

Clinical and Radiological Profile of Trigeminal Neuralgia- A Retrospective Study

ROY THOMAS



ABSTRACT

Introduction: Trigeminal neuralgia is described as severe, stabbing unilateral pain along the distribution of trigeminal nerve branches. The three subtypes include- Classical, secondary and idiopathic.

Aim: To study the clinical profile, presentation and radiological imaging features in trigeminal neuralgia patients.

Materials and Methods: This cross-sectional study included outpatient medical records of 60 trigeminal neuralgia patients between June 2015 to June 2020 (five years) in a Tertiary care Medical College Hospital. Various parameters studied were: (a) Age; (b) Gender; (c) Dental treatment; (d) Pain severity; (e) Trigger factors; (f) Side and branch involved; (g) Sensory abnormalities; (h) MRI. Data was entered in Microsoft excel and analysed using SPSS statistical software 20.0. Chi-square test was used for categorical variables.

Results: Among the 60 patients studied, the common demographic and clinical features were as follows: 34 were

females (56.7%); 36 with right side presentation (60%); 25 had maxillary nerve division distribution (41.7%); 57 patients experienced shock/lancinating pain (95%); and 40 had numeric pain severity scale of 4-6 (66.7%). Classical Trigeminal Neuralgia was the most common subtype seen in 31 patients (51.7%). Involvement of dual divisions (maxillary and mandibular), absence of trigger factors and presence of hypoesthesia were more suggestive of Secondary Trigeminal Neuralgia ($p < 0.05$). Based on MRI imaging, 31 (51.7%) showed neurovascular compression with atrophy or displacement of trigeminal nerve root. Only 5 (8.4%) had secondary causes (schwannoma, meningioma, demyelination, infarct).

Conclusion: The key clinical features of trigeminal neuralgia include female preponderance, right side presentation, maxillary nerve division distribution, shock/lancinating pain with touch and breeze as common trigger factors. As some of them had a previous dental treatment or procedure, dentists need to be aware of this entity. Certain clinical features would help to differentiate the secondary from classic and idiopathic neuralgia subtype.

Keywords: Cephalalgia, Facial pain, Lancinating, Secondary trigeminal neuralgia

INTRODUCTION

According to International Association for the Study of Pain, trigeminal neuralgia is defined as sudden, unilateral, severe, brief, stabbing, recurrent episodes of pain in the distribution of one or more branches of the trigeminal nerve [1]. It may be idiopathic or have secondary causes. However, some patients experience moderate intense continuous pain along the affected nerve distribution. The annual incidence of trigeminal neuralgia is 4 to 5 in 100,000 with a higher prevalence in women [2,3]. It is rare below the age of 40, though it can also affect paediatric population [4].

The latest classification of the International Headache Society distinguishes between Classic, Secondary and Idiopathic Trigeminal neuralgia [5]. Classic trigeminal neuralgia includes all cases without an established aetiology (those with potential vascular compression-typically atrophy or displacement of the fifth cranial nerve). If any of the investigations recognise any structural abnormality which is different from the vascular compression affecting the trigeminal nerve; then it is termed as Secondary trigeminal neuralgia. It includes multiple sclerosis plaques, tumours in cerebellopontine angle, AV malformations and abnormalities of the skull base. When evaluation and imaging is normal, it is then termed as idiopathic trigeminal neuralgia [5].

Most clinicians see only a few patients because of the rareness of the disease with an estimated prevalence of 0.3%, and it is clinically evident that this is both misdiagnosed and undertreated [6]. These patients present a marked reduction in the quality of life in view of the nature and severity of pain [7].

The aim of this study was to evaluate the clinical profile and radiological imaging features in trigeminal neuralgia patients. This may help in a better understanding of the disease along with an early and appropriate management in these patients.

MATERIALS AND METHODS

A cross-sectional study was conducted using the medical records of 60 adult patients with Trigeminal Neuralgia who attended the Neurology outpatient department at Travancore Medical College, Kollam between June 2015 and June 2020. This study was approved by Institutional Ethics committee Review Board (TMC/069/20).

