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Melanotic Neuroectodermal Tumor of Infancy

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A case of melanotic neuroectodermal tumor of infancy was presented. This tumor occurred in the right maxillary alveolar ridge of 3-month-old female infant, showing bluish enlargement of alveolar mucosa with the displacement of central deciduous incisor. We described the gross, microscopic, and ultrastructural findings of this tumor. This case appears to be the first case of MNTI, reported in a Korean.

Key Words: *Melanotic neuroectodermal tumor, infantile tumor*

INTRODUCTION

Melanotic neuroectodermal tumor of infancy (MNTI) is a rare tumor which occurs most commonly in the infants below the age of six months, usually in the maxilla.

Since Krompecher made the first decription of this tumor in 1918 under the designation of congenital melanocarcinoma, over 160 cases have been reported under the various designations such as congenital melanocarcinoma, melanotic ameloblastoma (Miyake & Sugahara, 1960), retinal anlage tumor (Halpert & Patzer, 1947) melanotic progonoma (Stowens & Lim, 1974) and melanotic neuroectodermal tumor of infancy (Borello & Gorlin, 1966). The multitude of names reflects the divergent theories concerning its histogesis. Borello and Gorlin proposed the term MNTI to designate this tumor in 1966 and many others have agreed on this term and accepted it as a specific and recognizable entity.

Recently we have experienced this tumor occurring in the right maxilla of a 3-month-old infant. Inability to find a Korean case and the importance of differential diagnosis from other malignant tumors prompted this report.

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CASE REPORT

A 3-month-old female infant came to the Department of Oral Surgery, Seoul National University Dental Hospital for the evaluation of a slowly growing bluish gray firm mass on the crest of the right upper alveolar ridge, which interfered with milk feeding (Fig. 1). Her parent first noticed this swelling 4 weeks ago. The lesion expanded slowly initially but several days before admission it grew rapidly resulting in noticeable facial asymmetry and the labial displacement of right maxillary deciduous central incisior. A physical examination showed no remarkable change except for the brown pigmentation on the scalp. Radiologically the lesion appeared as a well circumscribed radiolucent area in the right maxilla, showing an irregular margin on the superior border and intraosseous destructive lesions without new bone formation.

Excision of tumor mass together with removal of adjacent three teeth was performed.

PATHOLOGICAL EXAMINATIONS

Grossly, the submitted specimen consisted of an ovoid gray white to brownish black fibrotic mass (Fig.

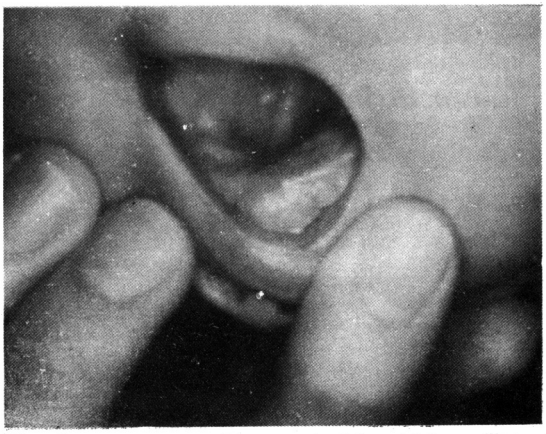

Fig. 1. Note bluish enlargement of the right maxillary ridge in 3-month-old infant.

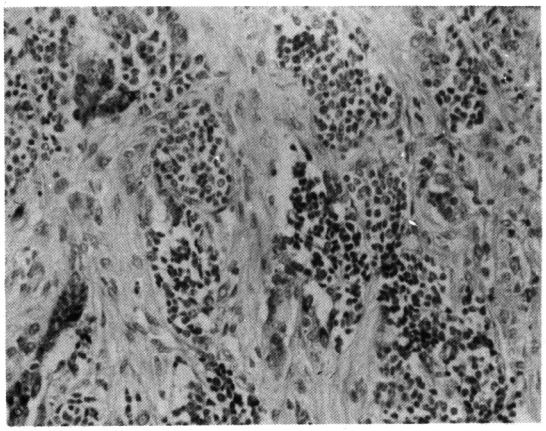

Fig. 3. Note sheets of neoplastic cells in the background of dense fibrovascular stroma (X100).

