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Case Report

Extraaxial Cerebellopontine Angle Medulloblastoma with Multiple Intracranial Metastases in Adult: A Rare Case Report with a Review of Literature

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Abstract

Medulloblastoma (MB) is very rare malignant primary brain tumor in adults and its location at cerebellopontine angle (CPA) is even rarer. There are only few case reports of CPA MBs in literature. Most of them are reported in pediatric age groups which are mostly intraaxial. Only 11 cases of extra-axial CPA MBs have been reported so far. The author is reporting a very rare case of adult extra-axial CPA MBs with multiple intracranial metastases. We are also reviewing clinical and radiological features and unusual way of its presentation along with surgical management. Keeping MBs as one of the differential diagnosis for extra-axial CPA tumors is going to increase our spectrum of diagnosis which can lead to alteration in management.

Keywords: *Cerebello-pontine angle, extra-axial, medulloblastoma, metastases*

Introduction

Medulloblastoma (MB) is the most common primary childhood brain tumor. It accounts for 25% of all pediatric intracranial tumors and 33% of all posterior fossa neoplasm in children.[1] In adults, the tumor is uncommon, accounting for approximately 1% of adult primary brain tumors and 6% of posterior fossa tumors, 80% of which occur before the end of the fourth decade.[1,2] Cerebellopontine angle (CPA) MBs are very rare, and mostly, they are intra-axial. Extra-axial CPA MB is extremely rare and only 11 adult cases have been reported in world literature.[3] Here, we report a rare case of adult CPA MB with multiple intracranial metastases, its diagnostic dilemma, and multidisciplinary approach for its management.

Case Report

A 26-year-old male patient presented with complaints of headache and ataxia for the past 2 months. He had left facial deviation, drooling of saliva from the left angle of the mouth, change of voice, nasal regurgitation, and difficulty in swallowing for 1 month. On examination, vision was normal and there was no evidence of papilledema on fundus examination. Left sided VII th, IX th, X th and XI th nerve paresis were present. The patient was positive for left cerebellar signs and nystagmus.

Magnetic resonance imaging (MRI) showed a heterogeneous lesion. It was hypointense on T1-weighted images (T1WIs) and hyperintense on T2-weighted images (T2WIs). There was heterogeneous enhancement of lesion after administration of contrast. Axial and coronal imaging revealed the attachments of the lesion to the left posterior petrosal dura extending from the sigmoid sinus till the medial aspect of the internal acoustic meatus and inferior surface of tentorium with brilliant dural enhancement. There was a restriction on diffusion-weighted imaging and blackening on Apparent Diffusion Coefficient (ADC). There were multiple intracranial metastases at the periventricular region [Figure 1a-f]. For further evaluation to rule out secondaries from the distant site, contrast-enhanced computed tomography of the chest and abdomen was done. However, it was normal. On correlating the preoperative clinical and radiological findings, the diagnosis of metastases was kept (primary undetermined).

