
Melanotic Neuroectodermal Tumor of Infancy (MNTI) – A case report

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Abstract

MNTI is a rare dysembryogenic tumor of infancy. It is a benign neoplasm usually seen in the first 6 months of life. The predominant site of origin is the pre-maxilla and the maxilla. It has a rapid expansile growth which manifests with feeding difficulty. The tumor arises from the neural crest cells. Histological examination reveals typical biphasic population of cells with deposits of melanin pigment. Immunohistochemistry (IHC) study helps in confirming the diagnosis. It has a locally aggressive course with high recurrence rate. Malignant transformation and metastatic spread is extremely rare. Wide excision of the tumor is the preferred treatment. Thorough follow-up is recommended for a period of 1 year. Early detection and proper surgery decreases complications with favourable outcome. A case report of this tumor affecting a 5-month old male child with involvement of the right maxillary antrum is being presented here. This case is reported for its rarity, and classical clinico-pathological findings.

Keywords: dysembryogenic, pre-maxilla, neural crest, immunohistochemistry

1.Introduction

MNTI is an osteolytic-pigmented benign neoplasm of neural crest cells, primarily affecting the jaws of infants. It is a locally aggressive tumor with rapid growth. It is composed of pigment-producing relatively primitive cells.[1] The two characteristic features of this tumor are the predilection for bones of skull in children below 1 year of age and the presence of melanin pigment in it, which makes the tumor distinct in clinico-pathological, immunohistochemical, ultrastructural and imaging fields.[2]

The mean age of patients at diagnosis is 4.3 months, with male to female incidence of 6:7; slightly commoner in female infants.[3] Approximately 92.8% of MNTI is seen in the head and neck region; the commonest site is maxilla in about 68-80% of cases, followed by skull (10.8%), mandible (5.8%) and brain (4.3%). The other sites involved are epididymis, mediastinum, ovary and uterus.[4][5]

In spite of its locally aggressive behavior, MNTI is generally considered as a benign tumor. Cutler *et al* demonstrated malignant features in only 1.9% of MNTI cases.[6] Local invasion usually involves bony destruction, tooth displacements and feeding difficulties. Radiograph only reveals radiolucency whereas computed tomography (CT) scan accurately defines the extent of the lesion and helps in good surgical planning.[4]

2. Case report

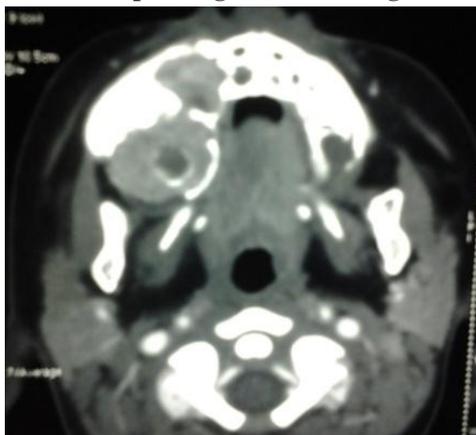
A 5-month old male child presented to the hospital with swelling and redness in the right cheek since 20 days. The swelling was progressively increasing in size. No history of fever, cold, cough or difficulty in feeding. The child was born of a non-consanguineous parentage through normal vaginal delivery. Child was immunized adequately for the age with no delay in developmental milestones. No significant past history. Pallor was seen on general

examination. No evidence of icterus, cyanosis, clubbing, lymphadenopathy, edema, malnutrition or dehydration was found.

On local examination, the swelling was well-defined measuring 4x4 cm, firm in consistency with smooth overlying surface. The swelling was non-tender and non-pulsatile. Extension into hard palate was evident. The swelling did not bleed on touch. No abnormality was found on systemic examination.

A plain radiograph of skull revealed a lytic lesion in the maxilla. On CT scan, an expanded soft tissue swelling in the right maxillary antrum was noticed (Fig. 1). Expansion of the involved bone was seen. Chest radiograph was normal. In view of the above findings, 24-hour urine sample was sent for the estimation of Vanillyl Mandelic Acid (VMA), which was found to be elevated.

