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Research article

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Involvement of Different Nerve Branches in Trigeminal Neuralgia on Right and Left Sides- A Retrospective Study.

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Abstract: One of the most common symptoms in the orofacial region is pain. Trigeminal neuralgia is characterized by pain affecting the trigeminal nerve and its related areas of distribution and is known to have significant impact on the quality of life. Misdiagnosis of trigeminal neuralgia has been reported by dentists in several previous studies in the literature. With this rationale, the aim of the present study is to determine the most commonly involved nerve branch and the side affected in trigeminal neuralgia patients. The present retrospective study involved 72 patients diagnosed with trigeminal neuralgia who reported from October 2013 to October 2014. Data regarding the age of onset, gender, side of involvement was analyzed from their clinical records. Out of the 72 patients, males were 42(58.3%) and females were 30(41.7%). In our study, a total of 56 % (i.e., 40) patients showed involvement on the right and 44% (i.e., 32) (i.e, 32) patients on the left side of the face. In this retrospective study, ophthalmic branch (V_1) was affected only in 3 patients. Mandibular nerve (V_3) alone was involved in 24 patients. Involvement of all the three divisions V_1, V_2 and V_3 was seen in 16(22.3%) of patients. Clinical similarities of trigeminal neuralgia that have an impact on different populations were demonstrated in this study. Detailed history and proper identification of involved nerve branch play an important role in the diagnostic accuracy and treatment satisfaction. Most involved branch in our study was the mandibular (V_3) branch and the most affected side was the right side. Correlation of systemic factors with trigeminal neuralgia can be attempted in future research.

Keywords: Trigeminal Neuralgia, Prevalence, Pain, Trigeminal Nerve

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1. INTRODUCTION

Trigeminal neuralgia is defined by the international association for the study of pain as "a sudden usually unilateral, severe, brief, stabbing, recurrent pain in the distribution of one or more branches of the fifth cranial nerve" and is prevalent in 2-3% of the world's population[1,2]. Trigeminal neuralgia is also known as Tic doulourex, fothergill's disease, prosopalgia, suicidal disease, trifacial neuralgia. This disease affects the trigeminal nerve and its branches i.e, the ophthalmic nerve (V1), maxillary nerve(V2) and the mandibular nerve (V3). Most commonly the maxillary and mandibular nerve branches are affected. The ophthalmic branch of trigeminal nerve is the least common to be affected. Trigeminal neuralgia is differentiated into two types by the International Headache Society as classic trigeminal neuralgia and symptomatic trigeminal neuralgia. While the symptomatic variant of trigeminal neuralgia is due to a structural lesion other than vascular compression the classical trigeminal neuralgia is often caused by a microvascular compression at the trigeminal root entry zone of the brain stem[3]. Trigeminal neuralgia is a comparatively rare disease affecting the orofacial region with an estimated annual incidence of 12.6/100,000 persons/year and the peak onset of the disease occurring in between 50-70 years of age[4]. The trigeminal neuralgia mostly affects the right side and has a strong preponderance to women[1].Often, as a result of unclear physical and laboratory diagnosis, misdiagnosis of trigeminal neuralgia occurs leading such patients to seek the help of numerous clinicians before a confirmed diagnosis is made. Despite its benign nature and being refractory to various treatment modalities the trigeminal neuralgia pain is known to show its impact on the patient's quality of life[5]. Post diagnosis, the initial conservative medical treatment is through the use of carbamazepine, oxcarbazepine, baclofen, gabapentin, clonazepam, lamotrigine, valproic acid, or topiramate[1]. In patients who do not respond to conservative medical treatment surgical interventions like rhizotomy, microvascular decompression or a gamma knife procedure[1] is advised. Diseases which mimic trigeminal neuralgia include cluster headache, dental pain (e.g., caries, cracked tooth, pulpitis, giant cell arteritis, glossopharyngeal neuralgia, intracranial tumors, migraine, multiple sclerosis, otitis media, paroxysmal hemicranias, post herpetic neuralgia, sinusitis, SUNCT, temporomandibular joint disorders and trigeminal neuropathy[1]. Bilateral trigeminal neuralgia is associated with multiple sclerosis. In patients who do not respond to the standard medications, and in whom atypical symptoms (such as bilateral or uncommon distribution, longer than usual pain duration, or both) to investigate whether demyelination, vascular compression, or a tumor is the cause of pain, most clinicians recommend the use of magnetic resonance imaging (MRI). Surpassing the other imaging modalities that depict the anatomical relationship between the trigeminal nerve to any abnormal structures MRI has been the premier imaging modality in the diagnosis of trigeminal neuralgia as the resolution of MRI is superior to that of other imaging modalities for visualizing the soft tissues[2]. Careful history and identification of involved nerve branch are important in correct diagnosis and also essential to a satisfactory treatment as the pharmacological responsiveness and the effectiveness of the surgical interventions are distinct among the various pathologies affecting the orofacial region. The aim of the present study is to determine the most commonly involved nerve branch and the side affected in trigeminal neuralgia patients.

