ORIGINAL RESEARCH

Clinical and Radiological Spectrum of Trigeminal Neuralgia

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ABSTRACT
Background: Trigeminal neuralgia is one of the most painful neurological disorders.In this study we aimed to describe the clinical and radiological spectrum of trigeminal neuralgia.
Martial and Methods: This is a single center prospective study conducted at a tertiary hospital in Southern India. A total of 50 patients with clinical diagnosis of trigeminal neuralgia according to ICHD-3 criteria were included in the study. Demographic characteristics, detailed case history that included side of face involved – left/right, area of face involved (V1/V2/V3/V1+V2/V2+V3/ V1+V2+V3), pain characteristics, triggering factors, sensory abnormalities was taken. MRI brain was performed in all patients. Classical,secondary,idiopathic trigeminal neuralgia was diagnosed based on ICHD-3 criteria.
Results: Fifty patients were included in our study, whose age group ranged from 32 to 77 years.The highest incidence was found in 51-60 years age group accounting for 36 % of cases. 30 (60%) were females and 20 (40%) were males. In 32 patients (64%) right side of face was affected and in 18 (36%) patients left side was affected. The most commonly described character of pain was lancinating type (32%) followed by mixed features (26%). V3 was involved in 24 patients accounting for 48% of cases. V2 was involved in 20 (40%) patients, V1+V2 in 1 (2%) patient, V2+V3 in 4(8%) patients, V1+V2+V3 in 1 (2%) patient. V1 involvement alone was not seen in our study.
Conclusion: Our study determined the clinical and radiological spectrum of trigeminal neuralgia patients. We conclude that the highest incidence is in 51-60 years age group with female preponderance, predominant involvement of right side of face and predominant maxillary division involvement. Lancinating type of pain was the most common type with touch being the most common trigger factor. Classical trigeminal neuralgia was the most common subtype.
Keywords: Trigeminal neuralgia, facial pain, triggering factors.

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INTRODUCTION
Trigeminal neuralgia (TN) has been referred to in the medical literature for centuries. References to unilateral facial pain causing facial spasms can be seen in the writings of Aretaeus of Cappodocia in the 2nd century A.D. and those of the Arab physician Jujani in the 11th century A.D. John Fothergill, in a paper published in 1773, described the typical features of TN, including its paroxysmal nature and association with triggering factors such as eating,

speaking, or touching the face. In 1756, the French surgeon Nicholas André coined the term —tic douloureux.[1,2] TN was 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. The pain is characterized by paroxysmal, lancinating electric-like pain lasting a few seconds with remissions and recurrences, often triggered by sensory stimuli, confined to the distribution of one or more branches of the trigeminal nerve. The findings of neurological examination are normal. A subtle trigeminal sensory deficit occasionally may be detected.[2] The annual incidence of TN has been reported as 4.3 per 100,000 population, with a slight female predominance.[3] It occurs in females 1.5 times more than in males. The annual incidence is about 3.4/100,000 for men and 5.9/100,000 for women (4,5). It occurs most commonly in people over 50 years old (more than 70% of sufferers), due to atherosclerotic changes which lead to increased tortuosity of the vessels that may result in vascular compression of the trigeminal nerve. However young adults and children can also be affected. If TN occurs in a younger patient, it almost always is associated with multiple sclerosis.[6,7,8] The latest classification of the International Headache Society distinguishes between Classical, Secondary and Idiopathic TN.[9]

ICHD-3 Criteria for Diagnosis of Trigeminal Neuralgia,[9]

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,[9]

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,[9]

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,[9]

A. Recurrent paroxysms of unilateral facial pain fulfilling criteria for Trigeminal neuralgia Neither

B. Neither Classical trigeminal neuralgia nor Secondary trigeminal neuralgia has been confirmed by adequate investigation

C. Not better accounted for another ICHD-3 diagnosis.

Most TN patients (>85%) have classical TN. Secondary TN has multiple causes, may be due to intrinsic brainstem pathology with trigeminal nerve nuclei, or tract involvement (e.g., multiple sclerosis or lacunar infarction), or due to extrinsic cerebellopontine angle pathology (e.g., neoplasms or vascular lesions). MRI is the imaging modality of choice to depict and characterize trigeminal nerve pathology.[10,11,12,13]

The aim of our study was to evaluate the clinical and radiological spectrum in TN patients. This helps in better understanding of the disease, early and appropriate management of these patients.

AIMS AND OBJECTIVES
- To study various causes of trigeminal neuralgia
- To study the clinical and radiological spectrum of trigeminal neuralgia.

MATERIALS & METHODS

This is a single center, prospective observational study done in a tertiary care hospital in Southern India for a period of 24 months. A total of 50 patients were enrolled in the study. The study was approved by the hospital ethical committee.

Study selection criteria:

Inclusion criteria:
- Patients clinically diagnosed as trigeminal neuralgia and willing to undergo MR imaging.
- Patients aged above 30 years.