Inclusion criteria and Exclusion criteria:

Patients diagnosed with trigeminal neuralgia as per the Criteria of the International Headache Society (ICHD 3), were included in the study [5]. Patients were excluded if: (a) with atypical facial pain (as per ICHD3); (b) not fulfilling the criteria for trigeminal neuralgia; (c) patients with prior history of neurosurgery procedure; (d) patients with prior history of trauma; (e) patients whose work up is incomplete/ MRI is not done; (f) associated connective tissue disorder.

The following variables were studied: (a) Age; (b) Gender; (c) Dental treatment/tooth extraction; (d) Severity of pain based on Numeric Pain Rating scale (0-No Pain, 1 to 3- Mild Pain, 4 to 6- Moderate Pain and 7 to 10- Severe Pain); (e) Trigger factors- chewing, touch, brushing teeth, eating, talking, breeze; (f) Side- left/right/bilateral; (g) Area involved V1/V2/V3/V1+V2/V2+V3/V1+V2+V3; (h) Sensory abnormalities: hypoesthesia, hyperesthesia, allodynia, hypoalgesia; (i) MRI.

MRI Imaging

MRI Brain of the 60 patients in the study was conducted with 1.5T Siemens unit system. The protocols used were: axial T1, T2, FLAIR, 3D CISS, postcontrast T1 series in case of suspicious lesions. Neurovascular compression with atrophy or displacement in the trigeminal nerve root, structural lesion, infarct, demyelinating plaque, space occupying lesion was assessed.

Based on the subtypes of trigeminal neuralgia (Classical, Secondary and Idiopathic), various clinical features were analysed.

ICHD-3 Criteria for Diagnosis of Trigeminal Neuralgia [5]

Recurrent paroxysms of unilateral facial pain in the distribution(s) of one or more divisions of the trigeminal nerve, with no radiation beyond, and fulfilling criteria B and C

- A. Pain has all of the following characteristics:
 1. lasting from a fraction of a second to 2 minutes
 2. severe intensity
 3. electric shock-like, shooting, stabbing or sharp in quality
- B. Precipitated by innocuous stimuli within the affected trigeminal distribution
- C. Not better accounted for by another ICHD-3 diagnosis.

ICHD-3 Criteria for Diagnosis of Classical Trigeminal Neuralgia [5]

- A. Recurrent paroxysms of unilateral facial pain fulfilling criteria *Trigeminal neuralgia*
- B. Demonstration on MRI or during surgery of neurovascular compression (not simply contact), with morphological changes (atrophy or displacement) in the trigeminal nerve root.

ICHD-3 Criteria for Diagnosis of Secondary Trigeminal Neuralgia [5]

- A. Recurrent paroxysms of unilateral facial pain fulfilling criteria for *Trigeminal neuralgia*, either purely paroxysmal or associated with concomitant continuous or near-continuous pain
- B. An underlying disease has been demonstrated that is known to be able to cause, and explaining the neuralgia
- C. Not better accounted for by another ICHD-3 diagnosis

ICHD-3 Criteria for Diagnosis of Idiopathic Trigeminal Neuralgia [5]

- A. Recurrent paroxysms of unilateral facial pain fulfilling criteria for *Trigeminal neuralgia*,
- B. Neither Classical trigeminal neuralgia nor Secondary trigeminal neuralgia has been confirmed by adequate investigation
- C. Not better accounted for another ICHD-3 diagnosis.

ICHD-3 Criteria for Diagnosis of Atypical Facial Pain [5]

- A. Facial and/or oral pain fulfilling criteria B and C
- B. Recurring daily for >2 hours/day for >3 months
- C. Pain has both of the following characteristics:
 1. poorly localised, and not following the distribution of a peripheral nerve
 2. dull, aching or nagging quality
- D. Clinical neurological examination is normal
- E. A dental cause has been excluded

STATISTICAL ANALYSIS

Data was analysed with SPSS statistical software. (SPSS, version 20.0, Chicago, IL, USA). Categorical variables were presented in number and percentage and were compared using Chi-square test. A p<0.05 was considered statistically significant.

