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Fluoroscopy-Guided Pulsed Radiofrequency of the Pudendal Nerve for Chronic Pelvic Pain: A Retrospective Analysis

Kronik Pelvik Ağrıda Floroskopi Kılavuzluğunda Pudendal Sinir Atımlı Radyofrekans: Retrospektif Bir Analiz

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ABSTRACT

Objective: This study aimed to evaluate the treatment response and tolerability of fluoroscopy-guided pulsed radiofrequency (PuNPRF) applied to the pudendal nerve in patients with chronic pelvic pain (CPP) who did not adequately respond to conservative treatments.

Method: This retrospective study included 26 patients with chronic pain localized to the anogenital and/or perineal regions. All patients underwent fluoroscopy-guided PuNPRF. Pain intensity was assessed using the numeric rating scale (NRS). Treatment response was analyzed using global perceived effect (GPE) scores and patient satisfaction levels at 1st and 3rd months post-procedure.

Results: A statistically significant reduction in NRS scores was observed at both the 1st and 3rd months post-procedure ($p<0.05$). According to GPE scores, 65.4% of patients reported at least 50% improvement at the first month, with a slight decline at the third month. Patient satisfaction remained generally high, though a limited decrease was noted by the third month. No serious or lasting adverse effects were reported during the follow-up period.

Conclusion: Fluoroscopy-guided PuNPRF appears to be a well-tolerated and potentially effective treatment option for patients with chronic anogenital and/or perineal pain associated with CPP who are unresponsive to conservative therapies. Positive patient-reported outcomes combined with the absence of serious adverse effects suggests that PuNPRF may hold a valuable place in individualized, multidisciplinary pain management approaches. Further prospective studies are needed to evaluate long-term efficacy, identify predictors of treatment response, and optimize retreatment protocols.

Keywords: Chronic pain, fluoroscopy, pudendal nerve block, pelvic pain, pulsed radiofrequency, pudendal neuralgia

ÖZ

Amaç: Bu çalışmada, konservatif tedavilere yeterli yanıt alınamayan kronik pelvik ağrı (KPA) hastalarında, floroskopi kılavuzluğunda uygulanan pudendal sinir atımlı radyofrekans (PuNPRF) tedavisinin yanıt düzeyi ve tolere edilebilirliği değerlendirildi.

Yöntem: Retrospektif olarak tasarlanan bu çalışmaya, anogenital ve/veya perineal bölgede lokalize kronik ağrısı olan 26 hasta dahil edildi. Tüm hastalara floroskopi eşliğinde PuNPRF uygulandı. Ağrı şiddeti sayısal değerlendirme ölçeği (NRS) ile ölçüldü. Tedaviye yanıt, işlem sonrası 1. ve 3. aylarda genel algılanan etki (GPE) skorları ve hasta memnuniyeti düzeyleri kullanılarak analiz edildi.

Bulgular: İşlem sonrası 1. ve 3. aylarda NRS skorlarında istatistiksel olarak anlamlı azalma gözlendi ($p<0,05$). Genel algılanan etki skorlarına göre, hastaların %65,4'ü birinci ayda en az %50 oranında iyileşme bildirdi; üçüncü ayda bu oran hafifçe azaldı. Hasta memnuniyeti genel olarak yüksek düzeyde seyretti, ancak üçüncü ayda sınırlı bir düşüş izlendi. Takip süresi boyunca ciddi veya kalıcı bir yan etki bildirilmedi.

Sonuç: Floroskopi rehberliğinde uygulanan PuNPRF, konservatif tedavilere yanıt alınamayan kronik anogenital ve/veya perineal ağrısı olan KPA hastaları için iyi tolere edilen ve potansiyel olarak etkili bir tedavi seçeneği gibi görünmektedir. Hasta geri bildirimlerine dayalı olumlu sonuçlar ve ciddi yan etkilerin olmaması, PuNPRF'nin bireyselleştirilmiş, multidisipliner ağrı yönetimi yaklaşımlarında değerli bir yer edinebileceğini göstermektedir. Uzun dönem etkinliğini değerlendirmek, tedaviye yanıtı öngören faktörleri belirlemek ve yeniden uygulama protokollerini optimize etmek amacıyla ileriye dönük çalışmalara ihtiyaç vardır.

