



Melanotic neuroectodermal tumour in infancy – Case Report

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Abstract

This case report presents the epidemiology, symptomatology, pathogenesis and treatment of a melanotic neuroectodermal tumour of infancy. MNTI is a rare tumour that is seen usually at or around birth. It is usually localised in facial region. The tumour originated from medial part of alveolar process of maxilla. Presented case developed in maxilla of four months old girl. Excision of a tumour with a dental germ 61 was performed. Despite MNTI shows benign histological character it has a high recurrence potential. Two months after first operation during routine follow up control, there was a tumour in oral cavity that was suspected to be relapse. Patient undergone second procedure in general anesthesia. Tumour was excised with radical margins. Due to complex functional and aesthetic character of facial region patients need specialistic treatment and rehabilitation of masticatory organ. Frequent presence of dental germs in the mass of tumour often causes malocclusion.

Key words

MNTI, melanotic neuroectodermal tumour, facial region neoplasms, rare benign infancy neoplasms

INTRODUCTION

The study aimed to familiarize practitioners, especially pediatricians, neonatologists, pediatric surgeons and dentists, with clinical symptomatology, pathogenesis and treatment of Melanotic Neuroectodermal Tumour of Infancy (MNTI). It is rare neoplasm which most often affects newborns and children in the first year of their life, regardless of gender. MNTI more frequently originates from the maxilla than the mandible [1, 2, 3, 4]. The tumour was first described by Krompecher in 1918 as ‘congenital melanocarcinoma’. Until Borello and Gorlin proposed the term Melanotic Neuroectodermal Tumour of Infancy, several names appeared in the literature: ‘melanotic progonoma’, ‘retinal anlage tumour’, ‘pigmented congenital epulis’, ‘melanotic ameloblastoma’, ‘congenital melanocarcinoma’, which confirmed the unclear tumour pathogenesis. [1] Recent ultrastructural, biochemical and immunophenotypic studies have shown a connection between the tumour and the primary neural tube involved in the formation of the maxilla, mandible and teeth. [1, 2, 5] Some patients with MNTI have demonstrated elevated levels of vanillin-mandelic acid [1] or alpha-fetoprotein in the urine and, in some cases, elevated levels of catecholamines in plasma and urine [1, 2].

The tumour grows exophytically. It has expansive character, shallowing the vestibule of oral cavity and the expansive growth causes osteolytic destruction of the bone structure. The tumour has no ulceration tendency, and its development does not affect the patient’s general condition [5].

MNTI tumours should be differentiated from rhabdomyosarcoma, giant cell intraosseous lesion, Ewing’s sarcoma, ossifying fibroma, fibrous dysplasia, haemangioma, vascular malformation, craniopharyngioma, Langerhans cell histiocytosis [1] with teratomata, and other congenital benign and malignant tumours. Surgery is the first-line treatment, involving radical tumour resection while maintaining healthy tissue margins. Relapses are associated with the non-radical surgery [3, 5].

This Case report presents details of a four-month-old girl diagnosed with MNTI.

CASE STUDY

The patient, a four-month-old girl, was born in spontaneous labour at term, from an uneventful first pregnancy. Birth weight of the child was 4.160g. The circulatory and respiratory adaptation period proceeded without complications, and she was assessed at 10 in the Apgar score. The child was fed with modified milk and mother’s milk without eating or sucking disorders. In the tenth week of life, the mother noticed a thickening of tissues in the maxilla on the left side, reddish in colour, which gradually increased to the size of a tumour causing bone distension. This resulted in smoothing the nasolabial fold on the left side.

With the suspicion of an abscess, the mother reported with the child to the Hospital Emergency Department of the District Hospital at their place of residence, where the inflammation was excluded. The child was admitted to the Paediatric Oncohematology Clinic of the St. Hedwig Provincial Clinical Hospital in Rzeszow, where imaging tests were performed: ultrasonic examination and CT. After consultation based on the history, physical examination

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and imaging. A maxillofacial surgeon made the diagnosis of cystic maxillary tumour with the recommendation of histopathological verification and further treatment. The general condition of the girl was good, which was confirmed by physical examination and anthropometric parameters; body length – 59 cm, body weight – 5,100 g. Laboratory tests indicated slightly elevated serum potassium – 5.3 mmol/l, and alkaline phosphatase – 374 U/L (124–341), and serum calcium – 11.1 mg/dl (9.0 – 11.0). Ultrasound of the cheek revealed the presence of a cystic tumour, 17 × 12 mm in size, located on the alveolar ridge of the maxilla on the left from the midline, filled with a homogeneous dense mass. The tumour was surrounded by a hyperechogenic border. The cystic lesion most likely included a tooth adjacent to its frontal border [Fig. 1].



