

Use of Cryoneurolysis Therapy for the Management of Idiopathic Trigeminal Neuralgia

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Background

Trigeminal neuralgia (TN) is a debilitating craniofacial pain disorder involving the fifth cranial nerve. The condition is characterized by recurrent, brief episodes of unilateral, electric shock-like pain typically in the maxillary (V2) and/or mandibular (V3) divisions. Attacks can occur up to 50 times daily and may be accompanied by continuous dull background pain in longstanding disease.¹ Classic TN is usually caused by neurovascular compression at the root entry zone, which can lead to focal demyelination and ectopic impulse generation.² Secondary causes include multiple sclerosis, tumors, and arteriovenous malformations, though the condition can also be idiopathic.

First-line management typically relies on pharmacologic therapy, most often sodium channel blockers such as carbamazepine or oxcarbazepine. Antineuralgic drugs have reported efficacy, though often limited by adverse effects including sedation, ataxia, hepatotoxicity, and hematologic toxicity.¹ For patients who are refractory to medical therapy, central procedures (e.g., microvascular decompression, gamma knife radiosurgery, rhizotomy) and peripheral ablative techniques are considered.^{1,2}

Cryoneurolysis represents a minimally invasive, peripheral technique. By cooling tissue with nitrous oxide to approximately -88 °C, it induces Wallerian degeneration of the axon and myelin while preserving structural components of the nerve (i.e., endoneurium, perineurium, and epineurium). This temporarily blocks nerve conduction and provides analgesia, while preserving the structural scaffold for axonal regeneration over weeks to months.³ The iovera[®] system uses nitrous oxide to achieve this effect and is FDA-cleared for some peripheral pain indications.⁴

Approach

- Comprehensive review of the patient's medical record
- Procedure:** percutaneous, fluoroscopically guided cryoneurolysis of the implicated trigeminal branches (V2/V3) using an iovera[®] cryoneurolysis device.
- Outcome measures:** Numeric Pain Rating Scale (0-10) at baseline, immediate post-procedure, and 1-month follow-up
- Patient gave informed consent for case submission

Case Presentation

- 75-year-old woman with a past medical history of NSTEMI on Plavix, hypertension, and stroke presented with longstanding idiopathic TN affecting the left V2-V3 distribution.
- She experienced severe burning, clicking facial pain approximately 3-4 times annually, and baseline dull pain since adolescence.
- Her medication regimen included lamotrigine 125 mg twice daily, oxcarbazepine 600 mg twice daily, and gabapentin 600 mg three times daily.
- She underwent a trigeminal nerve block with 2 mL of 0.5% bupivacaine, providing initial improvement, but was followed by persistent dull pain and flare-ups
- She developed medication side effects, including significant drowsiness, and overall pain control remained suboptimal.
- Given her comorbidities and limited response to medical management, she underwent cryoneurolysis of the left V2 and V3 divisions (Figure 1).
- The procedure was well tolerated without complications.

