

# TRIGEMINAL NEURALGIA: ANALYSIS OF PAIN DISTRIBUTION AND NERVE INVOLVEMENT

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## ABSTRACT

*The diagnosis of Trigeminal Neuralgia (TN) has been a source of confusion for clinicians and remains a difficult condition to manage. The study was conducted on 50 patients to evaluate the area of pain distribution and involved nerve. The diagnosis was based on history, clinical examination and response of pain to carbamazepine. The branch of the nerve was identified and confirmed with 2% lignocain with adrenaline 1:200,000 injection at the identified site and repeated three times on consecutive days. The age of patient's ranges from 21–79 years with a mean age 50 years. Males (60%) were affected more than female (40%) with ratio of 3:2. The right side was involved in 64% whereas left side in 36% of patients. The mandibular division was most commonly involved (n=30; 60%) followed by (n=17; 34%) and ophthalmic division (n=3; 6%. The most common site of nerve branch involved in descending order were inferior alveolar, infraorbital, long buccal and mental.*

**Key words:** *Trigeminal neuralgia, Neuropathic pain*

## INTRODUCTION

Trigeminal neuralgia (TN) is reputed to be one of the most painful conditions in human experience that is treated by various specialists including Oral and Maxillofacial Surgeons. TN 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”.<sup>1</sup> Its excruciating intensity as well as its facial location, sharp or electrical quality, phasic temporal profile, and particular drug responsiveness distinguish TN from other types of cranial pain. The pain, also known as “tic douloureux”, is paroxysmic and very severe. It can be triggered by non-noxious stimuli (a light cutaneous touch, chewing, talking, wind on face, cold) on a very localized spot on the face (the so-called “trigger zone”).

The diagnostic criteria of the International Headache Society (IHS) (1988)<sup>2</sup> are as follows:

- Paroxysmal attacks of facial pain that last a few seconds to less than two minutes.
- Pain has at least four of the following characteristics: (1) distribution along one or more divisions of the trigeminal nerve, (2) sudden, intense, sharp, superficial, stabbing or burning in quality, (3) pain intensity is severe, (4) precipitation from trigger areas, or by certain activities such as eating, talking, washing the teeth or cleaning the face, (5) between paroxysms the patient is entirely asymptomatic.
- Attacks are stereotyped in the individual patient.

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- No neurological deficit and exclusion of other causes.

The patient can sometimes benefit from long remissions without any treatment. With the exception of multiple sclerosis and of uncommon cases of posterior fossa tumours or other lesions impinging on the trigeminal nerve, ganglion or root, TN is considered as “idiopathic”. Some benign abnormality had for long been suspected. The current opinion is now in favour of a “neurovascular conflict”: an artery, most often a loop of the superior or antero-inferior cerebellar artery, has an offending contact with the trigeminal nerve root, which results in localized demyelination and ectopic triggering of neuronal discharges.<sup>3</sup>This hypothesis is in agreement with the relief provided by antiepileptic drugs and is supported by recent neuroimaging data.

Most cases are idiopathic in origin and medical management with carbamazepine is the initial treatment of choice. Gabapentine, baclofen and phenytoin can also be effective and in those in whom these do not work may require operation on the peripheral and central nervous system.

**MATERIALS AND METHODS**

This study has been carried out on fifty patients of any age group without gender predilection presenting with the features of trigeminal neuralgia to the department of Dentistry & Maxillofacial Surgery, Lady Reading Hospital Peshawar from Jan 2007 to Dec 2007. The Lady Reading Hospital is a tertiary care hospital.

The diagnosis was based on a detailed history, clinical examination and control of pain by carbamazepine. Orthopentograph (OPG) was performed for every patient to exclude any pathology. The branch of nerve was identified according to the site of pain and confirmed with diagnostic local anesthetic 2% lignocain with adrenaline 1: 200,000 injection at the identified site and repeated three times on consecutive days. An early morning appointment was given to the patients.

**RESULTS**

The age of the patients varied from 21 to 79 years with a mean age 50 years at the time of presentation.

Thirty-eight patients were above forty years and only six patients were from the age group 21-40years as shown in table no 1.

Out of total fifty patients, thirty were males and twenty were females with ratio of 3:2.

