

Esthesioneuroblastoma Presenting with Bilateral Proptosis and Blindness in a Child: A Case Report

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ABSTRACT

Esthesioneuroblastoma is a rare malignant tumour of the olfactory epithelium. The most common symptom is related to unilateral nasal obstruction. It rarely presents with bilateral proptosis and blindness. We report a 21-month-old girl with esthesioneuroblastoma in sphenoid and ethmoid sinus in a child presenting with bilateral proptosis, blindness, and irritability. The diagnosis was confirmed by histopathology.

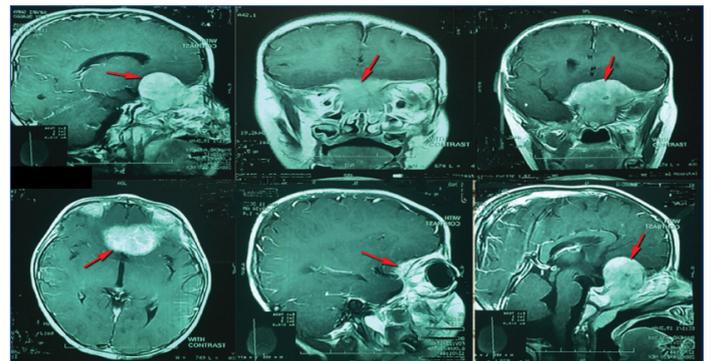
Keywords: Exophthalmos, Olfactory neuroblastoma, Sinus tumour, Visual loss

CASE REPORT

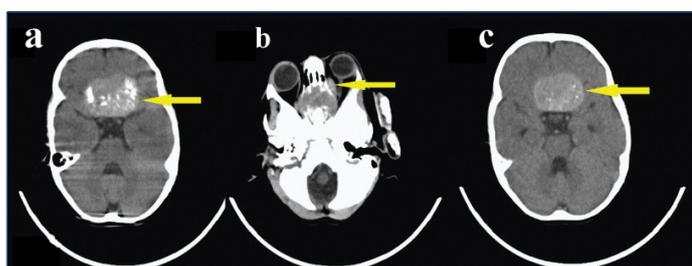
A 21-month-old girl presented with bilateral proptosis, blindness, and irritability since 15 days prior to admission. She was referred to the Paediatric Oncologist with the suspicion of rhabdomyosarcoma. On eye examination by ophthalmologist excessive lacrimation, decreased vision (light perception), strabismus, extraocular movement, paralysis and pale disc were detected. Her vital signs were normal. Other physical examinations including head circumference, thyroid, liver, and spleen also were normal. The laboratory workups are listed below: White Blood Cells: $5900 \times 10^3/\mu\text{L}$, Haemoglobin: 9.9 gm/dL, Mean Corpuscular Volume: 85 fL, platelets: $463 \times 10^3/\mu\text{L}$, Lactate Dehydrogenase: 712 U/L, Erythrocyte Sedimentation Rate: 28 mm/hr, Alanine Aminotransferase: 53 U/L, Alanine transaminase: 20 U/L. Brain CT scan revealed anterior base skull tumour invading orbit and ethmoid sinuses [Table/Fig-1]. MRI of the brain, orbit, and paranasal sinuses showed enhancing soft tissue mass lesion measuring about 34 mm \times 28 mm \times 22 mm involving sphenoid sinus and posterior aspect of ethmoid sinuses at the midline of anterior base of skull compressing optic chiasma and nerve and also destroying both orbits [Table/Fig-2].

Bilateral bone marrow biopsy and aspiration showed normocellular marrow with no evidence of metastasis [Table/Fig-3]. She was operated by Neurosurgeon and histopathology of the mass [Table/Fig-4] revealed malignant small round cell tumour and Immunohistochemical (IHC) study showed positive chromogranin, cytokeratin, and synaptophysin but S-100, CD99, and EMA were negative [Table/Fig-5]. Ki67 was 80% positive. IHC findings were in favour of olfactory neuroblastoma (esthesioneuroblastoma). The patient was treated with VAC protocol (vincristine, actinomycin-D, and cyclophosphamide) with improvement after receiving four

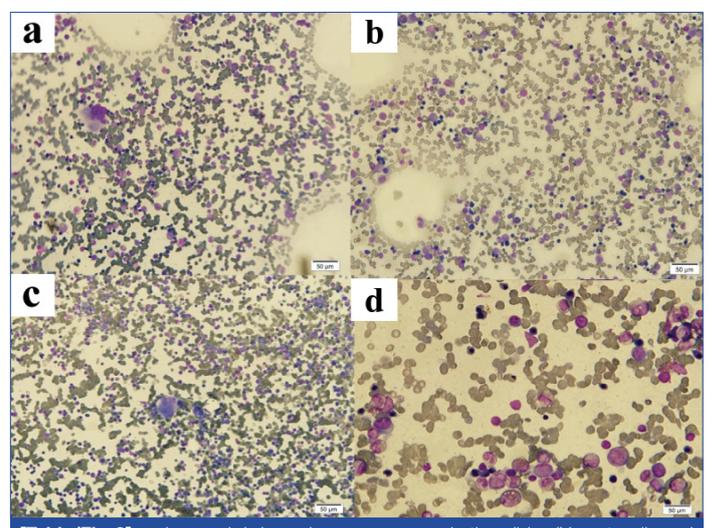
courses of chemotherapy (about four months after diagnosis) but not completely. Her vision and strabismus became better and proptosis also improved. The patient is on regular follow up. It should be noted that written informed consent was taken from her parents before this report.



