Headache Medicine

ID: 327

Image-guided pulsed radiofrequency of the sphenopalatine ganglion for refractory trigeminal-autonomic facial pain: a case report

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Introduction
Facial pain syndromes overlapping trigeminal neuralgia and trigeminal-autonomic cephalalgias (TACs) present significant therapeutic challenges. When intractable to optimized pharmacology, interventional neuromodulation targeting the sphenopalatine ganglion (SPG) emerges as a promising option. Pulsed radiofrequency (PRF) delivers high-voltage electric fields to modify synaptic signaling without thermal neurolysis, preventing permanent neurological deficits.

Case presentation
A 62-year-old male presented with a 5-year history of severe, recurrent, and highly refractory right-sided unilateral facial pain, reporting a baseline Numerical Rating Scale (NRS) score of 10/10. Although the initial presentation features overlapped with trigeminal neuralgia, the clinical presentation exhibited atypical features that deviated from the classical pattern, highlighted by prominent ipsilateral cranial autonomic symptoms (rhinorrhea, conjunctival injection, and lacrimation) and daily nocturnal crises. Structural brain magnetic resonance imaging revealed no neurovascular conflicts or relevant structural abnormalities. Prior pharmacological interventions—including maximum tolerated doses of anticonvulsants and neuromodulators, such as carbamazepine and pregabalin, alongside frequent opioid rescue medication—yielded unsatisfactory pain relief and persistent functional impairment. Given the therapeutic refractoriness and the clear involvement of the trigeminal-autonomic reflex loop, SPG neuromodulation via PRF was indicated. The procedure was performed under strict fluoroscopic guidance using a transcoronoid infrazygomatic approach. The radiofrequency cannula was meticulously advanced until its active tip was accurately positioned within the pterygopalatine fossa, targeted immediately posterior to the maxillary sinus wall and anterior to the pterygoid plates. Optimal sensory stimulation replicated the patient's typical pain distribution, confirming target accuracy prior to delivering the standard PRF cycles.

Discussion
The SPG is a critical relay in the trigeminal-autonomic reflex loop. Long-standing nocturnal attacks and localized autonomic dysregulation strongly implicate SPG hyperactivity. Fluoroscopic-guided percutaneous PRF allows a highly precise approach to the pterygopalatine fossa without injuring adjacent maxillary nerve branches. By maintaining tissue temperature below 42°C, PRF induces synaptic depression, normalizing the trigeminovascular hypersensitivity loop without destructive lesioning.

Conclusion
The procedure yielded immediate technical success. At the 3-month follow-up, the NRS score decreased from 10/10 to 3/10, and attack frequency transitioned from daily nocturnal crises to rare weekly episodes. A substantial reduction in rescue analgesics was achieved, with complete resolution of autonomic symptoms and restoration of normal sleep patterns. Image-guided PRF of the SPG represents a safe, technically feasible, and minimally invasive intervention for refractory atypical facial pain.

Keywords:
Facial pain
Sphenopalatine ganglion
Pain

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