

Melanotic Neuroectodermal Tumor of Infancy, A Rare Pediatric Tumor: Report of Two Cases with Review of the Literature

Neeraj Dhameja¹, Ravi Bhushan Raman², Vijay Kumar Jha³, Abhijeet Kunwar⁴

¹Assistant Professor, Department of Pathology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India

²Senior Resident, Department of Pathology, Indira Gandhi Institute of Medical Sciences, Shekhpura, Patna, India

³Senior Resident, Department of Pathology, Institute Of Medical Sciences, Banaras Hindu University. Varanasi, India

⁴Senior Resident, Department of Orthopedics, Institute Of Medical Sciences, Banaras Hindu University. Varanasi, India

Corresponding Author:

Vijay Kumar Jha

Senior Resident, Department of Pathology, IMS, BHU, Varanasi

Email id – vj.bhu07@gmail.com

Mobile – +918960202107

Abstract: *Melanotic neuroectodermal tumour of Infancy is a rare pediatric tumour with benign course and favourable prognosis. There are very few cases described in the literature. Herein, we report two cases of melanotic neuroectodermal tumour in infants, one with right maxillary mass and other with left temporal region swellings. Both the cases were diagnosed initially on fine needle aspiration cytology that revealed dual population of small cells and large epithelial cells with brownish black pigment. Later, histopathological examination showed characteristic morphological features with smaller neuroblastic cells and larger pigmented epithelial cells. Immunohistochemistry showed positivity for epithelial, melanotic and neural markers in various components of tumour.*

Keywords: Melanotic neuroectodermal tumour of infancy, Maxilla, Temporal region, Fine needle aspiration cytology, Immunohistochemistry.

1. Introduction

Melanotic neuroectodermal tumour of infancy (MNETI) is a rare neoplasm of infants characterized by dual population of neuroblastic cells and pigmented cells. Maxilla is the commonest site and other sites like skull are involved rarely. Complete surgical excision is the treatment of choice.^[1] The differential diagnosis includes other malignant small round cell tumours. We, herein describe two cases of MNETI in infants presented to our institution within a span of one year.

2. Case Reports

Case 1

A 2½ months old child presented with a history of rapidly growing swelling, measuring 3.0x3.0cm, in the right maxillary region for last 1 month. CT scan revealed heterogenous dense mass in the right maxillary antrum measuring 3.5x2.3cm. Radiologically neuroblastoma was suspected (Fig.1a and 1B).

Case 2

A 3 month old child presented with swelling in the left temporal region measuring 3.0x2.5cm. CT scan showed a mass in the left temporal bone involving the surrounding soft tissue. Clinically and radiologically, it was also suspected to be neuroblastoma (Fig.1C and D).