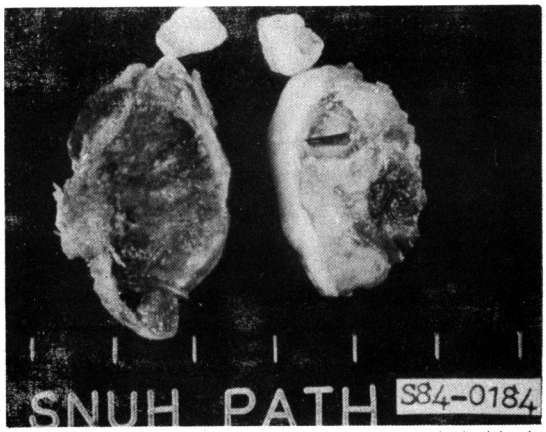

Fig. 2. The cut surface reveals almost entirely black pigmented area in the back ground of white yellow fibrotic tissue.

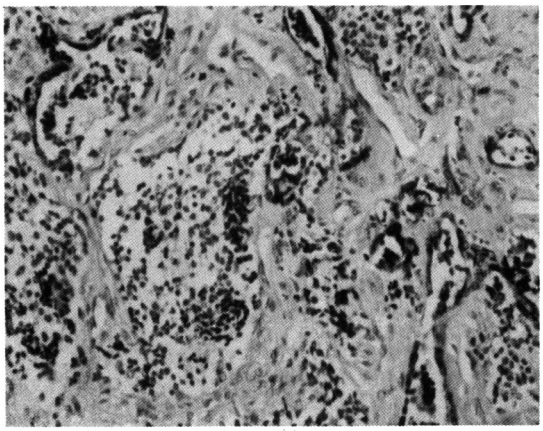

Fig. 4. Note alveolar like spaces or pseudogranular structure with central infoldings of tumor cells (X100).

2) measuring 3.5×2.5×2.0cm and 3 developing teeth. Cut surfaces of tumor mass revealed on almost entirely black pigmented area in the background of white yellow fibrotic tissue, and gave rubbery consistency.

Microscopically, the alveolar bone was replaced by the infiltrated neoplastic tissue. The lesion revealed sheets or cords of tumor cells in the background of dense fibrovascular stroma. Some tumor cells were arranged in alveolus like space or pseudoglandular structure with central infoldings. The individual tumor cells were recognized as three morphologically distinct types, namely densely pigmented cells, sparsely pigmented cells, and small undifferentiated cells. Densely pigmented cells were lining the alveolus like spaces, containing abundant brown pigment granules. Sparsely pigmented cells were observed predominantly in the margin of the lesion and in bone marrow spaces, having clear cytoplasm. Close examination of these cells revealed small amount of brown pigment granules. Small undifferentiated cell bore close morphologic resemblance to neuroblasts or lymphocytes, having scanty cytoplasm, and some of them occupied the central portion of alveolus like space.

Ultrastructurally, densely pigmented cells, sparsely pigmented cells and samll undifferentiated cells were recognized. Densely pigmented cells were spindle or ovoid in shape, closely packed with various

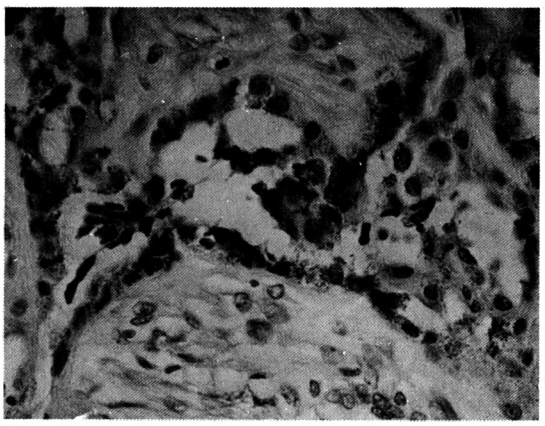

Fig. 5. Note alveolar like spaces lined by densely pigmented cells with central infoldings of tumor cells. (X400).