In our study right side of the face was found to be involved in thirty-two patients (64%) and left side in eighteen patients (36%). No case presented with bilateral involvement.

The Mandibular division was most commonly involved in this study (n=30; 60%) followed by maxillary (n=17; 34%) and ophthalmic divisions (n=3; 6%). The combination of V2 and V3 were seen in only four patients. All the three divisions were not involved in combination in our study.

The most common site of nerve branch involvement was as follows: mental (n=4); Inferior Alveolar (n=18); Long buccal (n=8); Infra-Orbital (n=15) as shown in table no 2.

Age (Years)	Male	Female	Total
21-30	3	3	6
31-40	3	3	6
41-50	7	5	12
51-60	10	6	16
Above 60 years	7	3	10
<b>Total</b>	30	20	50

TABLE 1: AGE AND GENDER DISTRIBUTION IN TRIGEMINAL NEURALGIA

Nerve branch involved	No of Cases
Inferior Alveolar	18
Infra-Orbital	15
Long buccal	8
Mental	4
Lingual	2
Branches of Ophthalmic	3
<b>Total</b>	50

TABLE 2: DISTRIBUTION OF NERVE BRANCH INVOLVED IN TRIGEMINAL NEURALGIA

## DISCUSSION

According to Penman in 1968<sup>4</sup>, the prevalence of TN is approximately 107 men and 200 women per 1 million people. Mauskop<sup>5</sup> states that approximately 40,000 patients in the US suffer from this condition at any particular time. The incidence is 4-5 cases per 100,000.

The pain resulting from TN imposes a substantial burden on patients. During severe attacks, affected patients may be unable to speak or eat. Even between attacks, some patients are gripped by an overwhelming fear that the pain could suddenly return at any time.<sup>6</sup> TN is associated with impairment in daily function and reduced quality of life. A European patient survey found that pain severity correlated with reduced measures of daily functioning, quality of life, well-being, sleep, mood and overall health status.<sup>7</sup> TN impacted employment in 34% of patients.<sup>7</sup> Two-thirds of patients reported moderate-to-severe pain within the previous 24 h.<sup>7</sup> Depressive symptoms are frequent in patients suffering from TN.<sup>8</sup>

The diagnosis is made nearly entirely based on the patient's history. It should be a simple matter for physicians to make the proper diagnosis, but it is not. In a survey of patients with TN, 90% had experienced pain for more than 1 year before receiving an accurate diagnosis, whereas 13% went 10 years without a diagnosis. First described in the 1600s, the clinical picture is one of pain and symptoms confined to the facial area; there are no systemic components to TN. Wartenberg<sup>9</sup> suggested that the hallmarks of TN would be paroxysms of pain confined to one or more of the three divisions of the trigeminal nerve. The pain is predominantly unilateral, and is described as electric, lancinating, focal, and sharp. It can last for seconds to minutes initially, and sometimes lasts as long as 1 hour. Usually the patient is symptom free between attacks. Later in the course of the disease, patients report dull, aching, constant pain in the same distribution as the paroxysms. Most patients experience a cyclic history of the pain, with the interval between attacks lasting weeks, months, and occasionally years (most patients experience a shortening of the interval between attacks in the course of a decade).<sup>10</sup>

The use of medications may add to the diagnosis. There are reports of the unique sensitivity of TN to

carbamazepine, and this is sometimes proffered as a fundamental part of the essential history. Carbamazepine will reduce or alter the pain in 70 to 90% of patients with TN, but also in 67% of patients with related head and neck pain.<sup>11</sup> There are no convincing reports that carbamazepine reduces trigger zone hyperalgesia. The response to this drug will not eliminate the diagnosis, but it may presage an improved surgical outcome.

Onset is typically after the fifth decade and is increasingly frequent with advancing age, although it can occur at any age. In a 40-year Rochester (MN, USA) population study, the annual age-adjusted incidence of TN per 100,000 was 4.3 for both sexes combined, 5.9 for women and 3.4 for men.<sup>13</sup> In addition to female gender, a history of hypertension or multiple sclerosis (MS) was associated with an elevated relative risk.<sup>13</sup> A higher rate was found in a prospective community-based UK epidemiologic study, which reported an age- and sex-adjusted annual incidence of eight per 100,000, as well as a lifetime prevalence of 0.7 per 1000 for patients in the London area.<sup>14</sup> There can be a family history in approximately 5% of patients with TN. Five percent of patients will experience bilateral sequential pain. More women may present than men (7.2 compared with 4.7 per 100,000), with the peak decade of presentation being the sixth<sup>15</sup>. The disease appeared at 26 years and in other study as early as 22 years.

