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Case Report

Prolonged Pulsed Radio Frequency Ablation of Bilateral Gesserian Ganglion for Intractable Trigeminal Neuralgia: A Case Report

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Received: July 13, 2016; **Accepted:** September 07, 2016; **Published:** September 09, 2016

Abstract

Introduction: Trigeminal neuralgia leads to considerable morbidity. The convention radiofrequency ablation is a good option for patients who do not respond to the conservative measures; whereas the literature of the use of pulsed radiofrequency ablation is limited. I am presenting a patient of intractable bilateral trigeminal neuralgia treated with prolonged Pulsed Radiofrequency ablation (PRF) of Gasserian ganglion.

Case Report: The patient was suffering from bilateral trigeminal neuralgia for last 5 years and was not responding to conservative management with medications. He had underwent two conventional radiofrequency ablation with relief for up to 2 weeks. The PRF of Gasserian ganglion for two cycles of 600 seconds on both sides at pulses of 20 msec at 2 Hz frequency at 45V with a temperature cut off at 42 degrees. The pain intensity, number and duration of painful episodes had decreased by more than 70%, 50% and 50% on both the sides (P value < 0.05) for about 6 months after the procedure respectively. The medication doses were decreased after the PRF. There was slight numbness on both sides, which remained the same till 6 months.

Conclusion: Prolonged PRF ablation of Gasserian ganglion can be an excellent treatment option in patients with intractable trigeminal neuralgia who had failed to respond to conventional RF.

Level of evidence: IV.

Keywords: Trigeminal neuralgia; Pulsed radiofrequency; Gasserian ganglion

Introduction

Trigeminal neuralgia is one of the most common conditions affecting the cranial nerves [1]. It results in severe lancinating pain along the trigeminal distribution occurring in paroxysms, but can also becomes chronic and beyond the distribution of the trigeminal nerve [1].

The conservative treatment options for trigeminal neuralgia are medications such as carbamazepine, oxcarbazepine, baclofen, lamotrigine, pimozide, pregabalin, etc. Sometimes, these medications are sometimes either not effective and have severe adverse effects like Stevens-Johnson syndrome [2].

The treatment options for patients who have failed the conventional treatment are surgical sectioning of trigeminal nerve, gamma knife treatment, percutaneous glycerol rhizolysis, percutaneous balloon decompression and percutaneous radiofrequency thermocoagulation of Gasserian ganglion [3-8] All the above treatment options has the risks of complications like facial muscle weakness, corneal anesthesia, anesthesia dolorosa, dysesthesia, sensory loss, etc [9,10].

I am describing a patient with intractable trigeminal neuralgia who was successfully treated with prolonged pulsed radiofrequency ablation (PRF) of Gasserian ganglion.

Case Report

My patient was a 52 year old male with bilateral intractable trigeminal neuralgia for last 5 years. The patient had severe lancinating pain in both the maxillary division of trigeminal nerve. The pain was episodic with 30-50 episodes per day lasting for near about 1 minute with a pain intensity of 10 in Numerical Rating Scale (NRS) and triggered by cold wind, eating, brushing teeth, etc. It had limited his daily activities and also disturbed the sleep. He had earlier undergone two conventional radiofrequency ablation with relief up to 30-50% for near about 2 weeks only. His magnetic resonance imaging of brain also did not show any neurovascular conflict which ruled out any possibility of neurovascular intervention. The patient was taking multiple medications, which included carbamazepine 800 mg/day, duloxetine 60 mg/day, gabapentin 1800 mg/day and tramadol 300mg/day with only 20-30% relief in pain intensity only. The other treatment options like gamma knife treatment, percutaneous glycerol rhizolysis, and percutaneous balloon decompression had been discussed with the patient; but the patient had refused those options due increased risks of complications. Finally, he had given consent for PRF of Gasserian ganglion after explaining with him the neuromodulatory role of extended pulsed radiofrequency ablation

Citation: Ahmed A. Prolonged Pulsed Radio Frequency Ablation of Bilateral Gesserian Ganglion for Intractable Trigeminal Neuralgia: A Case Report. Austin Pain Relief. 2016; 1(1): 1003.