Exclusion criteria:
- Patients having history of claustrophobia, history of metallic implants insertion, cardiac pacemakers, metallic foreign bodies or other contraindications for MR imaging.
- Patients in whom contrast medium is contraindicated.
- Patients aged <30 years
- Patients previously operated for trigeminal neuralgia.
- Patients with bilateral symptoms of trigeminal neuralgia

Study procedure:

A total of 50 patients who presented to Neurology department of our hospital with clinical diagnosis of trigeminal neuralgia according to ICHD-3 criteria, fulfilling inclusion and exclusion criteria were included in the study. Demographic characteristics, detailed case history that included side of face involved – left / right, area of face involved (V1/V2/V3/V1+V2/V2+V3/V1+V2+V3), character of pain, triggering factors, sensory abnormalities was taken. MRI brain was performed in all patients on a 1.5 Tesla MR unit (Siemens Avanto, Magnetom, A Tim+Dot System). Classical, secondary, idiopathic trigeminal neuralgia was diagnosed based on ICHD-3 criteria.

Statistical analysis:

Data was analysed with SPSS statistical software. (SPSS, version 20.0, Chicago, IL, USA). Descriptive data was presented as frequencies and percentages. Data was tabulated as per the content appropriate. Data representation was done by appropriate charts and diagrams.

RESULTS

The study included 50 patients fulfilling the inclusion criteria. Following observations were noted in our study.

Table 1: Age distribution of subjects (n= 50)

Age Group (Years)	No. of Subjects	Percentage
30 – 40	4	8
41 – 50	10	20
51 – 60	18	36
61 – 70	11	22
>70	7	14

Table 2: Frequency distribution of sex

Sex	Number of Subjects	Percentage (%)
Female	30	60
Male	20	40

Table 3: Showing frequency of side affected

Side affected	Frequency	Percentage
Right	32	64
Left	18	36

Table 4: Character of pain

Character Of Pain	Frequency	Percentage
Lancinating	16	32
Electric shock like	7	14
Burning	11	22
Dull	5	10
Mixed features	13	26

Table 5: Showing frequency of triggering factors

Trigger factors	Frequency	Percentage
Touching	27	66
Chewing	11	27
Drinking cold / hotdrinks	5	12
Cold wind blowing	14	34
Brushing	8	19
Talking	7	17
Mixed trigger factors	12	29

Table 6: Frequency of involvement of trigeminal nerve branches clinically

Branch	No. of Patients	Percentage (%)
V1	0	0
V2	20	40
V3	24	48
V1 + V2	1	2
V2 + V3	4	8
V1 + V2 + V3	1	2

V1, V2 and V3=the first, second and third branch of the trigeminal nerve involved in patient with TN, respectively

Table 7: Sensory Symptoms:

Sensory symptoms	Frequency	Percentage
Present	6	12
Absent	44	88

MRI Findings:
Based on the MRI findings 34 patients (68%) showed neurovascular compression (Classical trigeminal neuralgia). MRI of six patients (12%) revealed- Epidermoid (2), Multiple sclerosis (2), Schwannoma (1), Meningioma (1) (Secondary trigeminal neuralgia). About 10 (20%) had normal MRI findings (Idiopathic trigeminal neuralgia).
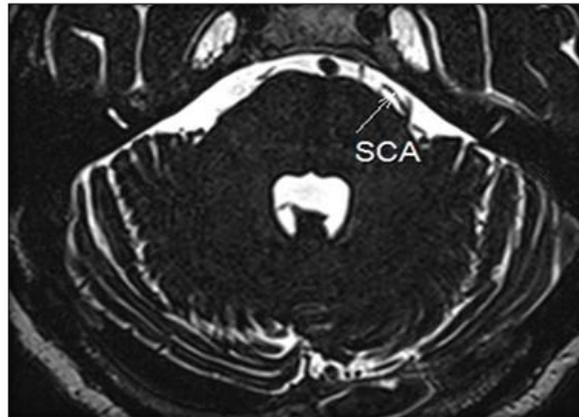
Table 8: Causes of trigeminal neuralgia detected using MRI

Cause	No. of subjects	Percentage
Neurovascular conflict	34	68
Multiple sclerosis	2	4

Epidermoid	2	4
Meningioma	1	2
Schwanomma	1	2
No cause detected	10	20

Gallery

CASE 1: Axial 3DCISS images showing superior cerebellar artery (SCA) compressing the left trigeminal nerve causing trigeminal neuralgia.

