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A CASE STUDY AND TREATMENT OF PRIMARY MENINGEAL MELANOCYTOMA ANTERIOR CRANIAL FOSSA ASSOCIATED WITH NEVUS OF OTA

Radiology

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ABSTRACT

BACKGROUND: A rare neurological tumor i.e. primary meningeal melanocytoma; it may occur at the base of the brain, it is extremely rare at the anterior cranial fossa.

CASE & RESULT: A 24-year-old lady presented with headache, vomiting and blurring of vision at our radiotherapy department after surgery. Neurological exams were otherwise normal. CT Scan Brain and Contrast Enhanced MRI scan showed a heterogenous hyper intense lesion on T2 and isointense on T1 measuring 39x53 mm in left frontal lobe extending to basal ganglia. Mass displacing the midline and right ventricle was dilated. Prior to surgery, malignant glioma was diagnosed and near total excision was performed. On postoperative histopathological exam, the tumor proved to be a meningeal melanocytoma, WHO Grade-I. There was no skin melanoma was found but on the left side of the face and scalp nevus of Ota was diagnosed. After surgery, the patient received radiation therapy. Patient was normal after first follow up after radiation therapy.

CONCLUSIONS: Our case of primary meningeal melanocytoma at the anterior cranial fossa is very rare. Primary meningeal melanocytoma is benign, it may behave aggressively. Complete surgical resection is curative for most cases, but recurrences have also been seen. Radiation therapy is significant to prevent relapse of the tumor, especially in cases of incomplete surgical resection.

KEYWORDS

Radiation, Meningeal Melanocytoma, Anterior Cranial Fossa Melanocytoma, Nevus Of Ota

INTRODUCTION

Primary meningeal melanocytoma is a benign neoplasm of central nervous system (CNS) rarely seen in clinical practice. The tumor is derived from melanocytes, and was first reported by Limas and colleagues in 1972 [1]. The prognosis is usually good, but there had been cases of aggressive behavior and relapse [2-7]. The annual incidence is about 1 per 10 million [4]. Primary meningeal melanocytoma is rarely located at or near the anterior cranial fossa and it is usually misdiagnosed [8-9]. The relevant medical literature is reviewed.

The diagnosis of primary meningeal melanocytoma is mainly based on histopathological and immune histo-chemistry (IHC) findings. The CNS melanocytoma may be diffuse melanosis, meningeal melanocytoma or primary malignant melanoma [4, 10-11]. The etiology of the disease remains unclear; meningeal melanocytomas are thought to arise from normally occurring leptomeningeal melanocytes. Melanocytes originate from the neural crest of the epidermis and leptomeninges [2-5]. The areas commonly involved in brain are the base of the brain, the cerebellopontine angle and the pineal body [2-4, 12]. Intrathecal meningeal melanocytoma has also been reported [7, 13]. Patients with meningeal melanocytoma may present with a variety of symptoms including increased intracranial pressure, seizures and (rarely) spinal cord compression, loss of vision [5-7].

Kawaguchi *et al.* (1998) and Uozumi *et al.* (2003) described patients with a meningeal melanocytoma located in the left frontal region [8-9]. When, primary meningeal melanocytomapresents at unusual locations, they were often confused with meningioma [15]. The preoperative diagnosis of meningeal melanocytoma is often difficult, as there are no definitive clinical and neuro-radiological features of the tumor. The tumor appears hyper- or iso-intense on CT scan with contrast enhancement, and presents with a high signal on T1- and fluid attenuated inversion recovery (FLAIR), and a low signal on T2-weighted MRI with contrast-enhancement [3,16].

The histopathological characteristics of meningeal melanocytoma have been reported in the medical literature [17-19]. Grossly, the tumor usually appears as a black lesion that is firmly attached to the underlying meninges. Microscopically, melanin granules are com monly seen. Immunohistochemically, meningeal melanocytomas are positive for S-100 protein, HMB-45 and vimentin [2-4]. Keratin, EMA and glial fibrillary acidic protein (GFAP) are usually negative; positive HMB-45 and negative EMA are strongly suggestive of the melanocytoma [17-18].

Although meningeal melanocytoma is a benign tumor but relapse and malignant transformation have been reported. Wang and colleagues had reported a case of primary meningeal melanocytoma located at the temporal lobe, which undergoes malignant transformation histo-pathologically three years after resection [6]. Uozumi *et al*. (2003) reported a patient who underwent a gross total removal with no adjuvant treatment, but after four years the tumor meningeal melanocytoma recurred locally and the patient underwent surgery and radiotherapy. Histopathological examination revealed a malignant melanoma originating from a melanocytoma [9].

