**Cerebral astroblastoma radiologically mimicking pilocytic astrocytoma: A case report**

Padam Raj Joshi,1 Sagar Babu Pandey,1 Usha Manandhar,2 Saroj GC,1 Gopal Sedain,3

1Maharajgunj Medical Campus, Maharajgunj, 44600, Kathmandu, Nepal

2Department of Pathology, Tribhuvan University Teaching Hospital, Maharajgunj, 44600, Kathmandu Nepal

3Department of Neurosurgery, Tribhuvan University Teaching Hospital, Maharajgunj, 44600, Kathmandu, Nepal

**Abstract**

Astroblastoma is a rare central nervous system tumor. We reported a case of a 24-years-old Nepalese woman with radiological features mimicking pilocytic astrocytoma which came out to be low grade astroblastoma in histopathological and immunohistochemistry examination after total excision of the tumor.

**Keywords:** astroblastoma, brain tumor, case report, pilocytic astrocytoma, histology.

**Introduction**

Astroblastoma is a rare primary tumor of the brain accounting for estimated 0.45-2.8% of primary brain gliomas.1,2 Exact prevalence of astroblastoma is not none due to its rarity. Its clinical features resemble other central nervous system tumors and is diagnosed by special histological and immuno-histochemical findings but still controversies exist because of insufficient clinicopathological data.3 It is listed under “other neuroepithelial tumor” by WHO without a numeric grading.4 Because of extreme rarity of tumor and non-specific radiological features there is high chance of misdiagnosis.5 In this case report we report a case of astroblastoma with its clinical, radiological and histopathological features along with management.

**Case presentation**

We report a case of a 24 year old Nepalese woman who presented in our center with a history of headache, vomiting for 15 days and her symptoms progressively worsened which is followed by one episode of loss of consciousness with abnormal body movement lasting five minutes. At the time of presentation, the patient was well oriented, alert with the Glasgow Coma Scale (GCS) E4V5M6. Sensory, motor, and cranial nerve examinations were unremarkable.

Non-contrast computed tomography (NCCT) of the head revealed hypo-dense well-defined lesions in the right frontoparietal region with a small calcified area without solid components (Figure 1A). Magnetic resonance imaging (MRI) of her cranium showed hypo-intense well defined cystic lesion with rim enhancement in T1 weighted images and hyper intense strongly enhancing well defined cystic lesion in T2 and FLAIR sequence in right frontoparietal region (Figures 1B, 1C, 1D, 1E) and radiological diagnosis of pilocytic astrocytoma was made.

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| **Figure 1 A.** CT head showing hypo dense well defined lesion with area of calcification, **B,C**. showing hypo-intense well defined lesion with rim enhancement in T1 weighted sagittal and coronal magnetic resonance images, **D.** showing hyper-intense well defined lesion in T2 weighted axial images, **E.** FLAIR axial cut showing hyper-intense lesion in fronto-temporal region. |

By making a working diagnosis of pilocytic astrocytoma she underwent right frontoparietal craniotomy. Following craniotomy the dura flap was raised and the lesion was localized intra-operatively by ultrasonography, and a corte section was done. Intra operationally there was a well-defined cyst involving part of the frontal and parietal lobe. Cyst wall was incised and gross total excision of tumor was done. Excised tumor was sent for histopathological examination. She was discharged on the 10th postoperative day with postoperative CT findings without residual tumor and without compression effect (Figure 2). After 3 months of the surgery the patient was doing well without any symptoms.

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| **Figure 2.** Showing postoperative image of NCCT head. |

Histopathological examination showed a tumor composed of perivascular arrangement of tumor cells with central thickened sclerosed blood vessels. Those tumor cells had indistinct cytoplasmic border with round to oval nuclei. Nuclear pleomorphism, mitotic activity and necrosis were not seen (Figure 3).