Anahtar sözcükler: Kronik ağrı, floroskopi, pudendal sinir bloğu, pelvik ağrı, atımlı radyofrekans, pudendal nevralji

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INTRODUCTION

Chronic pelvic pain (CPP) is a complex pain syndrome defined by persistent or recurrent pain lasting at least three months. This condition involves pelvic structures and is often accompanied by lower urinary tract, sexual, gastrointestinal, or gynecological symptoms, significantly impacting emotional, cognitive, and behavioral functioning (1,2). Chronic pelvic pain is relatively common; in the United Kingdom, its prevalence among women over the age of 25 has been reported as 14.8% (3). Due to its negative impact on quality of life, limited responsiveness to treatment, and the need for a multidisciplinary approach, CPP presents a significant challenge for healthcare systems (4,5).

Moreover, the etiology of CPP is typically multifactorial, involving both peripheral and central mechanisms that maintain or amplify pain (5). The clinical spectrum includes syndromes such as vulvodynia, chronic proctalgia, and pudendal neuralgia. Anogenital and perineal pain may arise from structural causes such as anal fistulas, thrombosed hemorrhoids, genital-anal malignancies, or dermatologic disorders; however, in many cases, no definitive organic pathology can be identified. Pudendal nerve pathologies are among the leading causes of neuropathic pain in this region (6).

The pudendal nerve arises from the sacral plexus and provides somatosensory innervation to the perineum, pelvic floor, and external genitalia. Pudendal neuralgia presents as a neuropathic pain syndrome marked by burning, sharp pain, and paresthesias in the pudendal dermatome, with a significant impact on quality of life. Diagnosis is based on the Nantes criteria described by Labat et al., which include pain in the pudendal nerve territory, worsening with sitting, absence during sleep, no objective sensory deficit, and pain relief following a diagnostic pudendal nerve block (PuNB) (7).

Patients initially diagnosed with other conditions who experience pelvic or perineal pain resistant to conventional treatments should be reassessed for pudendal neuralgia (8). Accordingly, peripheral nerve blocks—widely used in other pain syndromes—are also commonly employed in CPP, both diagnostically and therapeutically (9). Among the nerves innervating pelvic structures, the pudendal nerve is one of the most frequently targeted (10). However, these blocks often provide only short-term relief, underscoring the need for longer-lasting treatment options.

Pulsed radiofrequency (PRF) is a neuromodulatory technique that alters ion channels and pain signaling pathways without causing structural nerve damage. It can be safely applied to the pudendal nerve, which also contains motor fibers (11).

In this retrospective study, we evaluated the clinical outcomes and tolerability of fluoroscopy-guided pulsed radiofrequency applied to the pudendal nerve (PuNPRF) in patients with CPP localized to the perineal and/or anogenital regions who did not respond to conservative therapies. While pulsed radiofrequency treatment of the pudendal nerve is frequently discussed in the context of pudendal neuralgia, the retrospective design and potential limitations in fulfilling strict diagnostic criteria necessitated its evaluation within the broader CPP framework. The primary aim of the study was to evaluate the effect of fluoroscopy-guided PuNPRF on pain intensity in patients with CPP. To this end, changes in pain levels were quantitatively analyzed using the numerical rating scale (NRS). Secondary aims included the assessment of patient satisfaction following the procedure and the determination of the incidence of procedure-related adverse events. The findings are expected to contribute to clinical decision-making processes in planning interventional treatment options.

MATERIAL and METHODS

This retrospective study was conducted with the approval of the local Scientific and Ethical Review Board for Medical Research (Approval number: TABED 2-25-876/05.02.2025). A total of 26 patients who underwent at least one session of fluoroscopy-guided PuNPRF at a tertiary care pain clinic between January 2022 and December 2024 were included. Patient data were collected through a comprehensive retrospective review of hospital records and electronic medical systems. Missing information was completed via follow-up telephone interviews. Patients with incomplete or inaccessible records were excluded from statistical analyses.