Roser *et al.* (2004) reported a patient of recurrent melanocytoma who had undergone a subtotal removal, no adjuvant treatment was given. Patient had to undergo a second surgery for local recurrence. Histo-Pathology revealed a malignant melanoma originating from a melanocytoma [20]. After the second operation the patient died from the rapid spread of the malignant melanoma. Despite its benign appearance, meningeal melanocytoma may follow an aggressive course, with recurrence possible from seven months to five years after complete excision [21, 22]. Because meningeal melanocytoma may transform into malignant melanoma, complete resection if possible is advised. Complete surgical resection of the tumor is the standard of care treatment for this disease, but many factors can influence the success of total removal, the most important being tumor location. When, meningeal melanocytomas closely adhere to the dura of the skull base, it is very difficult to remove the infiltrated dura altogether, so only Simpson's grade II can be achieved [23].

Rades and colleagues (2004) [21] published a retrospective review that investigated the five-year survival rate of meningeal melanocytoma (89 cases). The five-year-survival rate was 100% in patients who had received complete resection, but only 46% in those whose resection was incomplete. Interestingly, the survival rate was 100% in patients

with combined (incomplete resection and adjunct radiation therapy) treatment. Based on the data, concerning relevant cases available from the literature, complete tumor resection should be considered for the best therapeutic option. In cases in which complete resection is not possible, postoperative radiation seems to be of benefit.

The necessity for radiotherapy depends on the degree of proliferation of the meningeal melanocytoma [21-22]. The antigen Ki-67 is a cellular marker for proliferation, and staining for Ki-67 will reveal the growth fraction of a cell population. Roser *et al.*'s (2004) report [20] described above, the meningeal melanocytoma subtotal resection was performed, the level of proliferation was low, and only 3% of cells were stained with Ki-67. The patient did not receive radiotherapy and after 12 years the tumor recurred and had a malignant transformation. At the time of recurrence, 5% of cells stained positive for Ki-67 [25-26]. Thus, the slow growth of the meningeal melanocytoma makes low Ki-67 staining relevant. If the tumor had been completely resected or radiotherapy administered, the patient's prognosis might have been excellent. Navas *et al.* [25] also recommended the MIB-1 (mindbomb E3 ubiquitin protein ligase 1)/Ki-67 labeling index, for its potential prognostic value in predicting aggressive clinical behavior and malignant progression of primary melanocytic neoplasms of the CNS. In our study, the complete resection was not possible because of the tumor adherence to the dura and the Ki-67 proliferative index was less than8-10%, as this is low, so postoperative radiotherapy was given.

Johannes *et al.* (2002) presented a review of the literature indicating that resection of melanocytoma is the treatment of first choice hampered by a relapse rate of approximately 30% depending on resection status. The role of adjuvant radiotherapy in patients with complete resection of melanocytoma has not yet been defined. These patients carry a risk of relapse of approximately 15%, and adjuvant irradiation is currently not recommended. Primary high-dose radiotherapy has been shown to be effective in long-term control of the neoplasm in patients where no resection of the tumor could be accomplished. In case of incomplete resection of melanocytoma, data of the literature indicate that adjuvant radiotherapy may in fact increase long-term local control of the tumor. Requirements for optimal treatment results of radiotherapy are sufficiently high doses of, at least, 50 Gy for intracranial lesions and three-dimensional treatment planning guarantying precise targeting of the tumor volume with only a low-risk of late sequalae to the surrounding tissues [27].

Hans-Hermann D *et al.* (2002) published a data that showed complete tumor resection was superior to incomplete resection alone with lower recurrence (4-38% versus 50-92%) and better overall survival rates (86-95% versus 30-58%). After incomplete resection radiotherapy seemed to improve prognosis (recurrence 15-45%; overall survival 91-92%). Between complete resection and incomplete resection plus radiotherapy no significant differences were observed for overall survival [28].