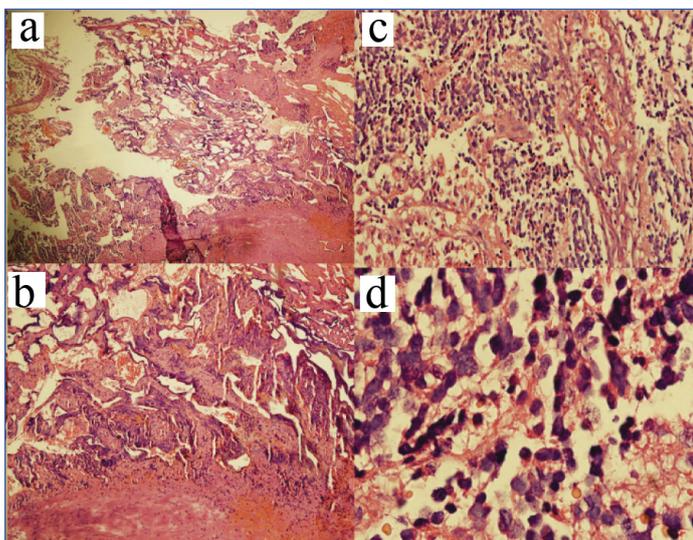
[Table/Fig-2]: Brain MRI- multiple images in different plains- shows a large extra-axial mass measuring about 34 mm \times 28 mm \times 22 mm arising from the floor of the anterior fossa. It involves sphenoid sinus and posterior aspect of ethmoid sinuses at the midline of the anterior base of skull compressing optic chiasma and nerve and also destroying both orbital cavities.



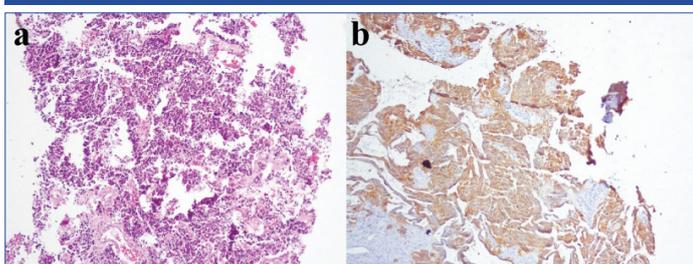
[Table/Fig-1]: a, b, and c: Brain CT scan-multiple images in different plains - shows anterior base skull tumour invading orbit and ethmoid sinuses.



[Table/Fig-3]: a, b, c and d shows bone marrow aspiration slides (Hematoxylin and Eosin stain) with polymorphic and normal cellularity, megakaryocyte is adequate, and no cluster of abnormal cells seen (a-20X, b-40X, c-10X, d-100X).



[Table/Fig-4]: a and b section of brain mass slides which show nice crush artifact of small round cell tumour (H&E), High power and low power- a- 4X, b-10X; c and d section of brain mass slides which show small round cell malignant tumour with high N/C ratio and hyperchromatic nuclei (H&E- c- 10X, d- 40X).



[Table/Fig-5]: a) Section of brain mass shows small cell malignant tumour with high N/C ratio and hyperchromatic nuclei (H&E, 100X); b) Section of brain mass shows immunohistochemistry for synaptophysin is positive.

DISCUSSION

Esthesioneuroblastoma is a rare malignant neuroectodermal tumour that originates from the olfactory epithelium. It accounts for about 3% of all sinus tumours [1,2]. The incidence of the tumour is about 0.4-1/1,000,000 population per year and, it can occur at any age with incidence peaks in the second and fifth decades of life [3]. The most common symptoms of esthesioneuroblastoma are unilateral nasal obstruction and epistaxis [4].

The differential diagnosis of proptosis in children is different from an adult. In the adult, thyroid disease is the most common cause, while in children; orbital cellulitis is the most common cause [5,6]. The common causes of proptosis among paediatric age groups include orbital cellulitis, capillary haemangioma, dermoid cyst, hyperthyroidism and malignancy such as retinoblastoma, rhabdomyosarcoma, optic glioma, myeloid leukaemia, chloroma, lymphoma, histiocytosis, Ewing sarcoma, esthesioneuroblastoma and metastasis [6,7]. Our case presented mainly with orbital manifestations. Symptoms due to local extension of tumour include anosmia due to tumour invasion of cribriform plate, orbital manifestation due to orbital involvement, and otitis media due to blockage of the eustachian tube. The diagnosis often occurs with delay [8-10]. Because some symptoms are non specific and it needs a high index of suspicion.