RESULTS

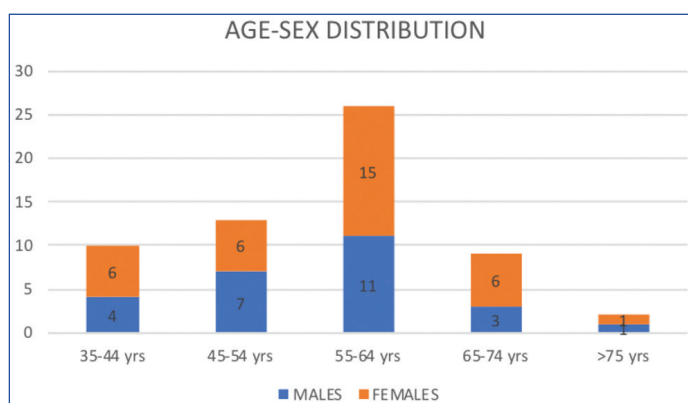
Among the 60 patients studied with trigeminal neuralgia, 26 (43.3%) were males and 34 (56.7%) were females. About 25 had maxillary nerve division distribution (41.7%), 57 patients experienced shock/lancinating pain (95%), touch and breeze as common trigger factors

in 54 (90%). The median age among males was 52.4 years and females were 56.5 years [Table/Fig-1].

Clinical features	Male (N=26)	Female (N=34)	Total (N=60)	p-value*
Side of face				
Left	10 (38.4%)	14 (41.2%)	24 (40%)	0.8315
Right	16 (61.6%)	20 (58.8%)	36 (60%)	
Division of nerve				
V2	11 (42.3%)	14 (41.2%)	25 (41.7%)	0.8385
V3	9 (34.6%)	10 (29.4%)	19 (31.7%)	
V2+V3	6 (23.1%)	10 (29.4%)	16 (26.6%)	
Pain character				
Shock like/Lancinating	24 (92.2%)	33 (97.1%)	57 (95%)	0.5018
Throbbing	1 (3.9%)	1 (2.1%)	2 (3.3%)	
Dull	1 (3.9%)	0 (0%)	1 (1.7%)	
Pain severity				
1-3	6 (23.1%)	9 (26.4%)	15 (25%)	0.1357
4-6	18 (69.2%)	22 (64.7%)	40 (66.7%)	
7-10	2 (7.7%)	3 (8.9%)	5 (8.3%)	
Others				
Trigger factors	24 (92.3%)	30 (88.2%)	54 (90%)	0.6023
Acute spontaneous pain	24 (92.3%)	33 (97%)	57 (95%)	0.8751
Previous dental treatment/procedure	18 (69.2%)	20 (58.8%)	38 (63.3%)	0.4701
No sensory findings	24 (92.3%)	31 (91.1%)	55 (91.6%)	0.6023

[Table/Fig-1]: Association between clinical features and gender. *Analysis was using Pearson's chi-square test

About 26 patients (43.3%) were in the age group 55-64 years. Of the total 34 females in the study group, 15 (44.1%) were in 55-64 year age group [Table/Fig-2].



[Table/Fig-2]: Age-sex distribution.

Based on the MRI findings 31 patients (51.7%) showed neurovascular compression with atrophy or displacement in the trigeminal nerve root (Classical trigeminal Neuralgia). MRI of five patients (8.4%) revealed- Schwannoma (1), Meningioma (1), Demyelination (2) and Infarct (1) (Secondary trigeminal neuralgia). About 24 (39.9%) had normal MRI findings (Idiopathic trigeminal neuralgia). In the study, hypoesthesia was the only sensory examination finding found in all the five patients of secondary trigeminal neuralgia. 90% of patients had trigger factors; the most common of which were touch (86.6%) and breeze (70%). Involvement of dual divisions (V2 and V3), absence of trigger factors and evidence of hypoesthesia were found in all patients of Secondary Trigeminal neuralgia (p<0.001) [Table/Fig-3].

