



SUCCESSFUL PUDENDAL NERVE BLOCK AND RADIOFREQUENCY IN 4 YEARS SCROTAL PAIN RESISTANT TO TREATMENT AND THREE VARICOCELECTOMIES: A CASE REPORT

Yang Yang Endro Arjuna^{1*}, Tasya Meidy Pradhana¹, Yusak Mangara Tua Siahaan²

*Correspondence: endroarjuna07@gmail.com

¹Faculty of Medicine, Universitas Pelita Harapan, Tangerang, Indonesia

²Department of Neurology, Faculty of Medicine, Universitas Pelita Harapan, Tangerang, Indonesia

Article History:

Received: February 27, 2025

Accepted: June 6, 2025

Published: January 1, 2026

Cite this as:

Arjuna YYE, Pradhana TM, Siahaan YMT. Successful Pudendal Nerve Block and Radiofrequency in 4 Years Scrotal Pain Resistant to Treatment and Three Varicocelectomies: A Case Report. *Magna Neurologica*. 4(1) January 2026: 15-20. [10.20961/magnaneurologica.v4i1.2259](https://doi.org/10.20961/magnaneurologica.v4i1.2259)

ABSTRACT

Background: Only a small percentage of patients (2-10%) report pain symptoms during varicocele or post-varicocelectomy. The cause of the pain remains unclear and is still a matter of debate. Neither conservative nor surgical treatments provide a conclusive solution for pain. Nerve blocks can serve as a diagnostic and therapeutic tool in cases where the origin of pain is unknown.

Case: A 30-year-old male presented with 4 year history of chronic scrotal pain, worsening over the past three weeks. The pain, rated 6/10 on the Numeric Rating Scale (NRS), was unrelieved by rest or analgesics and worsened at night and with prolonged sitting (NRS 7/10), significantly impacting daily activities. He had bilateral recurrent varicocele and underwent three varicocelectomies and ureteroscopy. Oral analgesics and neuropathic pain medications provided only temporary relief. The neurological examination revealed hyperalgesia in the distribution of the pudendal nerve. The imaging results were expected.

Discussion: A notable reduction in pain was observed following an ultrasound-guided diagnostic pudendal nerve block with 2 mL of 2% lidocaine, confirming pudendal neuralgia related to varicocele or post-varicocelectomy. The pain is likely due to compression of the pudendal nerve branch by an enlarged pampiniform plexus. Pulsed radiofrequency is utilized to provide longer-lasting pain relief. No complications were reported after the treatment.

Conclusion: Pudendal nerve blocks can alleviate scrotal pain and may be an alternative to genitofemoral and ilioinguinal nerve blocks. This is the first report of a successful pudendal nerve block for scrotal pain associated with varicocele or varicocelectomy.

Keywords: pudendal nerve block, pulsed radiofrequency, varicocele



This is an open-access article distributed under the terms of the Creative Commons Attribution- 4.0 International License

Introduction

Varicocele is the abnormal enlargement of the pampiniform venous plexus in the scrotum.¹ It affects up to 15% of individuals, with the prevalence increasing with age.^{1,2} Genetic factors and height are non-modifiable risk factors, while unhealthy lifestyles such as obesity and smoking are also strongly associated with the development of varicocele.³ Most varicoceles are asymptomatic and are often discovered incidentally during physical examinations or in male patients with abnormal sperm and semen analysis.^{4,5}

Invasive treatments, such as varicocelectomy, may be necessary to prevent retrograde flow in the internal spermatic veins and improve fertility.^{2,6}

