

BILATERAL SACRAL 4 PULSE RADIOFREQUENCY AND EPIDURAL TREATMENT FOR COCCYGODYNIA PAIN

Koksigodini Ağrısında Bilateral Sakral 4 Pulse Radyofrekans ve Epidural Tedavi

Mustafa ŞEN¹ 

¹ Clinic of Algology, Eskişehir City Hospital, ESKİŞEHİR, TÜRKİYE

ABSTRACT

Coccygodynia is a clinical condition characterized by chronic pain localized to the coccygeal region, typically triggered or exacerbated by sitting and often associated with prior trauma.

In this case report, a 45-year-old patient with chronic coccygodynia unresponsive to conservative treatment modalities was presented. As part of the interventional pain management strategy, the patient underwent pulsed radiofrequency and caudal transforaminal epidural steroid injection. Additionally, bilateral pulsed radiofrequency treatment was applied to the sacral dorsal root ganglia.

Follow-up assessments revealed a significant reduction in sacral pain following the intervention.

In cases of coccygodynia resistant to conservative management, pulsed radiofrequency treatment targeting the sacral dorsal root ganglia, in conjunction with conventional interventional techniques, may represent an effective and reliable therapeutic option for pain relief.

Keywords: Radiofrequency, epidural treatment, sacral pain, coccygodynia

ÖZ

Koksigodini, genellikle travma sonrası gelişen ve oturma ile şiddetlenen, koksiks bölgesinde lokalize kronik ağrı ile karakterize bir klinik tablodur. Bu olgu sunumunda, konservatif tedavilere yanıt vermeyen kronik koksigodini şikayeti bulunan 45 yaşındaki bir hasta değerlendirilmiştir. Hastanın tedavisinde, ağrı yönetiminde sık kullanılan girişimsel yöntemler arasında yer alan pulse radyofrekans ve kaudal transforaminal epidural steroid enjeksiyonuna ek olarak, bilateral sakral dorsal kök ganglionlarına radyofrekans uygulaması gerçekleştirilmiştir. Tedavi sonrası yapılan klinik takiplerde hastanın sakral bölgeye lokalize ağrısında anlamlı düzeyde azalma tespit edilmiştir. Konservatif yaklaşımlara dirençli koksigodini olgularında, klasik girişimsel yöntemlere ek olarak uygulanan bilateral sakral dorsal kök ganglion radyofrekans tedavisinin, ağrı kontrolünde etkili ve güvenilir bir seçenek olabileceği düşünülmektedir.

Anahtar Kelimeler: Radyofrekans, epidural tedavi, sakral ağrı, koksigodini



Correspondence / Yazışma Adresi:
Clinic of Algology, Eskişehir City Hospital, ESKİŞEHİR, TÜRKİYE
Phone / Tel: +905424567828
Received / Geliş Tarihi: 08.07.2025

Dr. Mustafa ŞEN
E-mail / E-posta: menings84@gmail.com
Accepted / Kabul Tarihi: 01.10.2025

INTRODUCTION

Coccygodynia (tailbone pain, coxalgia) is a chronic pain syndrome localized to the coccyx region. It is typically aggravated by sitting on hard surfaces and may radiate to the perineal area. The average age of onset is around 40 years, although it can occur in all age groups.¹ Etiologically, subluxation, hypermobility, and especially prior trauma to the coccyx are leading causes. In women, pelvic trauma related to pregnancy and childbirth, as well as mechanical stress from prolonged sitting, are common contributing factors. While perineal malignancies may rarely cause coccygeal pain, many cases are classified as idiopathic.²

The most prominent clinical finding in coccygodynia is chronic pain felt distal to the sacrum and around the anus, localized along the midline.³ This pain often intensifies with positional changes such as sitting, defecation, standing up from a seated position, or leaning backward while seated. Treatment typically begins with conservative methods, including nonsteroidal anti-inflammatory drugs, physical therapy, manual mobilization techniques, and stretching exercises.⁴ However, in cases unresponsive to these approaches, interventional treatments become relevant. Caudal epidural steroid injections (CESI), ganglion impar block (GIB), pulsed radiofrequency (PRF) of the ganglion impar, and occasionally chemical neurolysis are used as effective alternatives.⁵

The efficacy of CESI and GIB in cases unresponsive to conservative management has been demonstrated in various studies.⁶ A recent study reported that combining CESI with ganglion impar PRF (GI-PRF) enhanced treatment outcomes.⁷ The coccygeal plexus consists of the anterior branches of the S4 and S5 spinal nerves, along with the coccygeal nerve. These structures are involved in the sensory innervation of the perineum, anus, and sacrococcygeal region. Notably, stimulation of the S4 nerve root may cause anal pain, while combined stimulation of S4, S5, and coccygeal roots may result in coccygeal pain. In some cases, symptoms may also involve the S3 root.⁸

Recently, PRF targeting the dorsal root ganglion (DRG) has gained attention in chronic pain management.⁹ Its mechanism involves activation of descending noradrenergic and serotonergic inhibitory pathways.¹⁰ Because PRF provides neuromodulation without causing thermal lesions, it is considered a safe and effective technique for long-term analgesia.¹¹ This case report evaluates the clinical efficacy of CESI, GI-PRF, and bilateral S4 DRG-PRF in a patient with chronic coccygodynia unresponsive to prior conservative and interventional treatments.