Figure 1. Ultrasound examination before surgery presents a tumour in the vestibule of oral cavity

CT examination revealed: an osteolytic defect, 17 × 15 × 11 mm in size, filled with a substance of 55–65 Hounsfield units density. The tumour, located laterally to the first left upper incisor, did not demonstrate contrast enhancement. The lesion protruded the maxilla contours outward and upward, causing displacement of the first left incisor, which was within the lesion on its circumference. The second left incisor was secondary displaced to the side and slightly backwards, beyond the canine [Fig. 2].

Based on the clinical examination and imaging tests, the child was qualified for surgical biopsy of cystic tumour under general anesthesia, and postoperative histopathological verification. Intraoperatively, a cystic tumour was found,

reddish-blue-brownish in colour, about 2.5 cm in diameter. It was difficult to enucleate from the bone. The tumour perforated the capsule in some places and in the lumen of the encapsulated solid lesion was the germ of tooth 61, which could not be preserved. The surgical material in the form of two fragment, including the removed tumour, and a preparation constituting the tumour base, was submitted for histopathological examination. The child tolerated the operation well. Postoperative course was without complications.

Histopathological examination was performed at the Department of Pathomorphology of the Provincial Clinical Hospital No. 2 in Rzeszów and showed the presence of a tumour with MNTI features, and a lack of radicality from the ground side [Fig 3].

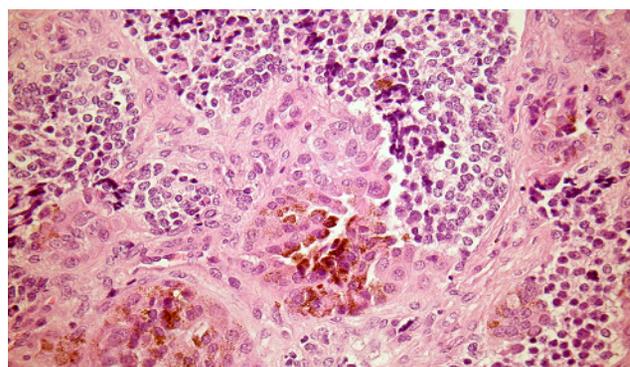


Figure 3. H&E staining, magnification 400x. Two populations of tumour cells are visible: small round cell with hyperchromatic nucleus and large polygonal epithelial cells with dye.

Immunohistochemical tests: HMB45 (+), cytokeratin in general AE1 / AE3 (+), Synaptophysin (+), S100 (-), Desmin (-). Immunohistochemical evaluation of large cells showed strong expression of total cytokeratin, EMA, HMB45, and vimentin. The cells contained Neuron-specific enolase (NSE), LSE-7, synaptophysin. No S-100 protein was found [Fig 4].



a)



b)

Figure 2. CT examination before surgery; a) sagittal cross-section b) transverse cross-section. The tumour visualized, including the tooth germ 61