Scrotal pain is a relatively uncommon condition, most frequently observed in males over 30, and accounts for approximately 2.5% of consultations in specialist clinics.⁷ Scrotal pain may result from various etiologies, including recurrent varicocele, hydrocele formation, neuropathic pain, referred pain from adjacent anatomical regions, nutcracker syndrome, infectious processes, and structural anomalies. The therapeutic approach is contingent upon identifying the

underlying cause. In instances of testicular torsion, immediate surgical exploration is imperative to reestablish testicular perfusion and prevent irreversible damage.⁸ In other cases, management strategies may include scrotal elevation, administration of nonsteroidal anti-inflammatory drugs (NSAIDs), antidepressants, and anticonvulsants, along with adjunctive interventions.⁸ Pain is an uncommon clinical symptom of varicocele, with only 2-10% of patients reporting scrotal pain.⁹ The typical treatment for a painful varicocele starts with conservative management and is followed by surgery.⁹ However, around 10% of patients continue to experience persistent pain after the procedure.⁹ Therefore, a thorough investigation and interdisciplinary collaboration are essential to enhance patients' symptoms and quality of life.¹⁰

Nerve blocks are a treatment option for pain in cases where medications do not provide sufficient relief.^{11,12} It serves as a diagnostic and a therapeutic intervention.¹³ Meanwhile, radiofrequency ablation (RFA) is a therapeutic procedure that alleviates pain by using thermal energy to disrupt peripheral nerves transmitting nociceptive signals to the central nervous system. Its use has risen in recent years due to its minimal complications.¹⁴⁻¹⁶ There are no published case reports or studies on the use of pudendal nerve blocks combined with radiofrequency ablation for treating chronic scrotal pain resulting from varicocele or varicocelectomy. This article may represent the first documented investigation into the combined application of pudendal nerve block and pulsed radiofrequency ablation to treat chronic scrotal pain resulting from varicocele or varicocelectomy.

Case Report

Written informed consent for publication was obtained from a 30-year-old male, who presented to the outpatient clinic with a 4-year history of chronic scrotal pain, worsened over the past three weeks. The pain, rated as 6/10 on the Numeric Rating Scale (NRS), worsened throughout the day, remained unrelieved by rest or routine analgesics, and was exacerbated at night and during prolonged periods of sitting (NRS 7/10). The symptoms significantly impacted his daily activities. The patient had bilateral recurrent varicocele (Grade 3 left, Grade 2 right) and underwent multiple procedures, including bilateral varicocelectomy performed three times and ureteroscopy. The most recent procedure was conducted five months before presentation, with no significant improvement in symptoms. Despite consultations with general practitioners, general surgeons, and urologists, the patient's scrotal pain persisted. Oral analgesics and neuropathic pain medications, including gabapentin

and NSAIDs, provided only transient relief. He noted no prior trauma, injury, or accidents before the onset of pain. Additionally, there were no urinary or fecal incontinence, urinary urgency, painful sexual intercourse, or foreign body sensation in the rectum.

During the physical examination, the patient was alert and well-nourished. Inspection of the scrotum revealed no erythema, swelling, or visible abnormalities. Palpation elicited mild tenderness on the left side without palpable masses or induration. Neurological assessment revealed normal motor strength and reflexes in the lower extremities, with sensory testing indicating hyperalgesia in the distribution of the pudendal nerve. Typical findings on color Doppler ultrasound of the scrotum, pelvic MRI, abdominal CT, and MRI. Given the persistent nature of the pain and the lack of significant findings from imaging, a pudendal neuralgia diagnosis was suspected (Figure 1). To confirm this, an ultrasound-guided diagnostic pudendal nerve block was performed using 2 mL of 2% lidocaine. This intervention resulted in a marked reduction in pain intensity, with the patient reporting a decrease from NRS 6/10 to 2/10 within 30 minutes post-injection.



Figure 1. Pelvic magnetic resonance imaging (MRI) revealed normal findings with no evidence of varicocele, while lumbosacral MRI showed a bulging disc without nerve root compression. The patient was informed that the relevant examinations would be included in the case report

The pudendal nerve block was performed using ultrasound guidance via the transgluteal (posterior) approach. The patient was prone for the procedure, and a low-frequency curvilinear ultrasound probe (2-5 MHz) was used. Scanning began over the posterior gluteal region with the probe in the transverse plane along an imaginary line connecting the greater trochanter to the posterior superior iliac spine (PSIS). Scanning began by moving the probe inferomedially until the piriformis muscle was visualized. At this level, the ischium appeared as a curved, hyperechoic line (Figure 2a). As the probe was advanced further caudally, the ischium became straighter and formed the ischial spine, visualized as a straight hyperechoic line (Figure 2b). At this level, color Doppler imaging confirmed the presence of the internal pudendal artery (Figure 2c), which was used as a landmark. The pudendal nerve was identified medial to the artery

within the interligamentous plane between the sacrotuberous and sacrospinous ligaments.