Patient Selection

Patients presenting with CPP localized to regions innervated by the pudendal nerve, who demonstrated inadequate response to conservative therapies, were included. A diagnostic pudendal nerve block was performed prior to PuNPRF in 76.9% of cases; only those reporting at least a 50% reduction in pain intensity on the NRS following PuNB proceeded to PuNPRF treatment. However, some patients received PuNPRF without prior PuNB due to various clinical considerations. Due to the retrospective design and inherent limitations of the study, the diagnosis of pudendal neuralgia was primarily based on clinical and anamnesis data documented in patient records, as strict application of standardized diagnostic criteria such as the Nantes criteria was not feasible (7). All procedures were performed under fluoroscopic guidance in an operating room setting.

Eligibility criteria were as follows:

- Clinical and psychological suitability for interventional procedures

- Absence of active infection, coagulopathy, or significant hematologic abnormalities as determined by laboratory findings
- No known allergy to local anesthetic agents
- No prior surgical interventions that could alter the anatomical integrity of the target area
- Completion of a signed informed consent form.

In accordance with the retrospective design of the study, all patients who met the predefined inclusion criteria within the specified time frame were included.

Procedure

An intravenous line was established in all patients, and continuous hemodynamic monitoring was maintained throughout the procedure. Patients were placed in the prone position, and the intervention site was prepared and draped under sterile conditions. The superior pubic ramus and ischial tuberosity were identified as anatomical landmarks. The fluoroscopy unit was positioned in the anteroposterior view, and the ischial tuberosity was visualized using approximately 15–20° ipsilateral oblique angulation and 0–10° caudal tilt. The apex of the ipsilateral ischial tuberosity was designated as the target point (Figure 1).

A 22-gauge radiofrequency cannula (10 cm in length, 10-mm active tip) was used for the procedure. After positioning the cannula at the target site, sensory stimulation was performed using a radiofrequency generator (NeuroTherm NT1100, NeuroTherm, Petersfield, UK). During the sensory test (100 Hz, 0.1 ms, 0.1–0.5 V), patients were assessed for sensations such as pain, numbness, or tingling in the perineal area. Motor stimulation (2 Hz, >2 V) was then applied to observe for involuntary contractions in the ipsilateral lower extremity. The absence of a motor response confirmed that the needle tip was positioned away from the sciatic nerve, as intended.

Once an appropriate sensory response was obtained, PRF treatment was initiated. If no response occurred at voltages exceeding 0.5 V, cannula positioning was revised. When correct positioning was confirmed, PRF was applied at 42°C with a frequency of 2 Hz, pulse width of 20 ms, and total duration of 360 seconds. For patients with bilateral symptoms, the procedure was repeated on the contralateral side.

Following the procedure, all patients were monitored in the observation unit for at least one hour. After completing general and neurological assessments, they were discharged.

Statistical Methods

Descriptive statistics were used to analyze the data. Continuous variables were presented as mean ± standard deviation,

