

## EVALUATION OF EXTRA AXIAL CEREBELLOPONTINE ANGLE TUMOURS THROUGH MRI

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### Abstract:

**Aim:** This study aimed to evaluate the incidence of extra-axial cerebellopontine angle tumours and to characterize extra-axial cerebellopontine angle tumours.

**Methods:** The study was carried out in Dhaka Medical College for the duration of 2 years from July 2016 to July 2018. All patients with clinical suspicion of CP angle tumours subjected 1.5 T MR imaging system. Total 30 patients were evaluated during this period.

**Results:** Extra-axial CPA tumours accounts for 7-10% of brain tumours. Most common extra-axial CPA tumour is schwannoma (60%), followed by meningioma (27%), epidermoid (7%), arachnoid cysts (7%). 51-60 years is the most common age group involved. Schwannomas are common extra-axial CPA tumours which are enhancing round masses most commonly arise from the vestibular nerve and associated with enlargement of the internal auditory canal. Meningiomas are the second most common extra-axial CP angle tumours which oval or hemispheric lesions with a broad attachment to tentorium or petrous dura matter.

**Conclusion:** MRI is the most sensitive noninvasive modality to characterize extra-axial CPA tumours. MRI identifies the location and extension of the lesions based on their characteristic signal and enhancement pattern on contrast.

**Keywords:** Extra-Axial, Cerebellopontine, Brain tumour, MRI

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### Introduction

The cerebellopontine angle (CPA) cistern is a subarachnoid space containing cranial nerves and vessels bathed in cerebrospinal fluid (CSF). The CPA is bounded by the pons, the anterior aspect of the cerebellum and the petrous temporal bone covered by dura mater. Tumours of the cerebellopontine angle (CPA) comprise 10% of all intracranial tumours<sup>1,2</sup>

Vestibular schwannomas account for 70%–80% of all CPA lesions, meningiomas 5-12% and

epidermoid cysts 2-6%, other lesions, which accounts every d<sup>n</sup>1%<sup>1,2,3</sup>. Tumours derived from various anatomical structures, includes primary origin from internal auditory meatus, pontocerebellar cistern and lateral recess of the 4th ventricle, temporal bone, brain stem, or cerebellar nervous tissue<sup>4,5,6</sup>

Clinical presentation of the CPA tumours is variable and it depends upon the size and location of the tumour. It can be asymptomatic in early stage or it can give vertigo, tinnitus, or

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hearing loss. Vascular compression of the vestibule-cochlear nerve also causes vertigo and tinnitus.

Computerized tomography (CT) and magnetic resonance imaging (MRI) are the primary modalities for diagnosis of cerebellopontine lesions. MRI is considered superior in differentiating the different types of CPA masses.

**Material and Methods**

Patients attending the Department of Radiology, Dhaka Medical College, Dhaka was the main source of data for this study. All patients referred to the Department of Radiology with clinical suspicion of CPA tumours for the duration of 2 years from July 2016 to July 2018 subject for study. A total of 30 patients were enrolled in this study. Patients from all age groups who are clinically suspected to have ICSOL were included and patient having a history of claustrophobia, metallic implants insertion, cardiac pacemakers were excluded from this study.

**Results:**

Thirty patients were evaluated, whose age group ranged from 10 to 90 years. The highest incidence of extra-axial cp angle tumours was found in 51-60 years age group accounting for 29% of cases and least was seen in the age group of 11-20years constituting 4%. Thirty patients were evaluated of which 9 (30%) were males and 21 (70%) were females. Out of the 30 patients who were evaluated, schwannoma (60%) is the most common pathology followed by meningioma (26.7%), epidermoid (6.7%), arachnoid cysts (6.7%). The most common extra-axial CP angle tumour is schwannoma with 18 cases (60%). This was followed by meningioma with 8 cases (26.7%), followed by epidermoid and arachnoid cysts with 2 cases each (6.7%). Extra-axial CP angle tumors are more common above 4th to 5th decade. Peak age incidence noted in 5th to the 6th decade with 8 cases (26.7%).

**Table-I**  
*Age incidence of various extra and CP angle tumors*

Tumor type	10-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	Total
Schwannoma	1	2	2	3	4	3	3	0	18
Meningioma	0	0	1	1	3	1	1	1	8
Arachnoid cyst	0	1	1	0	0	0	0	0	2
Epidermoid cyst	0	0	1	0	0	1	0	0	2
Total	1	3	5	4	7	5	4	1	30

**Table-II**  
*Presenting symptoms and number of patients*

Symptoms	Schwannoma (n = 18)	Meningioma (n = 8)	Arachnoidx (n = 2)	Epidermoid (n = 2)
Hearing loss	14	3	0	0
Tinnitus	7	2	1	1
Headache	10	3	2	2
Dizziness	6	1	2	0
Facial numbness	2	0	0	0
Diplopia	1	0	0	0

Out of 18 cases of Schwannoma 4 cases in 5th to 6th decade followed by 3 cases each in 4th, 6th and 7th decades. Out of 8 cases Meningioma 3 cases in 5th to 6th decade. Out of 30 cases of extra-axial CPA tumours 21 cases are female (70%), males 9 cases (30%) with a female preponderance, female: male ratio being 2.3:1 (Table 1).