An in-plane needle approach was used under real-time ultrasound guidance. A 23-gauge, 100-mm long RF needle with a 5 mm active tip was inserted medially to laterally, targeting the pudendal nerve situated medial to the pudendal artery. Sensory stimulation at 50 Hz was then performed, with the sensory threshold maintained below 0.5 V. Once the stimulation parameters were confirmed, pulsed radiofrequency (PRF) treatment was applied. A 45 V radiofrequency current was delivered in 20 ms pulses at 2 Hz for 360 seconds.

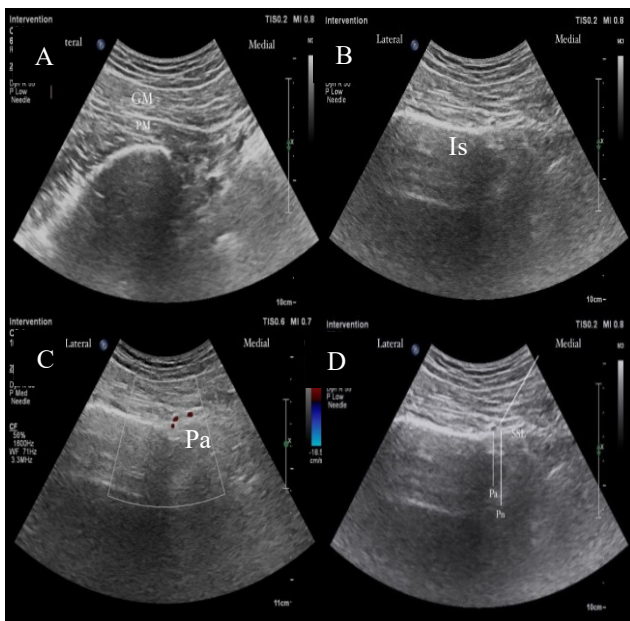


Figure 2. Ultrasonographic visualization of the pudendal nerve. (A) The ischium is observed as a curved hyperechoic line at the piriformis muscle level. (B) With caudal movement of the probe, the ischium straightens and forms the ischial spine, which is identified as a straight, hyperechoic line. (C) The pudendal artery is delineated using color Doppler imaging. (D) Ultrasonographic depiction of the pudendal artery, pudendal nerve, and the needle trajectory is introduced in a medial-to-lateral orientation. GM = Gluteus maximus, PM = Piriformis muscle, SSL = Sacrospinous ligament, Pa = Pudendal artery, Pn = Pudendal nerve, Is = Ischial spine. The patient was informed that relevant examinations would be included in the case report

The patient reported a significant reduction in pain intensity one day after the procedure, and no adverse events were reported. At the 6-month follow-up, the patient remained pain-free, resumed normal activities, discontinued the use of analgesic medications, and experienced a significant improvement in quality of life. The same procedure was conducted a year prior, and the patient remained pain-free for a year before bilateral varicocele reoccurred in 2024.

Discussion

The patient's extensive history of recurrent varicocele and multiple surgical interventions complicates the clinical picture. Despite undergoing three varicocelectomies and ureteroscopy, the persistent pain suggests a non-structural etiology. Normal imaging findings, including scrotal Doppler ultrasound, pelvic MRI, and abdominal CT, effectively ruled out anatomical abnormalities, such as residual varicocele, epididymitis, or neoplasms, as potential causes. The diagnosis of pudendal neuralgia in this case was based on the Nantes Criteria, a widely accepted guideline for identifying this condition.^{10,17} The criteria consist of five main components, most evident in this patient. First, the patient's chronic pain was localized to the pudendal nerve's distribution area, specifically the left scrotum. Second, the pain worsened with prolonged sitting, a hallmark feature of pudendal neuralgia, due to increased pressure on the nerve. Third, the pain improved when lying down, consistent with the mechanical nature of pudendal nerve irritation. This patient has experienced a recent worsening of symptoms, with pain that is no longer relieved by rest.