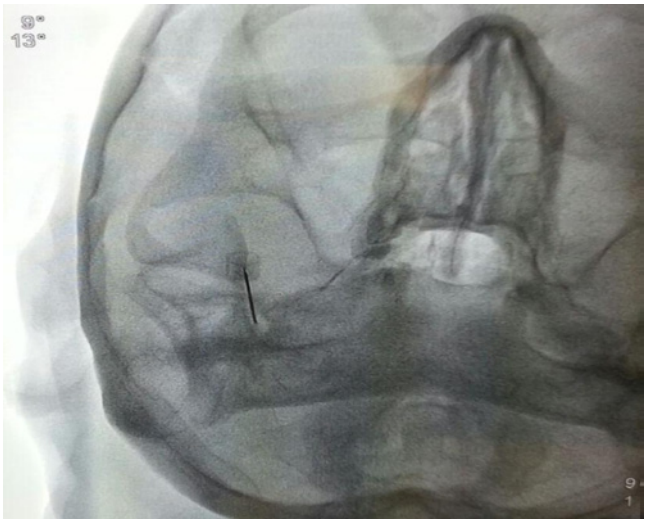

Figure 1: Antero-posterior view of the RF needle entering the foramen ovale.

and the possible risks and benefits.

The PRF was done in the operation theatre under all aseptic conditions. The patient was positioned supine with slight head extension and monitoring was done as per ASA (American Society of Anesthesiologists) requirement and intra-venous cannulae were secured. The C-arm of the fluoroscope SIREMOBIL Compact L (Siemens AG, Healthcare Sector, Henkestr. 127, and 91052 Erlangen, Germany) was focused postero-anetriorly and moved from caudal to cranial end to produce a submental view showing the foramen ovale. A 10 degree tilt to the ipsilateral side was used to better visualization of foramen ovale. The needle entry point was 2.5 cm lateral to the angle of the mouth on the ipsilateral side. The needle entry point was anesthetized with 1 ml of 2% lignocaine. A 10 cm long radiofrequency needle with 10 mm active tip is directed towards the ipsilateral pupil under fluoroscopic guidance (Figure 1). During needle insertion one finger was kept inside the mouth to prevent the entry of the needle into the mouth. The patient was sedated with 60 mg of propofol intra-venously before the entry of the needle into the foramen ovale. The fluoroscope was then rotated to give the lateral view to show the final position of the needle just beyond the angle formed by the clivus and petrosal ridge of the temporal bone (Figure 2). The sensory stimulation was done using 50 Hz frequency at less than 0.5 V and with fine repositioning of the needle to stimulate the ipsilateral maxillary area. After the confirmation of final position of the needle, PRF was done at pulse width 20 m sec, 2 Hz frequency and at 45V for 600 seconds at temperature of 42 degrees for two cycles by using Cosman RFG-1B RF generator (Cosman Medical, Inc, Burlington, Massachusetts). The sedation during the PRF was provided with intra-venous (50+15 mcg) fentanyl. The patient was observed for 2 hours in the recovery area and is discharged in stable condition on the next day.

The pain intensity in NRS had improved from 10 by about more than 70% and 80% at 1 and 6 months after the procedure. There were more than 50% decrease in the number and duration of painful episodes for 6 months. The patient was able to go out and eat without much discomfort; and also there was improvement in sleep also. The carbamazepine dose was slowly tapered off at 1 month, gabapentine

