Case Report

Melanotic neuroectodermal tumor of infancy: A rare entity

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Abstract

Melanotic neuroectodermal tumor of infancy (MNTI) is a rare neoplasm with a predilection for the head-and-neck region. Approximately 472 cases reported in literature till date. We report an unusual case of MNTI in a 1-month old child. A 10 cm × 5 cm × 5 cm nontender, firm, deep-seated swelling was seen involving the right zygomatic and maxillary region. Magnetic resonance imaging was suggestive of rhabdomyosarcoma and immunomorphological assessment of the excision specimen revealed the final diagnosis of MNTI. On follow-up, the patient developed recurrence 4 months after surgery and was reoperated. The present case emphasizes that albeit rare, pediatric surgeons and pathologists must always keep in mind the possibility of MNTI while dealing with maxillofacial tumors in infants. Owing to rather nonspecific clinicoradiological features, histopathology supplemented with immunohistochemistry remains the gold standard for diagnosis. Although considered to be a benign tumor, close clinicoradiological follow-up is strongly recommended given the significant risk of recurrence as highlighted by our case.

Keywords: Melanotic, melanotic neuroectodermal tumor of infancy, pediatric, pigmented

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INTRODUCTION

Melanotic neuroectodermal tumor of infancy (MNTI) is a rare neoplasm first described by Krompecher in 1918.[1] With approximately 472 cases reported in literature till date, various terminologies have been denominated for this uncommon tumor including melanotic progonoma, melanotic odontoma, congenital melanocarcinoma, retinal anlage tumor, and pigmented congenital epulis. The diverse nomenclature reflects the elusive origin of this rather unusual tumor.[2]

MNTI frequently occurs in infants and has a predilection for head-and-neck region. Although benign, 10%–15% local recurrence rate and rare reports of metastatic spread emphasize the need to delineate this tumor as a distinct entity.[3]

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We report an unusual case of MNTI involving the maxilla in a 1-month-old child who developed recurrence within 4 months of surgery. Our case discusses the clinicopathological features and the diagnostic approach to this rare entity, with a special emphasis on the need for close follow-up.

CASE REPORT

A 1-month-old male child presented with a rapidly growing mass in the right side of the face for 20 days. There was decreased oral intake noticed by the mother. There was no history of trauma, loss of weight, or any other swelling in the body. The child was a full-term normal vaginal delivery with birth weight of 2.6 kg. The antenatal, natal, and

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postnatal period of the mother was uneventful. General physical examination including the systemic examination was within normal limits. Local examination revealed a 10 cm × 5 cm × 5 cm nontender, firm, deep-seated swelling in the right side of face involving the zygomatic and maxillary region. The overlying skin did not show any ulceration or discoloration. Intraoral examination revealed a bulging mass from the roof of oral cavity [Figure 1a]. Routine blood investigation including hemogram, liver function tests, and kidney function tests were within normal limits. Magnetic resonance imaging (MRI) revealed an ill-defined T2 hyperintense mass lesion in the soft tissues of right cheek, also involving the zygomatic arch of maxilla and extending toward floor of orbit [Figure 1b]. A provisional radiological diagnosis of rhabdomyosarcoma was rendered, and the patient was planned for a wide local excision.

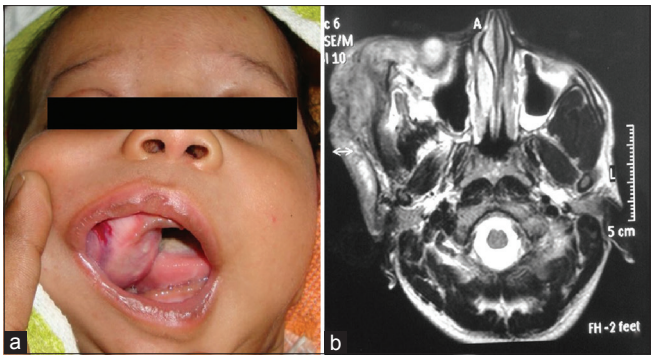

Figure 1: (a) A 10 cm × 5 cm × 5 cm nontender, firm swelling in the right side of face involving the zygomatic and maxillary region. Intraorally, the mass is seen bulging from the roof of oral cavity. (b) Magnetic resonance imaging shows an ill-defined T2 hyperintense mass lesion in the right cheek soft tissues, involving the zygomatic arch of maxilla and extending toward floor of orbit