In our case, according to orbital manifestation and ophthalmology

consult, brain lesion affecting chiasma was suspected, therefore imaging study was done and revealed mass lesion. The final diagnosis was done by IHC study on biopsy specimen. Tumour staging in our case according to Kadish system [11] was stage C.

Olfactory neuroblastoma is a soft, polypoid and haemorrhagic mass. Microscopically, it shows a variety of features. Typically it exhibits a lobular shape with overriding highly vascularized fibrous stroma. Tumour cells are monomorphic with the contextual neurofibrillary matrix. The nuclei consist of salt and pepper chromatin. Olfactory neuroblastoma can exhibit mitosis, calcification, and necrosis [12-14].

Three tumours may be confused with esthesioneuroblastoma, which includes sinonasal undifferentiated carcinoma, rhabdomyosarcoma and Ewing sarcoma, they should be differentiated from each other [15]. These tumours can be differentiated by morphology and immunohistochemically. For example, in Ewing sarcoma CD99 is positive, rhabdomyosarcoma shows myogenic marker and sinonasal undifferentiated carcinoma exhibits diffuse positivity of cytokeratin [14].

Treatment includes surgical resection combined with radiotherapy and/or chemotherapy [2, 4]. Esthesioneuroblastoma is an aggressive and chemosensitive tumour in paediatric patients. In children, chemotherapy is preferred modality than invasive surgery [3].

The prevalence of local recurrence in esthesioneuroblastoma is 20%-40% [16]. Relapse may be occurred years after finishing treatment, often happens more than 10 years, thus long term follow up is required [9].

CONCLUSION

Esthesioneuroblastoma should be differentiated from other malignant tumours even it presents with rare manifestation. A multidisciplinary approach is necessary for better patient care. Regular long term follow up is needed because the rate of local recurrence is high.

REFERENCES

- [1] Lopez R, Mazzoni L, Chaput B, Jalbert F. Olfactory neuroblastoma presenting with exclusive orbital manifestations. *J Craniofac Surg.* 2013;24(2):667-69.
- [2] Olmo HR, Stokes SM, Foss RD. Olfactory neuroblastoma: A case report. *Head Neck Pathol.* 2016;10(2):256-60.
- [3] Bisogno G, Soloni P, Conte M, Podda M, Ferrari A, Garaventa A, et al. Esthesioneuroblastoma in pediatric and adolescent age. A report from the TREP project in cooperation with the Italian neuroblastoma and soft tissue sarcoma committees. *BMC Cancer.* 2012;12:117.
- [4] Uslu GH, Canyilmaz E, Zengin AY, Mungan S, Yoney A, Bahadır O, et al. Olfactory neuroblastoma: A case report. *Oncol Lett.* 2015;10(6):3651-54.
- [5] Dhir SP, Jain IS, Jain GC. Proptosis in children. *Indian Pediatr.* 1977;14(6):475-77.
- [6] Massoud F. Proptosis; differential diagnosis. *Br J Ophthalmol.* 1946;30:622-30.
- [7] Rao AA, Naheedy JH, Chen JY, Robbins SL, Ramkumar HL. A clinical update and radiologic review of pediatric orbital and ocular tumours. *J Oncol.* 2013;2013:975908.
- [8] Song CM, Won TB, Lee CH, Kim DY, Rhee CS. Treatment modalities and outcomes of olfactory neuroblastoma. *Laryngoscope.* 2012;122(11):2389-95.
- [9] Ward PD, Heth JA, Thompson BG, Marentette LJ. Esthesioneuroblastoma: Results and outcomes of a single institution's experience. *Skull Base.* 2009;19(2):133-40.
- [10] Jethanamest D, Morris LG, Sikora AG, Kutler DI. Esthesioneuroblastoma: a population-based analysis of survival and prognostic factors. *Arch Otolaryngol Head Neck Surg.* 2007;133(3):276-80.
- [11] Kadish S, Goodman M, Wang CC. Olfactory neuroblastoma. A clinical analysis of 17 cases. *Cancer.* 1976;37(3):1571-76.
- [12] Lund VJ, Howard D, Wei W, Spittle M. Olfactory neuroblastoma: past, present, and future? *Laryngoscope.* 2003;113(3):502-07.
- [13] Lund VJ, Milroy C. Olfactory neuroblastoma: clinical and pathological aspects. *Rhinology.* 1993;31(1):01-06.
- [14] Haroon S, Tariq MU, Memon A, Fatima S, Hasan SH. Olfactory neuroblastoma: A clinicopathological experience of a rare entity from Pakistan. *Pak J Med Sci.* 2016;32(3):585-90.
- [15] Mezzelani A, Tornielli S, Minoletti F, Pierotti MA, Sozzi G, Pilotti S. Esthesioneuroblastoma is not a member of the primitive peripheral neuroectodermal tumour-Ewing's group. *Br J Cancer.* 1999;81(4):586-91.
- [16] Dulguerov P, Allal AS, Calcaterra TC. Esthesioneuroblastoma: a meta-analysis and review. *Lancet Oncol.* 2001;2(11):683-90.

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