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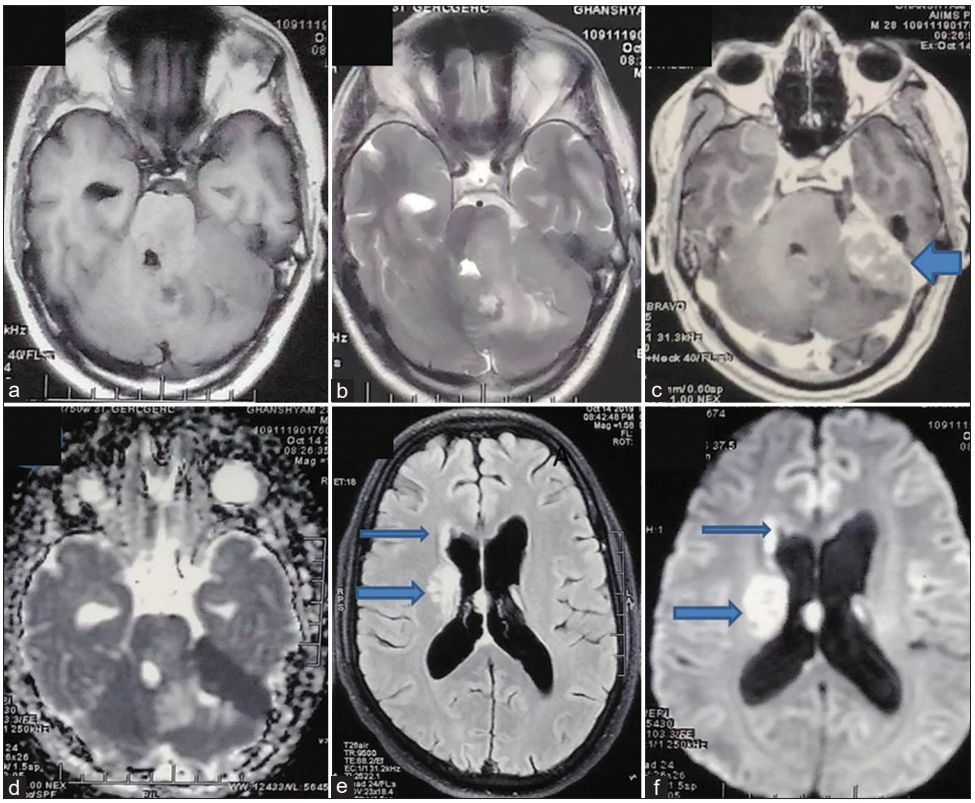

Figure 1: (a and b) Axial T1 section showing hypointense and axial T2 section showing iso- to hyperintense left cerebellopontine angle mass. (c and d) Axial contrast section showing heterogeneously enhancing and ADC Showing restriction at left cerebellopontine angle region. (e and f) showing flair and diffusion-weighted imaging sequence with periventricular hyperintesity and diffusion restriction of metastases

He underwent a standard retromastoid approach and the lesion was exposed through the left CPA. The lesion was grayish white, extra-axial, soft to firm, suckable. There was a clear plane between the tumor and cerebellum; however, it was adherent to dura and tentorium laterally. It was involving all the lower cranial nerves. The seventh and eighth cranial nerves were passing through the tumor. All the cranial nerves were identified and preserved. Near-total resection was done. Intraoperatively, it was looking like round-cell tumor [Figure 2a-d]. Both the intraoperative period and postoperative period were uneventful. He did not develop any new focal neurological deficit and his cerebellar signs also gradually improved. However, lower cranial nerve and seventh nerve paresis persisted till the time of writing this article. Postoperatively, the patient was subjected for radiotherapy and chemotherapy.

The histopathology (HP) showed a highly cellular tumor composed of rosettes of small round cells, with high nucleus–cytoplasm ratio and increased mitotic figures – suggestive of classical MB – WHO Grade IV [Figure 3a and b]. Immunohistochemical study revealed synaptophysin, S-100 protein, and neuron-specific enolase to be positive, but glial fibrillary acid protein, neurofilament, and cytokeratin were negative.

Discussion

MBs are predominantly found in the pediatric age group accounting for one-fourth of all pediatric intracranial tumors. The most common site is the cerebellar vermis. In 10%–30% of pediatric cases, it spreads to the rest of the central nervous system through cerebrospinal fluid (CSF).[2]

MB in adults is an uncommon entity (1% of adult primary brain tumors) and its presence in CPA region is exceptionally rare. There have been only 11 reported cases of extra-axial MB in the adult literature.[3] Presutto *et al*. has suggested that extraaxial findings of MB are very rare in children, but nearly 50% of adult MBs arise from the cerebellum or pons at its lateral surface.[4] In our patient, the tumor was completely separated from the surrounding cerebellum and it was also extra-axial making it quite rare. The tumors most often occur among patients in their late 20s and early 30s.[3] The two most common extra-axial locations reported for this tumor are the tentorial and CPA regions.[3,5-7]

It has been suggested that extra-axial MBs located at CPA may originate either by the proliferating remnants of the external granular layers of the cerebellar hemispheres including the flocculus or from germinal cells or their remnants present at the posterior medullary velum.[8] Akay *et al*. suggested that extra-axial MBs at CPA arise