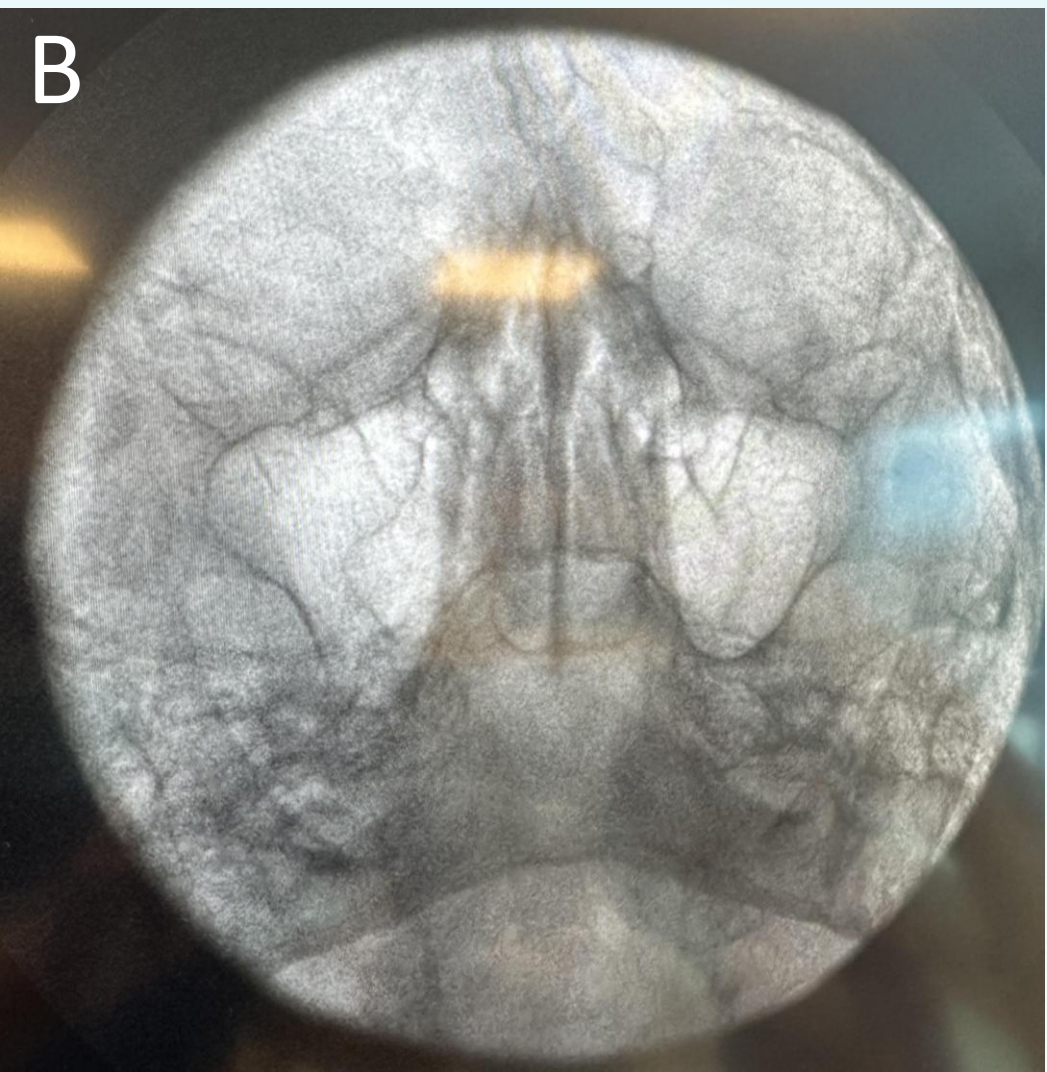
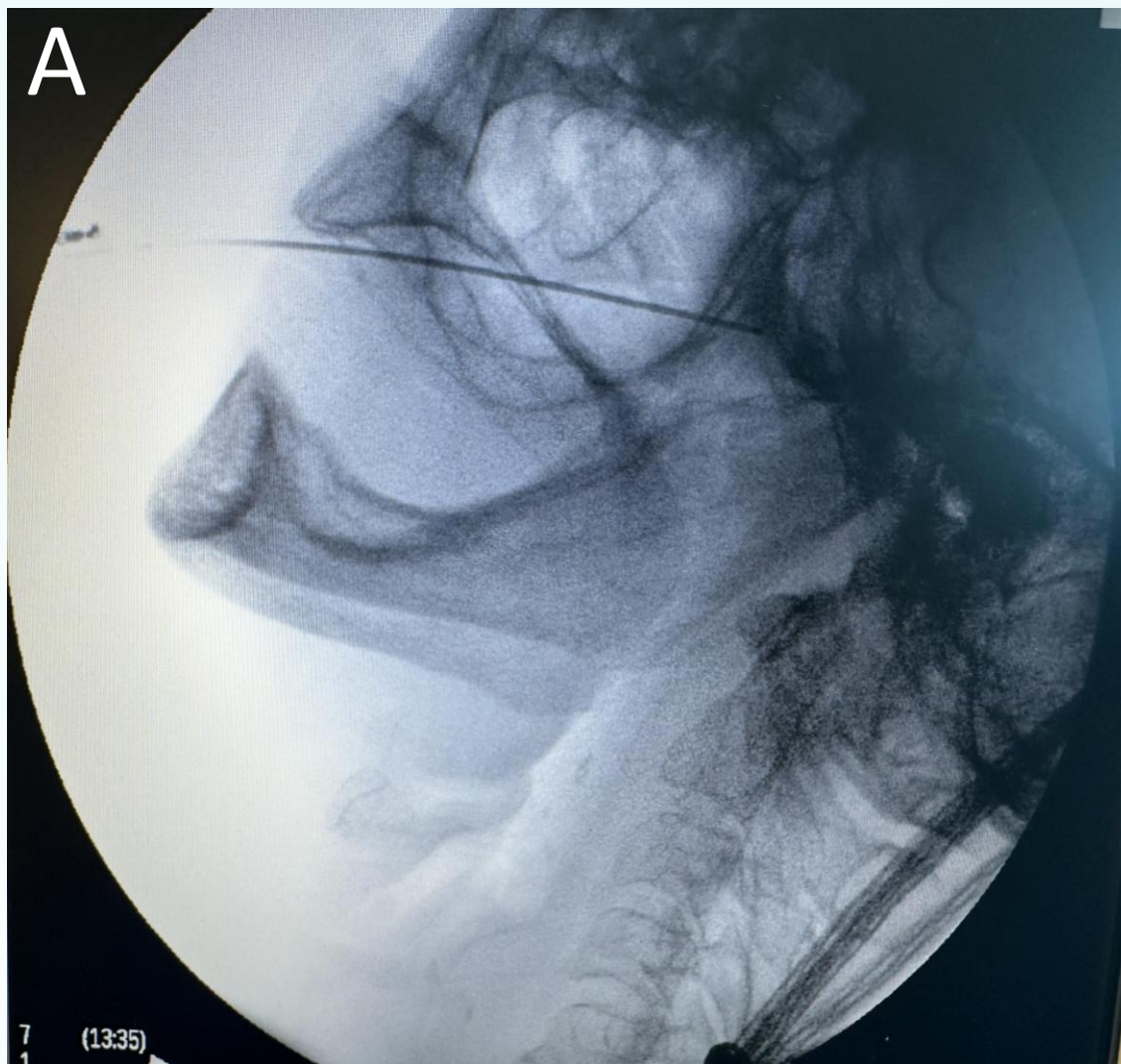


