Ultrasound-Guided Pulsed Radiofrequency of the Pudendal Nerve for the Treatment of Chronic Pelvic Pain with Different Etiologies: A Case Series

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ABSTRACT

We aimed to evaluate the efficacy of pulsed radiofrequency therapy (PRT) combined with pudendal nerve (PN) block for the treatment of chronic pelvic pain (CPP) with different etiologies. The data of nine patients whose CPP did not reduce with pharmacological treatment and who underwent PRT combined with a local anesthetic to the bilateral PN with ultrasound guided were analyzed retrospectively. Age, gender, CPP etiology, and duration of pain were evaluated. Response to treatment was assessed before and three months after the PRT by the Numerical Rating Scale (NRS) score and the American National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI). The median age of the nine patients was 56 years, and six were male. All the patients had been complaining of a variety of CPP etiologies for a median duration of 12 months. Three patients had interstitial cystitis, two had urinary bladder carcinoma, another two had prostatitis, and the last two had pudendal neuralgia. There was a significant decrease between the median pre-PRT and post-PRT NRS scores (9 vs 3, p=0.017). Moreover, the pre-PRT and post-PRT NIH-CPSI values were found to be statistically significantly different. There was no change in the designated scoring values between the pre-PRT and post-PRT scores in Cases number 2 and 4, whose etiologies were urinary bladder carcinoma.

Pulsed radiofrequency therapy with PN block provides a reduction in pain severity and urination complaints and increases the quality of life of patients with CPP.

Keywords: Pulsed radiofrequency treatment, pudendal nerve, chronic pain, pelvic pain, pudendal neuralgia

INTRODUCTION

Chronic pelvic pain (CPP) is characterized by symptoms such as paresthesia, numbness, burning, and sharp pain in the perineal and suprapubic regions. The pain is usually aggravated by sitting, voiding, defecation, ejaculation, and ovulation (1). These physiological functions, which are not
associated with pain, become a source of pain because of central sensitization (2). Patients with CPP are usually diagnosed after experiencing symptoms for a long time. Patients get a variety of treatments during this time, including pharmaceutical therapy, nerve blocks, decompressive surgery, physical therapy, and neuromodulation (3).

Pudendal nerve (PN) provides sensory innervation to the perineum and external genitalia, along with motor innervation to the urethral and anal sphincters. As with many pain syndromes, peripheral nerve block can be effective in CPP treatment. Among the various nerves innervating the pelvic region and organs, PN is preferred as a first choice nerve for both diagnosis and treatment (4). However, peripheral nerve blocks have a short-term effect; therefore, they are often combined with steroids. While some studies have reported that steroid combination prolongs treatment time, other studies have reported it as ineffective (5).

Therefore, pulsed radiofrequency therapy (PRT), which provides long-term effectiveness in pain treatment, is preferred to steroids. Pulsed radiofrequency therapy recalibrates the ion channels of the nerve and provides pain treatment with a neuromodulation effect by stopping inappropriate pain signals without causing full denervation (6). It is safer than conventional radiofrequency ablation, causes minimal tissue destruction, and can be applied to the PN containing motor fibers without causing sexual, bowel, or bladder dysfunction (7).

In the literature, studies on PRT with PN block are often related to pudendal neuralgia (8). In this case series, we aimed to evaluate the efficacy of PRT combined with PN block for the treatment of pudendal neuralgia, as well as other causes of CPP.

**CASE SERIES**

Ethics and Registration Approval for this study was obtained from the Local Ethics Committee of Diskapi Yıldırım Beyazıt Research and Training Hospital with decision number 129/06-24.01.2022. All participants were informed about the study and their written informed consent was obtained.

Between 2020 and 2021, the data of nine patients whose CPP did not reduce with pharmacological treatment and who underwent PRT combined with a local anesthetic to the bilateral PN were analyzed retrospectively in Diskapi Yıldırım Beyazıt Research and Training Hospital Pain Clinic. Age, gender, CPP etiology, and duration of pain were evaluated. Pulsed radiofrequency therapy response was assessed using prospective telephone questionnaires and retrospective reviews of the medical records. Pain intensity before and three months after PRT was evaluated by numerical rating scale (NRS) scores. By making simple gender-specific changes in anatomical terms, the American National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI) was used to evaluate the pain symptom, voiding symptoms, and quality of life scores before and three months after PRT (9).

**Interventions**

The patients were placed in the prone position. After disinfection with povidone-iodine, a convex ultrasound (Versana Premier Ultrasound Systems, GE, USA) probe (2–5 Hz) was placed on the posterior superior iliac spine in the transverse plane. By scanning caudally and medially, the interligamentous area where the PN passes and the ischial spine, in the form of a hyperechoic line, were visualized. The pudendal artery was visualized by color Doppler ultrasonography (Figure 1). A 22 G 5 mm active-tipped

![Figure 1. Access to the pudendal nerve under ultrasound guidance. A) Position of the convex ultrasound probe in the gluteal region and inserting the needle from medial to lateral with in-plane technique B) Identification of the ischial spine (IS) and the interligamentous area (ILA) between the sacrotuberous and sacrospinous ligaments where the pudendal nerve is located C) Identification of the internal pudendal artery (PA) by color Doppler ultrasound.](image-url)
radiofrequency needle (NeuroPole SC-K needle) was advanced into the interligamentous area. On sensory stimulation at 50 Hz frequency and motor stimulation at 2 Hz frequency, with an impedance of 300–500 Ω when the excitability of the nerve was below 0.5 volt, the needle was positioned until paresthesia in the breech and genital organs and contraction in the anal sphincter were felt. A 45-volt radiofrequency current not exceeding 42°C was introduced for 240 seconds. Then 3 mL of 0.25% bupivacaine was administered. In all the patients, the procedure was applied to bilateral PNs.