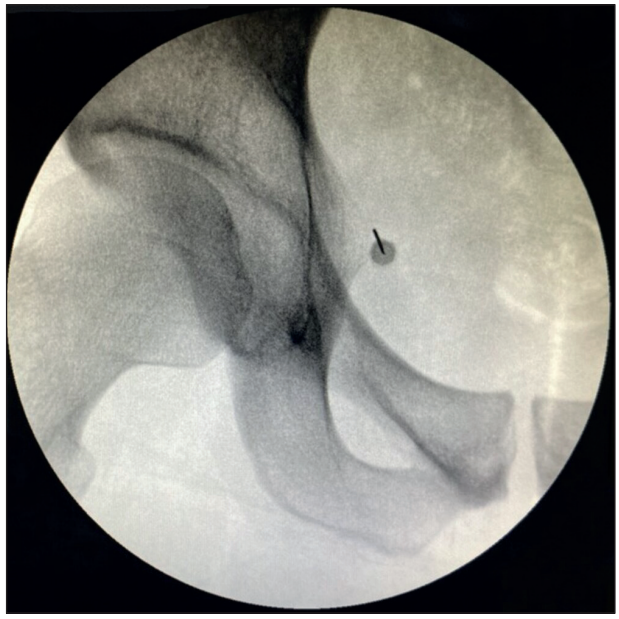

Figure 1. Fluoroscopic image of pulsed radiofrequency application to the left pudendal nerve. The radiofrequency cannula is visualized at the level of the ischial spine under ipsilateral 10–15° oblique fluoroscopic imaging.

while categorical variables were expressed as frequency (n) and percentage (%). The distribution of the data was evaluated using the Kolmogorov–Smirnov test, which revealed that the data did not follow a normal distribution. Accordingly, non-parametric statistical methods were employed.

To assess changes in NRS scores measured at baseline, 1st month, and 3rd months after treatment, the Friedman test was used as an appropriate method for repeated measures analysis. When the Friedman test indicated statistically significant differences, pairwise comparisons were conducted using the Wilcoxon signed-rank test to determine between which time points the differences occurred.

The Wilcoxon signed-rank test was also applied to evaluate changes in global perceived effect (GPE) scores and self-reported patient satisfaction levels. This non-parametric test is used to assess differences between two related samples, with results interpreted using the Z value and p value derived from positive and negative rank sums. A p value of <0.05 was considered statistically significant for all analyses.

All statistical analyses were performed using IBM Statistical Package for the Social Sciences (SPSS) Statistics for Windows, Version 21.0 (IBM Corp., Armonk, NY, USA).

Measurement and Data Collection

To evaluate the efficacy of PuNPRF treatment, outcome measures were assessed prior to the intervention and at predetermined follow-up intervals. These included:

- Numeric Rating Scale: Pelvic pain intensity was measured using an 11-point numeric rating scale ranging from 0 to 10, where 0 indicates "no pain" and 10 represents "the worst imaginable pain."
- Global Perceived Effect Score: The GPE score reflected the patient's subjective perception of change in their primary complaint, including both pain and functional outcomes. It was rated using a 7-point Likert-type scale with percentile-based interpretations for clarity (12) (Table I).
- Patient Satisfaction: Patients rated their satisfaction with the treatment on a 5-point Likert scale: 5 – Very Satisfied, 4 – Satisfied, 3 – Neutral, 2 – Dissatisfied, 1 – Very Dissatisfied.

Data Collection: Patient data were obtained from hospital records and electronic medical systems. Missing data were completed through telephone contact. All collected information was recorded on a standardized "Study Data Form." Patients whose data could not be obtained were excluded from statistical analysis.

Follow-Up Time Points: Assessments were conducted before PuNPRF treatment and at 1st-month and 3rd-month follow-up visits.

Outcomes: The primary outcome of this study was the change in pain intensity, as measured by the NRS, following fluoroscopy-guided PuNPRF treatment. Secondary outcomes included patient satisfaction assessed using a 5-point Likert scale, and the incidence of procedure-related adverse events.

Table I. Global Perceived Effect Score and Corresponding Percentage of Change

Score	Percentage of Change	Description
7	≥ 75% improvement	Very Much Improved
6	50–74% improvement	Much Improved
5	25–49% improvement	Slightly Improved
4	0–24% change	No Change
3	25–49% worsening	Slightly Worsened
2	50–74% worsening	Much Worsened
1	≥ 75% worsening	Very Much Worsened

Note: Positive percentages indicate improvement, while negative outcomes are expressed as worsening. Score 7 corresponds to Very Much Improved with ≥ 75% improvement, and score 1 corresponds to Very Much Worsened with ≥ 75% worsening.