Out of 18 cases of Schwannoma 12 cases of females, 6 cases of males, out of 8 cases of Meningioma 6 cases of females, 2 cases of males, 2 cases of arachnoid cysts of females, 1 case of epidermoid cyst is male and another case is female. So, there is a female preponderance in extra-axial CPA tumours.

Majority of the patients shows headache and dizziness. Majority of the Schwannoma patients shows hearing loss, headache, tinnitus, and dizziness (Table 2).

Out of 18 cases of Schwannoma 7 case shows homogenous enhancement (39%), 11 cases show heterogenous enhancement (61%) on contrast. Out of 8 cases of Meningioma 7 case shows homogenous enhancement (87%), 1 case shows heterogeneous enhancement (13%) on contrast. Out of 2 cases of each arachnoid cyst and epidermoid cyst follows CSF signal intensity on T1, T2, and FLAIR (Figure 1 and Figure 2). Diffusion restriction in 2 cases (100%) of the epidermoid cyst, no restriction in 2 cases of arachnoid cysts.

### Discussion

In our study of MR imaging of extra-axial cp angle tumors, we evaluated 30cases. Out of Thirty patients evaluated schwannoma diagnosed in 18 cases (60%). Among the 18 cases, Males were 6 and Females were 12 with a female to male ratio 2.3:1. A maximum number of patients in the age group of 50-60yrs constituting 40% of patients. Unilateral involvement is seen in 17 cases and bilateral involvement is noted in 1 case, which is a case of Neurofibromatosis type II with multiple vestibular schwannomas in cp angle, Meckel's cave, lateral walls of cavernous sinuses and Neurofibromas in the spinal canal. The commonly involved location is the vestibular component of VIII nerve, then facial and

trigeminal nerves. In this study, 17 cases of vestibular schwannoma (89.4%) and 1 case of trigeminal schwannoma were recorded.

Previous studies reported that schwannomas arise from the vestibulocochlear nerve, is more often than the other cranial nerve and the vestibular division is more commonly involved than the cochlear division<sup>7,8</sup>.

The literature reported that vestibular schwannomas account 8 to 10% and 60–90% of total CPA tumors<sup>9,10</sup>. In the current study, the common lesion observed was vestibular schwannoma, accounts for 53.3% in total, which was consistent with the previous studies.

One case of trigeminal schwannoma encountered in this study. Hodgson TJ et al<sup>11</sup> reported that signal intensity of the masses on MRI will not contribute to the accurate radiographic diagnosis of the intracanalicular meningioma.

In the present study, one lesion was showed both solid and cystic components. Both the lesions showed marked enhancement on postcontrast sequences. Similar findings were described by Valavanis A et al<sup>12</sup>

On T1, most tumors are isointense to the cortical grey matter (from 56% to 94%). Hypointense meningiomas account from 20% to 48%, and hyperintense tumors on T1-weighted images are rare. On T2-weighted images, about 50% of the tumors remain isointense with the brain cortex. Hypointense tumors are less common, from 4% to 18%, whereas hyperintense lesions account for 35% to 44%<sup>22,23</sup>.

In the present series, on T1-weighted images, Out of 8 cases of Meningioma 5 cases were Iso-intense (62.5%), 2 cases hypo-intense (25%), 1 case show mixed intensity (12.5%). On the T2-weighted images, Out of 8 cases of Meningioma in 6 cases were hyperintense (75%), 1 case was isointense (12.5%) 1 case show mixed intensity (12,5%) to the cortical grey matter.

In our study, all the meningiomas showed enhancement after contrast administration, Out of 8 cases of Meningioma 7 case shows

homogenous enhancement (87%), 1 case shows heterogeneous enhancement (13%) on contrast.

Nakau et al.,<sup>13</sup> studied the correlation of the MR imaging and histopathological findings in nine cases of meningiomas with a dural tail sign. They suggested that tumour cell nests in the dura-mater of those patients, making the surgical resection of these areas mandatory. Almost 35% of the patients with meningiomas may present the dural tail signal on post-contrast T1-weighted images<sup>14</sup>. In the present series, this sign was seen frequently, being identified in 50% of the patients.

### Conclusion

A spectrum of usual and unusual lesions exists in the CP angle. Among extra-axial CP angle tumours acoustic schwannomas are most common tumours at CP angle followed by meningiomas. Signal intensity on MR imaging, enhancement, shape and margins, extent, mass effect and adjacent bone reaction are also helpful in establishing the diagnosis. MRI is the most sensitive non-invasive modality in the characterization of extra-axial cp angle tumours. It can identify the site and extension of the lesions as well as the characteristic signal and enhancement pattern on contrast. Apart from diagnosing, MR imaging plays an important role in stratifying patients into appropriate treatment options.

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