Fourth, there was no significant sensory loss, although hyperalgesia in the pudendal nerve territory was noted during the neurological examination. Finally, the pain responded dramatically to an ultrasound-guided pudendal nerve block, reducing pain intensity from NRS 6/10 to 2/10. This demonstrates the advantages of nerve blocks over other treatments, particularly their role as a diagnostic tool. It is also therapeutic when the cause of pain remains uncertain after a detailed history, physical examination, and imaging or electrodiagnostic tests, fulfilling the last criterion.¹³ Although multiple techniques, including fluoroscopy-guided and CT-guided pudendal nerve blocks, have been demonstrated, the success rate of ultrasound-guided blocks is comparable while avoiding radiation exposure.^{18–20} Ultrasound scanning, using a low-frequency transducer moved caudally from the ilium, allows for the real-time visualization of key structures, including the ischial spine, sacrotuberous ligament, sacrospinous ligament, and internal pudendal artery. Ultrasound-guided nerve blocks provide precise needle placement near the pudendal nerve, thereby reducing risks such as sciatic numbness. Although it has a longer procedure time than fluoroscopy, it remains a safer, less invasive, and more effective method.²⁰

The exact cause of pain associated with varicocele and chronic pain remains unclear. Various theories have been proposed to explain scrotal pain associated with varicocele, including the compression of adjacent

neural fibers due to the expansion of the venous complex, elevated scrotal temperature, ongoing inflammation, and ischemia resulting from venous stasis.^{21,22} The somatic innervation of the scrotum varies according to the specific region. The pudendal nerve, via its perineal branches, mainly supplies the posterior scrotum. Enlarging the pampiniform plexus may compress adjacent nerve branches, resulting in pain, which is why a pudendal nerve block can offer immediate pain relief.²³ This is a rare case because, anatomically, the other two primary nerves are more prone to nerve injuries. The ilioinguinal nerve, which innervates the anterior part of the scrotum, passes through the deep inguinal ring along with the cord structures. The genitofemoral nerve divides above the inguinal canal into the genital branch, which passes through the deep inguinal ring with the cord structures, and the femoral branch, which passes below the inguinal canal and innervates the anterolateral scrotum.²³

As a result, when the pampiniform plexus dilates, these two nerves are at a much higher risk of injury than the pudendal nerve branches.^{21,23} This is further supported by several case reports that document damage to the ilioinguinal and genitofemoral nerves following varicocelectomy surgery performed in the inguinal region.^{24,25} On the other hand, there have been reports of successful pain relief in varicocelectomy patients who underwent genitofemoral and inguinal blocks.^{26,27} However, to date, no case reports have indicated that a pudendal nerve block is an effective treatment for chronic scrotal pain due to varicocele or varicocelectomy. This may be the first documented instance of successfully treating varicocele or varicocelectomy-related pain with pudendal nerve block. At the same time, no adverse effects were observed in this case. Potential complications associated with nerve blocks and radiofrequency ablation include infection, bleeding, needle misplacement, and local anesthetic systemic toxicity (LAST). These risks necessitate specialized expertise to ensure patient safety during the procedure.^{28,29}

Two distinct radiofrequency techniques are routinely employed in clinical settings: continuous (CRF) and pulsed (PRF). The conventional CRF technique uses an electrode to generate heat above 45°C, which creates a magnetic current to target and damage the nerve.³⁰ While CRF has been widely used to treat neuropathic conditions such as pudendal neuralgia, it has largely been abandoned due to significant risks, including bowel, bladder, and sexual dysfunction, associated with the high temperatures required.³⁰ PRF is a minimally invasive procedure that is well-tolerated and does not carry the potential adverse effects associated with high temperatures. It employs a radiofrequency current that alternates

between brief electrical stimulation (e.g., 20ms) and a resting phase (e.g., 480ms). This intermittent pattern allows for heat dissipation, maintaining the temperature of the target tissue below 42°C. Temperature below 42°C rarely induces nerve tissue damage, rather than CRF.^{26,31,32}

PRF demonstrates high effectiveness, with long-term case series showing that 89% of patients with pudendal neuralgia experienced significant improvement over a period of up to 4 years, compared to those treated with conventional therapy alone.³³ Currently, PRF is often used in combination with nerve blocks, as this combined approach offers better pain relief and reduces depression more effectively than nerve blocks alone.³⁴⁻³⁷ Therefore, PRF shows promise for patients with chronic neuralgic pain that does not respond to conservative treatments.