CASE REPORT

A 45-year-old male with a normal body mass index presented with a two-year history of coccyx pain, exacerbated by sitting and occasionally severe in intensity. He reported reduced participation in social activities, reliance on a sitting cushion, and a significant decline in his quality of life. The pain onset followed a fall, and trauma was directly linked to coccygeal injury. Physical examination revealed tenderness over the coccyx and pain-related facial expressions when seated. His numerical rating scale (NRS) pain score was 8/10. Previous interventions included conservative management in orthopedic and physical therapy clinics, administration of nonsteroidal anti-inflammatory drugs, impar block, and PRF. However, these approaches did not result in significant clinical improvement. The patient declined opioid-based pharmacological treatment due to concerns regarding potential adverse effects.

Radiographs of the pelvis and sacral MRI were normal. The patient was informed about interventional procedures and gave written consent for the treatment. The patient was placed in the prone position in the algology intervention room. After aseptic preparation of the intergluteal region, the coccygeal area was anesthetized under fluoroscopic guidance, and a 22-gauge radiofrequency needle with a 5 mm active tip was advanced to the ganglion impar (Figure 1a). After confirming placement with 1 mL of contrast medium, PRF was applied at 42°C for 240 seconds (Figure 1b). In the same session, following local anesthesia of the caudal entry site with 2 mL of 0.5% bupivacaine, a 22-G spinal needle was advanced into the caudal epidural space under fluoroscopic guidance (Figure 2). A total of 10 mL of fluid was injected, comprising 3 mg/1 mL betamethasone, 3 mL bupivacaine, and 6 mL of 0.9% NaCl. Subsequently, a radiofrequency needle was guided to the bilateral S4 DRG (Figure 3a). Sensory stimulation at 50 Hz elicited paresthesia in the sacrococcygeal, anorectal, and perineal regions. No muscle contraction occurred with 2 Hz motor stimulation. Following appropriate responses, bilateral S4 DRG-PRF was applied at 42 °C for 240 seconds (Figure 3b). The patient was monitored for 30 minutes post-procedure without complications. His NRS pain score at one hour post-intervention was 5/10. At a 20-day follow-up, he reported a 70% reduction in pain and expressed satisfaction with the treatment. His NRS score was 3/10. At the three-month follow-up, the patient's NRS score was 2/10, and the clinical improvement was sustained without any reported adverse effects.

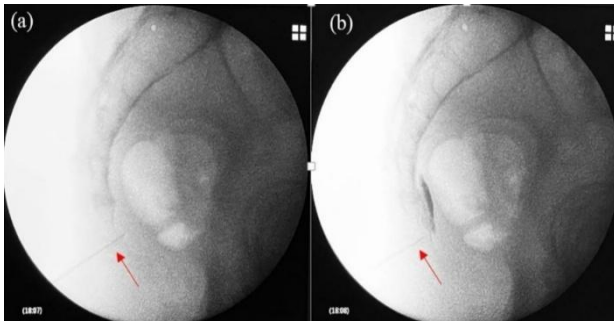


Figure 1: (a) Lateral fluoroscopic view showing the pulse radiofrequency needle positioned at the level of the ganglion impar, (b) Lateral fluoroscopic image obtained following contrast injection at the ganglion impar region.

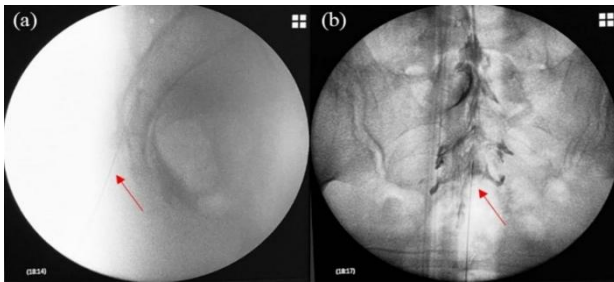


Figure 2: (a) Lateral fluoroscopic view of the spinal needle placement into the caudal epidural space, (b) Anteroposterior fluoroscopic image following contrast administration into the caudal epidural space.

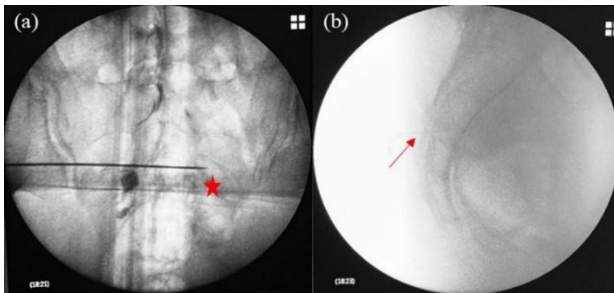


Figure 3: (a) Fluoroscopic image showing the positioning of the marker probe over the bilateral sacral 4 dorsal root ganglia, (b) Lateral fluoroscopic image obtained during pulse radiofrequency application to the bilateral S4 dorsal root ganglia.