RESULTS

This study retrospectively evaluated the responses of patients with CPP to fluoroscopy-guided PuNPRF treatment. Demographic and clinical characteristics of the participants and their treatment responses were analyzed. The findings are presented as follows:

Demographic Characteristics of Participants

A total of 26 patients were included in the study. The mean age was 51.30 ± 15.15 years. Gender distribution was equal, with 50.0% female (n=13) and 50.0% male (n=13). At least one comorbid condition was present in 61.5% of the participants (n=16), with hypertension (42.3%, n=11), diabetes mellitus (19.2%, n=5), and thyroid dysfunction (11.5%, n=3) being the most common (Table II).

Table II. Demographic Characteristics of Patients Included in the Study (n=26)

Variable	Category	Mean ± SD / n (%)
Age (years)		51.30 ± 15.15
Gender	Female	13 (50)
	Male	13 (50)
Comorbid Diseases		16 (61.5)
	HT	11 (42.3)
	DM	5 (19.2)
	CAD	1 (3.8)
	Thyroid Dysfunction	3 (11.5)
Pelvic Trauma History		3 (11.5)
Malignancy		2 (7.7)
Surgical History		7 (26.9)
Pain Duration (years)		3.37 ± 4.1

Note: Values are presented as mean ± standard deviation for continuous variables and number (percentage) for categorical variables. **HT:** Hypertension, **DM:** Diabetes mellitus, **CAD:** Coronary arterial disease.

Diagnosis and Clinical Characteristics

The mean duration of pelvic pain was 3.37 ± 4.1 years. Pudendal neuralgia was diagnosed in 57.7% (n=15) of patients. Other etiologies included post-surgical pain (11.5%), post-traumatic pain (7.7%), and metastatic cancer (3.8%). Pain was primarily localized to the perineum (84.6%, n=22), genital region (80.8%, n=21), and perianal/rectal region (73.1%, n=19). Continuous pain was reported by 57.7% (n=15), while 42.3% (n=11) experienced episodic pain. Pain localization was left-sided in 50% (n=13), right-sided in 26.9% (n=7), and bilateral in 23.1% (n=6) (Table III). Prior treatments included physical therapy and rehabilitation (11.5%, n=3) and surgery (23.1%, n=6). Common medications used for pain management included pregabalin (34.6%, n=9), serotonin-norepinephrine reuptake inhibitors (30.8%, n=8), and opioids (23.1%, n=6).

Before PRF, 76.9% of patients underwent a diagnostic PuNB under fluoroscopic guidance via a transgluteal approach (5 mL of 0.125% bupivacaine per side). The PuNPRF was applied unilaterally or bilaterally depending on symptom localization (Table III).

Table III. Clinical Features, Pain Characteristics, and PuNPRF Treatment Details

Variable	Category	n (%)
Presumed Cause of Pain	Unknown	2 (7.7)
	Post-Surgical Pain	3 (11.5)
	Pudendal Neuralgia	15 (57.7)
	Post-Traumatic Pain	2 (7.7)
	Metastatic Cancer	1 (3.8)
	Rectal Cancer	1 (3.8)
	Post-Infection	1 (3.8)
	Chronic Interstitial Cystitis	1 (3.8)
Region of Pelvic Pain	Coccyx	7 (26.9)
	Ilioinguinal	8 (30.8)
	Iliohypogastric	3 (11.5)
	Perineum	22 (84.6)
	Genital Region	21 (80.8)
	Sacral Region	2 (7.7)
	Perianal/Rectal	19 (73.1)
Nature of Pain	Continuous	15 (57.7)
	Episodic	11 (42.3)
PuNPRF Treatment Side	Right	7 (26.9)
	Left	13 (50.0)
	Bilateral	6 (23.1)

PuNPRF: Fluoroscopy-guided Pulsed Radiofrequency. **Note:** Values are presented as number (percentage). Some patients reported pain in more than one pelvic region, and bilateral treatments were applied where necessary.

Pain Scores

Baseline NRS scores averaged 7.80 ± 0.80, decreasing significantly to 3.07 ± 1.89 at 1st month post-treatment. At 3rd month, the NRS score slightly increased to 3.76 ± 2.30 but remained significantly lower than baseline (Figure 2).

