

ORIGINAL ARTICLE

Branches of Trigeminal Nerve Causing Idiopathic Trigeminal Neuralgia and Effectiveness of Microvascular Decompression for Immediate Pain Relief

INAYAT SHAH¹, HAMEED ULLAH KHAN², GHULAM MUSTAFA WARDAG³, AIMEN MAHMOOD SHAH⁴, SYED GULRUKH SABA SHAH⁵, JAMAL NASIR KHAN⁶

¹Junior Registrar, Department of Neurosurgery, Mardan Medical Complex MTI, Mardan

²Assistant Professor, Department of Neurosurgery, Indus Medical College, Tando Muhammad Khan

³Associate Professor, Department of Neurosurgery, Bolan Medical College, Quetta

⁴Registrar, Department of Oral Medicine, Oral Diagnosis & Radiology, Rehman College of Dentistry, Peshawar

⁵Assistant Professor, Department of Anatomy, Module Coordinator DME, Gandhara University, Kabir Medical College & Sardar Begum Dental College, Peshawar

⁶Lecturer, Department of Oral Biology, Sardar Begum Dental College & Hospital, Peshawar

Correspondence to: Dr. Aimen Mahmood Shah, Email: aimenshah@yahoo.com

ABSTRACT

Objective: To determine the efficacy of microvascular decompression for immediate pain relief of idiopathic trigeminal, caused by different branches of trigeminal nerve.

Study Design: Descriptive study.

Place and Duration of Study: Department of Neurosurgery, Mardan Medical Complex, Mardan from 1st January 2020 to 30th June 2021.

Methodology: One hundred and thirty nine patients were collected from Tertiary Care Hospitals of KPK. A consent form and detailed history was performed with clinical examination and relevant investigations like CT and MRI of the brain. Pre-operative preparation was done with following investigations like complete blood count and viral serology for hepatitis, coagulation profile was carried out. Patients was assessed and included in the study according to the inclusion and exclusion criteria. The patients were operated by the same neurosurgeon. Patients were assessed after 72 hours post-operatively for pain relief by Visual Analogue Scale (VAS- Scale).

Results: The mean age was 63±12.24 years. The data was divided into two 37% male and 63% females were included in the study. The most common branch of trigeminal nerve causing pain is right infraorbital (V2), (45) 32.37% and 23.02% is right inferior alveolar nerve V3. The less common branch of mandibular nerve is right lingual nerve 0.719 %. The study showed that microvascular decompression was effective in 88% patients and was not effective in 12% patients. The trigeminal neuralgia is common in old age patients from 60 to 80 years that is 45%.

Conclusion: The most common branch of the trigeminal nerve was right infraorbital nerve causing pain in old age individuals and it is concluded that microvascular decompression was 88% effective in idiopathic trigeminal neuralgia in terms of immediate pain relief.

Key words: Efficacy, Microvascular decompression, Idiopathic trigeminal neuralgia, Immediate pain relief

INTRODUCTION

The fifth cranial nerve (trigeminal nerve) is the biggest cranial nerve. It has both sensory and motor divisions. The nuclei of motor division are located in the pons which innervates muscles of mastication and muscles of tympanic membrane called tensor muscle of the tympanic membrane of the ear. The nuclei of sensory division of the trigeminal nerve extends from midbrain via medulla and innervates sensation in the head and neck it also cause disorder called trigeminal neuralgia. Both divisions of trigeminal nerve leave the brain stem at the side of the pons, which is further accompanied by 7th cranial nerve (facial nerve) and 8th cranial nerve (acoustic nerve). These nerves pass via cerebellopontine angle together.¹

Tic douloureux which is also called trigeminal neuralgia is the most frequent and common disorder with severe pain which is sometimes referred for psychiatric consultation.² It can be idiopathic but it can cause by demyelination and compression of the nerve³ or it can be caused by injury to the trigeminal root entry zone by pressure from the adjacent arteries and veins at the level of the pons.^{4,5} The pain of the trigeminal neuralgia is unilateral involving 2nd and 3rd division of the nerve, it can be maxillary division or mandibular division of the nerve. There must be some initiating or trigger point or some stimulus which can aggravate the pain. If the pain caused by the nerve is unilateral or hemifacial pain or spasm, it can be due to aneurysm, arteriovenous malformation and tumor that can compress both the trigeminal and facial nerve. In the tonsillar region trigeminal neuralgia can be associated with glossopharyngeal neuralgia including cranial nerve IX.⁶

