Case Report

Cukurova Anestezi ve Cerrahi Bilimler Dergisi

Phenol Neurolysis for Treatment-Resistant Post-Traumatic Neuropathic Pain: A Case Report

Ahmet Hilmi Günüç[1]

[1] Department of Algology, Isparta City Hospital, Isparta, Türkiye

Correspondence: Ahmet Hilmi Günüç, MD; hgunuc@yahoo.com

Abstract

Post-traumatic neuropathic pain due to peripheral nerve injury can be challenging to manage, especially when standard therapies fail. A 35-year-old man had a six-year history of right sural nerve neuropathic pain (Numeric Rating Scale, NRS 9) following a shrapnel injury to the distal leg. Surgical repair and rehabilitation were followed by persistent burning and shooting pain in the lateral ankle region. Pharmacologic therapies, including analgesics and gabapentinoids, provided minimal relief. Interventional attempts with a popliteal nerve block produced only short-term relief, and subsequent pulsed radiofrequency at the popliteal fossa led to transient improvement. After recurrent pain, phenol neurolysis of the sural nerve was performed following a successful diagnostic sural nerve block. The patient experienced near-complete pain resolution following phenol neurolysis. At the 4-month follow-up, his pain was significantly reduced (NRS 3), daily function had improved, and no complications were observed. This case demonstrates that phenol neurolysis can provide effective longer-term relief for treatment-resistant peripheral neuropathic pain.

Keywords: Phenol neurolysis; sural nerve; refractory neuropathic pain; peripheral nerve injury

1. Introduction

Post-traumatic neuropathic pain can be severe and challenging to manage, often proving resistant to conventional analgesics and standard treatments[1]. When neuropathic pain persists despite pharmacotherapy (e.g., anticonvulsants and antidepressants) and interventional modalities, clinicians may consider neurolytic procedures. Chemical neurolysis with phenol is a classic but underutilized technique, typically reserved for intractable pain after other modalities have failed[2]. Although there are no strict consensus guidelines for phenol neurolysis, careful patient selection is essential; candidates should undergo thorough evaluation and should have failed prior therapies, with a successful diagnostic nerve block indicating a potentially favorable response to neurolysis[2]. We report a case of chronic post-traumatic neuropathic pain refractory to standard treatments that was successfully treated with peripheral phenol nerve ablation.

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2. Case Presentation

A 35-year-old man presented with severe neuropathic pain (Numeric Rating Scale, NRS = 9/10) in the lateral aspect of his right distal lower leg and ankle. Six years earlier,

he had sustained a blast injury from an explosion, resulting in shrapnel wounds to the distal tibia, fibula, and surrounding soft tissues. The patient underwent multiple surgical repairs and extensive rehabilitation. However, since the initial trauma and surgeries, he had experienced persistent burning and dysesthetic pain in the sural nerve distribution, involving an approximately 40 cm^2 area located about 5 cm above the lateral malleolus (Figure 1). The pain was debilitating and prevented him from working. He had tried numerous treatments, including tricyclic antidepressants, gabapentinoids, nonsteroidal anti-inflammatory drugs, and opioid analgesics, with only minimal relief.