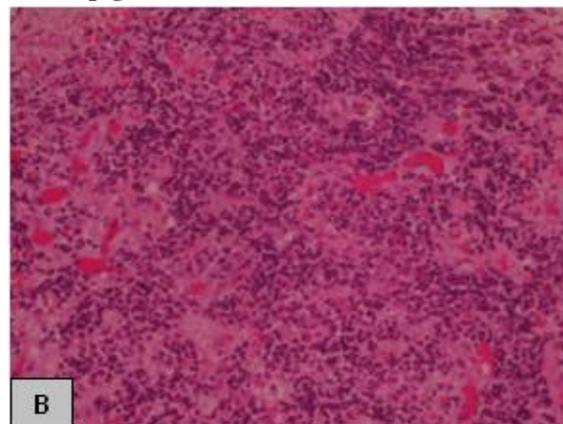
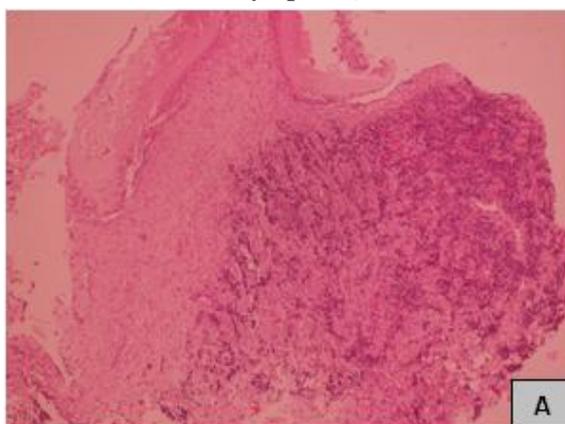
Fig. 1: CT scan shows expanding mass in the right maxillary antrum



Surgery was planned and wide excision of the tumor was done by Caldwell-Luc operation; tumor mass was then sent for histopathological examination (HPE). The cut surface was grey-black in color. On microscopic examination, the tumor was composed of cells arranged in alveolar pattern separated by fibrovascular stroma. Two distinctive

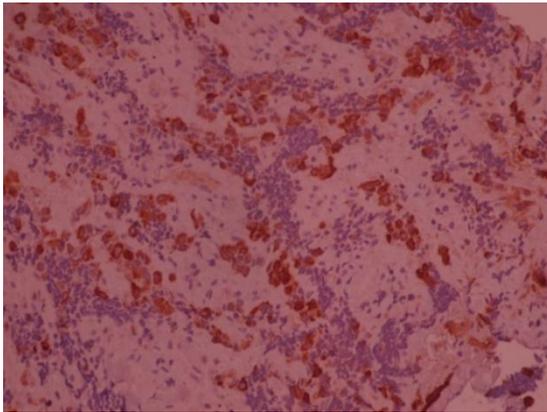
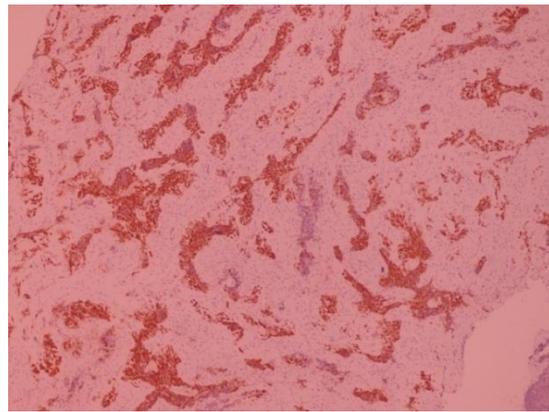
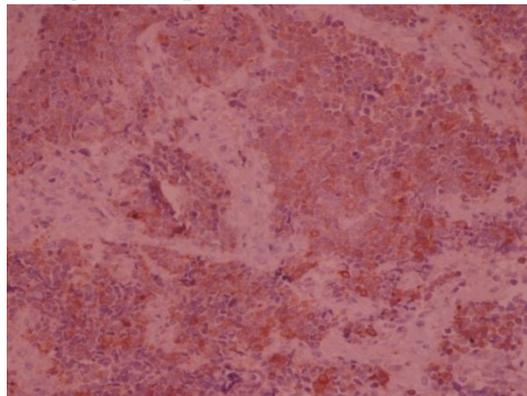
types of cells were seen - Large cells arranged peripherally with abundant cytoplasm, round vesicular nucleus and brown pigment; and small cells with scanty cytoplasm and hyperchromatic round nuclei were seen in the centre. Histological features were consistent with a small round cell tumor.