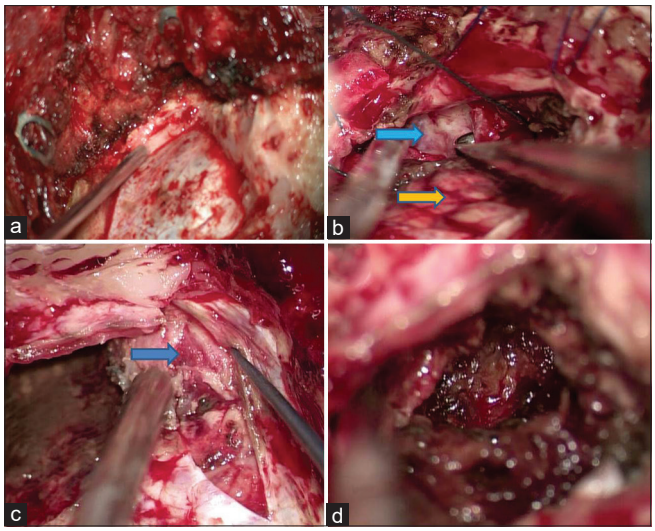

Figure 2: (a) Intraoperative image showing left retromastoid craniotomy. (b) Blue arrow showing tumor and yellow arrow showing the cerebellum. (c) Blue arrow showing tumor attached at the tentorium region. (d) Operative cavity showing excision of mass with hemostasis

by the lateral extension from the fourth ventricle through the foramen of Luschka or there may be direct exophytic growth from the site of origin at the surface of cerebellum or pons.[8,9]

The radiological features of MB are classical: they display an iso- or hypointense signal on T1WI, are heterogeneous on T2WI, and exhibit heterogeneous enhancement after addition of gadolinium, sometimes demonstrating a central hemorrhagic zone (our preoperative diagnosis of CPA metastasis was due to age and clinical presentation of the patient along with imaging features). Other differential diagnoses at this region can be meningioma. CPA meningiomas present with homogeneous enhancement, dural tailing, and diffusion restriction. However, heterogeneous enhancement or cystic changes in meningioma is not rare. Even metastasizing meningioma has been reported in the literature having multiple intracranial metastases.[10] Additional differential diagnosis includes CPA epidermoid cyst and hemangioblastomas. An epidermoid cyst is an uncommon benign tumor at CPA occurring in adults. They are differentiated from CSF intensity in MRI by minimal peripheral enhancement and diffusion restriction. However, hemangioblastomas presented as a cystic mass with a mural nodule. It shows multiple flow voids in MRI due to hypervascular nature and generally associated with Von Hippel–Lindau syndrome.[4]

Our patient presented with extra-axial dura-based mass at CPA with multiple intracranial metastases. We investigated the patient on the line of secondaries spreading from the distant primary location. Intraoperatively also, the tumor was separately located from the cerebellar tissue. However, HP report made the diagnosis more interesting and streamlining the further management.

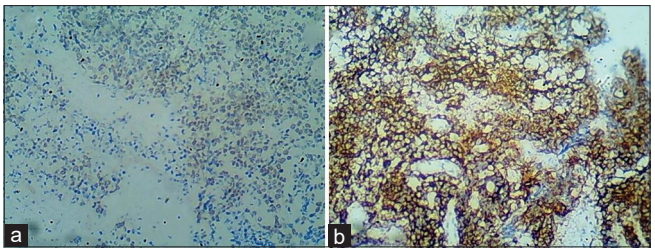

Figure 3: (a and b) Classic medulloblastoma showing a diffuse pattern of tumor growth with poor cellular differentiation, nuclear molding, and minimal indistinct cytoplasm (b). Immunohistochemistry (IHC): Synaptophysin positivity in the medulloblastoma shows as a brown staining of the cells