The primary limitation of this study is its single-patient design, which restricts the generalizability of the findings. Further research involving a larger cohort is necessary to validate the efficacy of pudendal nerve block and pulsed radiofrequency in managing chronic scrotal pain, potentially establishing these interventions as standard treatment options. Additionally, the study relied solely on the Visual Analogue Scale (VAS) to assess pain levels. While VAS is a widely used tool for pain measurement, it does not encompass other critical aspects of patient well-being. Incorporating comprehensive assessments, such as quality of life questionnaires, would provide a more holistic evaluation of treatment outcomes.

Conclusion

In conclusion, pudendal nerve blocks can effectively alleviate pain in patients with varicocele or post-varicocelectomy pain. This method may be an alternative to genitofemoral and ilioinguinal nerve blocks in individuals with chronic scrotal pain. Moreover, Pulsed Radiofrequency can be used with nerve blocks to enhance long-term results. To date, this is the first reported case of successful pudendal nerve block in a patient with chronic scrotal pain related to varicocele or post-varicocelectomy. Additionally, further studies are needed to provide more robust findings.

References

1. Neves Da Silva H V., Meller RL, Ogundipe EA, Rochon PJ. Varicoceles: Overview of Treatment from a Radiologic and Surgical Perspective. *Semin Intervent Radiol*; 2022. 39(5):490-7. DOI: 10.1055/s-0042-1757939

