

**PULSED RADIOFREQUENCY ABLATION OF MANDIBULAR BRANCH OF  
TRIGEMINAL NERVE FOR TREATMENT OF TRIGEMINAL NEURALGIA****Dr. Garima Dabas<sup>1\*</sup> and Dr. Sahil Gupta<sup>2</sup>**<sup>1</sup>Junior Resident, Department of Anaesthesia and Critical Care, IGMC Shimla.<sup>2</sup>Junior Resident, Department of General Medicine, IGMC Shimla.**\*Corresponding Author: Dr. Garima Dabas**

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Article Received on 11/07/2022

Article Revised on 01/08/2022

Article Accepted on 22/08/2022

**ABSTRACT**

Trigeminal neuralgia (TN) is a neuropathy affecting the face and is the most common neuralgia that occurs in people over 50 years of age. According to the studies, the most common etiology is vascular compression of the trigeminal nerve causing focal demyelination and aberrant neural discharge and other causes include multiple sclerosis or brain tumors. Carbamazepine remains the drug of choice for the treatment of TN. Minimally invasive interventional pain therapies like radiofrequency ablation i.e. pulsed or thermocoagulation and microvascular decompression are possible options when drug therapy fails. The technique of pulsed radiofrequency ablation of the trigeminal nerve is described in detail in this review.

**KEYWORDS:** Carbamazepine remains the drug of choice for the treatment of TN.**INTRODUCTION**

The trigeminal nerve has three branches

- V1 (ophthalmic), which innervates the eyes and forehead.
- V2 (maxillary), which supplies cheeks, and nose.
- V3 (mandibular), that gives nerve supply to inside of the ear, tongue, chin, and lower lip.

Trigeminal neuralgia is the most common cause of facial pain with the prevalence of 4.3 per 100,000, and females are more commonly affected. It usually affects patients who are above 50 years but can affect younger people with multiple sclerosis also.<sup>[1]</sup>

The International Headache Society has come forth with the diagnostic criteria for trigeminal neuralgia.<sup>[2,3]</sup> Diagnosis is said to be confirmed if the patient had at least 3 episodes of unilateral facial pain with the following symptoms.

- Meeting at least 1 of the following 4 criteria: (1) paroxysmal and lasting from a fraction of a second to 2 minutes; (2) severe; (3) electric shock-like, shooting, stabbing, or sharp; (4) precipitated by nonpainful stimuli
- Occurring in at least 1 division of the trigeminal nerve with no radiation beyond its distribution
- Lacking neurologic deficits and any other identifiable causes

Treatment includes carbamazepine and oxcarbazepine as primary agents, although neuroleptics and

anticonvulsants can be used.<sup>[4]</sup> Only 25% of patients will achieve total long-term pain control using the above medications,<sup>[4]</sup> indicating that large number of patients would require an intervention at some point to treat their pain. Surgical options include neurovascular decompression, balloon compression, glycerol gangliolysis, and radiofrequency ablation (RFA).<sup>[5]</sup> The goal of vascular decompression is to compress the vessels which result in trigeminal nerve decompression, but it was successful for initial 1-2 years with a decline in efficacy after 10 years.<sup>[6]</sup> In addition, this surgical procedure has the risk of complications. Balloon compression is performed under general anaesthesia in which a Fogarty balloon is inserted into the Meckel cave and inflated with a dye. But the appropriate duration for compression remains controversial.<sup>[7]</sup> This procedure provides short-term pain relief and includes complications associated with the procedure and general anaesthesia.<sup>[8]</sup> Glycerol gangliolysis requires an injection of glycerol through the foramen ovale with initial success in relieving pain but variable efficacy in 1 year period and 53% recurrence rate at 1 year.<sup>[9]</sup> Several other procedures have been described for treating trigeminal neuralgia: stereotactic radiosurgery, alcohol injection, cryotherapy, local light amplification by stimulated emission of radiation, and electroacupuncture.<sup>[10]</sup> None of these procedures provides long-term efficacy, some require general anaesthesia, and they all have complications.

The role of pulsed RFA in treating trigeminal neuralgia has been described but has not been well studied. The

traditional technique is to place the RFA needle through the mouth until it is in proximity to the foramen ovale (close to the gasserian ganglion) and then to perform RFA, but this technique is associated with pain and soft tissue trauma.<sup>[11]</sup> But with the advancements in technology, the needle can be introduced directly from outside using fluoroscopy and the thermal injury to the motor component of the nerve can be prevented by using pulsed RFA over conventional thermal RFA. We hereby describe the efficacy and effectiveness of Pulsed RFA in our case of 48 year old patient for the treatment of trigeminal neuralgia.