Fig. 2: A. Nests of small cells surrounded by large cells (H & E, X10) B. Large cells with eosinophilic cytoplasm, vesicular nucleus and brown pigment (H & E, X40)



Immunohistochemical studies were done for further categorisation. Cytokeratin (CK) and HMB45 were positive in large cells and negative for small cells (Fig. 3 & 4). Neuron-specific enolase (NSE)

was positive in small round cells and negative in large cells (Fig. 5). S100 was negative in large and small cells.

Fig. 3: CK positive in large cells (X40)**Fig. 4: HMB45 positive in large cells (X40)****Fig. 5: NSE positive in small cells (X40)**

Thus, a final diagnosis of MNTI was made by correlating HPE and IHC findings. This case was followed up for the next six months without any recurrence.

3. Discussion

MNTI is a relatively uncommon, benign neoplasm of early infancy with locally aggressive growth accompanied by high recurrence rate. Very few cases of this tumor have been recorded in the world literature. The tumor has been referred in the literature by various names such as retinal anlage tumor, melanotic progonoma, pigmented ameloblastoma, melanotic adamantinoma, pigmented teratoma and retinoblastic teratoma.[4][7] It was first described in 1918 by *Krompecher* in the German literature as ‘congenital melanocarcinoma’.[8] Borello and Gorlin suggested the origin of the tumor to be from neural crest and also, as the incidence was common in infants, they coined the term ‘Melanotic Neuroectodermal Tumor of Infancy’ (MNTI) which is universally accepted now.[7]

MNTI was previously thought to be of odontogenic origin but immunohistochemical and ultrastructural studies have demonstrated the neuronal differentiation. Variable expression of IHC markers in various studies suggest that MNTI is a primitive neuroectodermal tumor with polyphenotypic expression of neural and epithelial

markers, melanin production, occasional rhabdomyoblastic, glial, ganglionic and osseous differentiation and no photoreceptor differentiation.[9]-[11]

Borello and Gorlin in 1966 reported a case of melanotic tumor of maxilla in a 3-month old child and they found increased urinary VMA pre-operatively and the levels were normal post-operatively. Urinary VMA level is useful in identifying the tumors of neural crest origin.[7] In the present case also, the urinary VMA level was increased initially and returned to normal once the tumor was excised.

Characteristically, histology of the lesion shows dual population of cells. One is large, polygonal cells resembling melanocytes with brown pigment and the other small, neuroblast-like round cells with condensed chromatin.[2] This similar feature is noted in the present case. IHC markers are useful in differentiating MNTI from various other small cell tumors of infancy such as embryonal rhabdomyosarcoma in which desmin and myoglobin are positive; burkitt’s lymphoma where leucocyte common antigen (LCA) is positive and malignant melanoma which gives positivity to HMB45 and S100.[12][13] In the present case, IHC positivity for HMB45 and NSE indicates melanocytic and neuroblastic differentiation of the tumor cells respectively, thus confirming the diagnosis of MNTI.

Complete excision with tumor-free wide margin is the treatment of choice. In some cases, radiotherapy and/or chemotherapy can be used as an alternative or adjuvant therapy.[4] Early detection and prompt treatment prevent complications.

Local recurrence rate of 10-15% whereas metastatic spread of 3% has been reported.[3] Therefore, it needs a follow up for atleast six months post-operatively with clinical and radiographic evaluation to rule out recurrence.

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