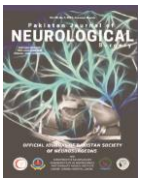

PAKISTAN JOURNAL OF NEUROLOGICAL SURGERY (QUARTERLY) – OFFICIAL JOURNAL OF PAKISTAN SOCIETY OF NEUROSURGEONS

Original Article

Cerebellopontine Angle (CPA) Tumors Presenting with Trigeminal Neuralgia (TN): A Study from LRH, Peshawar

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ABSTRACT

Background/Objective: The cerebellopontine angle (CPA) is the most prevalent site for brain tumors, accounting for 10% of all cases. CPA tumors can have a direct or indirect pathogenic impact on the auditory nerve and brain stem. The study aimed to quantify the prevalence of cerebellopontine angle tumors in patients with trigeminal neuralgia.

Material and Methods: A cross sections study was conducted and 100 patients were included from the Neurosurgery department of LRH, Peshawar. Magnetic resonance images (MRI) were used to look for CPA tumors. The data on CPA tumors were stratified for age and gender. Suboccipital retromastoid craniectomy was performed.

Results: The mean age of the patients was 43 years. 38 patients were male and 62 were female. CPA tumors were seen in three percent of trigeminal neuralgia patients. There existed a significant difference ($p < 0.00001$) between the presence and absence of CPA tumors. A maximum number of patients ($n = 37$) were not having CPA tumors from the age group of 51-60 years. An insignificant association was reported for CPA distribution concerning age and gender.

Conclusion: According to our findings, 3% of trigeminal neuralgia patients had cerebellopontine angle tumors. We urge more investigation and screening of trigeminal neuralgia patients for CPA tumors based on the findings of this study.

Keywords: Trigeminal Neuralgia, Cerebellopontine Angle Tumors (CPA), Magnetic resonance images (MRI), Tumor Ear.

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Date of Submission: 20-07-2022
Date of Revision: 15-09-2022
Date of Acceptance: 25-09-2022
Date of Online Publishing: 30-9-2022
Date of Print: 30-9-2022

DOI: 10.36552/pjns.v26i3.772

INTRODUCTION

A cerebellopontine angle (CPA) is the commonest location for brain tumors, with 10% of them considered to originate there. CPA tumors can either directly or indirectly influence the auditory

nerve and brain stem pathologically.[1] In brainstem tumors, both the tumor ear (placed ipsilateral to the lesion) and the nontumor ear may interfere with the auditory system. It would very certainly result in hearing losses on both sides, whether overt or covert.[2] Because of these aspects, CPA tumors present an excellent clinical scenario for learning about the auditory temporal resolution component.[3-4] Significant problems such as facial palsy, cerebrospinal fluid leaking, meningitis, and other cranial nerve deficits might occur following surgery. Death, on the other hand, has become a less common consequence as a result of enhanced imaging techniques that allow for early detection, the use of the microscope, and intraoperative monitoring of the cranial nerves.[5]

Trigeminal neuralgia symptoms have a significant detrimental impact on a patient's quality of life and economical activities, and the majority of patients feel some level of depression as a result.[6-7] Trigeminal neuralgia is classified as classic trigeminal neuralgia, which is caused by vascular irritation of the trigeminal nerve root, and symptomatic trigeminal neuralgia, originate from various issues such as vascular diseases, tumors, and demyelination as in multiple sclerosis.[8] According to several sources, cerebellopontine angle tumors are responsible for 1 to 9.9% of occurrences of trigeminal neuralgia.[9] Demyelination of the trigeminal nerve is caused by localized pressure on the nerve caused by tumor compression. This raises the possibility of trigeminal nerve ectopic action potential generation. Cerebellopontine angle cancers were discovered in 10.4% of patients; epidermoid lesions were the most common, appearing in 7.4% of patients and accounting for 75% of the cerebellopontine angle tumors in these people. Meningiomas and vestibular schwannomas both accounted for 1.4% of cases.[10-11] CPA angle tumors have a considerable and dramatic influence on cranial nerves both before and after surgery. This study evaluated the prevalence of CPA tumors in those who have chronic trigeminal neuralgia. The trigeminal nerve is the most commonly harmed among people affected with CPA angle tumors, which is why this study was conducted. The current investigation will emphasize the magnitude of the problem among our trigeminal neuralgia sufferers.

MATERIAL AND METHODS

Study Design & Setting

Cross-sectional research was carried out at Lady Reading Hospital's Neurosurgery Department in Peshawar. Before this study could begin, the institution's research committee and ethical board provided their approval.

