THE EFFECT OF THREE TREATMENT MODALITIES ON NEUROPATHIC PAIN SYMPTOMS OF TRIGEMINAL NEURALGIA: A RETROSPECTIVE STUDY

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ABSTRACT:

Trigeminal Neuralgia (TN) is a debilitating painful condition that adversely affects the quality of life of the patient. Medications such as Carbamazepine and Phenytoin are the first line of treatment for this condition. But they come with their own set of side effects. Surgical management is planned for patients refractory to medications. Some patients are indicated for invasive management like Peripheral Neurectomy (PN) and some for minimally invasive like Radiofrequency Lesioning (RFT) and Long Acting local anaesthetic blocks (LA). The aim of the present study was to retrospectively evaluate the patients and note their experience of the effect of three minimally invasive treatment modalities (RFT, PN, LA) on their neuropathic pain symptoms of TN. A questionnaire was provided to patients who had been treated with either of the three treatment modalities in the past. 10 patients of each treatment modality were compared. No statistically significant difference in pain relief was found amongst the three treatment modalities.

Keywords: trigeminal neuralgia, radiofrequency thermocoagulation, pain management, peripheral neurectomy, long acting local anaesthesia blocks

I. INTRODUCTION:

Trigeminal neuralgia (TN), also termed as tic douloureux, is a chronic pain condition that affects the trigeminal (V cranial) nerve. The condition is defined by the International Headache Society (IHS) as a “unilateral disorder characterized by brief electric shock-like pains, abrupt in onset and termination, and limited to the distribution of one or more divisions of the trigeminal nerve” [International Headache Society, 2004].1 TN is more prevalent in females (37-67 years old) affecting the maxillary and mandibular branches (De Toledo et al 2016).2 The attack lasts anywhere from a few seconds to 2 min/episode and can trigger in quick succession. The intensity of pain is incapacitating which adversely affects the patient’s quality of life. (Sydney P 2015)3 Treatment options for TN include medications or surgical interventions. Medications such as Carbamazepine or Phenytoin are commonly

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used to reduce the frequency/severity of the pain, but with unpleasant side effects. Khalid Quliti (2015)4 The possible side effects are sedation, dizziness, nausea, vomiting, ataxia, hyponatremia, and increase in the level of hepatic enzymes which may contraindicate its use in elderly patients. The uncommon but fatal side effects include leukopenia, aplastic anemia, allergic rash, systemic lupus erythematosus, hepatotoxicity, and Stevens-Johnson’s syndrome. (Hassan 2013)5 Therefore, as a precautionary measure, a complete blood count, serum sodium, and liver function tests within several weeks after starting therapy are advisable to rule out complications (if any) (Benneto, 2007 and Hassan, 2013)5,6. Surgical procedures are the least considered but for patients’ refractory to medications. Other minimally invasive treatment options for TN include (but not limited to) radiofrequency thermocoagulation, peripheral neurectomy and long acting local anesthesia. Radiofrequency thermocoagulation (RFT) involves the gasserian ganglion ablation with medium frequency alternating current that reduces the pain signals. It has the advantage of being a simple day care procedure with long-term pain relief (Zakrzewska 1999).7 One of the limitation to this procedure is that 15 – 20% of the patients show recurrence of pain in 12 months leading to need for repeating the procedure. (Emrıl D, Ho K. Treatment of Trigeminal Neuralgia: role of radiofrequency ablation. J Pain Res 2010;3:249–54)8 Also, high dependency of RFT on advanced technology and capital intensive technology like fluoroscopic guidance using C-arm, restricts its widespread use. (Emrıl D, Ho K 2010) Peripheral neurectomy (PN) is surgical removal of terminal affected branches of trigeminal nerve. This conventional procedure performed under local anesthesia is well tolerated by patients with recurrence rate of only 6.66% (Agrawal 2011). However this option cannot be used in poor surgical risk patients or for elderly patients.(Emrıl D, Ho K 2010). Long (LA) acting local anesthesia using xylocaine/lidocaine (with higher concentrations ~ 5%) is a simple to perform treatment for pain relief in TN (Choi 1998).9 The higher concentration local anesthetics leads to a post block effect with long term pain attenuation (Ross BK 1992).10 One of the risks of using high concentration local anaesthetics is it can lead to neurotoxicity or irreversible inhibition of neural conduction.(Choi 1998). According to Bainton CR this neurotoxicity is concentration dependent. Thus this limitation can be overcome by using the lowest possible effective concentration needed. (Bainton CR 1994)11 While there have been several studies and publications that have effectively presented the efficacy of different minimally invasive procedures with inputs based on experiences from pain practitioners, there has been very limited analysis/research to gauge the efficacy of these procedures from a patient standpoint. In the field of pain management, patient feedback on his/her experiences. This questionnaire survey aims to retrospectively gain insight into the patient experience. This questionnaire survey was designed to obtain the patient’s experience and quality of pain relief obtained from the three said procedures. The survey aimed at comparing the duration of pain relief obtained amongst the three procedures and also to find which procedure showed the most reduction in severity of pain. The question that sought an answer to whether oral medications were still needed after the procedure was also incorporated in this survey. Answers were also sought to questions like did the attacks persist after the procedure and if they did, which procedure of the three showed least frequency. Another aim of this survey was to find if repeating the procedure was needed due to failure of obtaining pain relief or the pain relief lasting for a very short duration. Hence, the aim of the present study was to retrospectively evaluate the patients and note their experience of the effect of three minimally invasive treatment modalities (RFT, PN, LA) on their neuropathic pain symptoms of TN.