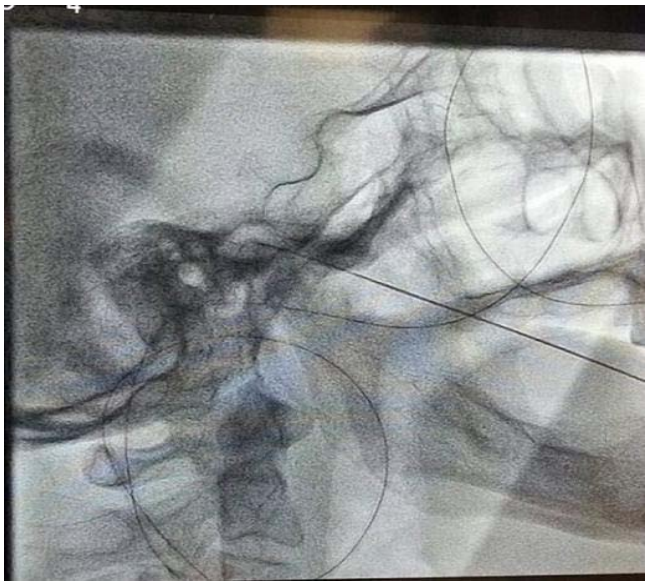

Figure 2: Lateral fluoroscopic view of the final position of the RF needle in the angle formed by the clivus and petrosal ridge of the temporal bone.

was tapered off at 3 months and the patient was continued at duloxetine only at 6 months after the procedure. There was numbness in the bilateral maxillary area which remained the same for 6 months. There was no motor weakness or decreased sensation over the ophthalmic division of trigeminal nerve.

The consent of the patient was taken for publication of his case report and the procedural image.

Discussion

The application of prolonged PRF of the Gasserian ganglion resulted in significant and long term improvement in pain and quality of life in the patient who had earlier failed both conservative treatment and conventional RF.

The PRF of Gasserian ganglion had been described in literature. But in earlier studies, it was considered ineffective as compared to conventional RF for Gasserian ganglion, the reason behind this ineffectiveness may be the duration of PRF as in their study the PRF was given for shorter duration [11].

Recently, the longer duration of PRF had showed promising results in many case reports and studies and also it did not resulted in any adverse effects. Van Zundert, et al and Deepak et had used prolonged PRF of 4 and 8 minutes respectively to Gasserian ganglion resulting in significant and prolonged pain relief without any complications [12,13]. In another recent study, Nicholas Chua et al had applied extended PRF of 6 minutes at 45 V, with a pulse width of 10 ms and a pulse frequency of 4 Hz to Gasserian ganglion resulted in 80% pain relief in 73.5%, 61.8% and 55.9% at 2, 6, and 12 months respectively without any complications [14]. These studies also strengthened the fact that prolonged PRF resulted in long term pain relief which earlier studies had failed to show. The positive results of prolonged PRF had also been shown in a study where prolonged duration of PRF to Saphenous nerve for 8 minutes resulted in significant and long lasting relief in pain without any adverse effects [15]. One previous study had

found out that increasing output voltage also improves the results of the PRF; which we had done in our case [16].

In my patient, the conservative management with medications and intervention like conventional RF had failed. Due to the neuromodulatory effect of the PRF, the patient had given this option as he had failed the conventional RF. Also the duration of the PRF was also increased than earlier ones described in literature.

Our case report also confirms that the mechanisms of conventional and PRF are different and PRF can be tried in patients who had previously failed the conventional RF. The PRF acts *via* neuromodulation with c-Fos gene and Activating Transcription Factor 3 (ATF3) [17,18].

Also the complications described with PRF were less as compared to conventional RF, which has complications like dysesthesia, keratitis, decreased corneal reflex, decreased motor power masseter muscle, anesthesia dolorosa, sensory loss, etc [10]. Due to this; the PRF can be an effective alternative to RF in patients who are not willing to take risks of those complications.

Conclusion

The case report also confirms that PRF of the Gasserian ganglion is an effective treatment option for the patients with intractable trigeminal neuralgia who had failed conservative treatment. But to firmly conclude the above statement, a randomized sham controlled with large sample size and prolonged follow-up is needed.

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