2. Lomboy JR, Coward RM. The Varicocele: Clinical Presentation, Evaluation, and Surgical Management. *Semin Intervent Radiol*; 2016. 33(3):163–9. DOI: 10.1055/s-0036-1586143
3. Johnson D, & Sandlow J. Treatment of varicoceles: techniques and outcomes. *Fertility and sterility*; 2017. 108(3):378–384. DOI: 10.1016/j.fertnstert.2017.07.020
4. Chung JM, Lee SD. Current Issues in Adolescent Varicocele: Pediatric Urological Perspectives. *World J Mens Health*; 2018. 36(2):123. DOI: 10.5534/wjmh.170053
5. Macey MR, Owen RC, Ross SS, Coward RM. Best practice in the diagnosis and treatment of varicocele in children and adolescents. *Ther Adv Urol*; 2018. 10(9):273–82. DOI: 10.1177/1756287218783900
6. Tatem AJ, Brannigan RE. The role of microsurgical varicocelectomy in treating male infertility. *Transl Androl Urol*; 2017. 6(4):722–9. DOI: 10.21037/tau.2017.07.16
7. Leslie SW, Sajjad H, Siref LE. Chronic Testicular Pain and Orchalgia. In: *StatPearls*. StatPearls Publishing; 2023. Retrieved on January 21, 2025. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK482481/>
8. Saab MM, Landers M, & Hegarty J. Males' Awareness of Benign Testicular Disorders: An Integrative Review. *American journal of men's health*; 2018. 12(3):556–566. DOI: 10.1177/1557988315626508
9. Alkhayal A, Aljumaiah S, Alhagbani A, Alnahdi M, Abumelha S, Alrabeeah K. Varicocelectomy for scrotal pain: Is it effective? *Urol Ann. Urology Annals*; 2023. 15(3):311–4. DOI: 10.4103/UA.UA_64_20
10. Lai CZ, Chen SJ, Huang CP, Chen HY, Tsai MY, Liu PL, et al. Scrotal Pain after Varicocelectomy: A Narrative Review. *Biomedicines*; 2023. 11(4):1–12. DOI: 10.3390/biomedicines11041070
11. Li J, & Szabova A. Ultrasound-Guided Nerve Blocks in the Head and Neck for Chronic Pain Management: The Anatomy, Sonoanatomy, and Procedure. *Pain physician*; 2021. 24(8):533–548. DOI: 10.1093/pm/pnac007
12. Niyonkuru E, Iqbal MA, Zeng R, Zhang X, Ma P. Nerve Blocks for Post-Surgical Pain Management: A Narrative Review of Current Research. *J Pain Res*; 2024. 17:3217–39. DOI: 10.2147/JPR.S476563
13. Guven KS, Kose HC, Celikel F, Tulgar S, De Cassai, A, Akkaya OT, et al. Chronic Pain: An Update of Clinical Practices and Advances in Chronic Pain Management. *The Eurasian journal of medicine*; 2022. 54:57–61. DOI: 10.5152/eurasianjmed.2022.22307
14. Zhitny VP, Jannoud R, Young JP, Dixon B, Bungart B, Phillips L, Sutin K, Bernstein J, Issa M. Radiofrequency Ablation: Honoring the Pioneers of Modern Therapeutic Innovations. *Cureus*; 2024. 16(11):e72831. DOI: 10.7759/cureus.72831
15. Starr JB, Gold L, McCormick Z, Suri P, Friedly J. Trends in lumbar radiofrequency ablation utilization from 2007 to 2016. *Spine J*; 2019. 19(6):1019–28. DOI: 10.1016/j.spinee.2019.01.001
16. Abd-Elsayed A, Hughes M, Narel E, Loebertman MD. The Efficacy of Radiofrequency Ablation for Pain Management in Patients with Pre-Existing Hardware at the Site of Ablation. *Pain Ther*; 2020. 9(2):709–16. DOI: 10.1007/s40122-020-00201-4
17. Luesma MJ, Gale I, & Fernando J. Diagnostic and therapeutic algorithm for pudendal nerve entrapment syndrome. *Algoritmo diagnóstico y terapéutico del síndrome de atrapamiento del nervio pudendo. Medicina clinica*; 2021. 157(2):71–78. DOI: 10.1016/j.medcli.2021.02.012
18. Levin D, Van Florcke D, Schmitt M, Kendall LK, Patel A, Doan L V., et al. Fluoroscopy-Guided Transgluteal Pudendal Nerve Block for Pudendal Neuralgia: A Retrospective Case Series. *J Clin Med*; 2024. 30;13(9):2636. DOI: 10.3390/jcm13092636
19. Gubbels A, Linder M, Baran TM, Koritysskiy F, Rahman A. Effect of steroid dose on efficacy of CT-guided pudendal nerve blocks for pudendal neuralgia. *Journal of Endometriosis and Pelvic Pain Disorders*; 2022. 14(4):192-198. DOI: 10.1177/22840265221142656
20. Singh VK, Gupta A, Gupta A, et al. Comparison of the Analgesic Efficacy of Ultrasound-Guided Transperineal Approach Using Pudendal Nerve Block Versus Caudal Block in Children Undergoing Urological Surgeries: A Randomized Controlled Trial. *Cureus*; 2024. 16(11):e74244. DOI: 10.7759/cureus.74244
21. Baek SR, Park HJ, Park NC. Comparison of the clinical characteristics of patients with varicocele according to the presence or absence of scrotal pain. *Andrologia*; 2019. 51(2):4–9. DOI: 10.1111/and.13187
22. Jarvi KA, Christopher W, Curtis Nickel J, Trustin Domes, John Grantmyre, Armand Zini. Canadian Urological Association best practice report on chronic scrotal pain. *Can Urol Assoc J*; 2018. 12(6):161–72. DOI: 10.5489/cuaj.5238
23. Kinter KJ, Newton BW. Anatomy, Abdomen and Pelvis, Pudendal Nerve. In: *StatPearls*. StatPearls Publishing; 2023. Retrieved on January 21, 2025. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK554736/>
24. Napolitano L, Pandolfo SD, Aveta A, Cirigliano L, Martino R, Mattiello G, Celentano G, Barone B, Rosati C, La Rocca R, Spina G, Spirito L. The Management of Clinical Varicocele: Robotic Surgery Approach. *Front Reprod Health*; 2022. 4:791330. DOI: 10.3389/frph.2022.791330
25. Sharp E, Roberts M, Żurada-Zielińska A, Zurada A, Gielecki J, Tubbs RS et al. The most commonly injured nerves at surgery: A comprehensive review. *Clinical*

