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Research Article

Trigeminal Neuralgia with respect– Electrophysiological and Magnetic Resonance Image

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Abstract

With more and more advances in the field of electrophysiological studies and techniques, with improvised and advanced neuroimaging techniques, the diagnostic accuracy has increased over the years. Although satisfactory treatment of this condition is still to come, pharmacotheurapcitics and drug trails are ongoing for the search of novel drugs for better control of symptoms. In the last few decades, surgery either external or percutanous procedures has provided a number of treatment options in terms of cost effectiveness, minimal invasiveness and morbidity. Maxillary and mandibular divisions were more frequently involved with higher incidence of left side involvement. 45.1% reported definite triggering factor/factors with tactile stimulus and cold face wash being the common triggering factors. 83.8% complained symptoms as electric shock like sensation followed by intense stabbing / pricking and burning pain in 70.9% and 67.0% respectively. Latencies of blink reflex were absent or prolonged in 41.9% of patients. 80% of patients with abnormal blink reflex had abnormalities in MRI too which was statistically significant (P=0.007). Severity of pain did not correlate with either MRI or EPS (P>0.05)

Keywords: Neuralgia; Physiological; Images;

Introduction

The clinical description of severe facial pain, which is now known as trigeminal neuralgia, can be traced back to more than 300 years. The name tic-douloureux was first used to describe trigeminal neuralgia and remains synonymous with the classical form of trigeminal neuralgia. The tic refers mainly to the visible effects of the brief and paroxysmal pain that in classic trigeminal neuralgia lasts only a few seconds. The pain is reported as one of the most excruciating pain syndromes. It has been known to drive patients with trigeminal neuralgia to the brink of suicide. The pain is severe that it often causes the patient to wince or make an aversive head movement as if trying to escape the pain thus producing an obvious movement or tic.

With more and more advances in the field of electrophysiological studies and techniques, with improvised and advanced neuroimaging techniques, the diagnostic accuracy has increased over the years. Although satisfactory treatment of this condition is still to come, pharmacotheurapcitics and drug trails are ongoing for the search of novel drugs for better control of symptoms. In the last few decades, surgery either external or percutanous procedures has provided a number of treatment options in terms of cost effectiveness, minimal invasiveness and morbidity.

Aims

1. To find out abnormalities in trigeminal evoked potentials and blink reflex.
2. To attempt to co-relate between ,
   i) MRI findings and electrophysiological abnormalities.
   ii) Clinical features with MRI and electrophysiological abnormalities.

Materials and Methods

The study was conducted in 31 patients. All these patients were chosen from both inpatients as well as outpatient department of our hospital. A detailed history of illness followed by clinical examination and investigations as detailed was done in all these patients.

Inclusion criteria: Clinically pain restricted to one or more branches of trigeminal nerve either unilateral or bilateral; Typical pain of trigeminal neuralgia which is lancinating or electric shock like in nature ; The paroxysms of pain not lasting for more than a few seconds to minutes; The pain should not radiate beyond the area supplied by the trigeminal nerve.

Exclusion criteria: Pain likely to be arising from other facial structures like sinusus, tooth, ocular structures or soft tissue; Pain arising

from intra/extra cranial structures including vascular, tension and other types of headache; Atypical cephalalgia or facial pain; Patients with unreliable history.

Electrophysiological testing

Blink Reflex

Blink reflex is an electrical analogue of corneal reflex. The afferent limb of blink reflex is the ophthalmic division of the trigeminal nerve and the efferent the facial nerve. The recording surface electrodes are placed bilaterally inferior to the lower lid half way between the inner and outer edge of the orbit. The reference electrode is placed on the side of nasal bone and ground electrode is placed on the chin.

Stimulation is carried out keeping the cathode on the supraorbital notch over the supra orbital nerve and the anode directed somewhat laterally. A gain of 200-500 mv/division with time base of 10ms/division is used.Stimulation should be given at low rate 1 in 3 seconds and the subject is asked to keep the eyes open to avoid muscle artifact.