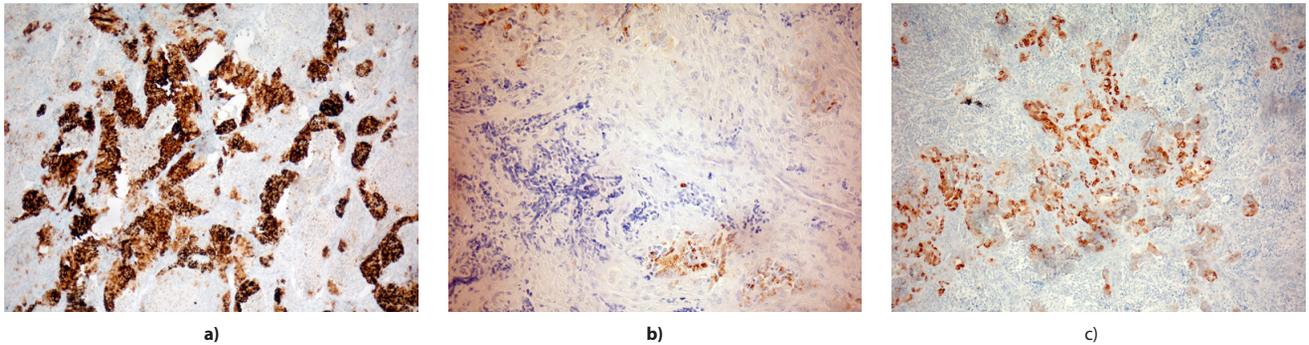


Figure 4. Immunohistochemical staining: a) HMB45 – positive in a large tumour cell population, b) S100 – negative, c) Cytokeratin AE1 / AE3 – positive in a large tumour cell population.

On the third day after the surgery, the child was discharged with observation and outpatient control recommendations.

In the second month after surgery, during examination of the child, a swelling, suspected of tumour recurrence, was found in the oral cavity on the operated side. A CT examination of the facial part of the skull revealed a lesion suspected of a relapse in the medial part of the left maxillary bone with dimensions of $11 \times 13 \times 9$ mm, and filled with a substance of 45–65HU density, slightly protruding the contours of the maxilla outside [Fig. 5].



Figure 5. CT transverse cross-section revealing tumour recurrence

The child was re-operated under general anesthesia. The tumour resection included 2mm margins at its base. Perioperatively, the child required transfusion of red blood cell concentrate. Perioperative antibiotic prophylaxis was used.

Histopathological examination confirmed the presence of MNTI in the operating material. Due to fragmentation of the mater; assessment of radicality was difficult.

At present, the child remains under the control of the Maxillofacial Surgery Clinic of the F. Chopin Provincial Clinical Hospital in Rzeszów.

During outpatient follow-up, no clinical or radiological evidence of recurrence was found in the CT examination 20

months after surgery [Fig 6]. The child remains in constant follow-up. During the first year, the patient was controlled every 2–4 weeks, afterwards at intervals of 3 months. No local recurrence has been observed at the 2-year follow-up.



Figure 6. Transverse cross-section CT, 20 months after second resection. Radiologically without signs of recurrence

DISCUSSION

According to the data from specialistic literature, MNTI belongs to rare tumours of the neonatal and early childhood period, and is characterized by a benign clinical course. [2, 3, 4, 5] Tumour histogenesis was unexplained until recently. Although MNTI is histologically benign, it is characterized by clinically rapid aggressive growth and local expansion [4]. It may obstruct feeding and breathing – in the case of its large size. It requires radical surgical treatment.

The clinical symptoms observed in this case report were consistent with the data presented in medical literature [7, 10]. The tumour appeared in the early neonatal period. Despite the large size, the tumour did not cause difficulty in breathing

and feeding. The child gained weight physiologically. In the available literature on the subject, views on management are often contradictory. Some authors tend to claim that the tumour should be removed sparingly, due to the child's developmental age [2, 3, 4]. Extensive resection treatment is limited to clinically very advanced cases. Of the available treatment methods, it is also worth mentioning chemotherapy, mainly reserved for inoperable or recurrent cases [1]. Due to the age of patients, prognosis and possible complications, radiotherapy is not recommended [1]. According to the literature, recurrence is observed in 20–25.6% of patients [11, 12, 13], and metastases to distant organs are observed in 3%–12.8% of patients treated [11, 13]. In the described case, recurrence appeared relatively early – after 2 months, and was associated with the non-radical nature of the first surgery.

Early diagnosis of MNTI favourably reduces morphological and functional complications after surgery [1, 2, 9, 10]. Tumours of small size cause less tissue damage, allow for a more sparing type of surgery, and thus promise faster tissue regeneration of the operated area. The surgical intervention necessary to remove the tumour may result in jaw development disorders, bone deformation, disorders in tooth eruption, and tooth loss. [9] In the described case, the tumour mass contained tooth germ 61, which in the future will be manifested by the lack of this tooth and dental-occlusal abnormalities. Therefore, the child's parents must be informed about the consequences of surgical treatment, which may be associated with disorders of maxilla development, tooth eruption, occlusal abnormalities, and the need for future orthodontic treatment. In this case, the girl's parents were informed about the effects of the treatment, for which they gave their informed consent.

