Section: Anaesthesiologist

Research

COMPARISON OF CONVENTIONAL VERSUS PULSED VERSUS COMBINED RADIOFREQUENCY ABLATION FOR TRIGEMINAL NEURALGIA

Sunny Bhasin[1], Mohit Mahajan[2], Preet Kanwal Narula[3], Sumit Kumar Khatri[4]

[1]Senior Consultant Anaesthesiologist, Director Aastha Pain Clinic Jabalpur, Chief Intensivist National Hospital, Jabalpur MO NSCB Medical College, Jabalpur, Madhya Pradesh, India
[2]Head and Senior Consultant, Department of Anesthesia, Pain Medicine and Critical Care Director, Mahajan Medicity Pvt Ltd, Pathankot, Punjab, India
[3]Principal Consultant & Head, Department of Anaesthesia, Pain Medicine & Critical Care, Max Super Speciality Hospital, Bathinda, Punjab, India.
[4]Consultant, Department of Pain medicine and Anaesthesia, Arihant Hospital & Research Center, Indore, Madhya Pradesh, India

Received : *09/10/2022*
Received in revised form : *10/11/2022*
Accepted : *23/11/2022*

Keywords:
Trigeminal Neuralgia, Conventional Radiofrequency, Pain, Patient Satisfaction Score.

Corresponding Author:
Dr. Sunny Bhasin,
Email:drsunnybhasin@gmail.com
ORCID: 0000-0002-7209-0418

DOI: 10.47009/jamp.2022.4.5.169

Source of Support: Nil,
Conflict of Interest: Nonedeclared

Int J Acad Med Pharm
2022; 4 (5); 813-816

Abstract

Background: To compare conventional versus pulsed versus combined radiofrequency ablation for trigeminal neuralgia. **Materials and Methods:** Thirty adult patients age ranged 18- 70 years of trigeminal neuralgia were divided in three groups of 10 each based on mode of treatment. Parameters such as side of pain, VAS, PSS and complications was recorded. **Result:** The mean age was 53.2 years in group A, 49.6 years in group B and 51.7 years in group C. The mean duration of pain was 60.4 months in group A, 61.2 months in group B and 62.3 months in group C. Side was left in 18 in group A, 20 in group B and 19 in group C and right 22 in group A, 20 in group B and 21 in group C. The mean pre- treatment VAS was 8 in each group. At 3 months was 2 in group A, 3 in group B and 3.4 in group C. At 6 months was 0.5 in group A, 1 in group B and 0.7 in group C. The difference was non- significant (P> 0.05). The mean PSS was 2 in group A, 3 in group B and 2.5 in group C. At 3 months was 6 in group A, 6.2 in group B and 7 in group C. At 6 months was 8.4 in group A, 8 in group B and 8.2 in group C. The difference was non-significant (P> 0.05). **Conclusion:** All methods of treatment of trigeminal neuralgia such as conventional radiofrequency, pulsed radiofrequency and combined conventional and pulsed radiofrequency found to be safe and effective with comparable results.

INTRODUCTION

Trigeminal neuralgia (TN) is defined as severe, episodic pain distributed along one or more branches of the trigeminal nerve. The pain attack could occur at any time, and the resulting intense pain severely affects the quality of life of the patients. Long-term effects of trigeminal neuralgia include anxiety, depression, and even suicide. The pathological processes of primary trigeminal neuralgia are very complex, and the pathogeneses are still unclear.[1]

TN shows the complex neurophysiological mechanisms. As demyelination of branches of the nerve or activation of peripheral receptor, transmission and projection of nociceptive information, and convergence of nociceptive afferents into common central neurons, as well as the interaction of a multitude of neurotransmitters and neuromodulators, may play a key role in the perception of pain.[2]

Till date, there are no effective treatments available for the treatment of trigeminal neuralgia. Surgical intervention is performed if pharmacotherapy is unsuccessful, either due to intolerable side effects or poor pain control.[3] Although pharmacotherapy is frequently the preferred treatment option, several patients prefer surgery as a first-line treatment due to its long-lasting effect. Interventional therapy for TN is either destructive with trigeminal nerve sensory function destroyed intentionally or non-destructive with decompression of the trigeminal nerve and preservation of its regular function.[4] The most common procedures in treating TN pain are the use of radiofrequency (RF). The main advantages of RF seem to be its effectiveness and high pain relief rate without the dangerous complications of surgical procedures and lack of side effects and reduction of oral medication.[5] We

ISSN (O): 2687-5365; ISSN (P): 2753-6556

attempted present study to compare conventional versus pulsed versus combined radiofrequency ablation for trigeminal neuralgia.