''Friedman test'' indicated a significant change in NRS scores over time ($\chi^2(2) = 42.49$, $p<0.001$). Pairwise comparisons revealed a significant decrease from baseline to 1st month ($Z = -4.48$, $p<0.001$) and a mild increase from 1st to 3rd months ($Z = -2.36$, $p=0.018$), suggesting notable initial pain relief with a slight waning effect over time (Table IV).

Treatment Outcomes (GPE Scores and Patient Satisfaction)

At 1st month post-treatment, 57.7% (n = 15) of patients re-

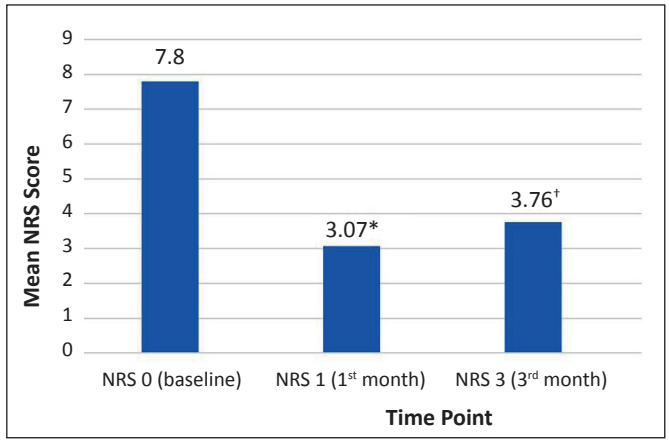

Figure 2. Mean numeric rating scale scores at baseline and follow-up. **NRS:** Numeric rating scale.
Mean NRS scores at baseline, 1st month, and 3rd month. A significant reduction was observed at the 1st month (*p<0.001 vs. baseline), followed by a slight but statistically significant increase at the 3rd month (†p=0.018 vs 1st month); however, pain levels remained substantially lower than baseline throughout the follow-up.

Table IV. Statistical Analysis of NRS Score Changes Over Time

Time Point	NRS Score (Mean ± SD)	Comparison	Test Used	Z / χ^2 Value	p-value
Baseline	7.80 ± 0.80	Baseline vs. 1st Month	Wilcoxon signed-rank	Z = -4.48	<0.001 **
1st Month	3.07 ± 1.89	1st Month vs. 3rd Month	Wilcoxon signed-rank	Z = -2.36	0.018 *
3rd Month	3.76 ± 2.30	—	—	—	—
Overall	—	Time effect (3 points)	Friedman test	$\chi^2(2) = 42.49$	<0.001 **

Comparison of NRS scores measured at baseline, 1st month, and 3rd month following fluoroscopy-guided PuNPRF treatment. A significant reduction in pain scores over time was detected using the Friedman test. Post hoc pairwise comparisons were conducted with the Wilcoxon signed-rank test. Statistical significance levels: *p<0.05, **p<0.001.
Notes:
- The Wilcoxon signed-rank test was used for pairwise comparisons between time points.
- The Friedman test was used to assess the overall time effect across the three measurement points.
- p<0.05 (*), p<0.001 (**).

Table V. Descriptive Statistics of GPE Scores at 1st and 3rd Months

Time Point	Percentage of Change	n (%)	Interpretation
GPE-1 (1st Month)	0–24%	3 (11.5)	No Change
	25–49% Improvement	6 (23.1)	Slightly Improved
	50–74% Improvement	2 (7.7)	Much Improved
	≥ 75% Improvement	15 (57.7)	Very Much Improved
GPE-3 (3rd Month)	0–24%	6 (23.1)	No Change
	25–49% Improvement	7 (26.9)	Slightly Improved
	≥ 75% Improvement	13 (50.0)	Very Much Improved

GPE: Global perceived effect. **Note:** Values are presented as number (percentage). Improvement levels are categorized based on the patient-reported percentage of symptom change following treatment. As no patients reported a 50–74% improvement at the 3rd-month follow-up, the "Much Improved" category has been omitted from the table.