The age range at presentation in our experience is 21 years to 79 years. 21 years old young man presented with TN having no changes on brain MRI. Men (60%) presented more than women (40%) in contrast to other studies (ratio 3:2). We did not see any correlation with family history. One hypertensive lady in our study presented with trigeminal nerve.

There is some controversy about the frequency of side of presentation. White and Sweet<sup>16</sup> reported right-sided pain in 61%, left-sided in 36%, and bilateral in 4%. Investigators in other studies did not find a propensity for one side or another. We also found pain presentation more on right side (64 %) than on left side (36%). Bilateral presentation was not seen in our study.

Systemic illnesses such as multiple sclerosis, Lyme disease, and Charcot-Marie-Tooth disease can be part of the cause of the pain. Chiari malformations may

exacerbate the pain of various cranial nerves, including the trigeminal nerve, as can other pathological phenomena. Rushton and Olafson<sup>17,23</sup> found that approximately 1% of patients with multiple sclerosis (MS) develop TN, whereas Jensen et al<sup>22</sup> stated that 2% of patients with TN have MS. These conditions can produce sequential pain on the contralateral side, or increased incidence of bilateral pain. Most often the pain is due to vascular cross-compression of the root entry zone of the main sensory root of the trigeminal nerve, in the posterior fossa.

Cerebrovascular disease can give rise to TN when infarction involves the spinotrigeminal nucleus or tract (IHS 13.18.2, central post-stroke pain). TN has been reported in patients with pontine<sup>18</sup> and lateral medullary infarctions,<sup>19</sup> as well as in association with brachium pontis cavernous angioma.<sup>20</sup> Additionally, the author has seen a case of bilateral TN following bilateral pontine infarctions. We observed one patient in our series that presented with such ischemic changes. The patient was referred to neurosurgeon.

The most of investigation in the literature revealed that mandibular division was involved most commonly and the ophthalmic division was less commonly presented. The maxillary division remained in between the two. Kenneth F<sup>15</sup> found that symptoms were predominate in the V<sub>3</sub> (15%), or V<sub>2</sub> (17%), and the combination of V<sub>3</sub> and V<sub>2</sub> (32%), and rarely start in only the V<sub>1</sub>. All three divisions are affected in 17% of patients at onset

In this investigation, the findings were reported. Only three patients (6 %) patients presented with the involvement of first division whereas 3<sup>rd</sup> division was the most common (60%). The combination of V<sub>2</sub> and V<sub>3</sub> were seen in only four patients. All the three divisions were not involved in our study. However Kutusic et al showed the involvement of mandibular and maxillary division of trigeminal in appropriately equal proportion, and in a small percentage the ophthalmic division. No specific reason was seen in the most common or less common involvement of the nerve in the disease process.

The various studies showed that among the branches of ophthalmic, maxillary and mandibular division, the inferior alveolar remained the most com-

monly involved. However some investigators reported infra-Orbital as the most commonly involved nerve. The lingual nerve and the branches of Ophthalmic are rarely presented. Our study supported these views.

## CONCLUSION

Careful history and identification of the nerve involved is important in correct diagnosis and is essential to satisfactory treatment because the pharmacologic responsiveness of TN and effective surgical options are distinct among craniofacial pain syndrome. Many patients are misdiagnosed and undergo misguided, unnecessary procedures and ineffective treatments. Correct diagnosis and treatment with carbamazepine is beneficial in majority of patients. The age of the patients varied from 21-79 years. Male were affected more than female with ratio of 3:2. The right side was involved more than left side. The mandibular division was most commonly involved (60%).

