ORIGINAL ARTICLE

RETRO MASTOID SUBOCCIPITAL MICROVASCULAR DECOMPRESSION TECHNIQUE FOR THE TREATMENT OF TRIGEMINAL NEURALGIA: A CASE SERIES STUDY

Mumtaz Ali[1], Akram Ullah[1], Ramzan Hussain[1], Sajid Khan[1], Arif Hussain[1], Hanif Ur Rehman[1], Muhammad Zubair[1], Amjad Ali[2]

ABSTRACT

Introduction: Trigeminal neuralgia is a condition of craniofacial pain which is characterized by sudden, excruciating, and brief pain in the sensory distribution of one or more branches of the fifth cranial nerve resulting in decreased quality of life of the affected patient. In patient's refractory to pharmacological or conservative treatment, the surgical procedure of choice is microvascular decompression. The aim of our study was to determine the outcome of retro mastoid suboccipital microvascular decompression technique for the trigeminal neuralgia.

Material & Methods: This case series study was conducted in Department of Neurosurgery Prime Teaching Hospital and Irfan General Hospital Peshawar from January 2020 to January 2022. Consent from the ethical committee and patients were taken. All patients of trigeminal neuralgia were included. Those patients having mass lesion were excluded. All information were put in proforma. Results were analysed by SPSS version 20.

Results: Total sample size of our study was 58 patients. Majority of the patients were female (n 34 59%). Mean age of the patients was 44± 5 years (range 25-60 years). The common level of pain distribution was in maxillary and mandibular branches V2-V3, 39(67.8%). The most common aetiology of trigeminal neuralgia was superior cerebellar artery loop in 41(70.7%) patients. Surgical outcome in terms of pain relief was in 49 (84.5 %) patients, after 6-8 months follow-up, The most common complication of surgery was CSF leak in 3(5.2%) patients, followed by post operative Sub arachnoid haemorrhage in 1(1.8%) patient, mortality was reported in 2 (3.4%) patients.

Conclusion: The results of our study concluded that microvascular decompression surgery is effective in reducing pain, improving patient satisfaction in trigeminal neuralgia patients who are refractory to conservative treatment options such as carbamazepine's. The procedure also has some complications such as cerebrospinal fluid leakage and sub arachnoid haemorrhage

Key Words: Decompression, microvascular, neuralgia, retro mastoid, suboccipital, superior cerebellar artery

Authors' Declaration: The authors declared no conflict of interest and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors contributed substantially to the planning of research, question designing, data collection, data analysis and write-up of the article.

Authors' Affiliation

[1]Ali Institute of Neurosciences, Irfan General Hospital, Peshawar

[2]Hayatabad Medical Complex, Peshawar

Corresponding Author

Ramzan Hussain

Ali Institute of Neurosciences, Irfan General Hospital, Peshawar

Email: yousha223@gmail.com

This article may be cited as: Ali M, Ullah A, Hussain R, Khan S, Hussain A, Rahman H, Zubair M, Ali A**.** Retro mastoid suboccipital microvascular decompression technique for the treatment of trigeminal neuralgia: a case series study. Rehman J Health Sci. 2023;5(1). 34-37

Submitted: November 29, 2022 Revisions Submitted: May 31, 2023. Accepted: June 27, 2023

INTRODUCTION

Trigeminal neuralgia is a condition of craniofacial pain which is characterized by sudden, excruciating, and brief pain in the sensory distribution of one or more branches of

the fifth cranial nerve resulting in decreased quality of life of the affected patient. Symptoms of trigeminal neuralgia includes lancinating, paroxysmal, unilateral and short term facial pain which radiates to maxillary or mandibular regions and sometimes accompanied by fascial muscles spasm or tic.[1,2] The condition can affect any of the five branches of trigeminal nerve but the second and third branch of trigeminal nerve is most commonly affected.[3] Nicholas André used the term "tic douloureux" to describe the clinical characteristics of trigeminal neuralgia suggestive of fascial spasms.[4] Trigeminal neuralgia is an uncommon condition affecting a smaller portion of population. Annually, it affects 4 to 13 people per 100,000 while having an overall prevalence of 0.015% in the general population.[5] The diagnosis of trigeminal neuralgia is based on history and physical examination but 3D volumetric MRI is used for the investigation of micro vascular compression and also for the secondary causes of the trigeminal neuralgia.[6] Treatment options include both conservative and non-conservative methods. Drugs of choice for long term management of trigeminal neuralgia are carbamazepine and oxcarbazepine. While in patient's refractory to pharmacological or conservative treatment, the surgical procedure of choice is microvascular decompression.[7] Other surgical options include partial sensory rhizotomy, peripheral neurectomy, glycerol block, radio frequency rhizotomy and gamma knife surgery.[8] The open surgical procedure most frequently used is the microvascular decompression of the trigeminal nerve. The procedure is performed through retro mastoid sub occipital craniotomy.[9] In this case series retro mastoid sub occipital microvascular decompression was used in patients of trigeminal neuralgia for decompressing the nerve and improving the symptoms. The aim of this study was to find out the surgical outcomes in terms of pain and patient satisfaction while also evaluating the post-surgical complications.