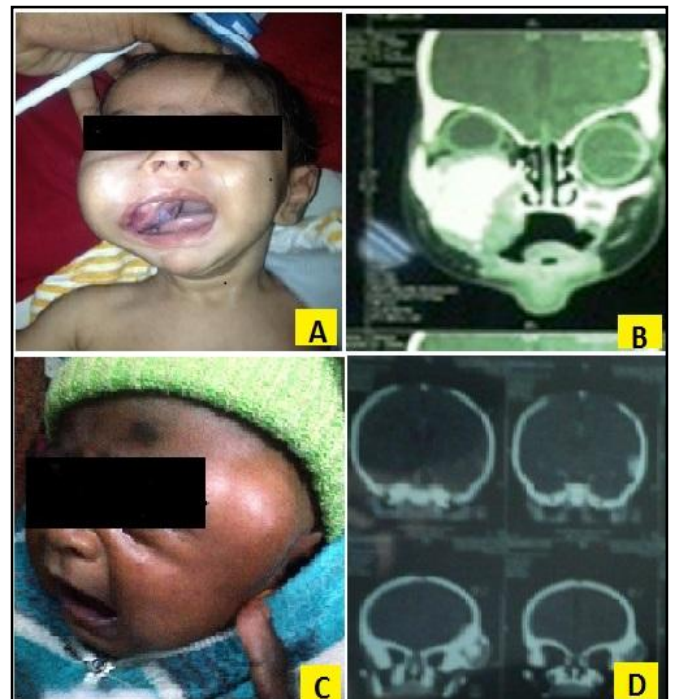


Figure 1: Panel of photographs showing mass in maxillary and temporal region of case 1 (Fig.1A) and 2 (Fig. 1C). CT scan of same cases revealed hyperdense masses in maxillary antrum (Fig. 1B) and left temporal region (Fig.D).

FNAC was done in both cases using 10 ml disposable syringe with 23 gauge needle. Air dried and alcohol fixed smears were prepared and stained with Giemsa and

Papanicolou stains respectively. The smears in both cases showed mixed population of small round cells and large epithelial pigmented cells. The small cells showed enlarged hyperchromatic nuclei, inconspicuous nucleoli and scanty cytoplasm. The large cells showed eccentric nuclei,

conspicuous nucleoli and abundant cytoplasm with black and brown pigment in Papanicolou stains (Fig.2A) and Giemsa stain (Fig.2B)

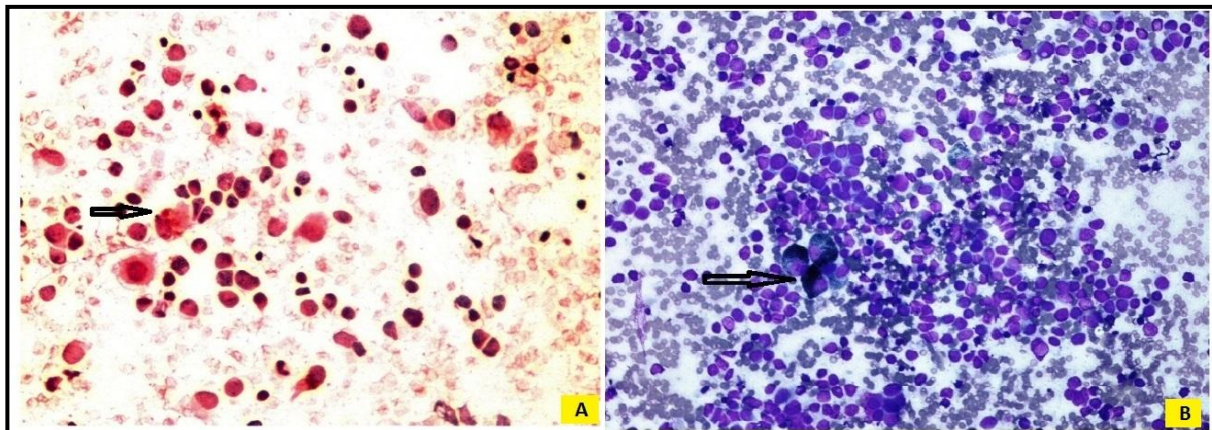


Figure 2:- FNAC smears showing large pigmented epithelial cells (arrow) and small neuroblastic cells in Papanicolou stain (Fig.2A, X200) and Giemsa stain (Fig.2B, 100X)

Based on these cytological findings, a diagnosis of MNETI was suggested and surgical excision was done. The gross specimens of both the cases comprised of multiple grey black fragments varying in size from 0.5-1.0cm. Hematoxylin and Eosin (H&E) stained slides of both the cases showed a tumour with similar morphology. The tumour showed alveolar pattern with dense fibrous stroma (Fig.3A). The alveoli were lined by large epithelial cells showing prominent brownish pigment. The center of the alveoli showed sheets of small round cells with enlarged hyperchromatic nuclei and scant cytoplasm (Fig.3B). Immunohistochemistry (IHC) was done for cytokeratin (CK), HMB-45 and neuron specific enolase (NSE). The large pigmented epithelial cells revealed positivity for CK, HMB-45 and NSE. Smaller cells showed positivity for NSE only (Fig.3C and D).