## REFERENCES

- 1 Merskey H, Bogduk N. In: Classification of chronic pain: Descriptions of chronic pain syndromes and definitions of pain terms 2<sup>nd</sup> Ed. IASP Press, Seattle, WA, USA 1994.
- 2 International Headache Society. Classification and diagnostic criteria for headache disorders, cranial neuralgia and facial pain. Cephalalgia 1988; 8:1-96.
- 3 Barker FG, Jannetta PS, Bissonette DJ, Larkins MV, JHO HD. The long term outcom of microvascular decompression for trigeminal neuralgia. N Engl J Med 1996; 334: 1077-83.
- 4 Penman KA, Bartz, Davis R. Relative effectiveness of an instant replay videotape recorder in teaching trampoline. Res Q 1968 ;39:1060-2.
- 5 Gan TJ, Lubarsky DA, Flood EM, Thanh T, Mauskop J, Mayne T, Chen C. Patient preferences for acute pain treatment. Br J Anaesth. 2004 ;92:681-8.
- 6 Ceshire WP. Trigeminal neuralgia feigns the terrorist. Cephalalgia 2003; 23:230.
- 7 Tolle T Duke E, Sadosky A. Patient burden of trigeminal neuralgia: results from a cross-sectional survey of health state impairment and treatment patterns in European countries. Pain Pract 2006;6:153-60.
- 8 Marbach JJ, Lund P. Depression, anhedonia and anxiety in temporomandibular joint and other facial pain syndromes. Pain 1981; 11:73-84.
- 9 Wartenberg H. Neuritis, Sensory Neuritis, and Neuralgias. New yark. Oxford University Press 1958:337-77.
- 10 Quatitative sensory testing in investigation of orofacial pain and sensory function. J Orofac Pain 2004; 18:85-107.
- 11 Tyler EC, Kassam AB, Horowitz MH, et al. Predictors of outcome in surgically managed patients with typical and

