Case Report/*Olgu Sunumu*

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

Farklı Etiyolojilere Sahip Kronik Pelvik Ağrı Tedavisinde Ultrason Kılavuzluğunda Pudendal Sinirin Pulsed Radyofrekansı: Bir Olgu Serisi

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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

ÖZ

Farklı etiyolojilere sahip kronik pelvik ağrı (KPA) tedavisinde, pudendal sinir (PS) bloğu ile birlikte uygulanan pulsed radyofrekans tedavisinin (PRT) etkinliğini değerlendirmeyi amaçladık.

Kronik pelvik ağrısı farmakolojik tedavi ile azalmayan ve ultrason kılavuzluğunda bilateral PS'ye lokal anestezik ile kombine PRT uygulanan dokuz hastanın verileri retrospektif olarak incelendi. Yaş, cinsiyet, KPA etiyolojisi ve ağrı süresi kaydedildi. Tedaviye yanıt, PRT'den önce ve üç ay sonra Sayısal Derecelendirme Ölçeği (NRS) puanı ve Amerikan Ulusal Sağlık Enstitüleri Kronik Prostatit Semptom İndeksi (NIH-CPSI) ile değerlendirildi. Dokuz hastanın ortanca yaşı 56 olup, altısı erkekti. Tüm hastalar, medyan 12 aylık bir süre boyunca farklı etiyolojilere bağlı KPA'dan şikayetçiydi. Üç hastada interstisyel sistit, iki hastada mesane kanseri, diğer iki hastada prostatit ve son iki hastada pudendal nevralji vardı. Medyan NRS skorlarında PRT öncesine göre PRT sonrasında anlamlı bir düşüş vardı (9 kıyasla 3, p=0,017). Ayrıca, PRT öncesi ve sonrası NIH-CPSI değerlerinde de istatistiksel olarak anlamlı bir fark bulundu. Etiyolojisi mesane kanseri olan ikinci ve dördüncü olguların PRT öncesi ve sonrası skorları arasında belirlenen skorlama değerlerinde değişiklik olmadı.

Pudendal sinir bloğu ile birlikte uygulanan PRT, ağrı şiddeti ve idrara çıkma şikayetlerinde azalma sağlamakta ve KPA'lı hastaların yaşam kalitesini artırmaktadır.

Anahtar sözcükler: Pulsed radyofrekans tedavisi, pudendal sinir, kronik ağrı, pelvik ağrı, pudendal nevralji

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

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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 Beyazit 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 Yildirim Beyazit 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

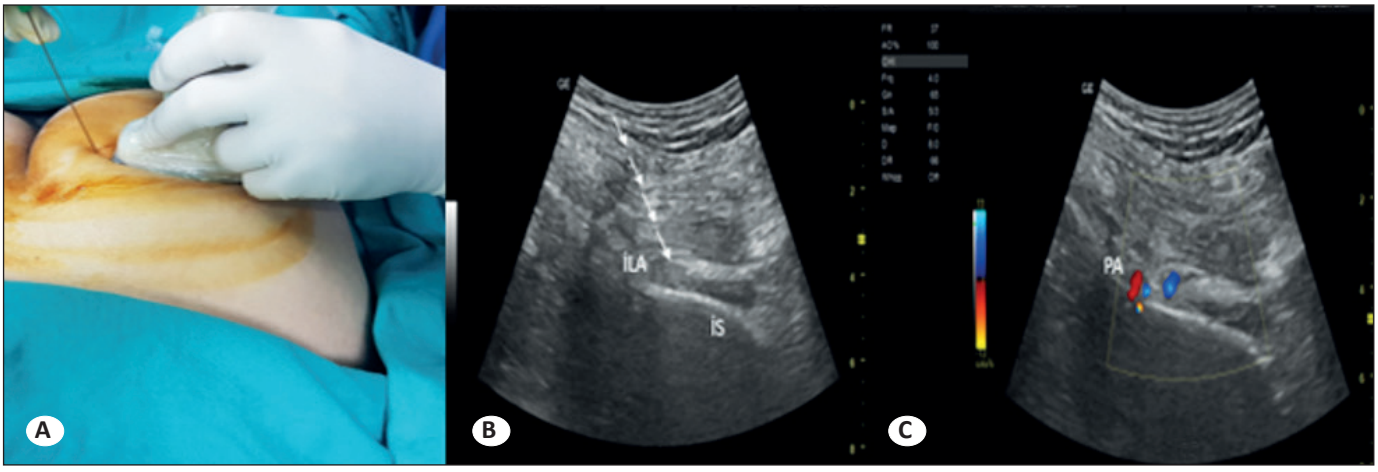

Figure 1. Access to the pudendal nerve under ultrasound guidance. **A)** Position of the convex ultrasound probe in the gluteal region and inserting the needle from medial to lateral with in-plane technique **B)** Identification of the ischial spine (IS) and the interligamentous area (ILA) between the sacrotuberous and sacrospinous ligaments where the pudendal nerve is located **C)** Identification of the internal pudendal artery (PA) by color Doppler ultrasound.

