

Perineural Injection Therapy as a Therapeutic Option for Secondary Trigeminal Neuralgia: A Case Report

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ABSTRACT

Perineural Injection Therapy (PIT) using 5% dextrose has emerged as a minimally invasive approach for neuropathic pain; however, its role in trigeminal neuralgia (TN), particularly in cases with structural etiology, remains uncertain. We report a case of a 59-year-old woman with secondary trigeminal neuralgia associated with neurovascular contact who was refractory to pharmacologic therapy and declined surgical intervention. The patient presented with classical paroxysmal facial pain involving the maxillary and mandibular divisions, with a Numeric Rating Scale (NRS) score of 10/10. Magnetic resonance imaging demonstrated neurovascular contact between the right superior cerebellar artery and the trigeminal nerve at the root entry zone.

The patient underwent three sessions of PIT using 5% dextrose injected subcutaneously at five anatomically defined trigeminal points. At 6-month follow-up, pain intensity improved markedly to NRS 1/10, corresponding to a Barrow Neurological Institute (BNI) Pain Intensity score of I–II, with complete discontinuation of analgesic medication. No adverse events were observed.

Despite this favorable outcome, the fluctuating natural history of trigeminal neuralgia and the potential contribution of placebo effects limit causal interpretation. PIT may represent a minimally invasive option in carefully selected patients who are refractory to medication and decline surgical treatment. Further controlled studies are required to clarify its efficacy and clinical role.

Keywords: Trigeminal Neuralgia; Perineural Injection Therapy; Pain Management.

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INTRODUCTION

Trigeminal neuralgia (TN) is a severe neuropathic pain disorder characterized by recurrent, unilateral, brief episodes of electric shock-like pain within the distribution of the trigeminal nerve¹. The condition is typically triggered by innocuous stimuli and significantly impairs quality of life. Current treatment strategies are well established, with sodium channel blockers such as carbamazepine or oxcarbazepine serving as first-line therapy, while second-line pharmacologic agents and surgical interventions are considered in refractory cases. Surgical approaches, including microvascular decompression and ablative procedures, are particularly relevant in patients with structural etiologies².

Despite the availability of established treatment algorithms, a subset of patients remain refractory to pharmacologic therapy, develop intolerance to medications, or decline surgical intervention. In such scenarios, minimally invasive

alternatives may be explored. Perineural Injection Therapy (PIT), which involves subcutaneous administration of 5% dextrose targeting peripheral nerves, has been investigated in various peripheral neuropathic pain conditions³. However, clinical evidence supporting its use in cranial neuropathic pain remains limited, and its role in trigeminal neuralgia has not been clearly established. This report describes a patient with secondary trigeminal neuralgia associated with neurovascular contact who experienced significant clinical improvement following PIT

CASE PRESENTATION

A 59-year-old woman presented with a one-year history of severe right-sided facial pain involving the maxillary and mandibular divisions of the trigeminal nerve. The pain was described as stabbing and electric shock-like in nature, lasting approximately one minute per episode and occurring multiple times daily. It was consistently triggered by light tactile stimuli, including washing the face and brushing the

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teeth. At presentation, the pain intensity was rated as 10 out of 10 on the Numeric Rating Scale (NRS).

The patient was initially treated with carbamazepine, which had to be discontinued due to a hypersensitivity reaction. Subsequent treatment with valproic acid and gabapentin failed to provide adequate pain relief. Although other guideline-recommended agents such as oxcarbazepine, baclofen, and lamotrigine were considered, these options were not pursued due to patient preference and concerns regarding potential adverse effects.

Neurological examination revealed mechanical allodynia in the distribution of the right maxillary (V2) and mandibular (V3) branches without evidence of sensory loss, motor deficit, or involvement of other cranial nerves. No clear refractory period was identified between pain attacks. Magnetic resonance imaging demonstrated neurovascular contact between the right superior cerebellar artery and the trigeminal nerve at the root entry zone, without evidence of nerve atrophy, displacement, or additional intracranial pathology. These findings were consistent with a diagnosis of secondary trigeminal neuralgia.