- atypical trigeminal neuralgia: Comparison of results following microvascular decompression. *J Neurosurg* 2002; 96:527-31.
- 12 Cheshire WP. Trigeminal neuralgia: diagnosis and treatment. *Curr Neurol Neurosci Rep* 2005; 5: 79–85.
- 13 Jatusic S, Beard CM, Bergstralh E, Kurland LT. Incidence and clinical features of trigeminal neuralgias, Rochester, Minnesota, 1945-1984. *Ann Neurol* 1990; 27:89-95.
- 14 Mac Donald BK, Cockerell OC, Sander J WAS, Shorvon SD. The incidence and lifetime prevalence of neurological disorders in a prospective community based study in the UK. *Brain* 2000; 123:665-76.
- 15 Kenneth F, Casey MD, Peter J Jannetta. The role of Patient History and Physical Examination in the Diagnosis of Trigeminal Neuralgia. *Neurosurg Focus* 2005; 18: 106-12.
- 16 Tew JM Jr, Van Loveren H. Percutaneous rhizotomy in the treatment of intractable facial pain(trigeminal, glossopharyngeal and vagal nerves), in Schmidek HH, Sweet WH(Eds): *Operative Neurosurgical Techniques: Indications, Methods, and Results, Ed 2.* Orlando: Gune S Stratton, Vol 2, 1988: 1111-1123.
- 17 Rushton JG, Olafson RA. Trigeminal neuralgia associated with multiple sclerosis. A case report. *Arch Neurol* 1965 ;13:383-6.
- 18 Lizuka O, Hosokai Y, Mori E. Trigeminal neuralgia due to pontine infarction. *Neurology* 2006; 66: 48
- 19 Warren HG, Kotsenas AL, Czervionke LF. Trigeminal and concurrent glossopharyngeal neuralgia secondary to lateral medullary infarction. *AJNR Am J Neuroradiol* 2006; 27: 705-07.
- 20 Vitek L, Tetteborn B. Cavernous angioma in the brachium pontis presenting with trigeminal neuralgia: Case Report. *Eur Neurol* 2002; 48:226-28.
- 21 Katusic S, Williams DB, Beard CM et al. Epidemiology and clinical features of idiopathic trigeminal neuralgia and glossopharyngeal neuralgia: similarities and differences, Rochester, Minnesota, 1945–1984. *Neuroepidemiology* 1991; 10: 276–81.
- 22 Jensen TS, Rasmussen P, Reske-Nielsen E. Association of trigeminal neuralgia with multiple sclerosis: clinical and pathological features. *Acta Neurol Scand*; 65: 182–89.
- 23 Olafson RA, Rushton JG, Sayre GP. Trigeminal neuralgia in a patient with multiple sclerosis: An autopsy report. *J Neurosurg* 1966 :24:755-9.
- 24 Gupta V, Singh AK, Kumar S, Sinha S. Familial trigeminal neuralgia. *Neurol Ind* 2002; 50: 87-9.
- 25 Zakrzewska JM. Trigeminal neuralgia. *Clin Evid* 2002 ;7: 1221-31.
- 26 Burchiel KJ, Slavin KV: On the natural history of trigeminal neuralgia. *Neurosurgery* 46:152–155, 2000.
- 27 Sato J, Saitoh T, Notani K, et al. Diagnostic significance of carbamazepine and trigger zones in trigeminal neuralgia. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 97:18–22, 2004
- 28 Love S, Coakham HB. Trigeminal neuralgia: pathology and pathogenesis. *Brain* 2001;124:2347-60.
- 29 Burchiel KJ. A new classification for facial pain. *Neurosurgery* 2003; 53, 1164–66.
- 30 Eller JL, Raslan AM, Burchiel KJ. Trigeminal neuralgia: definition and classification. *Neurosurg Focus* 2005; 18:223-26.
- 31 Kress B, Schindler M, Rasche D et al. MRI volumetry for the preoperative diagnosis of trigeminal neuralgia. *Eur Radiol* 2005; 15: 1344–48.
- 32 De Simone R, Marano E, Brescia Morra V et al. A clinical comparison of trigeminal neuralgic pain in patients with and without underlying multiple sclerosis. *Neurol Sci* 2005; 26:150–51.
- 33 Hojaili B, Barland P. Trigeminal neuralgia as the first manifestation of mixed connective tissue disorder. *J Clin Rheumatol* 2006; 12:145–47.
- 34 Jaaskelainen SK, Teerijoki-Oksa T, Forssell H. Neurophysiologic and quantitative sensory testing in the diagnosis of trigeminal neuropathy and neuropathic pain. *Pain* 2005; 117: 349–57.
- 35 Chole R, Patil R, Degwekar SS, Bhowate RR. Drug treatment of trigeminal neuralgia: a systematic review of the literature. *J Oral Maxillofac Surg* 2007; 65, 40–45.
- 36 Jorns TP, Zakrzewska JM. Evidence-based approach to the medical management of trigeminal neuralgia. *Br J Neurosurg* 2007;21: 253–261.
- 37 Baillie JK, Power I. The mechanism of action of gabapentin in neuropathic pain. *Curr Opin Invest Drugs* 2006;7: 33–39.
- 38 Li ST, Pan Q, Liu N et al. Trigeminal neuralgia: what are the important factors for good operative outcomes with microvascular decompression. *Surg Neurol* 2004; 62: 400–05.
- 39 McLeod NM, Patton DW. Peripheral alcohol injections in the management of trigeminal neuralgia. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007; 104: 12–17.
- 40 Athanasiou TC, Patel NK, Renowden SA, Coakham HB. Some patients with multiple sclerosis have neurovascular compression causing their trigeminal neuralgia and can be treated effectively with MVD: report of five cases. *Br J Neurosurg* 2005; 19: 463–68.
- 41 de Bondt BJ, Stokroos R, Casselman J. Persistent trigeminal artery associated with trigeminal neuralgia: hypothesis of neurovascular compression. *Neuroradiol* 2007; 49: 23–26.
- 42 Epidemiology and treatment of neuropathic pain: the UK primary care perspective. *Pain.* 2006 ;122:156-62.
- 43 Cheshire WP. Trigeminal neuralgia. *Curr Pain Headache Rep* 2007; 11: 69–74.
- 44 Katusic S, Beard CM, Bergstralh E, Kurland LT. Incidence and clinical features of trigeminal neuralgia, Rochester, Minnesota, 1945–1984. *Ann Neurol* 1990; 27: 89–95.
- 45 Facial neuralgias: analysis of the different types seen at Lagos University Teaching Hospital, (Luth). *Niger J Clin Pract* 2005; 8:114 -17.

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