Medical management for the neuralgia is medication like anticonvulsants, tricyclic antidepressants but if the pain is severe and medications did not respond to pain than microvascular

decompression is recommended for treatment of immediate pain relief. In case of surgical treatment an interneural vein can be removed because it travels between the sensory and motor branches of the trigeminal nerve and cause pressure on the nerve. Its removal can relieve pressure on the nerve and reduce pain. If the vein is bisecting the nerve specially the sensory branch of the nerve then selective trigeminal nerve rhizotomy is another approach for the immediate relief of the neuralgic pain.⁷

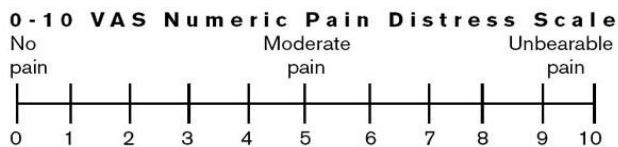
The trigeminal ganglion received three divisions which travel backward from the sensory receptor site of the face like ophthalmic, mandibular and maxillary division of the trigeminal nerve. Ciliary body of the eye, cornea, lacrimal gland, nasal mucosa, conjunctiva, skin of the eyelids, nose and forehead is supplied by the ophthalmic division of the trigeminal nerve. The lower third of the face, oral mucosa and anterior two third of the tongue and lower teeth are supplied by mandibular division of trigeminal nerve.⁸

The aim of the study is to find out the efficacy of microvascular decompression for immediate pain relief of idiopathic trigeminal, caused by different branches of trigeminal nerve.

MATERIALS AND METHODS

It was a descriptive study conducted in tertiary care hospitals of KPK. The sample size was 139 patients visiting to neurosurgery department for the treatment of pain caused by idiopathic trigeminal nerve. Duration of the study was six month after the approval of synopsis. Trigeminal neuralgia is a syndrome (TGN) which is diagnosed clinically by unilateral paroxysmal and lancinating severe facial pain, aggravated by cutaneous stimulus whereas Idiopathic trigeminal neuralgia includes all the cases of

TGN without any etiological factor with vascular compression of the trigeminal nerve. The efficacy of microvascular decompression was determined by using visual analogue scale (VAS) after 72 hours follow up. The efficacy was considered if patients complain of pain <3 on visual analogue scale.



Patient age was from 20-80 years with diagnosed idiopathic TGN and both male and female were included in the study. While patient with space occupying lesion at CP angle like tumours, multiple sclerosis and patient on other medical treatment were excluded from the study. Medical history and detailed clinical examination with relevant investigation including CT and MRI of the brain were recorded. An informed consent was taken from the participant inject able ketorolac and analgesic was given for 48 hours postoperatively. Patient was assessed by using VAS scale after 72 hours postoperatively for immediate pain relief caused by idiopathic trigeminal neuralgia. The data was entered and analyzed through SPP-20.

RESULTS

There were 51(37%) males and 88 (63%) females and mean age was 63±12.249 years (Table 1). There was no CP angle tumour. The scale VAS was used and the result were 122 (88%) patients had VAS score ranged 1-3 while 17 (12%) patients had VAS score range 4-10 mean VASs score 3±1.717. Efficacy of micro vascular decompression among patients was 122 (88%) and was not effective in 17 (12%) patients (Tables 2-5).

Table 1: Demographic information of the patients (n=139)

Variable	No.	%
Age (years)		
20-40	17	12.0
41-60	60	43.0
61-80	62	45.0
Gender		
Male	51	37.0
Female	88	63.0

Table 3: Frequency of branches of trigeminal nerve causing trigeminal neuralgia (n=139)

Branches of trigeminal nerve causing neuralgia	No.	%
Right supra orbital v1	2	1.43
Left supraorbital v1	2	1.43
Right infraorbital v2	45	32.37
Left infraorbital v2	26	18.7
Right inferior alveolar v3	32	23.02
Left inferior alveolar v3	18	12.94
Right lingual v3	2	1.43
Left lingual v3	1	0.71
Right long buccal v3	8	5.75
Left long buccal v3	3	2.15