DISCUSSION

Trigeminal neuralgia, though uncommon is a disturbing and disabling pain disorder. Despite a typical clinical presentation, it can sometimes be missed in an outpatient setting.

Type	Classical (n=31)	Secondary (n=5)	Idiopathic (n=24)	Total (n=60)	*p-value
Side of face					
Left	13 (41.9%)	3 (60%)	8 (33.3%)	24 (40%)	0.5150
Right	18 (58.1%)	2 (40%)	16 (66.7%)	36 (60%)	
Division of nerve					
V2	20 (64.5%)	0 (0%)	5 (20.8%)	25 (41.7%)	<0.001
V3	11 (35.5%)	0 (0%)	8 (33.3%)	19 (31.7%)	
V2+V3	0 (0%)	5 (100%)	11 (45.9%)	16 (26.6%)	
Pain radiation					
Within the division	31 (100%)	0 (0%)	13 (54.1%)	44 (73.3%)	0.9116
Outside the division	0 (0%)	5 (100%)	11 (45.9%)	16 (26.7%)	
Pain character					
Shock like/Lancinating	31 (100%)	2 (40%)	24 (100%)	57 (95%)	0.0856
Throbbing	0 (0%)	2 (40%)	0 (0%)	2 (3.3%)	
Dull	0 (0%)	1 (20%)	0 (0%)	1 (1.7%)	
Pain severity					
1-3	8 (25.8%)	3 (60%)	4 (16.6%)	15 (25%)	0.1510
4-6	20 (64.5%)	1 (20%)	19 (79.1%)	40 (66.7%)	
7-10	3 (9.7%)	1 (20%)	1 (4.3%)	5 (8.3%)	
Others					
Trigger factors	31 (100%)	0 (0%)	23 (95.8%)	54 (90%)	<0.0001
Acute spontaneous pain	31 (100%)	2 (40%)	24 (100%)	57 (95%)	0.1673
Previous dental treatment/procedure	20 (64.5%)	0 (0%)	18 (75%)	38 (63.3%)	0.0636
No Sensory findings	31 (100%)	0 (0%)	24 (100%)	55 (91.6%)	<0.0001

[Table/Fig-3]: Correlation between clinical features and subtypes.

*Analysis was using Pearson's Chi-squared test; p<0.05 was considered statistically significant

In the study, among the 60 patients studied with trigeminal neuralgia, 56.7% were females. The median age among males was 52.4 years and females were 56.5 years. Most common age group was between 55-65 years. In the study by Rai A et al., 55% were males, with average age of 58.97 years for males and 59.96 years for females [8]. Maarbjerg S et al., did a prospective systematic study of clinical characteristics in 158 patients. The prevalence of women (60%) was significantly higher than that of men with average age of onset 52.9 years [9]. In the study by Katheriya G et al., peak age of onset was between the 5th and the 6th decades of life. Females (59.2%) were more predilected for neuralgia than males [10]. These studies results were in agreement with present study results.

In the present study, right side of the face was more commonly involved than the left. Both sides were equally affected in the study by Rai A et al., [8]. In most of the studies, it has been observed that the right side of the face was affected more frequently than the left side [9,10].

Regarding the division of trigeminal nerve involved, it was found that maxillary (V2) and mandibular (V3) divisions were involved in 25 (41.7%) and 19 (31.7%) patients, respectively, while in remaining 16 (26.6%) patients, both V2 and V3 nerves were involved. The result was in consistent with the study by Rai A et al., [8]. Mandibular nerve was more commonly involved in the study by Katheriya G et al., [10]. However, all these studies had same observation that the combinations of V2+V3 were less common as similar to present study.