Inclusion Criteria

Those patients included those who presented with trigeminal neuralgia. Patients of both genders with ages between 18-60 years were included.

Exclusion Criteria

Patients who have undergone surgery on the CPA angle in the past were excluded. Patients who have had facial trauma in the past were not included.

Data Collection

The research included 100 patients who met the inclusion criteria and were hospitalized and from outside departments. The data were collected with the informed consent of the patients. Suboccipital retro mastoid craniectomy was performed. All patients' history was taken from physical examinations. Magnetic resonance images (MRI) were used to look for CPA tumors. Demographic information was taken on a proforma. Strict exclusion criteria were used to prevent confounding factors and bias in research outcomes.

Analysis of Data

The data was analyzed using SPSS version 25 for mean values, and percentages. The stratification of CPA tumors concerning age and gender was analyzed through the Chi-Square test. A p-value of 0.05 was deemed significant.

RESULTS

Age & Gender Distribution

14% of patients were in 20 – 30 years, 20%were in 31 – 40 years, 28% were in 41 – 50 years and 38% were in 51 – 60 years (Table 1). The average age was 43 ± 2.37 years. 38% were male and 62% were female patients.

Incidence of AP Tumors

Based on an analysis of 100 patients, it was determined that three patients (3% of the total) had cerebellopontine angle tumors, whereas 97 patients (97% of the total) did not. There existed a significant difference ($p < 0.00001$) between the presence and absence of CPA tumors (Table 2).

Stratification of AP Angle w.r.t Age and Gender

Tables 3 – 4 provide stratification of cerebellopontine angle tumors based on age and gender. One patient from each following age group reported CPA tumor: 31 – 40 years, 41 – 50 years, and 51 – 60 years. A maximum number of patients (n = 37) were not having CPA tumors from the age group of 51 – 60 years. Two female and one male patient suffered from a CPA tumor. 37 male and 60 female patients were not having CPA tumors. An insignificant association was reported for CPA distribution concerning age and gender.

Table 1: Age-wise Distribution (n = 100).

Age Groups (Years)	Prevalence	%age
20 – 30	14	14%
31 – 40	20	20%
41 – 50	28	28%
51 – 60	38	38%

Table 2: Incidence of Cerebellopontine Angle Tumors.

CPA Tumors	Frequency	%age	P value
Yes	3	3%	p < 0.00001 (significant result)
No	97	97%	

Table 3: CPA tumors' distribution for age ranges.

Presence/Absence of Tumor	Age Groups (Years)				Total	P Value
	20 – 30	31 – 40	41 – 50	51 – 60		
Yes	0	1	1	1	3	0.8597
No	14	19	27	37	97	(insignificant
Total	**14**	**20**	**28**	**38**	**100**	result)

Table 5: Distribution of CPA tumors concerning gender (n = 100).

Presence/Absence of tumors (CPA)	Male	Female	Total	P Value
Yes	1	2	3	0.8657
No	37	60	97	(insignificant result)

DISCUSSION

Trigeminal neuralgia (TN) is most commonly caused by vascular compression at the nerve root, and microvascular decompression (MVD) is an effective surgical treatment for this condition. In certain cases, TN is caused by an intracranial space-occupying lesion, and tumor excision is frequently advised. When craniotomy is not an option, it is difficult to decide the best therapy.[18] Trigeminal neuralgia (TN) is a neurological condition characterized by intermittent and unexpected occurrences of face pain, which is most usually caused by vascular compression at the nerve root. Previous research has shown a structural relationship between tumor and neurovascular structures, but little is known regarding the role of tumor type in the genesis of TN.[19] CPA tumors were found in 3% of trigeminal neuralgia sufferers. A significant difference occurred between the presence and absence of CPA tumors. The age group of 51 – 60 years had the highest number of individuals (n = 37) who did not have CPA tumors.