MATERIALS AND METHODS

After considering the utility of the study and obtaining approval from ethical review committee of the institute, we selected Thirty adult patients age ranged 18- 70 years of trigeminal neuralgia of either gender. All selected patients agreed to participate in the study.

Demographic characteristics of patients was entered in case sheet proforma. The patients were divided in three groups of 10 each. In group A, patients were administered fluoroscope guided conventional radiofrequency ablation at 75℃ and thermal lesion was applied for 270 seconds. In group B, patients were administered fluoroscope guided pulsed radiofrequency ablation for 10 minutes at 45 V, with a pulse width of 10 ms and a pulse frequency of 4 Hz at 42°C. In group C, patients were administered fluoroscopic guided conventional radiofrequency ablation followed by pulsed radiofrequency ablation. Patients were followed up for a period of 6 months. Pain was recorded on VAS scale before treatment, at 3 months and at 6 months. Pain intensity of the attacks using VAS (‘‘0’’ no pain to ‘‘10’’ worst possible pain) was recorded. Patient satisfaction using patient satisfaction scale (PSS; ‘‘0’’ very dissatisfied to ‘‘10’’ very satisfied) was recorded. Other parameters such as side of pain and complications was also recorded. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

RESULTS

Group A comprised of 6 males and 4 females, group B had 5 males and 5 females and group C had 4 males and 6 females [Table 1].

The mean age was 53.2 years in group A, 49.6 years in group B and 51.7 years in group C. The mean duration of pain was 60.4 months in group A, 61.2 months in group B and 62.3 months in group C. Side was left in 18 in group A, 20 in group B and 19 in group C and right 22 in group A, 20 in group B and 21 in group C. The difference was non-significant (P> 0.05) [Table 2].

The mean pre- treatment VAS was 8 in each group. At 3 months was 2 in group A, 3 in group B and 3.4 in group C. At 6 months was 0.5 in group A, 1 in group B and 0.7 in group C. The difference was non- significant (P> 0.05) [Table 3].

The mean PSS was 2 in group A, 3 in group B and 2.5 in group C. At 3 months was 6 in group A, 6.2 in group B and 7 in group C. At 6 months was 8.4 in group A, 8 in group B and 8.2 in group C. The difference was non- significant (P> 0.05) [Table 4].

Complications recorded were facial numbness 1 in group A, 2 in group B and 1 in group C, Anesthesia dolorosa 2 in group A, 3 in group B and 4 in group C, pain at entry site 4 in group A, 1 in group B and 2 in group C and mastication muscle weakness 3 in group A, 2 in group B and 1 in group C. The difference was non- significant (P> 0.05) [Table 5].

Table 1: Patients distribution

Groups	Group A	Group B	Group C
Male	6	5	4
Female	4	5	6

Table 2: Baseline characteristics

Groups	Group A	Group B	Group C	P value
Mean age (years)	53.2	49.6	51.7	0.84
Mean pain duration (months)	60.4	61.2	62.3	0.95
Side (Left/right)	18/22	20/20	19/21	0.79

Table 3: Comparison of pain intensity (VAS)

Groups	Group A	Group B	Group C	P value
Pre- treatment	8	8	8	1
3 months	2	3	3.4	0.09
6 months	0.5	1	0.7	0.82

Table 4: Assessment of patient satisfaction score

Groups	Group A	Group B	Group C	P value
Pre- treatment	2	3	2.5	0.74
3 months	6	6.2	7	0.92
6 months	8.4	8	8.2	0.97