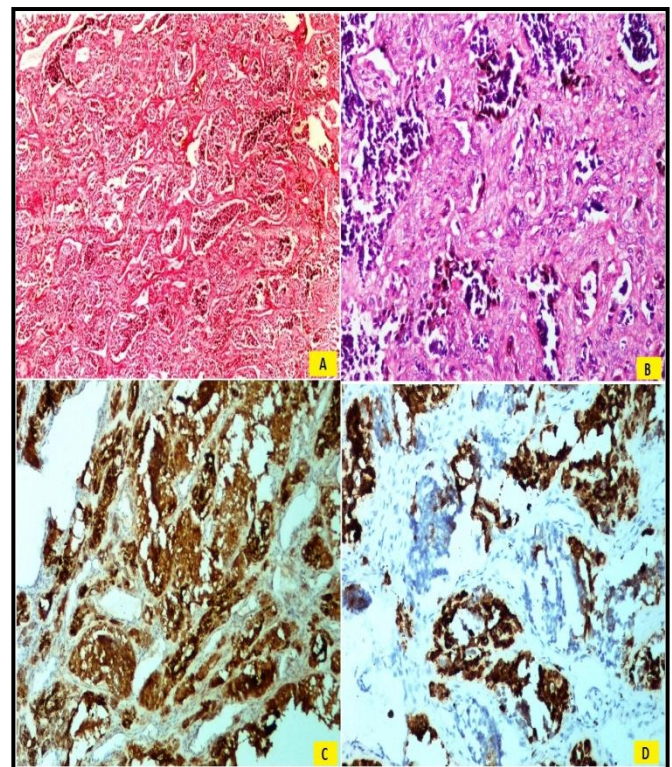


Figure 3: Panel of photographs showing alveolar arrangement of tumour cells in fibrous stroma. Alveoli show peripherally arranged pigmented epithelial cells and centrally located small neuroblastic cells (Fig.3A and B, H&E stain, 100X). NSE is positive in both smaller neuroblastic & larger epithelial cells (Fig.3C, 100X). HMB-45 expressed only in larger epithelial cells (Fig.3D,100X).

Based on characteristic clinical, histopathological and immunohistochemical findings, a diagnosis of MNETI was made. Presently both children are on regular follow up for more than one year and are free from any evidence of recurrence.

3. Discussion

MNETI is a rare neoplasm of infancy. It was first described by Krompecher in 1918 as congenital melanocarcinoma.^[2] This tumour is known by various other names like retinal analage tumour, melanotic ameloblastoma and melanotic prognoma because the histogenesis of this tumour was not clearly known previously and was thought to arise either from the odontogenic epithelium or from developing retinal epithelial cells.^[3] Borello et al. thought it to be a tumour of neural crest origin based on elevated vanillylmandelic acid (VMA) levels and named this tumour as melanotic neuroectodermal tumour of infancy which is the current accepted histogenesis and preferred name of this tumour.^[4] MNETI is a tumour of infancy with 95% of cases presenting within 1st year of life with a female predominance.^[5] In the present study, both cases presented in first 3 months of age and one was male and other was female child. Clinically the child presents with rapidly growing non ulcerated mass. Head and neck is the commonest region with 70% of the cases occurring in the maxilla. Other less commonly involved sites are mandible, skull, neurocranial dura or brain, epididymis, skin, mediastinum and uterus.^[5,6] Temporal bone involvement is very rare with only few case reports.^[7,8] In a review of seven cases of MNETI, Johnson et al. found one case involving the temporal bone.^[9] In the present study, one child had right maxillary involvement and the other child had left temporal bone involvement. VMA levels may be elevated or within normal limits and in our both cases it was within normal limit. On radiological examination, CT scan shows well demarcated hyperdense lesion and magnetic resonance imaging (MRI) shows hyperintense images on T1 and hypodense images on T2.^[10] Cytological examination shows scanty to moderately cellular smears with dual population of larger epithelial cells and smaller neuroblastic cells. In the present study, the smears were cellular and 2nd case showed rosette formation as described in other case reports having temporal bone involvement.^[8,9] Histopathological examination shows alveolar pattern of the tumour having large epithelial pigmented cells in the periphery and small neuroblastic cells in the center.^[11] Immunohistochemical examination shows positivity for epithelial (cytokeratin - CK) and melanocytic (HMB-45) markers in the large epithelial cells. Neural markers (neuron specific enolase, NSE) are positive in the large epithelial and small neuroblastic cells both. S-100 is negative. Neurosecretory granules and melanosomes are seen on electron microscopic examination in small and large cells respectively. MNETI has benign clinical course and complete surgical excision is the treatment of choice. Recurrence can be seen in 10-15% of the cases and metastasis in 7% of cases.^[6,10] The differential diagnosis includes other malignant small round cell tumours like Ewings sarcoma/primitive neuroectodermal tumour (PNET), alveolar rhabdomyosarcoma and metastatic neuroblastoma. Characteristic dual population of cells and immunohistochemical positivity for epithelial, melanotic and neural markers differentiate MNETI from other small round cell tumours.