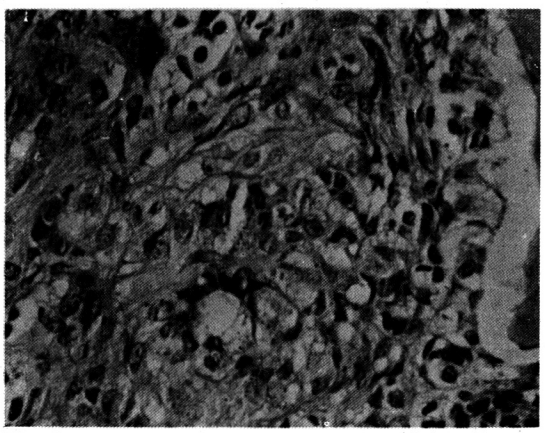

Fig. 6. Note sparsely pigmented cells in peripheral bone marrow portion. (X400).

stages of malanosome granules, and also containing rough endoplasmic reticulum and mitochondria. Sparsely pigmented cells were ovoid in shape, containing small amount of melanosome granules, well developed granular endoplasmic reticulum, and mitochondria. Small undifferentiated cells were small, having and avoid nucleus and scanty oytoplasm containing neurofilament like structure and granular endoplasmic reticulum.

Putting all these findings together "melanotic neuroectodermal tumor of infancy" was the most likely diagnosis.

This patient is healthy with no evidence of recurrence 20 months after the surgical removal.

DISCUSSION

The melanotic neuroectodermal tumor of infancy is a tumor of long debate and controversy concerning its histogenesis. As aforementioned, its histogenetic theories were various.

To date, several theories have been put forward to explain its histogenesis. Krompecher in 1918 first suggested its origin from the enclaved epithelial rest at the time of embryonic fusion of the facial processes, and he considered it as a malignant tumor from the histological findings.

Other investigators proposed its histogenesis from

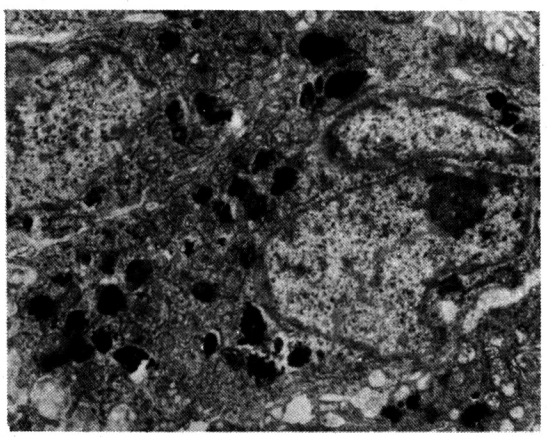

Fig. 7. Electron micrograph of densely pigmented cells showing various stages of melanosome, well developed RER, and a few mitochondria in the cytoplasm.

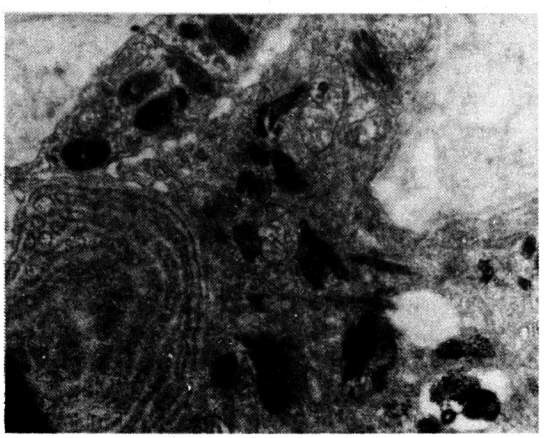

Fig. 8. High power of Fig. 7 reveals various stages of melanosome in association with RER

odontogenic apparatus. Mummery and Pitts (1926) reported a pigmented maxillary tumor of 5-month-old female infant under the name of melanotic epithelial odontom, a asserting its origin to be from odontogenic apparatus from the viewpoint that it occurs predominantly in the maxilla and frequently in association with dental elements. Thereafter many investigators favored this opinion and have used the term "melanotic or pigmented ameloblastoma", suggesting that the tumor might arise from some proliferative, aberrant dontogenic epithelium. (Halpert et al., 1947; Kerr et al., 1964).