II. MATERIALS AND METHODS

A questionnaire was formulated which had provision for recording general information (name, age, gender, address and phone number) and the section for specific information. Questions for specific information were divided in two parts. Part I had questions about the condition before treatment was carried out like side affected, triggering factors, dosage of oral medication, frequency and duration of the attacks. Part II had questions pertaining to post treatment ie amount and longevity of pain relief obtained using Wong- Baker FACES Pain Rating Scale, post treatment side effects of the treatment procedure, requirement of oral medication, persistence of attacks and need for repetition of the procedure. Questionnaire was validated for face and content validity. 10 Patients each who have undergone the three treatment modalities for Trigeminal Neuralgia- Long acting anaesthetic agent injections(5% Xylocaine), Peripheral Neurectomy, Radiofrequency Thermocoagulation in Niramaya Hospital, Chinchwad, Pune, Maharashtra and Dr. D Y Patil Dental college and Hospital, Pimpri, Pune Maharashtra between January 2001 and February 2009 were identified. This was a retrospective type of study. Total convenience sample size was 30. Data was collected over a period of 2 months. The patients who were on medical treatment of Carbamazepine or Phenytoin before undergoing either of the three treatment modalities and who were willing to participate in the survey were included in the study. Patients who had undergone more than one type of treatment modality and having systemic conditions other than trigeminal neuralgia were not included in the study. The study was conducted after due approval from the Institutional Scientific and Ethics Committee of Dr. D. Y. Patil Dental College and Hospital, Pimpri, Pune (DYPDCH/IEC/ICMR STS/09/09) that functions as per the ethical principles
The questionnaire was filled after getting an informed written consent duly filled from all the participants. Clinical Records of the patient were also obtained and used as a reference for filling out some information in the questionnaire. The data obtained was organized in MS Office Excel 2016 (Microsoft Office Professional Plus 2016, Microsoft, USA) for further statistical analysis with SPSS v. 24 (IBM SPSS Statistics Inc, USA). It is described using Mean, Percentage and Chi Square test.

Results

The response rate was 100%. The information recorded from each patient for severity of trigeminal neuralgia before either of the three treatment modalities was performed was noted in first half of questionnaire. Out of the total sample of 30 subjects, 60% were suffering from trigeminal neuralgia for more than 8 years and 86.66% had pain on right side. Majority of the patient’s triggering factors were speaking (100%), chewing (93.33%) and exposure to cold air (86.66%). Mean dose of Carbamazepine consumed by subjects before undergoing procedure was 610mg per day. Range of drug intake was 200–1000mg per day. 80% of subjects had 10–20 attacks per day. For 86.66% patients duration of an attack was 5–10 seconds. Pain relief obtained after either of the three treatment interventions, measured according to Wong Baker Faces Pain Scale was recorded for a period of 6 months. For Group I (Radiofrequency thermocoagulation) 20% said ‘hurts little bit’ after 1 week of procedure and 10% said ‘hurts little more’. After 15 days, 30% said ‘hurts little bit’ and after 3 months upto 6 months, 100% had no pain at all. For Group II (Peripheral Neurectomy) 100% had no hurt after one week, 20% said ‘hurts little bit’ after 15 days, 100% had no pain after 3 months. At 6 months, 80% had no pain, 10% recorded as ‘hurts even more’ and 10% ‘hurts whole lot’. For Group III (Long Acting anaesthetic Injections) 90% had no pain one week post treatment upto 3 months. At 6 months post treatment, 50% had no pain, 20% said ‘hurts little bit’, 10% said ‘hurts little more’ and 20% said ‘hurts even more’. When pain relief obtained was compared between Group 1, 2 and 3 according to chi square test the difference was not significant (p>0.05). Maximum patients in all 3 groups at all intervals of time said that they had ‘no hurt’ or ‘hurts little bit’. All patients from all groups suffered from numbness of face as a side effect. Individuals who had been treated with long acting anaesthetic injections had significantly higher need for medications compared to other two groups. For 90% patients in each group the attacks stopped completely. 50% of patients from Group 3, 40% from Group 2 and 10% from Group 1 had to repeat the procedure.