Table 5: Comparison of complications

Complications	Group A	Group B	Group C	P value
Facial numbness	1	2	1	0.86
Anesthesia dolorosa	2	3	4	
Pain at entry site	4	1	2	
Mastication muscle weakness	3	2	1	

ISSN (O): 2687-5365; ISSN (P): 2753-6556

DISCUSSION

Trigeminal neuralgia (TN) is the worst type of facial pain. It is described as intense, sharp, stabbing, and shooting like electric shock pain. It can be triggered by touch, chewing, laughing, shaving or face wash.[6] TN is described as the most irritating pain known to humanity, many drugs and surgical procedures have been used for treatment. Despite numerous available approaches, the results are not completely satisfying.[7] Radiofrequency therapy at low temperature of 42–60°C is generally applied in clinical practice. The repeated therapies are needed as the effect of treatment rate is not high, and the effective duration is not long.[8] The present study compared conventional versus pulsed versus combined radiofrequency ablation for trigeminal neuralgia.

Our results showed that group A comprised of 6 males and 4 females, group B had 5 males and 5 females and group C had 4 males and 6 females. Kumar et al,[9] compared the safety and efficacy of conventional versus pulsed versus combined radiofrequency ablation for treatment in 60 patients divided in three groups of 20 each. Pain scores were found comparable between the three groups at all the time points ($p>0.05$). Vital parameters like heart rate, systolic and diastolic blood pressures were also comparable amongst the three groups at different time points and showed no statistical significance ($p>0.05$). None of the patients reported any serious complications.

Our results demonstrated that the mean age was 53.2 years in group A, 49.6 years in group B and 51.7 years in group C. The mean duration of pain was 60.4 months in group A, 61.2 months in group B and 62.3 months in group C. Side was left in 18 in group A, 20 in group B and 19 in group C and right 22 in group A, 20 in group B and 21 in group C. Erdine et al,[10] evaluated the effect of pulsed radiofrequency (PRF) in comparison with conventional radiofrequency (CRF) in the treatment of idiopathic trigeminal neuralgia in 40 patients which were randomly assigned to two treatment groups. Group 1 was treated with CRF and group 2 was treated by PRF. The VAS scores decreased significantly and PSS improved significantly after the procedure in Group 1. The VAS score decreased in only 2 of 20 patients from the PRF group (Group 2) and pain recurrence occurred 3 months after the procedure. At the end of 3 months, we decided to perform CRF in Group 2, because all patients in this group still had intractable pain. After the CRF treatment, the median VAS score decreased and PSS improved significantly.

Our results demonstrated that the mean pre-treatment VAS was 8 in each group. At 3 months was 2 in group A, 3 in group B and 3.4 in group C. At 6 months was 0.5 in group A, 1 in group B and 0.7 in group C. Xie et al,[11] compared the effects of different types of supraorbital foramen variations on the treatment efficacy of radiofrequency therapy for V1 trigeminal neuralgia in 54 patients. 25 patients were grouped into the hole group and 29 into the notch group. The NRS scores before and at 1 day, 0.5 years, 1 year and 2 years after operation showed no significant differences between the two groups. The numbness and numbness degree after operation showed no significant differences between the two groups. The numbness degree at 2 y after operation was significantly lower than 1 d after operation ($P< 0.05$). The effective rate at 1 d, 0.5 y, and 1 y after operation showed no significant differences between the hole and notch groups.

Our results showed that the mean PSS was 2 in group A, 3 in group B and 2.5 in group C. At 3 months was 6 in group A, 6.2 in group B and 7 in group C. At 6 months was 8.4 in group A, 8 in group B and 8.2 in group C. Our results revealed that complications recorded were facial numbness 1 in group A, 2 in group B and 1 in group C, Anesthesia dolorosa 2 in group A, 3 in group B and 4 in group C, pain at entry site 4 in group A, 1 in group B and 2 in group C and mastication muscle weakness 3 in group A, 2 in group B and 1 in group C. Khadeja et al,[12] assessed the effectiveness of combined PRF and TRF for long-term therapy of patients with idiopathic TN. There were significant improvements of pain relief as regards visual analog scale showed baseline VAS [8.65 ± 0.59] and first day, 1, 3, 6, 12, 18, 24 months [3.60 ± 1.09, 2.55 ± 0.69, 1.7 ± 0.65, 1.05 ± 0.68, 0.85 ± 0.67, 0.80 ± 0.69, 0.9 ± 0.69], respectively, facial numbness and postoperative masseter muscle weakness recovered more rapidly in patients receiving combined PRF and TRF therapy.