The patient underwent through radiotherapy and chemotherapy with gradual improvement. Literature has reported a 5-year survival rate to be 30% in MBs at such location, but none the cases in literature had multiple intracranial metastases along with CPA MBs.[1,8] Craniospinal irradiation (CSI) is delivered to the entire brain and spine and given concurrently with primary site radiation assuming metastasis to the whole neural axis. Given the reduction in CSI-associated morbidity in adults as compared to children, most adults receive and can tolerate a higher dose (36 Gy) CSI as opposed to the 23.4 Gy utilized in children.[11] Chemotherapy is less well tolerated in adults, and it has not yielded the clearly beneficial results that it has in children. There have been no randomized clinical trials comparing radiotherapy alone versus radiotherapy with adjuvant chemotherapy in adults to determine whether there is an incremental benefit to the addition of chemotherapy. Therefore, chemotherapy is often reserved for high-risk adult patients.[11,12] An additional immunologic approach that has been gaining momentum in adult brain tumors is immune checkpoint blockade. This strategy blocks immune checkpoint inhibitors such as PD-1 and CTLA-4 that normally dampen the immune response. Although, to date, these therapies have not been employed in children, emerging research indicates that like adult gliomas, MB expresses the primary ligand of PD-1 and PD-L1.[13]

Previous studies have identified various significant prognostic factors such as age, staging of disease, residual tumor, metastasis, location of tumor, and molecular biology.[14,15] Nalita *et al*. have suggested in their analysis that various significant factors associated with poor prognosis and death, were children younger than 3 years (hazard ratio [HR]: 2.88 [95% confidence interval [CI] 1.19–6.95]; $P = 0.01$), nonmidline location (HR 2.49 [95% CI 0.11–5.58]; $P = 0.02$), size of residual tumor ≥1.5 cm^2 ($P = 0.02$), high-risk group ($P = 0.02$), and children who did not receive radiation therapy ($P = 0.01$).[14] Desmoplastic variant has better prognosis than classic variant. It is a unique study to suggest that midline location MBs had good prognosis as compared to nonmidline location with statistical significance.[14] However, Rutkowski *et al.* have reported that nonmidline tumors had a better 8-year overall survival rate than the midline tumor, but it was not significant in multivariable analysis.[16]

Kamuran *et al*. have shown in their meta-analysis that adult MBs have lower 5-year overall survival and disease-free survival as compared to pediatric MBs. The presence of hydrocephalus, initial local recurrence, initial Karnofsky Performance Scale (KPS) <70, subtotal surgical resection, shortness of duration of symptoms, and primary site dose <54 *Gy* are negative prognostic factors in the adult age group.[15,17-20] Late recurrences of MB are more frequent in adults compared with pediatric patients. Pediatric relapses are usually seen in the initial 2 years, and the median time for MB recurrences in adults is 26 months. Although multiple intracranial metastases or distant are considered as poor prognostic factors in both adult and pediatric age group, they were not statistically significant in meta-analysis.[15]

Considering the patient as a high-risk group adult (size >3 cm) with nonmidline location of MB, with multiple intracranial metastases, we subjected the patient for radiotherapy and chemotherapy. Surgery along with radiotherapy and chemotherapy is the mainstay for survival and disability-free life in such patients. HP was suggestive of classic MB which was poor prognostic marker for this patient. However, long-term behavior of primary operated site and distant periventricular metastases cannot be predicted even after complete resection and radiation.

