

Response-Guided Low-Temperature Radiofrequency Ablation Without Escalation Above 60°C for Trigeminal Neuralgia: Two Case Reports

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ARTICLE INFO

Article history:

Received
17 May 2026

Revised
10 June 2026

Accepted
31 July 2026

Manuscript ID:
JSOCMED-17052026-57-6

Checked for Plagiarism: Yes

Language Editor:
Rebecca

Editor-Chief:
Prof. Aznan Lelo, PhD

Keywords

ABSTRACT

Introduction: Radiofrequency ablation (RFA) is an established interventional treatment for trigeminal neuralgia refractory to pharmacotherapy. Conventional protocols often escalate the temperature stepwise to 70–80°C; however, higher temperatures increase the risk of sensory complications. Whether selected patients can achieve pain control without escalation above 60°C remains clinically relevant.

Case Description: We report two patients with idiopathic trigeminal neuralgia of the mandibular (V3) division treated using a response-guided, low-temperature, fluoroscopy-guided RFA strategy. A 58-year-old man (baseline Numeric Rating Scale [NRS] 8) received two lesions at 50°C for 60 seconds each; a 63-year-old woman (baseline NRS 10) received two lesions at 60°C for 60 seconds each. Both had persistent pain despite paracetamol and pregabalin. Needle placement through the foramen ovale toward Meckel's cave was confirmed fluoroscopically, with sensory and motor testing. Both patients achieved complete pain relief immediately after the procedure (NRS 0), sustained at the three-month follow-up, without corneal complications, dysesthesia, motor deficits, or other adverse events.

Conclusion: Response-guided low-temperature RFA without escalation above 60°C may provide effective short-term pain relief in selected patients with idiopathic trigeminal neuralgia while minimizing unnecessary thermal exposure to healthy tissues. Prospective studies are needed to define the optimal patient selection, temperature, and long-term durability.

Case Reports, Radiofrequency Ablation, Trigeminal Neuralgia, Treatment Outcome

How to cite: Ramadhana R, Rahendra. Response-Guided Low-Temperature Radiofrequency Ablation Without Escalation Above 60°C for Trigeminal Neuralgia: Two Case Reports. *Journal of Society Medicine*. 2026; 5 (7): 269-273. DOI: <https://doi.org/10.71197/jsocmed.v5i7.301>

INTRODUCTION

Trigeminal neuralgia is a chronic neuropathic pain disorder characterized by sudden, severe, electric shock-like facial pain affecting one or more divisions of the trigeminal nerve. Pain attacks are commonly triggered by innocuous stimuli, such as chewing, speaking, tooth brushing, or light facial touch. The condition may substantially impair daily function, oral intake, sleep, and quality of life [1,2].

Pharmacological therapy remains the first-line treatment for trigeminal neuralgia. However, some patients continue to experience severe pain despite medication or develop adverse effects that limit long-term treatment. In such cases, interventional treatment may be considered [3]. Percutaneous radiofrequency ablation of the trigeminal ganglion is an established option for medically refractory TN. Conventional lesioning protocols often begin at approximately 60°C and escalate toward 70–80°C when pain relief or sensory change is inadequate. Although higher temperatures may improve lesion effectiveness, they may also increase the risk of facial numbness, dysesthesia, masticatory weakness, and corneal sensory disturbance [4-6]. Lower-temperature strategies have been explored to balance analgesic efficacy and safety. Nevertheless, the optimal temperature and number of lesioning cycles remain uncertain. This report presents two patients with idiopathic

mandibular division TN treated using a response-guided low-temperature strategy without escalation above 60°C.

CASE DESCRIPTION

Both patients underwent fluoroscopy-guided percutaneous radiofrequency ablation of the trigeminal ganglion. Written informed consent for publication was obtained from both patients, and all identifying information was removed.

Case 1

A 58-year-old man presented with idiopathic trigeminal neuralgia affecting the mandibular division. The patient reported severe paroxysmal facial pain with a baseline Numeric Rating Scale score of 8. The pain persisted despite pharmacological therapy with paracetamol and pregabalin, and he had no significant medical history. Neurological examination revealed no cranial nerve deficits or abnormal corneal reflexes. The clinical presentation was consistent with idiopathic trigeminal neuralgia involving the mandibular region.