Table VI. Distribution of Patient Satisfaction at 1st and 3rd Months

Satisfaction Level	1st Month n (%)	3rd Month n (%)
Very Satisfied	15 (57.7)	13 (50.0)
Satisfied	7 (26.9)	5 (19.2)
Neutral	3 (11.5)	5 (19.2)
Dissatisfied	1 (3.8)	3 (11.5)

Note: Values are presented as number (percentage). Satisfaction levels were self-reported by patients at 1st and 3rd month follow-up visits.

ported ≥75% improvement according to GPE scores, 7.7% (n=2) reported 50–74% improvement, 23.1% (n=6) reported 25–49% improvement, and 11.5% (n=3) reported no change. At 3rd month, 50% (n=13) reported ≥75% improvement, 26.9% (n=7) reported 25–49% improvement, and 23.1% (n=6) reported 0–24% improvement (Table V).

Regarding patient satisfaction, at 1st month, 57.7% (n=15) were very satisfied, 26.9% (n=7) satisfied, 11.5% (n=3) neutral, and 3.8% (n=1) dissatisfied. At 3rd month, the rates were 50.0% (n=13) very satisfied, 19.2% (n=5) satisfied, 19.2% (n=5) neutral, and 11.5% (n=3) dissatisfied (Table VI).

Wilcoxon signed-rank tests showed significant decreases between 1st and 3rd months in both GPE scores (Z = -2.26, p=0.024) and patient satisfaction (Z= -2.07, p=0.038), indicating a slight reduction in treatment effect and satisfaction over time.

Treatment Side Effects and Safety

Two patients (7.7%) experienced transient side effects, including mild leg weakness and numbness, which resolved completely within hours without functional impairment. No serious or permanent adverse effects were reported.

DISCUSSION

This retrospective study demonstrated that fluoroscopy-guided PuNPRF provided significant pain relief in patients with CPP localized to anatomical regions innervated by the pudendal nerve. A statistically significant reduction in pain intensity was observed at both the 1st and 3rd month follow-ups, with 65.4% of patients reporting at least a 50% improvement on the NRS at one month. Although a slight decline in treatment response was noted by the third month, pain levels remained considerably below baseline. These findings highlight the clinical value and safety of PuNPRF as a minimally invasive interventional option for this challenging patient population. The results also contribute to the growing body of evidence supporting the use of neuromodulation techniques in the management of refractory CPP. These observations suggest a favorable short-term tolerability profile, though prospective monitoring would be necessary to confirm long-term safety. However, due to the study's retrospective design and limited follow-up duration, further prospective studies with longer monitoring periods are needed to fully assess the long-term efficacy and safety of this treatment.

The cohort predominantly consisted of middle-aged adults with a nearly balanced gender distribution. Pudendal neuralgia was the most common clinical diagnosis, followed by postoperative, post-traumatic, and cancer-related pain. Pain localization corresponded primarily to the perineal, genital, and perianal/rectal regions, underscoring the anatomical rationale for targeting the pudendal nerve.

Patient-reported outcomes assessed via GPE scores and satisfaction surveys revealed that 65.4% of patients experienced at least a 50% improvement in their symptoms at one month, with a modest decline by the third month. Although adverse events were not systematically monitored, no serious or persistent adverse effects were reported during the available follow-up period.

It is crucial to note that pudendal region pain is not exclusively caused by nerve entrapment. Such pain may originate from central or peripheral mechanisms. Isolated perineal pain of-

ten suggests entrapment, whereas symptoms radiating to sacral dermatomes or accompanied by urinary complaints may indicate radiculopathy or central nervous system pathology (6). Although pudendal neuralgia was the most frequent diagnosis in this cohort, postoperative and post-traumatic etiologies remain clinically significant.