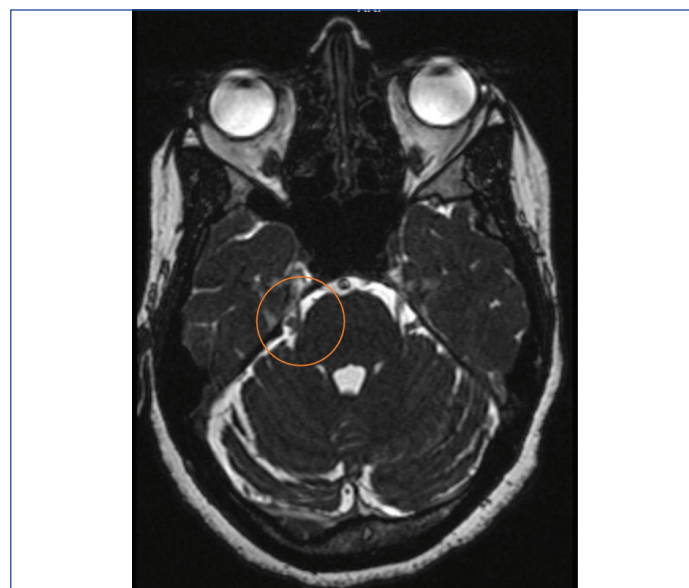
The diagnosis of trigeminal neuralgia is highly dependent on the character, duration and severity of the pain. In the study, the most commonly described character was shock like/lancinating (95%) with a severity of 4-6 (66.7%) on the Numerical rating pain scale. The most common pain descriptor was shock like pain in Rai A et al., study, stabbing pain in Maarbjerg S et al., study and sharp pain in Jainkittivong A et al., study [8,9,11].

Sensory findings (hypoesthesia) were observed in 8.4% patients. The most common trigger factors in the study were touch and breeze. In the study by Maarbjerg S et al., chewing and touch were the most

common trigger factors and significant proportion of surgery naïve patients had sensory abnormalities [9].

The pain of trigeminal neuralgia is sometimes falsely attributed to dental origin [12]. In the study, previous dental treatment/procedure was undertaken by 63.3% of patients. In the study by Rai A et al., 13.33% underwent dental treatment [8]. Furthermore, Jainkittivong A et al., described that many patients with trigeminal neuralgia have lost teeth because of unnecessary extractions; odontogenic pain being a common misdiagnosis [11]. Thus, serious caution should be taken in cases where it may be perceived initially as an episodic toothache.

In the present study based on MRI correlation, Classical trigeminal neuralgia was the most common sub type that showed neurovascular compression with atrophy or displacement of trigeminal nerve root [Table/Fig-4]. In the study by Masur H et al., about 33.3% of



[Table/Fig-4]: MRI 3D-CISS axial image showing neurovascular impingement of right trigeminal nerve.

patients had no neurovascular contact in MRI [13]. In a study by Nevan G et al., 62% had vessels seen abutting, or immediately adjacent to the trigeminal nerve on the side of their symptoms [14]. Analysis by Antonini G et al., showed that trigeminal root entry zone neurovascular contact was detected in 76% of symptomatic nerves [15].

In present study, when the clinical features were compared between the various three subtypes, division of trigeminal nerve, trigger factors and no sensory findings were found to be statistically significant. Involvement of dual divisions (V2 and V3), absence of trigger factors and evidence of sensory finding were suggestive of Secondary Trigeminal neuralgia.

Limitation(s)

The greatest limitation of the study was the retrospective design and the conclusions were based on observation from a single study centre. Also, the sample size was relatively low. Thus, a prospective multicentre study is required.

CONCLUSION(S)

Trigeminal neuralgia though uncommon is a treatable cephalgia which can have a major impact on the quality of life. The study determined the general clinical characteristics and MRI findings among trigeminal neuralgia patients. The common demographic and clinical features include female pre-ponderance, right side presentation, maxillary nerve division distribution, shock/lancinating pain with touch and breeze as common trigger factors. As some of them had a previous dental treatment or procedure, dentists need to be aware of this entity. Classical trigeminal neuralgia was the most common subtype. Involvement of dual divisions (V2 and V3), absence of trigger factors and evidence of sensory finding were more suggestive of Secondary Trigeminal neuralgia.