MATERIAL AND METHODS

This case series study was conducted in Department of Neurosurgery Prime Teaching Hospital and Irfan General Hospital Peshawar from January 2020 to January 2022. Ethical approval was granted from Institutional Review Board of the Hospital. Total of 58 patients were included in the study according to inclusion criteria of being diagnosed with trigeminal neuralgia through subjective and objective examination and being refractory to conservative treatment options irrespective of their age or gender. The patients having mass lesions evident by MRI were excluded from the study. Detailed subjective and objective examination along with radiological findings such as MRI were performed on each patient. Follow up period was from 6 to 8 months. Standard approach for microvascular decompression was performed.

PROCEDURE

Under general anaesthesia, the patient was placed in the lateral park bench position with the affected side placed up. Neck was slightly flexed, and head rotated 10-15 degress towards the contralateral side. The suboccipital retro mastoid incision was used which ranged from 10 cm in length from the above part of the pinna till the groove of mastoid, and one to two finger breadths medial to the groove. The craniectomy was centred slightly higher. The dura was opened, and CSF was drained. After that trigeminal nerve was identified. Intracisternal part of trigeminal nerve was selected and gently compressed with bayonet forceps. After identification of the causative vessel, artery loop was dissected off the nerve and spongeston was placed between the artery and trigeminal nerve. After the procedure, dura, muscles and skin were closed in layers. All information were put in proforma. Results were analysed by SPSS version 20. Descriptive statistics were used to find the frequencies and percentages of demographic variables and main outcomes i.e pain, satisfaction, and post-surgical complications.

RESULTS

Total sample size of our study was 58 patients. Majority of the patients were female (n= 34, 59%). Mean age of the patients was 44.22 $\pm$ 5.12 years (range 25-60 years). The common level of pain distribution was in maxillary and mandibular branches V2-V3, 39 (67.8%). The most common aetiology identified in our case series of trigeminal neuralgia was superior cerebellar artery loop in 41 (70.7%) patients. Surgical outcomes in terms of pain Relief were satisfactory as 49 (84.5 %) patients showed improvement in their pain levels measured by Visual Analogue Scale. The most common

complication of surgery was cerebrospinal fluidleak in 3 (5.2%) patients, followed by post operative Sub arachnoid haemorrhage in 1 (1.8%) patient, mortality was reported in 2 (3.4%) patients.

DISCUSSION

Trigeminal neuralgia imposes significant disruption in life of patients affected and is a troublesome disease. In those cases which are refractory to medicines and conservative treatments, several surgical procedures are available. Microvascular decompression is the surgical procedure of choice as it would decrease and abolish pain by decompressing the nerve. However, the procedure also carries risks and postsurgical complications.[10] The common branches of trigeminal nerve in which pain was reported in our study were maxillary V2 and mandibular V3 (67.8%) while the most common cause identified was superior cerebellar artery loop (70.7%). Most common complications were cerebrospinal fluid leak (5.2%) and subarachnoid hemorrhage along with mortality in 2 patients (3.4%). Reduction in pain was observed in participants of our study (84.5%). In our study majority of the participants who were diagnosed with refractory trigeminal neuralgia were females (n 34 58.7%) as compared to males. While the nerve branches most commonly affected were V2 and V3 (67.8%). A study carried out to determine the spectrum of microvascular decompression for trigeminal nerve also demonstrated the same results in which female to male ratio was 5:3 and the common branches affected were also V2 and V3 (40%) followed by V2 (27.5%) ,V3(25%) and V1 V2 (7.5%).[(11)] The cause of increase prevalence among females is unknown although estrogen fluctuations over the course of menstrual cycle may be attributed as a factor. While no specific reason for the involvement of a specific branch of nerve could be attributed in nerve injuries.[12] Our study illustrated better surgical outcomes in term of pain relief (84.5%) in patients after 6 to 8 months follow up period after MVD.A study carried out to find outcomes of MVD post-surgery also demonstrated that 78.8% of the patients had experienced immediate relief while 8 patients noticed complete relief of symptoms after 2 weeks.[13] These results substantiates the microvascular decompression as the ideal surgical procedure for refractory trigeminal neuralgia.

Superior cerebellar artery loop was identified as the most common etiology (70.7%) of trigeminal neuralgia in our study. A case series carried out in Kengeri between 1995-2007 also demonstrated that during surgery the commonest cause identified was superior cerebellar artery in 71.5% of the cases. Several studies also depict the same etiological factor.[12,14] Although MVD has excellent outcomes in terms of pain relief and patient satisfaction but still it carries some post-surgical complications and rarely more debilitating outcomes such as death. Our study illustrated that the most common complication associated with MVD was cerebrospinal fluidleak in 3 (5.2%) patients, followed by post operative Sub arachnoid haemorrhage in 1 (1.8%) patient, mortality was reported in 2 (3.4%) patients. Several studies had reported several other complications associated with MVD such as muscular atrophy, hearing loss, vascular and cerebellar injury, CSF leak and sensory disturbances.[15] In contrast with our results, a study carried out to determine complications associated with MVD illustrated the rate of CSF leak as 1.4% while no mortality rate was reported.[16] Permanent hearing loss as a complication of MVD is discussed in literature. A study carried to determine the complications associated with MVD showed that two patients developed permanent ipsilateral anacusia and also reported that 1.9% of patients developed hearing deficits after the procedure.[17] While in contrast no such complication is observed in our study. Excessive cerebellar retraction leading to stretching of the root is the cause attributed to hearing deficits after MVD.

