and GRA scores were organized, tabulated, and presented as mean ± standard deviation. Statistical comparisons were carried out among week 0, week 6, and week 12 recordings using Kruskal-Wallis test with statistical significance considered at $P < .05$. Post-test multiple comparison analysis was considered only if the test yielded a significant change.

As VAS was considered as the first evaluation parameter, sample size was considered to have 80% power of detecting mean reduction of 1 point in VAS. Based on these data, using GPOWER v3.1.9.2 software (Universitat Kiel, Germany) with effect size convention of 0.727 and α-error protection of 0.05, at least 18 patients were found to be included in the present study.

RESULTS

A total of 20 female patients were included in the study. Their age ranged between 31 and 53 years (mean, 40.8 ± 6.3 years), and the mean duration of symptoms was 4.5 ± 2.4 years (range, 1-9 years). The patients' main complaints were pain in the suprapubic area and lower abdomen (17/20). However, fewer patients reported pain in the perineum and vagina (4/20). All patients reported increased both urinary frequency (9-23 voids/day) and nocturia (2-5 voids/night). Urodynamically, decreased bladder compliance was recorded in eleven patients. During cystoscopy, Hunner's ulcer was seen in only one patient whereas glomerulations on cystoscopy were seen in nearly all patients (19/20). None of our patients had a history of surgical procedures or neuromodulation therapy whereas all of them reported failed other modes of therapy.