DISCUSSION

Coccygodynia presents a therapeutic challenge due to its diverse etiology and often persistent symptoms. In this case, the addition of bilateral S4 DRG-PRF to CESI and GI-PRF offered effective chronic pain control. GIB provides temporary sympathetic blockade using local anesthetic and steroid agents. However, its effect is often short-lived and may require repetition.¹² The S4 anterior nerve root plays a crucial role in sensory innervation of the rectum, anus, and perineum. Therefore, targeting the DRG in this region may be particularly beneficial in coccygodynia. As a key relay in nociceptive and neuropathic transmission, modulating the DRG with PRF can reduce pain perception. PRF regulates neural function without thermal damage, making it a safe and effective

treatment, particularly in neuropathic pain syndromes.¹³ CESI is commonly used in lower sacral radicular pain, including coccygodynia, and remains a preferred interventional option when conservative treatments fail.¹⁴

In this case, the favorable outcome following bilateral S4 DRG-PRF highlights its potential value. Although coccygodynia is often managed successfully with conservative methods, resistant cases may benefit from multidisciplinary and interventional approaches. Bilateral S4 DRG-PRF, in combination with CESI and GI-PRF, appears to be a safe and effective option for pain control in refractory coccygodynia. Future controlled studies with extended follow-up are essential to validate these findings and support their clinical application.

Conflict of Interest: The authors have no conflicts of interest to declare.

Researchers' Contribution Rate Statement: Concept/Design: MŞ; Analysis/Interpretation: MŞ; Data Collection: MŞ; Writer: MŞ; Critical Review: MŞ; Approver: MŞ.

Support and Acknowledgement: No financial support was received from any institution or person.

Informed Volunteer/Consent Form: Written informed consent was obtained from the patient to publish this case report.

REFERENCES

1. Fogel GR, Cunningham PY III, Esses SI. Coccygodynia: Evaluation and management. *J Am Acad Orthop Surg.* 2004;12(1):49-54.
2. Patel R, Appannagari A, Whang PG. Coccydymia. *Curr Rev Musculoskelet Med.* 2008;1(3-4):223-226.
3. Foye PM. Coccydymia: Tailbone pain. *Phys Med Rehabil Clin N Am.* 2017;28(3):539-549.
4. Lirette LS, Chaiban G, Tolba R, Eissa H. Coccydymia: An overview of the anatomy, etiology, and treatment of coccyx pain. *Ochsner J.* 2014;14(1):84-87.
5. Sir E, Eksert S. Comparison of block and pulsed radiofrequency of the ganglion impar in coccygodynia. *Turk J Med Sci.* 2019;49(5):1555-1559.
6. Sencan S, Yolcu G, Bilim S, Kenis-Coskun O, Gunduz OH. Comparison of treatment outcomes in chronic coccygodynia patients treated with ganglion impar blockade versus caudal epidural steroid injection: A prospective randomized comparison study. *Korean J Pain.* 2022;35(1):106-113.
7. Gazioğlu Türkyılmaz G, Rumeli Ş. Evaluation of the effectiveness of caudal epidural steroid injection as an adjuvant to ganglion impar pulsed radiofrequency therapy in chronic coccygodynia. *Heliyon.* 2024;10(10):e31161.
8. Woon JT, Stringer MD. Clinical anatomy of the coccyx: A systematic review. *Clin Anat.* 2012;25(2):158-167.
9. Vanneste T, Van Lantschoot A, Van Boxem K, Van Zundert J. Pulsed radiofrequency in chronic pain. *Curr Opin Anaesthesiol.* 2017;30(5):577-582.
10. Park D, Chang MC. The mechanism of action of pulsed radiofrequency in reducing pain: A narrative review. *J Yeungnam Med Sci.* 2022;39(3):200-205.

11. Erdem Y, Sir E. The efficacy of ultrasound-guided pulsed radiofrequency of genicular nerves in the treatment of chronic knee pain due to severe degenerative disease or previous total knee arthroplasty. *Med Sci Monit.* 2019;25:1857-1863.
12. Malik SH, Ahmad K, Ali L. Ganglion impar block for chronic coccydynia. *J Ayub Med Coll Abbottabad.* 2023;35(1):123-126.
13. Martens JM, Fiala KJ, Kalia H, Abd-Elsayed A. Radiofrequency ablation and pulsed radiofrequency ablation for the sympathetic nervous system. In: Abd-Elsayed A eds. *Radiofrequency Ablation Techniques.* Elsevier, 2023, 186-201.
14. Govardhani Y, RamMohan G, Abhijith S, Savithri B. A comparative retrospective study of the efficacy of caudal epidural with manipulation versus ganglion impar block with manipulation in patients with coccydynia. *Indian J Pain.* 2021;35:42-45.