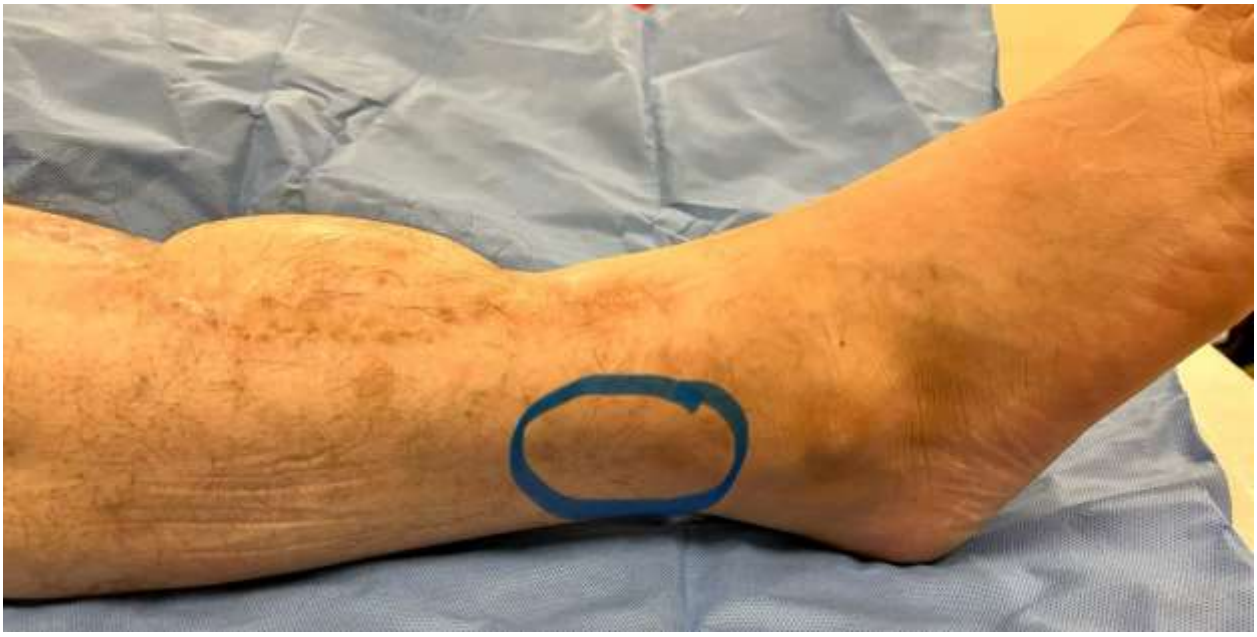

Figure 1. Pain area in the sural nerve distribution

On presentation to our pain clinic, we elected to perform a diagnostic and therapeutic nerve block. The patient received an ultrasound-guided popliteal sciatic nerve block with 0.125% bupivacaine (10 mL) plus 8 mg of dexamethasone. This provided near-complete pain relief for 48 hours, confirming the peripheral nerve as the likely pain generator. We then performed pulsed radiofrequency (PRF) treatment targeting the tibial component of the sciatic nerve at the popliteal fossa. PRF (42°C, 240 seconds) was chosen as a nondestructive neuromodulation technique. The patient experienced significant pain reduction for approximately two months following PRF. This outcome is consistent with literature reports that PRF of peripheral nerves can yield substantial but time-limited analgesia[3].

Approximately two months after PRF, the patient's pain recurred (NRS 8–9/10). Given the relapse of severe neuropathic pain and the failure of prior conservative measures, we proceeded with chemical neurolysis of the sural nerve after a successful diagnostic sural nerve block. Under real-time ultrasound guidance, a needle was advanced to a single injection point adjacent to the right sural nerve approximately 10–15 cm proximal to the lateral malleolus. Needle tip position was confirmed by direct ultrasound visualization, and injectate spread around the nerve was monitored during the injection. After negative aspiration, 5 mL of 6% glycerinized phenol solution was injected slowly and incrementally around the sural nerve (Figure 2). A 6% concentration was selected because phenol concentrations above approximately 5% are associated with protein coagulation and Wallerian degeneration, while use of a glycerol base helps restrict spread to the targeted area and may reduce off-target tissue injury[2]. The procedure was well tolerated, with no immediate complications. By the first week after the procedure, the patient

reported near-complete resolution of the neuropathic pain. At the 4-month follow-up visit, his pain remained greatly improved, with NRS 3/10 at worst (down from 9/10 before the procedure). He was able to resume normal daily activities and had discontinued all analgesic medications.