**Statistical Analysis**

Statistical analyses were performed using Number Cruncher Statistical Systems version 2007 (Kaysville, Utah, USA). The quantitative variables were presented as frequencies and percentages. Because of the limited patient population, the continuous variables were presented as median (minimum–maximum) values. The comparisons of qualitative variables were performed using the one-sample Wilcoxon signed-rank test. A p-value of <0.05 was considered significant.

**RESULTS**

Table I presents the demographic and clinical characteristics of the patients. The median age of the nine patients was 56 years (36–66 years), and six (66.6%) were male. All the patients had been complaining of a variety of CPP etiologies for a median duration of 12 months (6–36 months). Three (33.3%) patients had interstitial cystitis, two had urinary bladder carcinoma (22.2%), another two had prostatitis (22.2%), and the last two had pudendal neuralgia (22.2%).

As shown in Table II, there was a significant decrease between the median pre-PRT and post-PRT NRS scores (9 [8–10] versus 3 [1–10], p = 0.017). Moreover, the pre-PRT and post-PRT NIH-CPSI values (both in the total and the pain, urinary, and quality of life subscales) were found to be statistically significant. There was no change in the designated scoring values between the pre-PRT and post-PRT scores in cases 2 and 4, whose etiology was urinary bladder carcinoma.

**DISCUSSION**

There are only a few studies in the literature assessed the efficacy of PRT of the PN, and most of these studies were conducted among patients with pudendal neuralgia. In a randomized controlled study by Fang et al. among 77 patients...
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position to nineteen patients with pudendal neuralgia was found to be 89%; however, side effects in the form of short-term vaginal bleeding have been reported (14).

According to Robert et al. the PN is located between the sacrospinous and sacrotuberous ligaments at the level of the ischial spine (15). Under fluoroscopy guidance, the needle is advanced by feeling the passage through the sacrospinous ligament and targeting the ischial spine to which the sacrospinous ligaments are attached as a bone marker (16). However, fluoroscopy cannot visualize the interligamentous plane through which the PN passes, as in ultrasonography. Damage can be prevented by simultaneous visualization of the internal pudendal artery and sciatic nerve, which are close to the PN, with ultrasonography. In this case series, ultrasound guided PRT was applied to the PN, and no complications observed during or after the procedure.

The following are some of this case series’ limitations; the number of cases was limited, and the follow-up duration was only three months. Despite the small number of patients, the treatment results of chronic pelvic pain with four different etiologies were evaluated.

**CONCLUSION**

We recommend PRT with PN block in patients with CPP who do not respond to pharmacological treatment. Pulsed radiofrequency therapy with PN block provides a reduction in pain severity and urination complaints and increases the quality of life of patients with CPP. The success of PRT primarily depends on the proper positioning of the radiofrequency needle tip on the target nerve, which can be safely done with ultrasound guidance. Further randomized controlled trials are needed to demonstrate the efficacy and safety of PRT in patients with CPP.

**AUTHOR CONTRIBUTIONS**

Conception or design of the work: OTA, DY
Data collection: OTA, DY

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**Table II. Numerical Rating Scale and National Institutes of Health Chronic Prostatitis Symptom Index Values Before and 3 Months After Pudendal Nerve Pulse Radiofrequency Therapy**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-PRT median (min-max)</th>
<th>Post-PRT median (min-max)</th>
<th>z</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRS</td>
<td>9 (8-10)</td>
<td>3 (1-10)</td>
<td>-2.38</td>
<td>0.017</td>
</tr>
<tr>
<td>NIH-CPSI (Pain)</td>
<td>16 (14-19)</td>
<td>11 (5-19)</td>
<td>-2.37</td>
<td>0.017</td>
</tr>
<tr>
<td>NIH-CPSI (Urinary)</td>
<td>5 (0-10)</td>
<td>2 (0-4)</td>
<td>-2.38</td>
<td>0.017</td>
</tr>
<tr>
<td>NIH-CPSI (QoL)</td>
<td>10 (8-11)</td>
<td>4 (2-11)</td>
<td>-2.41</td>
<td>0.016</td>
</tr>
<tr>
<td>NIH-CPSI (Total)</td>
<td>32 (26-38)</td>
<td>17 (8-34)</td>
<td>-2.39</td>
<td>0.017</td>
</tr>
</tbody>
</table>

NIH-CPSI: National Institutes of Health Chronic Prostatitis Symptom Index; NRS: Numerical Rating Scale; QoL: Quality of life; PRT: Pulsed Radiofrequency Therapy. * indicates one-sample Wilcoxon signed rank test. z: The rank mean of one group compared to the overall rank mean.
**Data analysis and interpretation:** OTA, DY  
**Drafting the article:** OTA, DY  
**Critical revision of the article:** OTA

All authors (OTA, DY) reviewed the results and approved the final version of the manuscript.

**REFERENCES**