In conclusion, MNETI should be considered in infants presenting with mass in maxilla or other head and neck

regions. FNAC is a rapid, inexpensive and relatively less invasive technique to diagnose MNETI, however histopathological & immunohistochemical examination is essential to differentiate it from other malignant small round cell tumours of infancy for proper management.

References

- [1] Wenig BM, Dulguerov P, Kapadia SB, Prasad ML, Fanburg-Smith JC, Thompson LDR. Neuroectodermal tumours. In Pathology and Genetics of Head and Neck Tumours. IARC Press, Lyon 2005;65-75.
- [2] Chaudhary M, Mukherjee J, Bajaj P, Jain A. Melanotic neuroectodermal tumour of infancy. Indian Pediatrics 1997;97:248-51.
- [3] Irwing RM, Parikh A, Coumbe A, Albert DM. Melanotic neuroectodermal tumour of infancy. Journal of Laryngology and Otology 1993;107:1045-48.
- [4] Borello ED, Gorlin RJ. Melanotic neuroectodermal tumour of infancy-a neoplasm of neural crest origin. Report of a case associated with high urinary excretion of vanilmandelic acid. Cancer 1996;19(2):196-206.
- [5] Kapadia SB, Frisman DM, Hitchcock CL, Ellis GL, Popen EJ. Melanotic neuroectodermal tumour of infancy. Clinicopathological, immunohistochemical and flow cytometric study. Am J Surg Pathol 1993;17:566-73.
- [6] Pettinato G, Manivel JG, D'Amore ES, Gorlin RT. Melanotic neuroectodermal tumour of infancy. A reexamination of a histogenetic problem based on immunohistochemical, flow cytometric and ultrastructural study of 10 cases. Am J Surg Pathol 1991;15:233-45.
- [7] Lambropoulos V, Sfougaris D, Mouravas V, Petropoulos A. Melanotic neuroectodermal tumour of infancy (MNTI) arising in the skull. Short review of two cases. Acta Neurochir 2010;152:869-75.
- [8] Bellarbi S, Harmouch A, El Olchi MR, Fikri M, Arkha A, Sefiani S. Melanotic prognoma of temporal and occipital bones: A case report. Neurochirurgie 2013;59:138-40.
- [9] Johnson RE, Scheithauer BW, Dahlin DC. Melanotic Neuroectodermal Tumour of Infancy A Review of Seven Cases. Cancer 1983;52:661-66.
- [10] Hamilton S, MacRae D, Agrawal S, Matic D. Melanotic neuroectodermal tumour of infancy. Can J Plast Surg 2008;16(1):41-44.