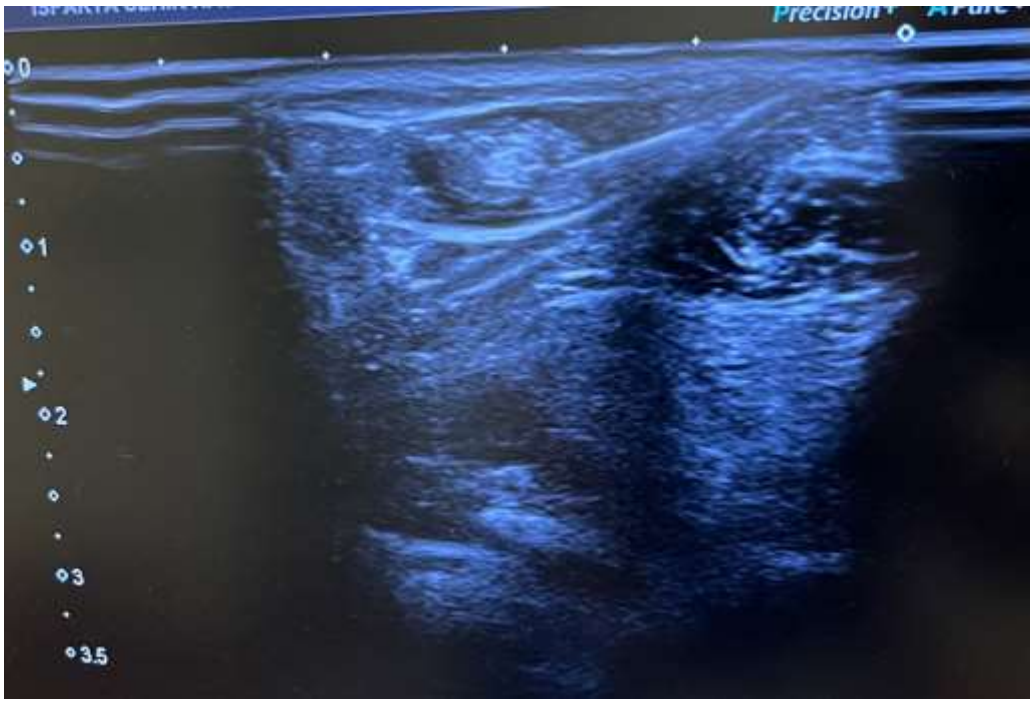

Figure 2. Ultrasound-guided sural nerve phenol injection

3. Discussion

This case illustrates that peripheral phenol neurolysis can provide safe and effective pain relief in treatment-resistant neuropathic pain stemming from nerve trauma. The sural nerve was an ideal target in this scenario: it is a purely sensory nerve, so neurolyzing it carries little risk of motor deficit, and the affected territory was well delineated. We ensured a positive response to a local anesthetic block before proceeding, in line with recommended practice to predict neurolytic success[2]. By using a glycerol-based phenol injection at a 6% concentration, we aimed to achieve a confined neurolytic effect, as glycerin can slow phenol diffusion and limit spread to surrounding tissues[2]. Concentrations above approximately 5% phenol produce protein coagulation and Wallerian degeneration in nerve fibers, resulting in long-lasting nerve blockade[2]. In this patient, a single phenol injection provided at least four months of relief, which is notable given that his pain had persisted for years despite multimodal therapy.

Our findings are consistent with earlier reports on phenol neurolysis in refractory pain. For example, Weksler et al. treated 42 patients with chronic non-malignant pain using 4% phenol and observed significant pain score reductions (average VAS from 8.7 to 1.9) with no major complications[4]. That prospective study concluded that phenol neurolysis is an effective and safe technique for severe chronic pain when used judiciously in appropriate cases. Phenol causes chemical ablation of nerve function, and although its use has declined with the advent of radiofrequency and other therapies, it remains a valuable option for localized neuropathic pain unresponsive to conventional treatments[2].

It is important to weigh the benefits of phenol blocks against their risks. In contrast to pulsed radiofrequency, which is typically nondestructive, phenol induces neural injury.

Even with careful technique, adverse effects can occur if the agent spreads beyond the target. Tissue irritation or necrosis of the skin, muscle, or surrounding soft tissue is a known hazard[6]. A recent report detailed a case of severe injection-site necrosis and infection after phenol genicular nerve ablation in a diabetic patient, underscoring the need for cautious patient selection and vigilance in post-procedure care[6]. Moreover, if phenol is injected too proximally or in excessive volume, there is a danger of neurotoxin spread into the central neuraxis. Devastating neurological injuries have been reported from phenol neurolysis performed near the spine; for instance, a case of intercostal nerve phenol injection led to paraplegia, presumably from phenol tracking into the subarachnoid space[5]. The patient did experience mild, expected post-procedure numbness in the sural nerve distribution, but this was an intended effect and was preferable to his prior debilitating pain.

Phenol neurolysis, although an older technique, can play a role in contemporary pain management for carefully selected patients. It should be considered only after other therapies (medications, nerve blocks, and neuromodulation) have proven insufficient. When performed, strict attention to technique is required: using the lowest effective concentration and volume of phenol, confirming location with precise imaging or nerve stimulation guidance, and performing incremental injection with frequent aspiration to avoid intravascular uptake. Adjuncts such as glycerin can help focus the neurolytic effect. Following these precautions, phenol neurolysis of a peripheral sensory nerve can provide substantial and lasting pain relief in otherwise refractory neuropathic pain.

4. Conclusion

In this case of post-traumatic neuropathic pain unrelieved by standard treatments, a targeted phenol neurolysis of the sural nerve achieved significant pain reduction and functional improvement. The case demonstrates that, in the setting of localized neuropathic pain refractory to medications and less destructive interventions, chemical neurolysis remains a viable option. Successful outcome requires proper patient selection (including a positive diagnostic block), meticulous technique, and awareness of potential complications. This report adds to the evidence that phenol nerve ablation can be an effective therapeutic tool for chronic neuropathic pain, providing relief when few other options remain.

genAI: No artificial intelligence-based tools or generative AI technologies were used in this study. The entire content of the manuscript was originally prepared, reviewed, and approved by the author.

Statement of Ethics: Written informed consent was obtained from the patient for publication of this case report and the accompanying images.

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