### CASE REPORT

A 52 year old female patient presented in the pain clinic with a history of pain in the right side face between the angle of the mouth and mandible since 6 months. Patient was prescribed tablet pregabalin 75 mg+ tablet methylcobalamine 750 mg HS but the VAS (Visual Analogue Scale) score of the patient was 9/10. The patient was then taken to the Operation theatre (OT) and was explained the entire procedure. After taking the informed consent from the patient, she was told to lie down in supine position with a 20 Gauge i.v. cannula in left hand and a pillow was placed below the shoulder. The monitors like spo2 monitor, ECG electrodes and NIBP were attached. Then the location of the trigeminal nerve was confirmed by C-arm, first in antero-posterior view, then in 30 degrees rotation that showed the cephalocaudal segmental view and lastly the C-arm was taken to the affected side in 30 degrees rotation to confirm the position of foramen ovale which lied just behind the ramus of the mandible. The right side of the face was cleaned and draped and 2% injection lignocaine 2 ml was injected locally at the site of needle entry, usually 2-2.5 cms lateral to the angle of mouth. Under fluoroscopic guidance, the 22 Gauge spinal needle was placed at lateral part of foramen ovale, where mandibular part of the trigeminal nerve was situated. The needle was then attached to the cord of the radiofrequency ablation machine and the machine is turned on after completion of the electrical loop circuit. Then the patient was asked to tell if she felt any tingling sensation on any part of the face i.e. above the eye if ophthalmic part of the trigeminal nerve was stimulated, near the cheeks if maxillary part or between the angle of mouth and the mandible if mandibular part of the trigeminal nerve was stimulated. The sensory stimulation was checked by keeping the voltage at 0.2 V and frequency at 50 Hz and width at 1 ms. The patient felt the tingling sensation below the angle of mouth i.e. the mandibular part of the trigeminal nerve was stimulated. The patient was having pain in the right side of the face between the angle of mouth and mandible, hence this part was needed to be stimulated. Hence keeping the needle at the same point, the motor stimulation was checked by keeping the frequency at 2 Hz and width at 1 ms and increasing the voltage to up to 2 V. Even at 2 V, the muscles of mastication i.e. lateral and medial pterygoid muscles, masseter and temporalis were not stimulated. So it was

noted that the nerve was not very near to the needle point that could cause damage to the motor component of the nerve. After that, the LA with inj 2% lignocaine was given through the same needle and RF ablation electrode was attached to complete the electrical loop and Pulse RFA process was started. In this, the radiofrequency currents were cycled for 20 milliseconds, at 2 Hz, for 120 seconds. The voltage was controlled so that the highest temperature remained below 42 degrees Celsius. This is done to avoid any damage to the spinal motor nerves. After completion of the procedure, 0.5 ml of 2% lignocaine was again injected to reduce the chances of neuritis. The post procedure VAS score was again noted which came out to be 2/10. Patient was then shifted to the post anaesthesia recovery room. The recovery was smooth and uneventful.

### DISCUSSION

TN is a clinically common painful disease, and a variety of drugs or surgical procedures are available for its treatment. Medications such as carbamazepine, oxcarbazepine, baclofen, lamotrigine, phenytoin, and topiramate could be administered to control pain. Intravenous infusion of a combination of magnesium and lidocaine can be very effective in some patients. However, different extents of side effects could occur after drug treatment. Procedures such as radiosurgery, percutaneous balloon compression, glycerol rhizotomy, radiofrequency thermocoagulation, peripheral nerve dissection, partial sensory nerve root dissection, and microvascular decompression could be utilized. Similarly, partial sensory nerve root dissection and microvascular decompression may not have persistent curative effect, while peripheral nerve dissection could lead to a loss of partial facial sensation.<sup>[12]</sup> Our case presents a novel method of treating patients with trigeminal neuralgia that is resistant to medical management. The pulsed RFA results in excellent pain relief and is also a safe procedure.

Conventional RFA (CRFA) and Pulsed RFA (PRFA) have previously been described as modalities for treating trigeminal neuralgia by using an approach through the mouth. CRFA, while effective, may cause nonselective damage to the nerve that can lead to the loss of motor and autonomic function. In a large study that included 1,600 patients who received CRFA for treating trigeminal neuralgia, the authors reported the following complications: diminished corneal reflex, masseter weakness and paralysis, dysesthesia, anesthesia dolorosa, keratitis, transient paralysis of cranial nerves III and VI, cerebrospinal fluid leakage, carotid-cavernous fistula, and aseptic meningitis.<sup>[13]</sup>

PRFA does not produce thermal lesions, but evidence suggests that microscopic damage to axonal microfilaments and microtubules can occur, with greater changes seen in C fibers than A-beta or A-delta fibers, the fibers principally responsible for pain transmission.<sup>[14]</sup> Studies of PRFA used to treat trigeminal

neuralgia have been variable. Erdine et al compared CRFA vs PRFA and found that PRFA was not effective in treating trigeminal neuralgia,<sup>[15]</sup> while another series showed that long-term efficacy was obtained.<sup>[16]</sup> However, these studies used the classic approach to target the gasserian ganglion through the foramen ovale. Recently, PRFA is becoming an alternative and effective therapy for patients with TN, as it is safe in reputation. But it is unclear whether the combination of CRFA with PRFA may decrease post-operative complications while maintaining long-term pain relief.

## CONCLUSION

Our study suggests that PRFA may be a safe and effective approach for treating trigeminal neuralgia in patients resistant to conservative management.

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