On the side of stimulation two responses R1 and R2 are recorded. The R2 response may vary and have an unclear onset and therefore several responses are superimposed (5-15) and minimal latency is recorded. The test requires stimulation on either side.

On supraorbital stimulation the impulse propogates through the trigeminal nucleus and excites the facial nerve via oligosynaptic reflex (R1 response)and traverses a polysynaptic pathway leading to bilateral facial nerve excitation R2 response. Unilateral stimulation elicits R2 bilaterally presumably through a more complex route than R1 including the pons and lateral medulla.[1,2]

Of the two components R1 serves a more reliable measure of nerve conduction along the afferant reflex pathways. Analysis or R2 helps to localize the lesion to afferent or efferent reflex arc.[2] Involvement of the trigeminal nerve causes an afferent pattern of abnormality, with delays or diminution of R2 bilaterally after stimulation on the affected side.

In our electrophysiology laboratory blink reflex was done on similar number of age and gender matched subjects. R1 response was recorded to be 10.00 ± 0.40 ms with the above mentioned procedure while R2i (Ipsilateral R2 response) and R2c (contralateral R2 response) was found to be 30.00 ± 0.40 ms. In the normal subjects there was no significant right / left asymmetry or male / female differences.

Trigeminal Evoked Potentials

Trigeminal evoked potentials permit evaluation of the sensory portion of the trigeminal nerve. Stimulation is done with the cathode at the corner of the mouth and the anode paramedian. This stimulates both divisions of the nerve (maxillary and mandibular). Each branches were studied separately by isolating the stimulation to the upper lip only or the lower lip only. The ground is placed between the stimulating and recording electrodes closer to the former.

Recording electrodes are placed on the contralateral scalp at C5 or C6. The reference is placed mid frontally (Fz). Stimulus was given 0.1/m sec in duration. The intensity was 3 times the sensory threshold avoiding a muscle response. Frequency was 2 to 3 hertz. In our laboratory trigeminal evoked potentials done in similar number of age and gender matched controls. Following values were obtained. N = 12 ± 0.4 msec, P = 15 ± 0.4 msec.

MRI

MRI was done with special emphasis to posterior fossa on 1.5t machine. Abnormalities with respect to Vth cranial nerve was labeled as an abnormal MRI in our study.

Results and Discussion

In our study, we included a total of 31 patients from both inpatient and outpatient departments.

Electrophysiological abnormalities

(i) **Blink reflex**

Among the 31 patients, the latencies of R1 and R2 (ipsilateral and contralateral) was either prolonged / absent in 13 patients (41.9%)

Correlation with MRI.

Abnormal blink reflex with abnormal MRI – 80.00%

Abnormal blink reflex with normal MRI – 23.1%. Correlation was significant (P=0.007)

Correlation with severity of pain.

Patients with normal blink reflex pain was severe in 83.33%

Patients with abnormal blink reflex pain was severe in 76.9%. Correlation was insignificant (P=0.656)

(ii) Trigeminal evoked potentials

In our study group (31 patients), N and P wave latencies were either prolonged / absent in 16 patients (51.6%)

Correlation with MRI.

Abnormal TEP's with abnormal MRI : 60.00%

Abnormal TEP's with normal MRI :53.84%

Statistically insignificant (P=0.768)

Correlation with severity of pain.

In patients with normal TEP's pain was severe in 73.33%

In patients with abnormal TEP's pain was severe in 87.55%

No correlation was found (P=0.318)

Comorbid illness.

32.2% were diabetic, 35.4% were hypertensive while 16.1% had ischemic heart disease.

The present study was conducted in SRMCH & RI which is a tertiary health care centre. The study was conducted between August 2006 to August 2008. The patients included both from inpatient department as well as outpatient department during this period.