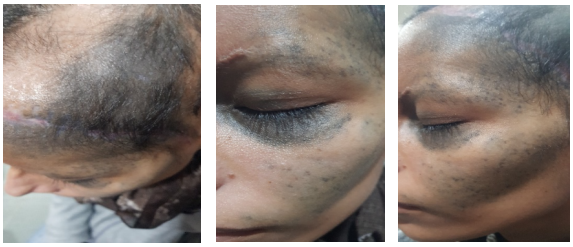
Hino *et al.* reported a patient with a combination of nevus of Ota and meningeal melanocytoma (14). There have been reports of tumor recurrence even after complete excision. For these tumors, radiotherapy is necessary. For those tumors given complete removal there is still debate whether radiotherapy is necessary. Therefore, adjuvant radiation therapy is advised in cases of both complete and incomplete resection [4, 24]. Here we report a rare case of primary meningeal melanocytoma located at the anterior cranial fossa. Our patient presented with, headache and eye symptoms and with left facial and scalp nevus (Nevus of Ota). In this case, we found that the tumor showed fascicles of oval to spindle cells with pigmentation. A focal vasocentric arrangement and nuclei appear bland; bean shaped with nucleoli was seen. Psomma bodies or necrosis was not seen. Immuno-histochemistry was positive for HMB-45 and Melan-A, and negative for EMA. These findings are consistent with the known pathological and immuno-histochemical characteristics of the melanocytoma.

CASE REPORT & INVESTIGATION

An old woman (24yrs) was referred from neurosurgeon to our Oncology/Radiation OPD for post-operative adjuvant radiation therapy. She presented with the chief complaints of blurring of vision from left eye, headache associated with vomiting in September 2019 to neurosurgeon. On initial clinical examination she was conscious oriented with no neurological deficit and all other clinical examination within normal limits except some loss of vision from left eye. She had discoloration of skin around left eye and extending to face and scalp, (Nevus of Ota; Figure 1). CT scan brain and contrast enhanced MRI scans showed a heterogenous hyper intense lesion on T2 and isointense on T1 measuring 39x53 mm in left frontal lobe extending to basal ganglia (Figure 2). Mass displacing the midline and right ventricle was dilated. Initial diagnosis of malignant Glioma radiologically was made. All hematological and biochemical tests were within normal limits.

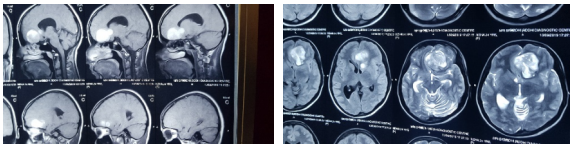
DIAGNOSIS [Meningioma Glioma (malignant)]

Histopathology showed melanocytic neoplasm favoring melanocytoma. In differential diagnosis (Figure 3) melanotic meningioma, neurocutaneous melanosis/ melanomatosis were kept. On Immuno histochemistry HMB-45 was 4 +, Melan A 4 +, EMA negative, Ki – 67 was 8-10% positive confirming the diagnosis of melanocytoma.



a) b) c)

Fig. 1: Facial photograph showing 'Nevus of OTA' over face and scalp



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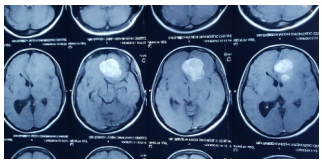
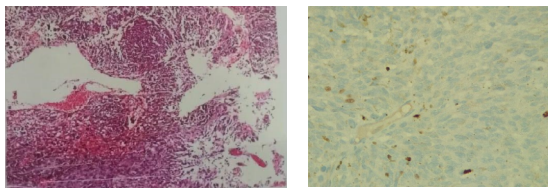


c)

Fig. 2: Pre-op MRI with contrast showing hypo-intense lesion on T2.



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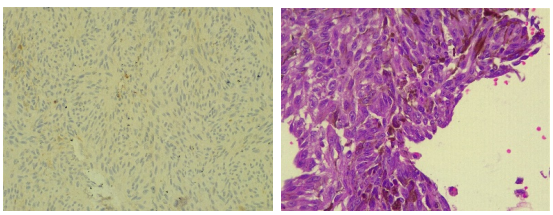
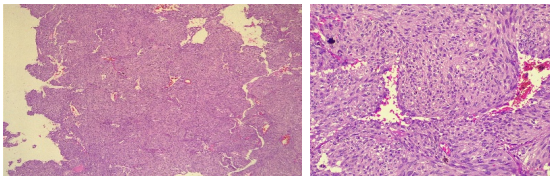
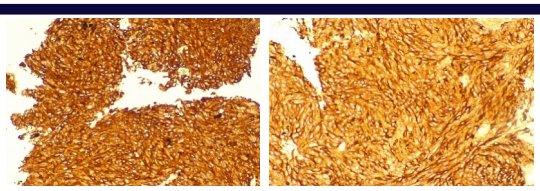


c) d)



e) f)



g) h)