It is beneficial for patients after surgery to remain under clinical observation, preferably by the treatment team. It is important that further therapeutic decisions are taken by a multidisciplinary team: a paediatric surgeon, a maxillofacial surgeon, and an orthodontist [10].

The patient remains under constant periodic follow-up of the maxillofacial surgeon, orthodontist and paedodontist. Recommended follow-up scheme is every 2 weeks during first 6 months, every 4 weeks during second 6 months and every 3 months afterwards for at least 3 years [1].

REFERENCES

1. Kaczmarzyk T, Stypułkowska J, Tomaszewska R, et al. Melanotyczny Neuroektodermalny Guz Dziecięcy. In: Nowotwory zębopochodne i guzy nowotworopodobne kości szczękowych. Warszawa: Wydawnictwo Quintessence; 2009. p. 243–247.
2. Hart I. Soft Tissue Tumours. In: Tumours of the Fetus and Infant: An Atlas. 2nd ed. Heidelberg: Springer; 2013. p. 80–81.
3. Mooi W, Krausz T. Melanotic lesions of odontogenic epithelium. In: Pathology of Melanocytic Disorders. 2nd ed. Boca Raton (FL): Hodden Arnold; 2012. p. 456–457.
4. Bui MM, Dodd LG. Tumours of soft tissue. In: Atlas of Soft Tissue and Bone Pathology with histologic, cytologic and radiologic correlations, New York: Demos Medical; 2015. p. 197–198.
5. Atkinson GO, Davis PC, Patric LE, et al. Melanotic neuroectodermal tumours of infancy. MR findings and review of literature. *Pediatr Radiol.* 1989; 20: 20–22.
6. Ma Y, Zheng J, Yang Z, Zhu H. et al. Melanotic neuroectodermal tumour of infancy in the soft tissue of forearm. Raport of a case. *Int J Clin Exp Pathol.* 2015; 8(10): 13584–13589. <https://pubmed.ncbi.nlm.nih.gov/26722579/>
7. Bangi BB, Avinash Tejasvi ML. Melanotic neuroectodermal tumour of infancy: A rare case report with differential diagnosis and review of the literature. *Contemp Clin Dent* 2012; 3(1): 108–112. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3341745/>
8. Manojlović S, Virag M, Lukšić I, et al. Melanotic neuroectodermal tumour of infancy: report of two cases and review of the literature. *J craniomaxillofac surg.* 2012; 40(4): 103–107. <https://pubmed.ncbi.nlm.nih.gov/21737290/>
9. Moreau A, Galmiche L, Minard-Colin V, et al. Melanotic neuroectodermal tumour of infancy (MNTI) of the head and neck: A French multicenter study. *J craniomaxillofac surg.* 2018; 46(2): 201–206. <https://pubmed.ncbi.nlm.nih.gov/29275074/>
10. Puchalski R, Shah UK, Carpentieri D, et al. Melanotic neuroectodermal tumour of infancy (MNTI) of the hard palate: presentation and management. *Int J Pediatr Otorhinolaryngol.* 2000; 53(2): 163–168. <https://pubmed.ncbi.nlm.nih.gov/10906523/>
11. Almomani MH, Rentea RM. Melanotic Neuroectodermal Tumour Of Infancy. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021. <https://pubmed.ncbi.nlm.nih.gov/32809431/>
12. Ren Q, Chen H, Wang Y, et al. Melanotic Neuroectodermal Tumour of Infancy Arising in the Skull and Brain: A Systematic Review. *World neurosurg.* 2019; 130(1): 170–178. <https://pubmed.ncbi.nlm.nih.gov/31295620/>
13. Pontes FSC, De Souza LL, Uchoa DCC, et al. *Head neck.* 2018; 40(12): 2749–2756. <https://pubmed.ncbi.nlm.nih.gov/30390348/>