CONCLUSION

All methods of treatment of trigeminal neuralgia such as conventional radiofrequency, pulsed radiofrequency and combined conventional and pulsed radiofrequency found to be safe and effective with comparable results.

REFERENCES

1. CruccuG, Biasiotta A, Galeotti F, Iannetti GD, Innocenti P, Romaniello A, et al. Diagnosis of trigeminal neuralgia: a new appraisal based on clinical and neurophysiological findings. Suppl Clin Neurophysiol. 2006;58:171-86. doi: 10.1016/s1567-424x(09)70067-4.
2. Zhou X, Liu Y, Yue Z, Luan D, Zhang H, Han J. Comparison of nerve combing and percutaneous radiofrequency thermocoagulation in the treatment for idiopathic trigeminal neuralgia. Braz J Otorhinolaryngol. 2016;82(5):574-9. doi: 10.1016/j.bjorl.2015.11.006.
3. Abd-Elsayed A, Kreuger L, Seeger S, Dulli D. Pulsed Radiofrequency for Treating Trigeminal Neuralgia. Ochsner J. 2018;18(1):63-65.
4. AlmozninoG, Benoliel R, Sharav Y, Haviv Y. Sleep disorders and chronic craniofacial pain: Characteristics and management possibilities. Sleep Med Rev. 2017;33:39-50. doi: 10.1016/j.smrv.2016.04.005.
5. Wu H, Zhou J, Chen J, Gu Y, Shi L, Ni H. Therapeutic efficacy and safety of radiofrequency ablation for the

ISSN (O): 2687-5365; ISSN (P): 2753-6556

treatment of trigeminal neuralgia: a systematic review and meta-analysis. J Pain Res. 2019;12:423-441. doi: 10.2147/JPR.S176960.
6. Ferini-Strambi L. Neuropathic Pain and Sleep: A Review. Pain Ther. 2017;6(Suppl 1):19-23. doi: 10.1007/s40122-017-0089-y.
7. MelekLN, Devine M, Renton T. The psychosocial impact of orofacial pain in trigeminal neuralgia patients: a systematic review. Int J Oral Maxillofac Surg. 2018;47(7):869-878. doi: 10.1016/j.ijom.2018.02.006.
8. Jiang C. Risk of probable posttraumatic stress disorder in patients with trigeminal neuralgia. Psychol Health Med. 2019;24(4):493-504. doi: 10.1080/13548506.2018.1530365.
9. Kumar A. Comparative evaluation of conventional versus pulsed versus combined radiofrequency ablation for trigeminal neuralgia. Indian J Anaes. 2022;66(1):89.
10. ErdineS, Ozyalcin NS, Cimen A, Celik M, Talu GK, Disci R. Comparison of pulsed radiofrequency with conventional radiofrequency in the treatment of idiopathic trigeminal neuralgia. Eur J Pain. 2007;11(3):309-13. doi: 10.1016/j.ejpain.2006.04.001.
11. XieK, Liu S, Huang B, Yao M. Effects of Supraorbital Foramen Variations on the Treatment Efficacy of Radiofrequency Therapy for V1 Trigeminal Neuralgia: A Retrospective Study. Pain Res Manag. 2020;2020:8142489. doi: 10.1155/2020/8142489.
12. El Hossieny KM. Impact of combining pulsed and thermal radiofrequency on long-term therapy of idiopathic trigeminal neuralgia: A prospective study. Egyp J Anaesth. 2020;36:1:78-82.

ISSN (O): 2687-5365; ISSN (P): 2753-6556