Figure 1. Fluoroscopic views demonstrating probe placement for cryoneurolysis at the foramen ovale

(A) Lateral view confirming trajectory and depth.

(B) Submentovertex view illustrating the alignment relative to the foramen ovale.

Outcome

Timepoint	NRS Pain Score (0-10)
Pre-operative	7
Immediately Post-operative	2
1-month follow up	0

Table 1. Patient Numeric Rating Scale (NRS) pain scores across three time points
Patient reported a decrease in pain level from 7/10 to 2/10 after the procedure. In her 1-month follow-up tele-visit, the patient reported a pain level of 0/10.

Discussion & Conclusions

- Cryoneurolysis offers a minimally invasive, reversible option for idiopathic TN refractory to medical therapy.
- Studies support its effectiveness and safety:
 - Bansal et al. reported >3 years of relief in 96% of patients, >4 years in 56.8%.⁵
 - Pradel et al. found ≥6 months of relief with sensory recovery in 4–8 months.⁶
- Compared to radiofrequency thermocoagulation, cryotherapy has lower rates of prolonged sensory loss and anesthesia dolorosa.^{5,6}
- Central procedures can provide long-term benefit but are more invasive and carry higher risks.⁷
- In this case, cryoneurolysis led to immediate pain reduction and complete relief at one month without complications.
- These findings, supported by existing literature, suggest cryoneurolysis is a promising alternative for select TN patients.
- Further studies are warranted to clarify long-term outcomes, recurrence rates, and optimal patient selection.

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