Table 2: CP angle lesion on CT and MRI brain

MRI	No.	%
Present	-	-
Absent	139	100.0

Table 4: Frequency of VAS score

VAS score	No.	%
1-3	122	88.0
4-10	17	12.0

Table 5: Frequency of efficacy and effectiveness

Efficacy	No.	%
Effective	122	88.0
Not effective	17	12.0

DISCUSSION

Pain is psycho-physiological experience of a human and it is produced by the alteration in neurological structure and function instead of causing nociceptive pain by the excitation of pain receptors. The neuralgic pain follows the path of a trigeminal nerve which is sometimes difficult to diagnose by oral and maxilla surgeon. TN is not lethal disorder but it is considered to be a most painful illness characterized by unilateral severe stabbing pain, resembles electric shock like pain of the area supplied by trigeminal nerve. From the study it was evident that 62% of the females are affected by this idiopathic pain as compared to males.⁹ These findings are not associated with the study performed by Bangash¹⁰ and Ahmed¹¹ TN was common in 6th decade and 7th decade and male and female ratio was 1:2 it is because of difference in sample size and technique.¹² TN is not common in early age like 1st, 2nd and 3rd decade Pakistan and India also showed similar results regarding the mean age in TN.¹³ In this study the most common branch of trigeminal nerve causing pain is right infraorbital (V2), (45) 32.37% and 23.02% is right inferior alveolar nerve V3. The less common branch of mandibular nerve is right lingual nerve 0.719 %. Our study correlates with other study where infraorbital nerve is the most common followed by right inferior alveolar nerve.¹⁴ Sohail et al¹⁵ reported that inferior alveolar nerve was the most commonly affected about 44% of patient. Individuals visiting to the hospital with moderate pain 42.20% which is followed by severe pain. In previous studies mandibular division of trigeminal nerve was the most common as compared to ophthalmic division of trigeminal nerve which is less commonly involved.^{14,16} The involvement of ophthalmic nerve was same as that of the results shows in the previous study but it is not in accordance with the result of Khitab⁹ and Rehman¹⁷ where there is no case related to the ophthalmic nerve.

Trigeminal neuralgia (TGN), also known as *astic douloureux*, syndrome is characterized by paroxysmal unilateral lancinating pain which is triggered by cutaneous stimuli for example chewing, brushing of teeth, talking and breeze on the face. In 1934 Dandy we, stated about the compression of sensory root of the trigeminal nerve by aberrant veins and arteries causing pain.¹⁸

Ali et al¹⁸ reported that 75% patients were affected by trigeminal neuralgia more than 50 years old. This study showed that 45% of patients with age 60-80 years are affected from trigeminal neuralgia as compared to age from 20-40 years 17% individuals were affected. It is because of age related changes in the vessels. It is very less in young age as compared to old age the percentage is increases. In the present study females are more effected 88 (63%) as compared to male 51 (37%) as compared to present study a study done in which females were more prone to disease as compared to male 1.4:1, female sex has been reported as a risk factor by some authors for recurrence after microvascular decompression.¹⁹

In the present study the status of pain at 72 hours was analyzed as no pain and mild pain (VAS score 1-3) was observed in 88% patients while moderate pain was observed in 12% patients. Similar findings were present in study done by Ali et al¹⁸ in which 94% patients were observed with no pain while 4% got mild pain and 2% patient with moderate pain. Similar findings were also been observed in another study done by Shams et al²⁰ in which 80% of patient with no pain was observed, in 17% mild pain was observed and 3% with moderate pain was observed.

In the current study, microvascular decompression is the most effective treatment of idiopathic trigeminal neuralgia especially in terms of pain relief because pain relief was found in 88% patients. Similar results were observed in study done by Ali et al¹⁹ in which pain relief was observed in 94.23% patients.18this figure is quite close to the work done in Lady Reading hospital, Peshawar and other national and international hospitals the study showed CSF leakage was observed in 0.9-12% after microvascular decompression.

The microvascular decompression is safe and effective therapy for patients in all age but patients in old age affected

probably more due to age related changes in the blood vessels in the present study. Similar results were observed in study done by Shams et al²⁰ in which mild pain was observed in 17 patients who were in age group 41-60 years, moderate pain was observed in 3 patients who were in age group 31-60 years.

Our study showed that microvascular decompression is highly significant in both male and female patients in terms of pain relief as in our results as pain relief was observed equally in male and female patients. Similar concepts were explained by Ali et al¹⁹ and Shams et al.²⁰

CONCLUSION

The most common branch of the trigeminal nerve was right infraorbital nerve causing pain in old age individuals and it is concluded that microvascular decompression was 88% effective in idiopathic trigeminal neuralgia in terms of immediate pain relief.

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