Fig. 3: Patient differential diagnosis a) histopathology report; b) Ki67; c) EMA; d) HE pigment at 40x; e) HE pigment at 4x; f) HE pigment at 20x; g) MELAN; h) HMB-45

TREATMENT

A left frontal craniotomy was done and near total excision of the tumor was performed with base of skull coagulated. Per operative a well-defined, soft, dark colored tumor was present attached to duramater; found pigmented after tumor removal. Postoperative patient was discharged after five days, in stable condition with no improvement of the vision. On follow-up after two months of treatment, a patient is doing fine. In view of near total excision post-operative radiation with LINAC/Photons/ IMRT was planned. A total dose of 50 Gy/ 28 F / in 5.3 weeks was delivered to tumor bed. On follow up after 4 month, patient was normal clinically, but there was no improvement of vision. She was advised a monthly follow-up and planned to review with MRI after three months of completion of radiotherapy.

CONCLUSIONS

The results summarized that a rare case of primary meningeal melanocytoma located at the anterior cranial fossa. Although meningeal melanocytomas are benign tumors, they may present with aggressive behaviors. In the present case, the meningeal melanoc ytoma was located at the anterior cranial fossa, and the tumor adhered to the dura of the skull base. The infiltrated dura was coagulated and removal was not done, in fact this operation was a near total removal of the tumor. In view of near total excision post-operative radiotherapy (IMRT, 50 Gy/ 28F/ 5.3 Wks) was delivered. She was clinically alright at first follow up after fifteen days of completion of radiotherapy. Complete surgical resection can be curative for most cases but radiation therapy is important to prevent relapse of the tumor when complete surgical resection is not possible.

CONSENT

The written informed consent was obtained from the patient for publication of this case report and accompanying images. The copies of the written consent are available for review upon request.

COMPETING INTERESTS

None to Declare

AUTHORS' CONTRIBUTIONS

The presented work was performed in collaboration with all authors. Dr. Vashi wrote the initial draft. Dr. Arun Kumar Aggarwal, Dr Tejpal Sharma and Dr Vijay (Neurosurgeon) contributed equally to this work. Dr. Lovenish Goyal and Dr. Varun Gupta are members of Tumor board. All authors have been read and approved the final version of the manuscript.