Conclusion

Extra-axial MB with multiple intracranial metastases is one of the rare diagnostic dilemmas at the cerebellopontine region. However, early histopathological diagnosis along with aggressive management with radiotherapy and chemotherapy can prolong overall survival and disease-free survival in young adult patients.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Chern JJ, Rao G, Lang FF, Medulloblastoma. In: Youmans JR, editor. Neurological Surgery. 7th ed.., Vol. 2. Philadelphia, PA W.B: Saunders Company; 2011. p. 549.
2. Bhaskar MK, Jaiswal M, Ojha BK, Singh SK, Chandra A, Meel M, *et al.* Extra-Axial Cerebellopontine Angle Medulloblastoma in an Infant. Pediatr Neurosurg 2017;52:122-6.
3. Goudihalli SR, Pathak A, Brar R, Mundi I. Reappraisal of cerebellopontine angle medulloblastomas: Report of a fatal case and lessons learned. Interdisciplinary Neurosurg 2018;12:20-23.
4. Presutto E, Chappell M, Fullmer J, Ezhapilli S. Posterior fossa medulloblastoma in an atypical extra-axial location: A case report. Radiol Case Rep 2018;13:365-70.
5. Bahrami E, Bakhti S, Fereshtehnejad SM, Parvaresh M, Khani MR. Extra-axial medulloblastoma in cerebello-pontine angle: A report of a rare case with literature review. Med J Islam Repub Iran 2014;28:57.
6. Singh M, Cugati G, Symss NP, Pande A, Vasudevan MC, Ramamurthi R. Extra axial adult cerebellopontine angle medulloblastoma: An extremely rare site of tumor with metastasis. Surg Neurol Int 2011;2:25.
7. Fallah A, Banglawala SM, Provias J, Jha NK. Extra-axial medulloblastoma in the cerebellopontine angle. Can J Surg 2009;52:E101-E102.
8. Pant I, Chaturvedi S, Gautam VK, Pandey P, Kumari R. Extra-axial medulloblastoma in the cerebellopontine angle: Report of a rare entity with review of literature. J Pediatr Neurosci 2016;11:331-4.
9. Akay KM, Erdogan E, Izci Y, Kaya A, Timurkaynak E. Medulloblastoma of the cerebellopontine angle-case report. Neurol Med Chir (Tokyo) 2003;43:555-8.
10. McCarthy C, Hofer M, Vlychou M, Khundkar R, Critchley P, Cudlip S, *et al.* Metastatic meningioma presenting as a malignant soft tissue tumour. Clin Sarcoma Res 2016;6:23.
11. Martin AM, Raabe E, Eberhart C, Cohen KJ. Management of pediatric and adult patients with medulloblastoma. Curr Treat Options Oncol 2014;15:581-94.
12. Tabori U, Sung L, Hukin J, Laperriere N, Crooks B, Carret AS, *et al*. Canadian Pediatric Brain Tumor Consortium. Medulloblastoma in the second decade of life: A specific group with respect to toxicity and management: A Canadian pediatric brain tumor consortium Study. Cancer 2005;103:1874-80.
13. Martin AM, Raabe E, Eberhart C, Cohen KJ. Management of pediatric and adult patients with medulloblastoma. Curr Treat Options Oncol 2014;15:581-594. doi:10.1007/s11864-014-0306-4.
14. Nalita N, Ratanalert S, Kanjanapradit K, Chotsampancharoen T, Tunthanathip T. Survival and prognostic factors in pediatric patients with medulloblastoma in Southern Thailand. J Pediatr Neurosci 2018;13:150-7.
15. Ibis K, Karadeniz A, Meral R, Guveli M, Basaran M, Bavbek S, *et al*. The prognostic factors and outcome of adult medulloblastoma: Where we stand. Int Surg 2016;101:352-60.
16. Rutkowski S, von Hoff K, Emser A, Zwiener I, Pietsch T, Figarella-Branger D, *et al*. Survival and prognostic factors of early childhood medulloblastoma: An international meta-analysis. J Clin Oncol 2010;28:4961-8.
17. Chan AW, Tarbell NJ, Black PM, Louis DN, Frosch MP, Ancukiewicz M, *et al*. Adult medullolastoma: Prognostic factors and patterns of relapse. Neurosurgery 200;47:623-31.
18. Carrie C, Lasset C, Alapetite C, Haie-Meder C, Hoffstetter S, Demaille MC, *et al*. Multivariate analysis of prognostic factors in adult patients with medulloblastoma. Cancer 1994;74:2352-60.
19. Skolyszewski J, Glinski B. Results of postoperative irradiation of medulloblastoma in adults. Int J Radiat Oncol Biol Phys 1989;16:479-82.
20. Boiardi A, Silvani A, Eoli M, Lamperti E, Salmaggi A, Gaviani P, *et al*. Embryonal tumors in the adult population: Implications in therapeutic planning. Neurol Sci 2000;21:23-30.