Grossly, the wide local excision specimen measured 12 cm × 10 cm × 6 cm. Cut surface of the tumor was gray-white, homogenous with focal areas of brown pigmentation. Microscopic examination revealed a partly circumscribed tumor comprising cells arranged in lobules and islands separated by fibrovascular septae [Figure 2a]. The islands comprised a biphasic population of tumor cells [Figure 2b and c]. Periphery of the island revealed larger polyhedral to cuboidal cells with moderate amount of eosinophilic cytoplasm and central vesicular nucleus. Focally, these cells showed the presence of intracellular brown-black granular pigment, which seemed to be melanin [Figure 2d]. Cells in the center of island were small, monomorphic, round with scant amount of eosinophilic cytoplasm and central hyperchromatic nucleus. No atypical mitosis, hemorrhage, or necrosis could be seen. Histopathological features were suggestive of a benign pigmented tumor probably of neuroendocrine origin and immunohistochemical panel was applied for confirmation. On immunohistochemistry, the larger tumor cells were positive for pan-cytokeratin (CK) [Figure 3a], epithelial membrane antigen (EMA), vimentin and human melanoma black-45 (HMB-45) [Figure 3b]. The smaller round cell population was positive for neuron-specific enolase (NSE), synaptophysin and chromogranin [Figure 3c]. These tumor cells were negative for leukocyte common antigen, cluster of differentiation 99 (CD99), S-100, desmin, smooth muscle actin and Myo D1. On the basis of immunomorphological features, a final diagnosis of melanotic neuroectodermal tumor of infancy involving the maxilla was rendered.

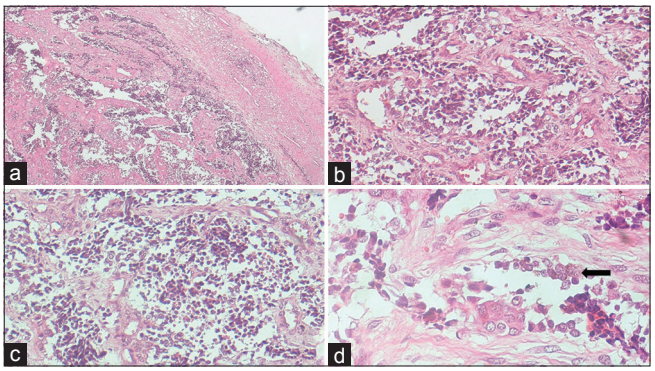

Figure 2: Photomicrograph showing (a) tumor cells arranged in islands and lobules separated by fibrovascular septae (H&E, ×100) (b and c) Biphasic population of tumor cells showing revealed larger cuboidal to polyhedral cells at periphery and small round blue cells in the center of the tumor island (H&E; ×400). (d) The larger polyhedral cells show intracellular brown-black granular pigment (arrow) (H&E; ×400)

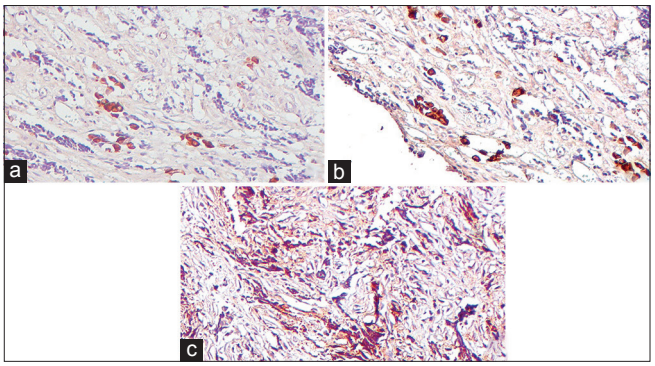

Figure 3: On immunohistochemistry, the larger peripheral cells show cytoplasmic immunoreactivity for (a) pan-cytokeratin (×200) and (b) human melanoma black-45 (×200). (c) The small round cell population was positive for chromogranin (×200)

Immediate postoperative period of the child was uneventful. On follow-up, patient developed recurrence 4 months after surgery and was reoperated.