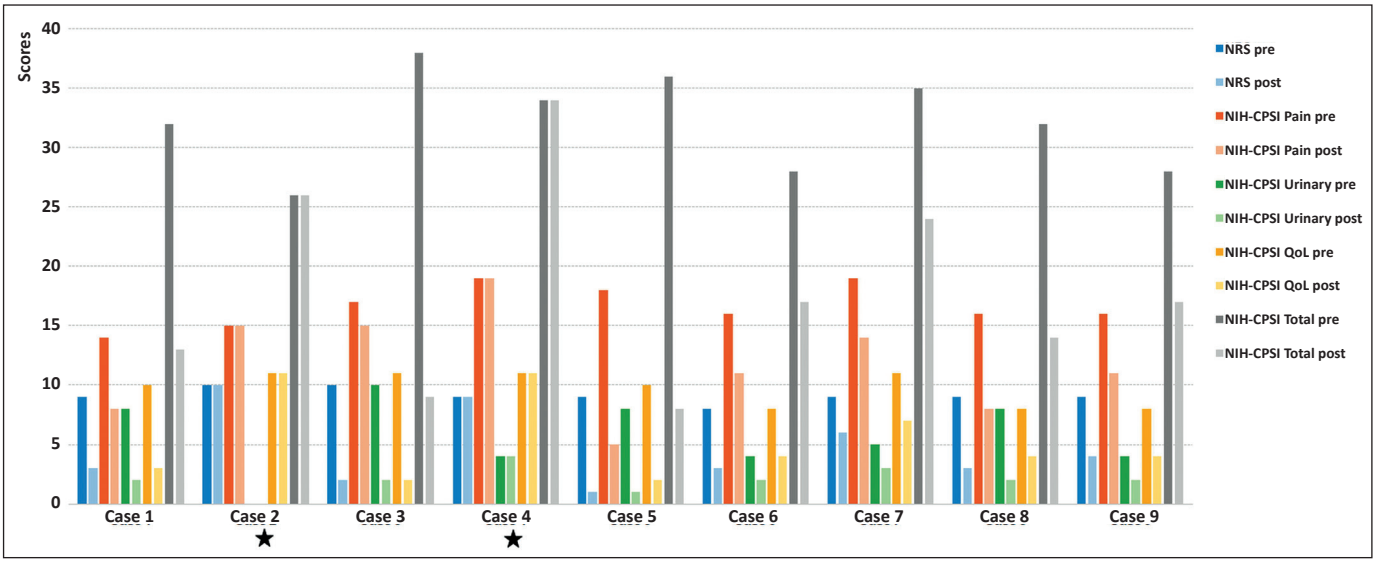

Figure 2. The case-by-case pre- and post pudendal nerve pulse radiofrequency therapy change in Numerical Rating Scale and National Institutes of Health Chronic Prostatitis Symptom Index values. Note that the designated pre- and post-interventional scores in cases 2 and 4 (indicated by star) did not change. **NIH-CPSI:** National Institutes of Health Chronic Prostatitis Symptom Index; **NRS:** Numerical Rating Scale; **QoL:** Quality of life.

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%).

Table I. The demographic and clinical characteristics of the patients

Variable	
Age (years), median (min-max)	56 (36-66)
Gender, n (%)	
Male	6 (66.7)
Female	3 (33.3)
Duration of pain (months), median (min-max)	12 (6-36)
Etiology, n (%)	
Interstitial cystitis	3 (33.3)
Urinary bladder carcinoma	2 (22.2)
Prostatitis	2 (22.2)
Pudendal neuralgia	2 (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

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

Variable	Pre-PRT median (min-max)	Post-PRT median (min-max)	z	p[a]
NRS	9 (8-10)	3 (1-10)	-2.38	**0.017**
NIH-CPSI (Pain)	16 (14-19)	11 (5-19)	-2.37	**0.017**
NIH-CPSI (Urinary)	5 (0-10)	2 (0-4)	-2.38	**0.017**
NIH-CPSI (QoL)	10 (8-11)	4 (2-11)	-2.41	**0.016**
NIH-CPSI (Total)	32 (26-38)	17 (8-34)	-2.39	**0.017**

NIH-CPSI: National Institutes of Health Chronic Prostatitis Symptom Index; **NRS:** Numerical Rating Scale; **QoL:** Quality of life; **PRT:** Pulsed Radiofrequency Therapy. [a] indicates one-sample Wilcoxon signed rank test. **z:** The rank mean of one group compared to the overall rank mean.

diagnosed with pudendal neuralgia, PN block was applied with a local anesthetic only to one group, while PRT combined with a local anesthetic was applied to another group (10). After three months of follow-up, the clinical efficacy rate was 92.1% in the PRT group and 35.9% in the local anesthetic only group.

However, CPP has multiple etiologies, including gynecological (endometriosis and pelvic inflammatory disease), gastroenterological (inflammatory bowel disease and colorectal carcinoma), urological (interstitial cystitis, prostatitis, and urinary bladder carcinoma), musculoskeletal (piriformis syndrome), and neurological diseases (pudendal neuralgia) (11). Whereas in our case series, the efficacy of PRT of the PN in four different causes of CPP was assessed. There was a decrease of more than 50% in the NRS score in the third month after the procedure in two cases (cases 6 and 9) with a diagnosis of pudendal neuralgia. Similar results were seen in three patients with interstitial cystitis and two patients with prostatitis. However, there was no decrease in NRS score in two patients with urinary bladder carcinoma. Sympathetic blocks (superior hypogastric and impar ganglion blocks) were then performed in these patients.

In our patients, an improvement in voiding symptoms within NIH-CPSI was observed, similar to the case report that revealed PN block to be useful in the treatment of urine urgency and hesitancy, as well as pelvic pain (12). Further studies are, however, needed to clarify whether PN blocks are effective in treating more than just pelvic pain.

When PN block performed with a blind technique, with the patient in the lithotomy position, the physician directs the needle by palpating the ischial spine from the vaginal wall in women and the rectum in men (13). The lithotomy position may be uncomfortable for the patient during the application, and some clinics may not have the appropriate equipment for the lithotomy position. Also, the position increases the risk of vascular injury and intravascular injection. The effectiveness of PRT with PN block applied transvaginally in the lithotomy 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

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.

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