Pudendal nerve block and PuNPRF treatments can be administered via transvaginal, transperineal, or transgluteal approaches under ultrasound or computed tomography guidance. However, these techniques have certain limitations related to cost, technical complexity, and patient comfort. In this study, the transgluteal approach performed under fluoroscopic guidance in the prone position was considered a practical alternative that may help mitigate some of these constraints (13). Although no direct comparison was conducted within this study, fluoroscopy was observed to be an effective and feasible modality in clinical practice, owing to its greater accessibility and the ability to facilitate anatomical targeting in a shorter time. Supporting this observation, a randomized controlled trial demonstrated that pudendal nerve blocks performed under ultrasound and fluoroscopic guidance by experienced clinicians yielded comparable efficacy and safety outcomes, while the procedure duration was significantly longer with ultrasound guidance (14). These findings suggest that both techniques can be safely and effectively employed by experienced practitioners.

While pudendal nerve blocks are valuable tools for both diagnosis and short-term pain relief, their effects are often temporary, requiring repeated interventions or alternative long-term treatments (15,16). In this context, PRF has gained increasing attention as a minimally invasive technique with the potential for prolonged pain relief. PRF acts by applying high-frequency electrical fields that modulate ectopic neural discharges without inducing structural nerve damage (17). Typically applied at 42°C with standardized parameters, PRF has shown promise in managing various forms of neuropathic pain, including pudendal region pain (18).

Akkaya and Yuruk reported that ultrasound-guided bilateral PuNB combined with PRF significantly improved pain and urinary symptoms in CPP patients, thereby enhancing quality of life (11). Similarly, our results indicate that fluoroscopy-guided PuNPRF significantly reduced pain and improved patient-perceived outcomes.

In a randomized controlled trial, Fang et al. demonstrated that combining PRF with PuNB yielded superior and longer-lasting analgesia compared to PuNB alone over three months (19). These findings are in line with our results, supporting the extended analgesic benefit of PuNPRF.

Additionally, a case series involving 20 patients with refractory pudendal neuralgia reported an 89% success rate over a median follow-up of four years, although repeat PuNPRF sessions every 2 to 6 months were needed to maintain clinical benefit (4). Our findings also suggest that while the initial effects of PuNPRF are significant, repeat sessions may be necessary for long-term relief.

Despite the inherent methodological limitations of this retrospective, single-center study—including a limited sample size and a relatively short three-month follow-up period—it provides clinically relevant evidence regarding the safety and efficacy of fluoroscopy-guided PuNPRF in managing chronic pelvic pain. The inclusion of patient-reported outcomes, such as GPE scores, offers a more comprehensive evaluation of the intervention's therapeutic value within multidisciplinary pain management frameworks. However, the retrospective collection of missing data via telephone interviews may introduce recall bias, which should be carefully considered when interpreting the results. Additionally, due to the nature of the data collection, it was not possible to systematically assess changes in patients' analgesic medication use over time, limiting the ability to evaluate the broader impact of PuNPRF on pharmacological pain management strategies. Nonetheless, these findings contribute meaningfully to the expanding body of literature on interventional treatment options for refractory chronic pelvic pain and underscore the need for larger, prospective, multicenter studies to confirm and extend these observations.

CONCLUSION

In this study, fluoroscopy-guided PuNPRF resulted in significant pain reduction and improved patient-perceived outcomes in individuals with chronic anogenital and/or perineal pain unresponsive to conservative treatment. Although clinical benefits slightly diminished by the third month, outcomes remained substantially better than baseline, and no serious or lasting adverse events were observed.

These results suggest that PuNPRF may be a well-tolerated and potentially beneficial therapeutic option for selected patients with CPP, based on patient-reported outcomes and the absence of serious adverse effects during the limited-duration follow-up. Identifying predictors of treatment success may enable more personalized approaches, while determining optimal retreatment intervals could further enhance long-term efficacy. Future prospective studies are warranted to validate these findings and explore the utility of repeated PuNPRF interventions within multidisciplinary treatment frameworks.

AUTHOR CONTRIBUTIONS

Conception or design of the work: SD, US
Data collection: SD, HB
Data analysis and interpretation: SD, US, GB, AC, SC
Drafting the article: SD, US, GB, AC
Critical revision of the article: SD, US, GB, EYA, SS
The author (SD, US, GB, AC, SC, HB, SS, EYA) reviewed the results and approved the final version of the manuscript.

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