Fluoroscopy-guided percutaneous radiofrequency ablation was performed under aseptic conditions with standard monitoring, including electrocardiography, non-invasive blood pressure, and pulse oximetry. No sedation was used. A 22-gauge radiofrequency needle was advanced through the foramen ovale toward Meckel's cave, and the needle position was confirmed using anteroposterior, oblique, and lateral fluoroscopic views. Sensory stimulation reproduced paresthesia in the symptomatic mandibular distribution, and motor testing demonstrated appropriate masseter contraction. The first lesion was delivered at 50°C for 60 seconds. After intra-procedural reassessment, a second lesion was performed at the same temperature for 60 seconds. The corneal reflex remained intact throughout the procedure. Immediately after the procedure, the patient reported complete pain relief, with the numeric rating scale score decreasing from 8 to 0. Pain relief was sustained at the three-month follow-up, and no dysesthesia, corneal complication, motor deficit, or recurrence was observed.

Case 2

A 63-year-old woman presented with idiopathic trigeminal neuralgia affecting the mandibular division. She reported severe paroxysmal facial pain with a baseline numeric rating scale score of 10. The pain persisted despite pharmacological therapy with paracetamol and pregabalin, and the patient had no significant additional medical history. Neurological examination revealed no focal cranial nerve deficits or normal corneal reflexes. The clinical findings supported a diagnosis of idiopathic mandibular division trigeminal neuralgia.

The same fluoroscopy-guided percutaneous radiofrequency ablation technique was performed, with standard monitoring and without sedation. A 22-gauge radiofrequency needle was introduced through the foramen ovale toward Meckel's cave, with the position confirmed in anteroposterior, oblique, and lateral fluoroscopic views. Sensory stimulation reproduced paresthesia in the mandibular distribution, while motor testing confirmed the masseter response. The first lesion was delivered at 60°C for 60 seconds. A second lesion was delivered at the same temperature for 60 seconds based on the intra-procedural clinical response; no escalation above 60°C was required. The corneal reflex remained intact after lesioning. Immediately after the procedure, the patient reported complete pain relief, with the numeric rating scale score decreasing from 10 to 0. At the three-month follow-up, pain relief remained sustained without recurrence, and no dysesthesia, corneal complication, motor deficit, or other adverse events were observed.

Timeline

Both patients had persistent mandibular division trigeminal neuralgia despite treatment with paracetamol and pregabalin. Fluoroscopy-guided radiofrequency ablation was performed using a response-guided low-temperature strategy. Pain relief was immediate in both patients and remained sustained at the three-month follow-up.

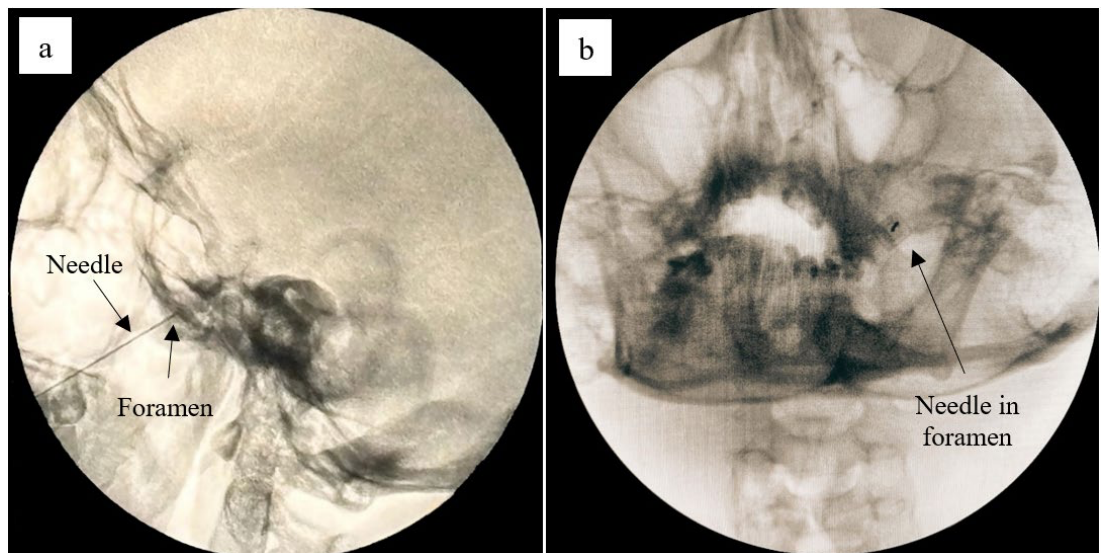


Figure 1. Fluoroscopic images demonstrating needle placement for RFA of the trigeminal ganglion. (a) Lateral view showing needle placement at the foramen ovale, targeting the mandibular (V3) division. (b) Anteroposterior (AP) view demonstrating the anatomical orientation and needle trajectory toward the foramen ovale.