A detailed history followed by complete neurological examination was done in all these patients. After satisfying both inclusion and exclusion criterias they were included in the study. Thus 31 consecutive patients of trigeminal neuralgia were enrolled in our study. All these patients were subjected to trigeminal evoked potentials and blink reflex by standard electrophysiological techniques. However MRI could not be done in all the patients due to financial constraints in some. An attempt was made to study the various aspects of trigeminal neuralgia as per the aims and objectives pertaining to our study.

Blink reflex

Blink reflex was studied in all our patients. Both early (R1) and delayed (R2) latencies were either prolonged or absent in 13 patients (41.9%).

G.cruccu et al[3] studied 50 patients of trigeminal neuralgia of whom 30 were idiopathic and 20 were symptomatic diagnosed by imaging (MRI). In the symptomatic group he found 15 of 20 patients with prolonged latencies of both early and late responses where as in idiopathic group 2 of 30 patients showed increased R1 and R2 (Ipsilateral and contra lateral) latencies.

B.W. Ongerboer et al[4] showed similar blink reflex abnormalities as cruccu et al in 4 of his patients with symptomatic TN and normal R1 and R2 latencies in 11 patients who were diagnosed to be idiopathic TN.

In another study G. Cruccu[5] and Biasiotta et al studied 120 consequitive cases of trigeminal neuralgia and identified 20 cases of secondary TN. Abnormal blink reflex was strongly associated with secondary TN with sensitivity of 96% and specificity of 93%. He reported blink reflexes were normal in most patients with idiopathic TN.

The AAN and EFNS practice guidelines[6] concluded that a high specificity (94%) and sensitivity (87%) of abnormal blink reflex is probably useful in distinguishing symptomatic and idiopathic forms.

In our study blink reflex abnormalities were significantly higher in patients with abnormal MRI 80.00% where as in patients with normal MRI blink reflexes were abnormal in 23.00% which was statistically significant (P=0.007). Our study correlates with study done by cruccu et al.[3] Severity of pain did not show any correlation with blink

reflex (P=0.6). Age, gender, quality of pain did not show any correlation with blink reflex.

Trigeminal evoked potentials

Trigeminal evoked potentials were abnormal nearly in half of our patients (57.60%). Prolonged latencies were obtained in 60.00% of our patients with abnormal MRI while patients with normal MRI had abnormal TEP's in 53.84%. This did not show any statistical correlation (P-0.77). In 87.55% of patients with abnormal TEP's had severe pain (7-10) as compared to 73.33% of patients who had normal TEP's and had no correlation with severity of pain (P=0.3).

A study done by Sundaram PK, Hegde AS et al[7] in 7 patients with CT proven masses showed abnormal TEP's in all their cases. Although all their cases clinically had TN, the number is too small to draw a conclusion. Cruccu G et al recorded TEP's in 30 patients of ITN and 20 patients of STN and found abnormalities in 80% of STN and 30% of those with ITN. As per the AAN and EFNS practice parameters pooled data from cruccu et,[3] cruccu e tal[8] and Leandri.M et al[9] found a sensitivity of 84% and specificity of 64% and concluded that many patients with symptomatic TN had normal TEP's while many patients with idiopathic TN had abnormal TEP's. Hence too much of overlap in patients of with idiopathic TN and symptomatic TN to be considered clinically useful. We found a similar correlation in our study.

Conclusion

Age, sex and quality of pain did not show correlation with MRI and electrophysiological studies. Maxillary and mandibular divisions were more frequently involved with higher incidence of left side involvement. 45.1% reported definite triggering factor/factors with tactile stimulus and cold face wash being the common triggering factors. 83.8% complained symptoms as electric shock like sensation followed by intense stabbing / pricking and burning pain in 70.9% and 67.0% respectively. Latencies of blink reflex were absent or prolonged in 41.9% of patients. 80% of patients with abnormal blink reflex had abnormalities in MRI too which was statistically significant (P=0.007). Severity of pain did not correlate with either MRI or EPS (P>0.05). 51.6% of patients showed abnormal TEPs in our study. There was no correlation between TEPs and MRI (P=0.768).

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