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REFERENCES

1. Limas C, Tio FO. Meningeal melanocytoma ("melanotic meningioma"). Its melanocytic origin as revealed by electron microscopy. Cancer 1972; 30: 1286–1294.
2. Clarke DB, Leblanc R, Bertrand G, Quartey GR, Snipes GJ. Meningeal melanocytoma. Report of a case and a historical comparison. J Neurosurg. 1998; 88: 116–121.
3. Painter TJ, Chaljub G, Sethi R, Singh H, Gelman B. Intracranial and intraspinal meningeal melanocytosis. Am J Neuroradiol. 2000; 21: 1349–1353.
4. Liubinas SV, Maartens N, Drummond KJ. Primary melanocytic neoplasms of the central nervous system. Clin Neurosci. 2010; 17: 1227–1232.
5. Ali Y, Rahme R, Moussa R, Abadjian G, Menassa-Moussa L, Samaha E. Multifocal meningeal melanocytoma: a new pathological entity or the result of leptomeningeal seeding? J Neurosurg. 2009; 111: 488–491.
6. Wang F, Qiao G, Lou X, Song X, Chen W. Malignant transformation of intracranial meningeal melanocytoma. Case report and review of the literature. Neuropathology 2011; 31: 414–420.
7. Perrini P, Caniglia M, Pieroni M, Castagna M, Parenti GF. Malignant transformation of intramedullary melanocytoma: case report. Neurosurgery. 2010; 67: E867–E869.
8. Kawaguchi T, Kawano T, Kazekawa K, Nakashima S, Honma T, Kaneko Y, Koizumi T, Dousaka A, Kishikawa M. Meningeal melanocytoma in the left frontal region. Brain Tumor Pathol. 1998; 15: 58–62.
9. Uozumi Y, Kawano T, Kawaguchi T, Kaneko Y, Ooasa T, Ogasawara S, Yoshida H, Yoshida T. Malignant transformation of meningeal melanocytoma: a case report. Brain Tumor Pathol. 2003; 20: 21–25.
10. Rodriguez y Baena R, Gaetani P, Danova M, Bosi F, Zappoli F. Primary solitary intracranial melanoma: case report and review of the literature. Surg Neurol. 1992; 38: 26–37.
11. Wadasadawala T, Trivedi S, Gupta T, Epari S, Jalali R. The diagnostic dilemma of primary central nervous system melanoma. J ClinNeurosci. 2010; 17: 1014–1017.
12. Czirjak S, Vitanovic D, Slowik F, Magyar A. Primary meningeal melanocytoma of the pineal region. Case report. J Neurosurg. 2000; 92: 461–465.
13. Jaiswal S, Vij M, Tungria A, Jaiswal AK, Srivastava AK, Behari S. Primary melanocytic tumors of the central nervous system: a neuroradiological and clinicopathological study of five cases and brief review of literature. Neurol India 2011; 59: 413–419.
14. Hino K, Nagane M, Fujioka Y, Shiokawa Y. Meningeal melanocytoma associated with ipsilateral nevus of Ota presenting as intracerebral hemorrhage: case report. Neurosurgery 2005; 56: E1376.
15. Beseoglu K, Knobbe CB, Reifenberger G, Steiger HJ, Stummer W. Supratentorial meningeal melanocytoma mimicking a convexity meningioma. Acta Neurochir (Wien) 2006; 148: 485–490.
16. Uematsu Y, Yukawa S, Yokote H, Iyakura T, Hayashi S, Komai N. Meningeal melanocytoma: resonance imaging characteristics and pathological features. J Neurosurg. 1992; 76: 705–709.
17. Winston KR, Sortel A, Schnitt SJ. Meningeal melanocytoma. Case report and review of the clinical and histological features. J Neurosurg. 1987; 66: 50–57.
18. O'Brien TF, Moran M, Miller JH. Meningeal melanocytoma. An uncommon diagnostic pitfall in surgical neuropathology. Arch Pathol Lab Med. 1995; 119: 542–546.
19. O'Brien DF, Crooks D, Mallucci C, Javadpour M, Williams D, du Plessis D, Broome J, Foy P, Pizer B. Meningeal melanocytoma. Childs Nerv Syst. 2006; 22: 556–561.
20. Roser F, Nakamura M, Brandis A, Hans V, Vorkapic P, Samii M. Transition from meningeal melanocytoma to primary cerebral melanoma. Case report. J Neurosurg. 2004; 101: 528–531.
21. Rades D, Heidenreich F, Tatagiba M, Brandis A, Karstens JH. Therapeutic options for meningeal melanocytoma. Case report. J Neurosurg. 2001; 95(2 Suppl): 225–231.
22. Rades D, Schild SE, Tatagiba M, Molina HA, Alberti W. Therapy of meningeal melanocytomas. Cancer 2004; 100: 2442–2447.
23. Simpson D. The recurrence of intracranial meningiomas after surgical treatment. J Neurol Neurosurg Psychiatry 1957; 20: 22–39.
24. Kurita H, Segawa H, Shin M, Ueki K, Ichi S, Sasaki T, Tago M, Kirino T. Radiosurgery of meningeal melanocytoma. J Neurooncol. 2000; 46: 57–61.
25. Navas M, Pascual JM, Fraga J, Pedrosa M, Shakur S, Carrasco R, Martínez P, Manzanares R, de Sola RG. Intracranial intermediate-grade meningeal melanocytoma with increased cellular proliferative index: an illustrative case associated with a nevus of Ota. J Neurooncol. 2009; 95: 105–115.
26. Lin B, Yang H, Qu L, Li Y, Yu J. Primary meningeal melanocytoma of the anterior cranial fossa: a case report and review of the literature. World J SurgOncol. 2012;10:135.
27. Johannes C, Thomas H, Werner P, Karl P, Michael B. Suprasellar Melanocytoma: A Case of Primary Radiotherapy and Review of the Literature, Journal of Neuro-Oncology 2002; 58: 39–46.
28. Hans-Hermann D. The value of radiotherapy in treatment of meningeal melanocytoma. Strahlentherapie und Onkologie 2002; 178(6): 336-42.