Table 1. Clinical characteristics, lesion parameters, and outcomes

Patient	Age/Sex	TN type	Distribution	Previous Medication	Temperature	Lesions	Outcome
1	58/Male	Idiopathic	V3	Paracetamol, Pregabalin	50 → 50°C	2	NRS 0 at 3 months
2	63/Female	Idiopathic	V3	Paracetamol, Pregabalin	60 → 60°C	2	NRS 0 at 3 months

Note: NRS = numeric rating scale; TN = trigeminal neuralgia; V3 = mandibular division.

DISCUSSION

These two cases demonstrate that response-guided low-temperature radiofrequency ablation without escalation above 60°C may provide complete short-term pain relief in selected patients with idiopathic mandibular division trigeminal neuralgia. The clinical value of this report lies in the use of repeated low-temperature lesioning guided by intra-procedural response rather than routine escalation to higher temperatures. Conventional radiofrequency ablation protocols frequently use stepwise temperature escalation when the initial lesion does not produce adequate sensory changes or analgesic effects. Higher temperatures may increase lesion size and improve immediate neural interruption, but they can also increase the likelihood of sensory complications [4-6]. This balance is particularly important in trigeminal interventions, where excessive thermal injury may result in facial numbness, dysesthesia, masticatory weakness, or corneal sensory impairment.

In the first case, two lesions at 50°C achieved complete pain relief; in the second, two lesions at 60°C achieved the same clinical result. Both patients had idiopathic trigeminal neuralgia involving the mandibular division, making the clinical profile relatively homogeneous. Neither patient required escalation to 70–80°C. This supports the concept that, in selected patients, repeated lesioning at lower temperatures may be sufficient when guided by clinical response and sensory assessment [7]. The preservation of the corneal reflex in both patients is an important safety observation. Although the target distribution was the mandibular division, corneal reflex testing remains a useful safety check during trigeminal ganglion procedures. No dysesthesia, corneal complication, motor deficit, or recurrence was observed during the three-month follow-up. This report has several limitations. First, it includes only two patients; therefore, the findings cannot be generalized to all patients with trigeminal neuralgia. Second, the follow-up was limited to three months, and longer observation is required to evaluate recurrence. Third, this technique may not be suitable for patients with atypical facial pain, tumor-related trigeminal neuropathy, demyelinating disease, impaired corneal reflex, extensive sensory

deficits, or structural lesions requiring alternative treatment. Further prospective studies are needed to determine optimal patient selection, lesion temperature, number of cycles, and long-term outcomes.

CONCLUSION

These two cases suggest that response-guided low-temperature radiofrequency ablation without escalation above 60°C may provide effective short-term pain relief in selected patients with idiopathic mandibular division of trigeminal neuralgia. Repeated lesioning at 50–60°C, guided by real-time clinical assessment, may reduce unnecessary thermal exposure while preserving neurological function.

DECLARATIONS

Ethical Approval: Not required for a single case report, according to institutional policy.

Consent for Publication: Written informed consent was obtained from the patient for the publication of this case report and accompanying clinical information.

CONSENT FOR PUBLICATION

The Authors agree to be published in the Journal of Society Medicine.

FUNDING

None

COMPETING INTERESTS

The authors declare no conflicts of interest in this case report.

AUTHORS' CONTRIBUTIONS

R.R. was responsible for patient management, data acquisition, and drafting the initial manuscript. R. contributed to the clinical supervision and critical revision of the manuscript for important intellectual content. Both authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

ACKNOWLEDGMENTS

The authors thank the staff of the Department of Anesthesiology and Intensive Therapy, Faculty of Medicine, Universitas Indonesia for their support in patient care and procedural documentation.

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