The mean age was 43 years, with a standard deviation of 2.37. The patient group was made up of 38% men and 62% women. Cerebellopontine angle tumors have been observed to develop 3% of the time in those suffering from trigeminal neuralgia. According to Afridi et al, the prevalence of cerebellopontine angle cancers was 10.4%; of these, epidermoid lesions were the most prevalent in 7.4% of patients and accounted for 75% of the tumors in these individuals.[11] Cerebellopontine angle tumors cause 1 – 9.9% of cases of trigeminal neuralgia, according to Cruccu et al.[12] According to Barker et al., the incidence of cerebellopontine angle epidermoid in trigeminal neuralgia ranged from 0.2 to 5.5%.[13] Kobata et al. reported that the mean age was 47. There were 38 male patients and 62% female patients. Trigeminal neuralgia occurs 9% of the time in cerebellopontine angle tumors.[14]. Kato et al, reported similar findings, with a mean age of 40 years. In this study, trigeminal neuralgia patients had CPA tumors at a frequency of 5%. There were 40% of male patients and 60% of female patients.[15] Similar findings were made by Matsuka et al, who found that the average age was 52 years. This study indicated that 7% of trigeminal neuralgia patients had cerebellopontine angle tumors. Forty-five percent of patients were male, and 55 percent were female.[16]Jamjoom et al. reported similar findings, with a mean age of 50 years. This study discovered that patients with trigeminal neuralgia had a frequency of cerebellopontine angle tumors of 5%. Patients comprised 46% men and 54% women, respectively.[17]

Rehman et al, (2021)[20] investigated the prevalence of CPA tumors in individuals suffering from trigeminal neuralgia. The average age group was 43 2.37 years, with 37% of patients being male and 62% being female. CPA tumors occurred in 3% of patients. They determined that 3% of individuals with trigeminal neuralgia had cerebellopontine angle tumors. Liu et al. (2017)[19] studied 35 patients with symptomatic TN caused by CPA tumors retrospectively. Symptomatic TN caused by tumors was distinguished by the advent of pain symptoms early in the disease, and different types of tumors may have distinct pathogenic processes in TN. After complete or subtotal tumor removal, it is critical to check the whole nerve root for suspected vascular compression. Jiang et al, (2022)[18] investigated the clinical results of percutaneous balloon compression (PBC) for secondary TN induced by CPA tumors. Trigeminal neuralgia (TN) may be caused by intracranial tumors in rare situations. Secondary TN induced by CPA tumors has a reported incidence of 1.7 to 11.6%.

Cholesteatoma of the cerebellopontine angle is frequently associated with trigeminal neuralgia. Because of its unique signal, magnetic resonance imaging is useful for early diagnosis. Surgical therapy is frequently the first option, and neuralgia alleviation was acceptable following the procedure. Microvascular decompression is

advised concurrently if certain problematic arteries were discovered after tumor surgical excision.[21] According to Kai et al, (2018)[21], all patients manifested trigeminal neuralgia on the same side of the cholesteatoma. There was no significant difference in clinical characteristics or surgical outcomes between groups A and B. All cholesteatoma patients had distinct and significant radiological findings. Tumors were eliminated in 18 individuals and partially removed in 8 others. All patients reported adequate pain alleviation. Transient aseptic meningitis in two patients, facial numbness in two patients, minor tinnitus in two patients, and mild and facial weakness in one patient were among the surgical consequences. In this series, no deaths, hematomas, or acute hydrocephalus were documented. There was no return of discomfort or tumor over the 12-80-month follow-up period. Zhang et al, (2020)[22] also conducted a retrospective study of individuals with CPA tumor-induced TN from a single institution. Secondary trigeminal neuralgia (TN) caused by tumors in the cerebellopontine angle (CPA) differs from classic neuralgia in terms of pathophysiology and therapeutic options. There is no consensus on the cause of tumor-induced neuralgia. Secondary TN caused by CPA tumors is rarer than regular TN. Tumor-induced TN differs from typical TN in that symptoms occur earlier and surgery is performed earlier.[22]

CONCLUSION & RECOMMENDATION

According to the results of our research, 3% of trigeminal neuralgia patients had cerebellopontine angle tumors. Based on the outcomes of this study, we recommend more research and screening of trigeminal neuralgia patients for CPA tumors. Larger trials with longer follow-ups are recommended to come to conclusions however, generally, 1 – 10% of trigeminal neuralgia symptoms are attributable to CPA tumors according to newer and much older studies.

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Additional Information

Disclosures: Authors report no conflict of interest.
Ethical Review Board Approval: The study was conformed to the ethical review board requirements.
Human Subjects: Consent was obtained by all patients/participants in this study.
Conflicts of Interest:
In compliance with the ICMJE uniform disclosure form, all authors declare the following:
Financial Relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.
Other Relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

AUTHOR CONTRIBUTIONS

Sr. No.	Author's Full Name	Intellectual Contribution to Paper in Terms of
1.	Farooq Azam	Study Design, Methodology, and Paper Writing.
2.	Adnan Khaliq	Data Calculation and Data Analysis.
3.	Farooq Azam	Interpretation of Results.
4.	Humayun Tahir	Statistical Analysis.
5.	Farooq Azam	Literature Review.
6.	Humayun Tahir	Literature Review and Quality Insurer.