DISCUSSION

MNTI most commonly involves the craniofacial skeleton with a predilection for the maxillary region (62.2%) followed by skull (15.6%) and mandible (7.8%).[4] Long

bones of extremities, mediastinum, brain, epididymis, uterus and ovary are rare sites of involvement. MNTIs are never congenital and most commonly occur in infants younger than 6 months of age with a male preponderance.[1] Age of presentation at 1 month and maxillary location seen in our case was classical for this tumor.

The most common presentation of MNTI is a painless, nonulcerative gingival mass which may or may not contain areas of bluish-black pigmentation and is often confused clinically with an eruption cyst. Furthermore, clinicoradiological misdiagnosis of a malignant etiology such as rhabdomyosarcoma, lymphoma, neuroblastoma, Langerhans cell histiocytosis and Ewing's sarcoma is common owing to its rapid growth potential and bone destruction as was seen in our case.[3]

The typical radiographic appearance of MNTI is an expansile radiolucent lesion which causes bony destruction and tooth displacement with tumor advancement. While CT defines the extent of the lesion and clearly delineates osseous involvement, MRI typically shows increased signal on T1-weighted images due to the paramagnetic effect of melanin.[5] However, lesions with dense pigmentation only exhibit such signal intensity which was not seen in our case. Histopathological evaluation thereby remains the gold standard for diagnosis.

Immunoreactivity for varied antibodies highlights the multiphenotypic character of MNTIs. Positivity for CK, EMA and HMB-45 observed in the larger peripheral cells reflects the epithelial and melanocytic differentiation of these cells.[6] The absence of S-100 reactivity aids in the differentiation of MNTIs from the more common pigmented tumors such as melanoma. The nests of small round cells in MNTI are positive for synaptophysin, chromogranin and NSE which along with ultrastructural studies support their neural cell crest origin. Despite the microscopic and immunohistochemical similarities, there are no common genetic changes linking MNTI with the other neuroectodermal tumors.[7] Some patients may show increased vanillylmandelic acid (VMA) excretion in urine, particularly with aggressive tumors. High urinary levels of VMA suggest the neural crest origin of this tumor.[4] Since this entity was not suspected preoperatively, VMA levels were not done in our case.

Wide local surgical excision with 2–5 mm margin remains the mainstay and the only modality of treatment with proven efficacy.[8] Follow-up of patients is recommended owing to a recurrence rate of 10%–35% reported in the literature. Recurrence might be due to incomplete excision of the primary tumor, seeding during surgery or tumor multicentricity. Metastatic spread, usually to lymph nodes, is uncommon and seen in only 3%–5% of the cases.[3] The only defined prognostic indicator of MNTIs is the age at manifestation. Infants who present within the first 2 months of life have the highest risk of recurrence, usually within 6 months of surgery. Our patient presented with recurrence within 4 months of surgical excision, falling into the poor prognostic group. However, no evidence of metastasis was seen in our case.

CONCLUSION

The present case emphasizes that albeit rare, pediatric surgeons and pathologists must always keep in mind the possibility of MNTI while dealing with maxillofacial tumors in infants. Preoperative clinicoradiological assessment seldom delineates this tumor owing to rapid growth potential and associated bone destruction. Characteristic histopathological features supplemented with immunohistochemistry remain the gold standard for diagnosis. Although considered to be a benign tumor, close clinicoradiological follow-up is strongly recommended given the significant risk of recurrence as highlighted by our case.

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.

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