As in the current study only those participants were recruited who had undergone MVD for trigeminal neuralgia and no control group was allocated for comparison, which is the limitation of the study exposing to risk of bias with no randomization. But the study illustrated the hypothesis on which further higher-level evidence can be carried out such as randomized control trials to proof or negate the hypothesis generated through the case series.

CONCLUSION

The results of our study concluded that Microvascular Decompression surgery is

effective in reducing pain, improving patient satisfaction in trigeminal neuralgia patients who are refractory to conservative treatment options such as carbamazepine's. Our study also concluded that superior cerebellar artery loop is the main aetiology in idiopathic trigeminal neuralgia. The procedure also has some complications such as cerebrospinal fluid leakage and sub arachnoid haemorrhage.

REFERENCES

1. Zakrzewska J, Linskey M. Trigeminal neuralgia. BMJ 348:474. 2014.
2. Gambeta E, Chichorro JG, W Zamponi G. Trigeminal neuralgia: An overview from pathophysiology to pharmacological treatments. Molecular Pain. 2020;16.
3. Raghavendra H, Varsha K, Sobti SJJoM, Research S. Micro vascular decompression for trigeminal neuralgia: preliminary experience. 2019;7(2):32-5.
4. Di Carlo DT, Benedetto N, Marani W, Montemurro N, Perrini PJNR. Microvascular decompression for trigeminal neuralgia due to vertebrobasilar artery compression: a systematic review and meta-analysis. 2021:1-10.
5. Jones MR, Urits I, Ehrhardt KP, Cefalu JN, Kendrick JB, Park DJ, et al. A Comprehensive Review of Trigeminal Neuralgia. 2019;23(10):1-7.
6. Zeng Q, Zhou Q, Liu Z, Li C, Ni S, Xue FJJoCN. Preoperative detection of the neurovascular relationship in trigeminal neuralgia using three-dimensional fast imaging employing steady-state acquisition (FIESTA) and magnetic resonance angiography (MRA). 2013;20(1):107-11.
7. Bendtsen L, Zakrzewska JM, Heinskou TB, Hodaie M, Leal PRL, Nurmikko T, et al. Advances in diagnosis, classification, pathophysiology, and management of trigeminal neuralgia. 2020;19(9):784-96.
8. Xu R, Xie ME, Jackson CMJJoPR. Trigeminal Neuralgia: Current Approaches and Emerging Interventions. 2021;14:3437-63.
9. Salcman M, Heros RC, Laws ER, Sonntag VK. Suboccipital Craniectomy: Retromastoid Approach for Trigeminal Neuralgia. Kempe's Operative Neurosurgery:Springer; 2004.13-20.
10. CHEN J-F, LEE S-TJCn, neurosurgery. Comparison of percutaneous trigeminal ganglion compression and microvascular decompression for the management of trigeminal neuralgia. 2003;105(3):203-8.
11. Chakravarthi PS, Ghanta R, Kattimani V. Microvascular Decompression Treatment for Trigeminal Neuralgia. 2011;22(3):894-8.
12. Bangash THJA, medicine p. Trigeminal neuralgia: frequency of occurrence in different nerve branches. 2011;1(2):70.
13. Jagannath P, Venkataramana N, Bansal A, Ravichandra MJAjon. Outcome of microvascular decompression for trigeminal neuralgia using autologous muscle graft: a five-year prospective study. 2012;7(03):125-30.
14. Hardy DG, Rhoton ALJJon. Microsurgical relationships of the superior cerebellar artery and the trigeminal nerve. 1978;49(5):669-78.
15. Tomasello F, Esposito F, Abbritti RV, Angileri FF, Conti A, Cardali SM, et al. Microvascular decompression for trigeminal neuralgia: technical refinement for complication avoidance. 2016;94:26-31.
16. La Torre D, Gorgoglione N, Cafarella D, Romano A, Lavano A, Germanò A, et al. A Novel Technical Refinement of Microvascular Decompression: Pain Relief and Complication Rate in a Consecutive Series of Patients With Trigeminal Neuralgia. 2020.
17. Mastronardi L, Caputi F, Cacciotti G, Scavo CG, Roperto R, Sufianov AJSNI. Microvascular decompression for typical trigeminal neuralgia: Personal experience with intraoperative neuromonitoring with level-specific-CE-Chirp® brainstem auditory evoked potentials in preventing possible hearing loss. 2020;11.