- anatomy (New York, N.Y.); 2021. 34(2):244–262. DOI: 10.1002/ca.23696
26. Celik EC, Ozbey I, Aydin ME, Yayik AM, Oral Ahiskalioglu E, Tor IH, et al. Efficacy of transversalis fascia plane block as a novel indication for varicocele surgery: prospective randomized controlled study. *BMC anesthesiology*; 2023. 23(1):48. DOI: 10.1186/s12871-023-02009-z
 27. Boran OF, Kandilcik M, Demir BT, Kati B, Demirkol MK, Barut O, et al. Effects Of The Different Anesthetic Methods On Postoperative Hospitalization And Use Of Analgesia İn Varicocele Surgery. *Med J SDU*; 2020. 27(2):180-185. DOI:10.17343/sdutfd.539792
 28. Steinfeldt T, Kessler P, Vicent O, Schwemmer U, Döffert J, Lang P, et al. Peripheral truncal blocks- Overview and assessment. *Anaesthesist*; 2020. 69(12):860-877. DOI: 10.1007/s00101-020-00809-3
 29. Wu J, Zhou Z, Huang Y, Deng X, Zheng S, He S, et al. Radiofrequency ablation: mechanisms and clinical applications. *MedComm*; 2024. 5(10):e746. DOI: 10.1002/mco2.746
 30. Wang CL & Song T. The Clinical Efficacy of High-Voltage Long-Duration Pulsed Radiofrequency Treatment in Pudendal Neuralgia: A Retrospective Study. *Neuromodulation: journal of the International Neuromodulation Society*; 2022. 25(8):1372–1377. DOI: 10.1111/ner.13401
 31. Vanneste T, Van Lantschoot A, Van Boxem K, Van Zundert J. Pulsed radiofrequency in chronic pain. *Curr Opin Anaesthesiol*; 2017. 30(5):577–82. DOI: 10.1097/ACO.0000000000000502
 32. 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. DOI: 10.12701/jyms.2022.00101
 33. Krijnen EA, Schweitzer KJ, van Wijck AJM, Withagen MIJ. Pulsed Radiofrequency of Pudendal Nerve for Treatment in Patients with Pudendal Neuralgia. A Case Series with Long-Term Follow-Up. *Pain Pract*; 2021. 21(6):703–7. DOI: 10.1111/papr.12999
 34. Fang H, Zhang J, Yang Y, Ye L, Wang X. Clinical effect and safety of pulsed radiofrequency treatment for pudendal neuralgia: A prospective, randomized controlled clinical trial. *J Pain Res*; 2018. 11:2367–74. DOI: 10.2147/JPR.S167866
 35. Wang F, Zhou Q, Xiao L, Yang J, Xong D, Li D, et al. A Randomized Comparative Study of Pulsed Radiofrequency Treatment With or Without Selective Nerve Root Block for Chronic Cervical Radicular Pain. *Pain Pract*; 2017. 17(5):589–95. DOI: 10.1111/papr.12493
 36. Tanyel Saraçoğlu T, Bılır A, Güleç MS. Effectiveness of combining greater occipital nerve block and pulsed radiofrequency treatment in patients with chronic migraine: a double-blind, randomized controlled trial. *Head Face Med*; 2024. 20(1):48. DOI: 10.1186/s13005-024-00449-7
 37. Wu Y, Huang J, Zhang W, Tian S, Chen G. Comparison of combined suprascapular and axillary nerve pulsed radiofrequency and nerve block for the treatment of primary frozen shoulder: a prospective cohort study. *Ann Med*; 2025. 57(1):2456692. DOI: 10.1080/07853890.2025.2456692