2. MATERIALS AND METHODS

The present retrospective study involved 72 patients diagnosed with trigeminal neuralgia. The clinical records of patients that have reported from October 2013 to October 2014 were considered for the data regarding the age of onset, gender and the side of involvement. After identifying the involved nerve branch in accordance with the site of pain, a diagnostic nerve block was given using a local anesthesia of 2% lignocaine with adrenaline 1:200,000 at the identified site. The study was started after obtaining consent from the patients and ethical committee clearance. (SRB/SDMDS12OMR1, IHEC/SDMDS12OMR1) approval from the institution.

2.1 Inclusion criteria

Patients diagnosed with trigeminal neuralgia (both classic and symptomatic) were included in this study.

2.2 Exclusion criteria

Patients with a history of any trauma and or surgeries were excluded from this study.

3. RESULTS

A total of 72 patients were included as study population in this study with an age range of 29-90 years. Mean age in females and males is 54.43 years and 61.28 years respectively. The overall mean age group is 57.85 years. Out of the 72 patients, females were 30(41.7%) and males were 42(58.3%). The total study population was divided into three age groups (<40 years, 41-60 years and > 60 years.) Table -1 shows the demographic data (gender and age distribution in the study). 3 females and 1 male were present in the age group of < 40 years whereas in the age group of 41-60 years, 18 males and 22 females were seen. 21 males and 7 females were present in the age group of >60 years. Table -2 shows the involvement of disease on right and left sides and distribution of involved nerve branches in the study population. According to the results of our study, the most commonly affected side was the right side (40 patients). Left side involvement was seen in 32 patients. The classic findings of trigeminal neuralgia reveal in several clinical studies the disease being more prevalent in women rather than men. However, there are few studies which show male predominance. In our study, though the difference in males and females is not much, the presence of male predominance among the diseased population might impact the changing trends of disease patterns. The most commonly affected nerve was the mandibular nerve branch (V_3) where its involvement was seen in 24 patients. Maxillary nerve (V_2) alone was involved in 7 patients and the ophthalmic nerve ($V_{1)\ a}$ alone was involved in 3 patients. In our study, both V_1 and V_2 were involved in 6 patients and 15 patients had both V_2 and V_3 involved. Both V_1 and V_3 were involved in only one patient. 16 patients showed involvement of all the three nerve branches (V_1, V_2 and V_3). In our study, most of the patients affected on the right side (i.e., 11) and left side (i.e.13) showed V_3 involvement.

Table 1. Demographic Data (Gender And Age Distribution)			
Age Group In Years	**Females**	**Males**	**Total**
<40	3	1	4(5.6%)
41-60	22	18	40(55.5 %)
>60	7	21	28(38.8%)
TOTAL	32	40	n=72(100%)

Table 2. Affected Side And Nerve Involvement In The Study			
Involved Nerve Branch	**Right Side**	**Left Side**	**Total**
Mandibular (V_3)	11(15.2%)	13(18.05%)	24
Maxillary (V_2)	4(5.5%)	3(4.16%)	7
Ophthalmic (V_1)	2(3%)	1(1.38%)	3
V_1 and V_2 and V_3	10(14%)	6(8.3%)	16
V_1 and V_2	4(5.5%)	2(2.7%)	6
V_2 and V_3	8(11%)	7(9.7%)	15
V_1 and V_3	1(1.4%)	0(0%)	1
TOTAL	40(56%)	32(44%)	n=72(100%)