III. DISCUSSION

In the information collected from all 30 patients suffering from trigeminal neuralgia before either of the three invasive treatment procedures was performed, showed that these patients were on very high dose of Carbamazepine for relief of pain. The average range of dose taken in these study patients was 200 to 1000mg per day. The recommended dose of Carbamazepine according to 2008 AAN-EFNS guidelines on trigeminal neuralgia management, is 200–1200mg per day. (Crucu 2008) The recommended maintenance dose range being 300–800mg per day. The daily dose is increased by 100mg on alternate days till desired pain relief is obtained or the side effects do not allow further increase. Observation of the current study showed that the patients were taking higher dosage of CBZ almost reaching maximum. Which implies that patients non responsive to medical therapy undergo invasive procedures for relief of pain from trigeminal neuralgia also Carbamazepine provided only temporary relief to them so they considered more options that will provide permanent relief. The patients average duration of taking medical line of treatment in this study was 7-8 years before coping for invasive treatment. This observation suggests that with time the effectiveness of Carbamazepine, the first line of treatment for Trigeminal Neuralgia reduces with time. A mechanism described as autoinduction by Campbell explains how the efficacy is 80% at first and declines to 50% over time necessitating higher doses to maintain pain relief. (Campbell 1966). 13 80% of study participants in current study had 10–20 attacks per day suggesting that Trigeminal Neuralgia impairs the day to day functioning of the patients. This observation is similar to noted by McMillan R who in an article describes Trigeminal Neuralgia as a debilitating facial pain, which can be so severe that it can impact on the patient’s ability to eat, wash and maintain oral hygiene. (Mc Millan Roddy 2011) After Radiofrequency Lesioning in Group I subjects, severity of pain reduced greatly gradually over a period of few weeks and complete pain relief was obtained for upto 6 months. Radiofrequency thermocoagulation is a procedure performed under CT guidance to ablate the gasserian ganglion. It is a percutaneous procedure done under C arm guidance which does not require endotracheal intubation which is an advantage for elderly patients, and for patients who require repeat procedure.

Gasserian ganglion therapies require short acting anaesthetics, are primarily overnight minor procedures with extremely low mortality [Crucu et al. 2008]. Patient can get back to routine life immediately. Similar efficacy after percutaneous RF rhizotomy is reported, as 98% of patients experienced immediate pain relief. (Raj Lou
Side effect noted by the patients in this study was numbness of face. According to a study by Zakrzewska et al. (1999) 10% of patients in the current study who had undergone RFT had to repeat the procedure after 6 months. This observation is similar to a study conducted by Emril D in 2010 where 5%–20% of patients experienced recurrence pain in 12 months. (Emril Ho 2010) After treatment with Peripheral Neurectomy in Group II patients, complete pain relief was obtained for 3 months in all patients. Pain relief lasted for 6 months for 80% of patients. 10% gave a score of 6 on Wong Baker’s Scale ie ‘Hurts even more’ and 10% gave a score of 8 on Wong Baker’s Scale ie ‘Hurts whole lot’. A retrospective study conducted by Agrawal and Kambalimath in 2011 on 28 patients over a follow up period of 3 years only 6.66% showed recurrence. (Agrawal 2011) Peripheral Neurectomy is a procedure well tolerated by patients, which can be done under local anaesthesia, and less costly and does not require general anaesthesia like more invasive procedures like craniotomy. This procedure is useful in places in India where rural population has no access or cannot afford advanced equipment like C Arm required for RFT. 50% of Group III patients is treated with long acting anaesthetic injections, had complete pain relief after 6 months. Remaining 50% had partial recurrence of pain. In a similar study by Choi in 1998 reported pain relief lasting for 14 months after 5% lignocaine, with 7.5% dextrose alcohol injection for trigeminal neuralgia patients.(Choi 1998) No statistical significant difference was found in the pain relief obtained when findings from all three groups were compared. When need for supplemental dose was compared, least need was found to be in Group II ie Peripheral Neurectomy. Thus neurectomy as a treatment modality according to the current study is better than RFT or long term alcohol injections in terms of need to take medications even after treatment. Least number of patients who had undergone Radiofrequency Lesioning had to repeat the procedure, followed by peripheral neurectomy. Longer follow up period and small sample size is one of the limitation of the study. A longer follow up period and a larger sample size would have given a more definite result.

IV. CONCLUSION

In conclusion, the results of the study demonstrated that all three treatment modalities had similar pain relief quality and duration. The least effective modality was Long Acting Anaesthetic Agent as the need for postoperative pharmacological treatment and incidence of repetition of procedure was maximum. The severity of postoperative numbness was the least in Radiofrequency Thermocoagulation than the other two. It is an outpatient procedure as opposed to Neurectomy which requires hospitalization and may require general anaesthesia as well. The Recurrence rate was very minimal as compared to other procedures. Also, the patients can return back to the work the same day after the procedure. So it can be suggested that Radiofrequency is the best modality. Also in Peripheral Neurectomy the requirement of post-operative medication was the least so it is the second best modality. Despite all the above findings obtained, other results were proved to be insignificant because of inadequate sample size and less duration of longterm follow-up. Hence, further studies are still required for the same.

REFERENCES


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