REFERENCES

- [1] Merskey H, Bogduk N. Classification of chronic pain descriptions of chronic pain syndromes and definitions of pain terms. Task Force on Taxonomy of the International Association for the Study of Pain. 2nd ed. Seattle, WA: IASP Press; 1994;59-71.
- [2] Katusic S, Williams DB, Beard CM, Bergstralh EJ, Kurland LT. Epidemiology and clinical features of idiopathic trigeminal neuralgia and glossopharyngeal neuralgia: Similarities and differences. Rochester, Minnesota, 1945-1984. *Neuroepidemiology*. 1991;10(5-6):276-81.
- [3] De Toledo IP, Conti Réus J, Fernandes M, Porporatti AL, Peres MA, Takaschima A, et al. Prevalence of trigeminal neuralgia. *J Am Dent Assoc*. 2016;147(7):570-76.
- [4] Dubey A, Mujoo S, Sakarde SB, Dubey AK. Paroxysmal neuralgia in pediatric population-A diagnostic dilemma for physicians and dental practitioners. *Kathmandu Univ Med J (KUMJ)*. 2018;10(40):74-77.
- [5] Headache Classification Subcommittee of the International Headache Society. The International Classification of Headache Disorders: 3rd edition. *Cephalalgia*. 2018;38(1):01-211.
- [6] Mueller D, Obermann M, Yoon MS, Poitz F, Hansen N, Slomke MA, et al. Prevalence of trigeminal neuralgia and persistent idiopathic facial pain: A population-based study. *Cephalalgia*. 2011;31:1542-48.
- [7] Araya EI, Claudino RF, Piovesan EJ, Chichorro JG. Trigeminal neuralgia: Basic and clinical aspects. *Curr Neuropharmacol*. 2020;18(2):109-19.
- [8] Rai A, Kumar A, Chandra A, Naikmasur V, Abraham L. Clinical profile of patients with trigeminal neuralgia visiting a dental hospital: A prospective study. *Indian J Pain*. 2017;31:94-99.
- [9] Maarbjerg S, Gozalov A, Olesen J, Bendtsen L. Trigeminal neuralgia-A prospective systematic study of clinical characteristics in 158 patients. *Headache*. 2014;54:1574.
- [10] Katheriya G, Chaurasia A, Khan N, Iqbal J. Prevalence of trigeminal neuralgia in Indian population visiting a higher dental care center in North India. *Natl J Maxillofac Surg*. 2019;10:195-99.
- [11] Jankittivong A, Aneksuk V, Langlais RP. Trigeminal neuralgia: A retrospective study of 188 Thai cases. *Gerodontology*. 2012;29:e611-17.
- [12] Law AS, Lilly JP. Trigeminal neuralgia mimicking odontogenic pain. A report of two cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 1995;80:96-100.
- [13] Masur H, Papke K, Bongartz G. The significance of three-dimensional MR-defined neurovascular compression for the pathogenesis of trigeminal neuralgia. *J Neurol*. 1995;242:93-98.
- [14] Baldwin NG, Sahni KS, Jensen ME, Pieper DR, Anderson RL, Young HF. Association of vascular compression in trigeminal neuralgia versus other "Facial Pain Syndromes" by magnetic resonance imaging. *Surg Neurol*. 1991;36:447-52.
- [15] Antonini G, Pasquale AD, Cruccu G, Truini A, Morino S, Saltelli G, et al. Magnetic resonance imaging contribution for diagnosing symptomatic neurovascular contact in classical trigeminal neuralgia: A blinded case-control study and meta-analysis. *Pain*. 2014;155(8):1464-71.

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Neurology, Travancore Medical College, Kollam, Kerala, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Roy Thomas,
Assistant Professor, Department of Neurology, Travancore Medical College,
Kollam-691020, Kerala, India.
E-mail: droythom@yahoo.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Sep 18, 2020
- Manual Googling: Oct 13, 2020
- iThenticate Software: Oct 28, 2020 (21%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? NA
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Sep 16, 2020**

Date of Peer Review: **Sep 30, 2020**

Date of Acceptance: **Oct 13, 2020**

Date of Publishing: **Nov 01, 2020**