Borello and Gorlin in 1966 proposed cogent objection to this theory, saying the origin of this tumor from odontogenic tissue did not explain the occurrence of the tumor in the area other than jaw bone, normal development of teeth in the area of tumor, and because teeth were uniformly present in that area. They also pointed out the scanty resemblance of tumor cells to odontogenic epithelium.

They reported a pigmented maxillary tumor of 3-month-old male infant accompanied by the increased urinary secretion of 3-methoxy 4-hydromandelic acid (VMA) in the presence of tumor and VMA returned to normal after extirpation of the tumor. Since high urinary levels of VMA are common findings in the individuals with neural cell tumors such as pheochromocytoma, ganglioneuroblastoma, neuroblastoma, and retinoblastoma, they consequently concluded this tumor to be originated from neural crest.

Thereafter most reports are in agreement with Borello and Gorlin's content.

Koudstaal et al., in 1968 observed the similarity of enzyme pattern of MNTI to that of certain other tumors probably derived from cells of the neural crest, concluding the origin of tumor cells from neural crest.

Dooling, et al., in 1977 payed heed to the striking histological similaries between MNTI and fetal pineal gland, suggesting that MNTI might be derived from neuroectodermal tissue and histologically distinguishable two types of cells in MNTI represent coexistence of different stages of differentiation. Dehner et al., (1979) described various stages of melanocytes and neuroblast like cells, suggesting neuroectodermal origin.

Our case also disclosed three distinct cell types, i.e., densely pigmented cells, sparsely pigmented cells and neuroblasts, suggesting strongly of neuroectodermal origin.

Nearly all cases of MNTI have occurred in infants under the age of the first six months with an approximately equal sex distribution in the 77 cases reported by Stowens and Lim (1974) and in the 90 cases reported by Lopez (1976).

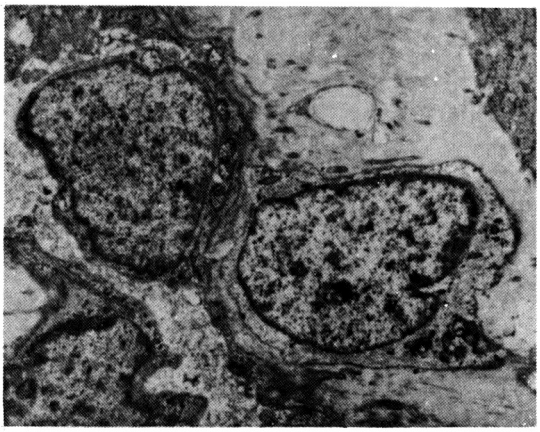

Fig. 9. Small undifferentiated cells.

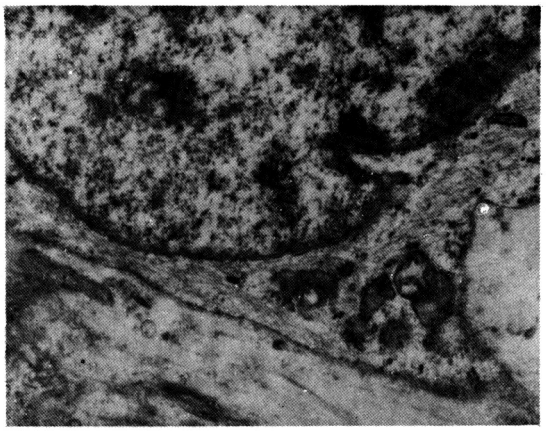

Fig. 10. High power of small undifferentiated cells reveals neurofilament like structure in the cytoplasm.

Although the maxilla, especially near the midline, was the most common site, there have been a few tumors reported in the other areas such as mandible, skull, shoulder region, palate, mediastinum, brain, skin, epididymis, and uterus (Schultz, 1957).

To date, most authors stat that clinical behavior of MNTI showes rapidly growing, darkly pigmented and nonulcerated lesion. Although the treatment of choice was considered to be conservative surgical excision, approximately 15% of MTNI were reported to recur (Berke & Gorlin, 1975). Rarely MNTI can be malignant even with distant metastasis (Dehner et al., 1979).

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