4. DISCUSSION

Female predominance in trigeminal neuralgia was reported by studies in the literature [6-9]. In the present study, (58.3%) i.e.,42 were males and 41.7 %(30) were females. The results of our study showed a male predominance and these findings were similar to four studies reported in the literature [10-13]. Peak age of onset of the disease in trigeminal neuralgia is observed between fifth and eighth decades of life [14-16]. In the present study, 40 patients (55%) were seen in the age group of 41-60 years. 38.8% of the study population was above 60 years of age. Right side involvement was seen in 56 %(i.e., 40) patients and left side involvement was seen in 44% patients. Pengfei Liu et al and Sung Hyun Lee et al reported in their studies that the right side is more frequently involved than left, due to the narrower foramen rotundum and foramen ovale on the right side [17, 18]. Our study did not reveal any bilateral presentation. The hallmark of trigeminal neuralgia is the paroxysms of pain limited to one or more of the three divisions of the trigeminal nerve[19]. The V1 branch(ophthalmic) distributes the scalp and forehead, upper eyelid and conjunctiva, cornea of the eye, tip of nose, nasal mucosa and frontal sinus areas. Hence, the pain involving this branch mimics pain of cluster headache, hemicranias continua and persistent idiopathic facial pain. The lower eyelid, cheek, nares, upper lip, upper teeth and gums, palate, roof of pharynx have sensory innervations from the V2 (maxillary branch. Hence, the pain involving these areas mimics maxillary sinusitis, odontogenic pain from maxillary posterior teeth. The V3 mandibular branch distributes to lower lip, lower teeth and gums, chin and lower jaw and the external ear mimicking mostly pain of glossopharyngeal neuralgia and TMD. Identification of the involved nerve branch is important in successful treatment of trigeminal neuralgia as it is often a diagnostic challenge for the clinician due to its vague clinical presentation precisely in early disease[19, 20]. Literature review reveals that mandibular nerve (V_3) followed by maxillary nerve (V_2) are the most commonly affected while ophthalmic is the least commonly involved [20-22]. The results of our study showed that out of the total 72 patients in the study population, the mandibular branch V_3 was most commonly affected in 24(33.3%) patients and maxillary branch (V_2)in 7(10%) patients. In the study done by Tanrikulu et al out of 180 patients, 25 patients showed V_1 and V_2 involvement[21]. In our study, Both V_2 and V_3 were affected in 15(21%) of the patients. In the study done by Jaimin et al, among 43 patients, v3 was affected in 1 patient while V_2 in 5 patients and both V_2 and V_3 involvement was seen in 14 patients. All the three nerve branches V_1, V_2, V_3 involvement was seen in 11 patients in their study[23]. In our study, all the three divisions V_1, V_2 and V_3 involvement was seen in 16(22.3%) of patients in our study. Nevertheless, any any specific reason regarding the involvement of the nerve in the disease process was not reported. Most probable reason for the predominance of mandibular nerve (V_3) in our study could be attributed to the inherent higher prevalence (V_3) in Asian population [2]. Usually most trigeminal neuralgia patients, whose pain involves the ophthalmic branch (V_1) often, tend to visit the ophthalmologist rather than first preferring an oral physician or a dentist. This could be attributed to the results showing the number of patients affected with ophthalmic branch (V_1) (i.e.3) in our study. Conversely, in most patients where the pain involved the mandibular nerve branch (V_3), have a higher chance of first consulting a dentist to rule the possibility of a dental problem which could be the reason be the reason for the predominance of this nerve branch in our study.

5. CONCLUSION

To conclude, a careful history and identification of the affected nerve plays a crucial role in early diagnosis of the disease and a prompt referral to the specialist concerned. Future studies may be done by correlating the systemic diseases like hypertension and depression with trigeminal neuralgia.

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7. AUTHORS CONTRIBUTION STATEMENT

Dr. Arvind Muthukrishnan was involved in the study concept. The study and the data analysis were done by Dr .K.Caroline Sunitha, Dr. R.Ramesh guided throughout the study.

8. CONFLICT OF INTEREST

Conflict of interest declared none.

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