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| **Figure 3.** Tumor cells radiate to central sclerosed blood vessels (Hand E, 200x). |

Immunohistochemistry analysis revealed positive immunostaining for glial fibrillary acidic protein (GFAP) (Figure 4A) and S-100 (Figure 4B) but negative immune staining for Epithelial Membrane Antigen (EMA) (Figure 4C) and pan-cytokeratin (Figure 4D). Gene analysis was not done. Based on these findings a diagnosis of low grade astroblastoma was made and was differentiated with pilocytic astrocytoma.

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| **Figure 4 A.** Immunohistochemistry showing EMA negative, **B.** Tumor cells strongly express GFAP (200x), **C.** Immunohistochemistry showing S-100 positivity (200x) and **D.** Negative immunostaining for pan-cytokeratin (200x). |

**Discussion**

Astroblastoma is one of the rarest central nervous system tumors. Exact clinicoepidemiological findings for the diagnosis and management of astroblastoma are insufficient to guide the maximal patient care due to its rarity and limited available study. It is most commonly seen in patients less than 5 years of age with mean and median age at diagnosis varying from 14.5-18 and 14 years respectively.6-8 Astroblastoma shows female preponderance with female to male ratio of 1.7-8:1.7,8

Astroblastoma is commonly located in supra-tentorial region mainly in frontal region but it is also reported from parietal, occipital, intraventricular, brain stem, spinal cord  and sometimes extra-axial.9-15 Clinically it is presented by different symptoms on the basis of the site where it is present. Common symptoms reported are headache, seizure, and vomiting.1

Radiologically it’s reported characteristics of non contrast head CT images are hyper-attenuated lesions including punctate calcification in most of the cases. Magnetic Resonance Imaging findings reported are mostly supratentorial, well demarcated, mixed solid cystic, hypointense to isointense lesion in T1 and T2 sequences which heterogeneously enhanced with peritumoral edema.It is also reported that multiple intra-tumoral cysts typically called bubbly appearance  with rim enhancement are common radiological features.8,16 In contrary to commonly reported findings CT images of our reported case showing well defined hypodense lesion with calcification, hypointense well defined lesion in T1 sequence and well defined hyperintense strongly enhancing lesion in T2 and FLAIR sequence of MRI brain directed diagnosis more towards pilocytic astrocytoma. But it lacks a solid component which is a common feature of pilocytic astrocytoma.17,18

Histopathological features composed of perivascular astroblast forming pseudorosette sometimes become confusing with ependymoma.7,19 But the characteristically reported findings of sclerosed thickened blood vessels typically described as hyalinized blood vessel core helps in making diagnosis of astroblastoma.9

According to published case reports management is done by gross total excision and if not possible by subtotal excision with chemotherapy.1,3,20 Recurrence is reported in sub-totally excised cases. It is also reported that radiotherapy following excision has a good outcome in high grade tumors.21,22 Thus the outcome of totally excised tumor is better than that of sub-totally and prognosis of low grade astroblastoma is better than that of high grade.

**CONCLUSIONS**

Astroblastoma is a rare central nervous tumor which presents clinically with similar symptoms as other brain tumors. Radiological findings are confusing and liable to misdiagnosis with other brain mass lesions but diagnosis could be established by histopathological examination. The treatment was done by gross total excision in our case. Tumor characteristics, definite diagnosis and specific management modalities of astroblastoma are still challenging which needs further studies despite its rarity.

**Abbreviations**

**WHO:** World Health Organization

**CT:** Computed Tomography

**GCS:** Glasgow Coma Scale

**MRI:** Magnetic Resonance Imaging

**GFAP:** Glial Fibrillary Acidic Protein

**EMA:** Epithelial Membrane Antigen

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**Declarations**

* **Consent for publication:**

Informed written consent was taken before writing the manuscript from the patient.

* **Competing interests:** None.
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**Authors' contributions**

Padam Raj Joshi has taken history, performed physical examinations. Dr Gopal Sedain was involved in management of patient. Padam Raj Joshi and Sagar Babu Pandey were involved in writing the manuscript. Dr Gopal Sedain, Dr Usha Manandhar and Saroj GC edited and revised the manuscript. All authors read and approved the final version of the manuscript.

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