CASE 2: Epidermoid cyst causing compression, deviation and atrophy of right trigeminal nerve in a patient with trigeminal neuralgia.
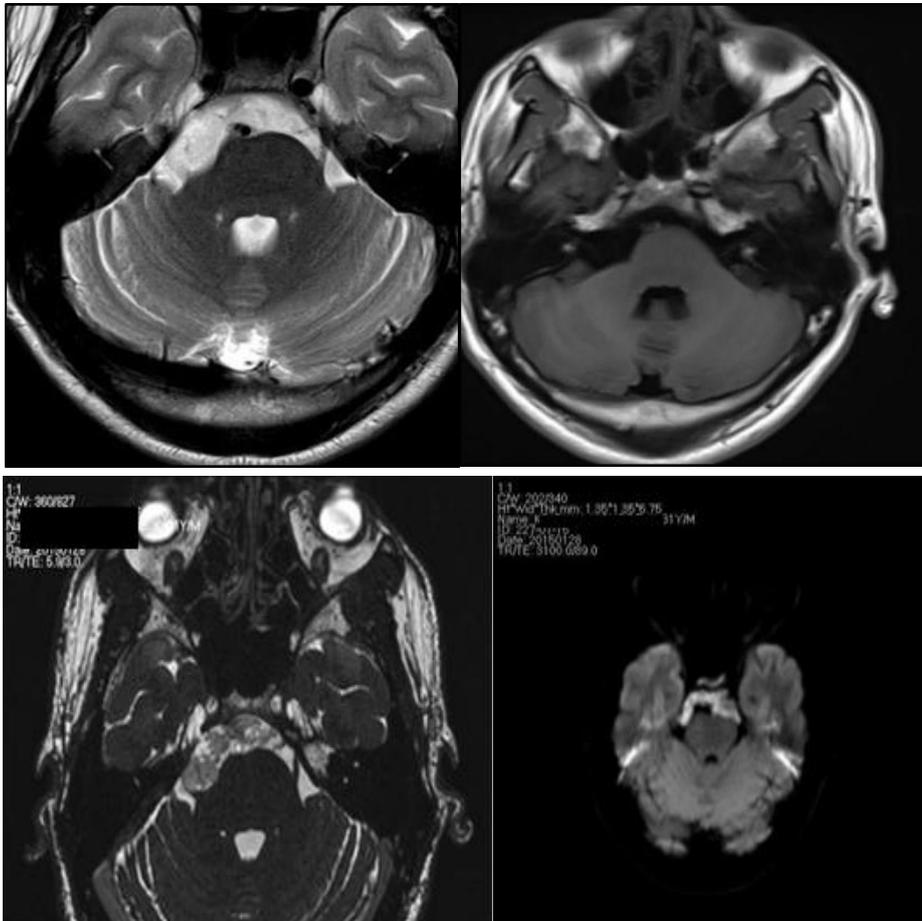
DISCUSSION

Fifty patients were included in our study, whose age group ranged from 32 to 77 years. The highest incidence was found in 51-60 years age group accounting for 36 % of cases and least incidence was seen in the age group of 30-40 years constituting to 8% in our study. Maarbjerg S et al. reported that the average age of onset of TN in their study was 52.9 years.[14] Of the 50 patients included, 30 (60%) were females and 20 (40%) were males. Female to male sex ratio in our study was 3:2. This is similar to a study conducted by Oesman C et al.[15] In their study female to male sex ratio was 3:2.

In 32 patients (64%) right side of face was affected and in 18 (36%) patients left side was affected. This is similar to a study conducted by Oesman C et al.[15] In their study in 65% right side was affected and in 35% patients left side was affected. Most of the studies have reported that right side of the face was affected more frequently than the left side.[14,16]

In our study, the most commonly described character of pain was lancinating type (32%).The most common pain descriptor was stabbing pain in Maarbjerg S et al., study and sharp pain in Jainkittivong A et al., study.[14,17]

In our study 41 (82%) patients had triggering factors and the most common triggering factor was touch in 27 (66%) patients. Maarbjerg S et al., have reported chewing (73%) as the most common triggering factor followed by touch (69%). Most common branch involved in our study was V3, in 24 patients accounting for 48% of cases. V2 was involved in 20 (40%) patients, V1+2 in 1 (2%) patient, V2+3 in 4(8%) patients, V1+2+3 in 1 (2%) patient. V1 involvement alone was not seen in our study. This is in close agreement with the study conducted by Zhou Q et al.[18] In their study, most common branch involved was V3, in 45.9% of patients. V2 was involved in 37.8% of patients, V1+2 in 2.7%, V2+3 in 10.8% and V1+2+3 in 2.7% of patients.

Sensory symptoms were present in 12% of cases in our study. Maarbjerg S et al. reported in their study that 29% of surgery-naïve patients had sensory abnormalities at neurological examination.[14] Classical trigeminal neuralgia was the most common sub type in our study (68%).Antonini G et al., reported that trigeminal root entry zone neurovascular contact was detected in 76% of symptomatic nerves.[19] Limitations of our study were that it is a single center study and the sample size was small.

CONCLUSION

Our study determined the clinical and radiological spectrum of trigeminal neuralgia patients. We conclude that the highest incidence is in 51-60 years age group with female preponderance, predominant involvement of right side of face and predominant maxillary division involvement. Lancinating type of pain was the most common type with touch being the most common trigger factor. Classical trigeminal neuralgia was the most common subtype.

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