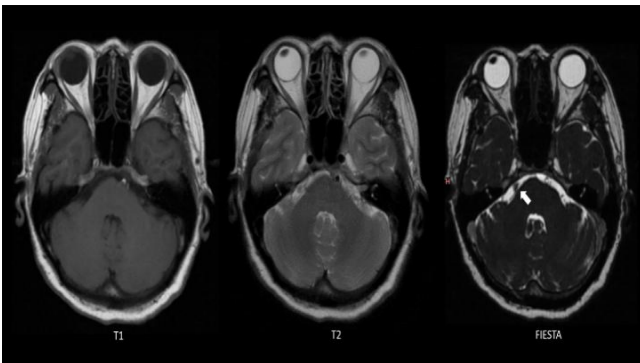


Figure 1. Brain MRI with contrast showed neurovascular contact of right superior cerebellar artery with right trigeminal nerve (arrow)

Alternative diagnoses, including short-lasting unilateral neuralgiform headache attacks (SUNCT/SUNA), persistent idiopathic facial pain, postherpetic neuralgia, and temporomandibular disorders, were systematically considered and excluded based on clinical characteristics and history. Neurosurgical intervention, including microvascular decompression, was discussed; however, the patient declined surgical treatment.

Perineural Injection Therapy was performed using isotonic 5% dextrose solution. The injections were administered subcutaneously under ultrasound guidance, allowing real-time visualization of the targeted anatomical structures and surrounding soft tissues. A high-frequency linear transducer was used to identify relevant superficial landmarks and to improve accuracy in localizing the cutaneous branches of the trigeminal nerve. The injections were delivered at five points corresponding to the trigeminal nerve distribution, including regions associated with the infraorbital, zygomaticofacial, buccal, mental, and mandibular

branches. Each injection site received approximately 1 to 2 mL of solution, with a total volume of approximately 6 to 8 mL per session.

The procedure was conducted under strict aseptic conditions, including appropriate skin preparation and aspiration prior to injection to avoid intravascular administration. No local anesthetic or additional pharmacologic agents were used. The patient underwent three treatment sessions at four-week intervals. No immediate or delayed adverse events were observed during or after the procedures.

The patient demonstrated progressive clinical improvement over the course of treatment. Following the first session, pain intensity decreased to approximately 6/10, with reduced frequency of attacks. After the second session, further improvement was noted, with pain intensity decreasing to 3/10 and reduced reliance on analgesic medication. Following the third session, pain intensity decreased to 2/10, and all analgesic medications were discontinued.

At six-month follow-up after the final session, the patient reported sustained pain relief with an NRS score of 1/10. This corresponded to a Barrow Neurological Institute (BNI) Pain Intensity score of I–II, indicating minimal to no pain without the need for medication. In addition, the patient reported significant improvement in daily functional activities, with previously triggering stimuli such as facial washing and tooth brushing no longer provoking pain. No sensory deficits or complications were identified.

DISCUSSION

This case describes a patient with secondary trigeminal neuralgia associated with neurovascular contact who experienced substantial symptom improvement following Perineural Injection Therapy. The presence of neurovascular contact at the root entry zone suggests a structural etiology, which typically supports surgical management, particularly microvascular decompression. However, in this case, pharmacologic therapy was limited by intolerance and lack of efficacy, and the patient declined surgical intervention, necessitating consideration of alternative treatment approaches.

Perineural Injection Therapy involves the administration of isotonic dextrose solution around peripheral nerves and has been proposed to modulate nociceptive signaling pathways. Several mechanisms have been suggested, including attenuation of neurogenic inflammation and modulation of ion channel activity; however, these remain theoretical and have not been specifically validated in trigeminal neuralgia⁴. The observed clinical improvement in this patient should be interpreted with caution. Trigeminal neuralgia is known to have a fluctuating course, with periods of spontaneous remission. In addition, placebo responses are well recognized in interventional pain procedures. Therefore, it is not possible to establish a direct causal relationship between PIT and the observed symptom improvement based on a single uncontrolled case.

From a clinical perspective, PIT may be considered in selected patients who are refractory or intolerant to pharmacologic therapy and who decline surgical

intervention. Its minimally invasive nature and relatively low cost may make it an attractive option in certain settings. Nevertheless, the absence of standardized protocols, limited reproducibility, and lack of high-quality evidence remain significant limitations^{5,6}.

Further research, including controlled studies and standardized outcome assessments, is required to determine the efficacy, safety, and appropriate clinical role of PIT in trigeminal neuralgia.

CONCLUSION

Perineural Injection Therapy using 5% dextrose may be associated with symptom improvement in selected patients with secondary trigeminal neuralgia who are refractory to pharmacologic treatment and decline surgical intervention. However, no causal relationship can be established based on this observation alone, and the findings should be considered hypothesis-generating. Further controlled studies are necessary to clarify the role of PIT in the management of trigeminal neuralgia.

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Ethics and Consent to Participate

Ethical approval was not required for this case report in accordance with institutional policies. Written informed

consent was obtained from the patient for publication of this case report and accompanying images..

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