Primary orbital neuroblastoma with intraocular extension

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Neuroblastoma is an undifferentiated malignancy of primitive neuroblasts. Neuroblastoma is among the most common solid tumors of childhood. Orbital neuroblastoma is typically a metastatic tumor. In this case report, we describe a 2-year-old child with a rapidly progressing orbital tumor. Computed tomography revealed an orbital mass lesion with extraocular and intraocular components. An incisional biopsy was done, and a histopathological examination showed features suggestive of neuroblastoma. Systemic workup including ultrasonography of the abdomen, chest roentgenogram, whole body computed tomography, and bone scintigraphy showed no evidence of systemic involvement. The diagnosis of primary orbital neuroblastoma was made, and the child was subjected to chemotherapy followed by rapid melting of the tumor. Neuroblastoma should be considered in the differential diagnosis of childhood orbital tumors.

Key words: Childhood orbital tumors, neuroblastoma, primary orbital neuroblastoma, primary orbital tumors

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Neuroblastoma is a malignant tumor of the primitive neuroblasts.[1,2] It is the second most common orbital tumor in children, after rhabdomyosarcoma accounting for 10–15% of childhood tumors.[1,3,4] Primary orbital neuroblastoma has been rarely reported in adults.[5,6] Frequent sites of primary neuroblastoma are abdominal, thoracic, cervical, and pelvic locations.[1,7] In more than 50% of cases, ophthalmic involvement occurs in due course.[4] Ocular manifestations include orbital mass causing proptosis, ecchymosis, Horner's syndrome, papilledema, nystagmus, extraocular muscle palsy, ptosis, retinal striae.[1,4] Primary orbital neuroblastoma constitutes 8% of cases.[1] It is, especially refractory to treatment unlike those arising from sympathetic chain and adrenal gland.[8,9] This is the first report on primary orbital neuroblastoma with intraocular extension.

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Case Report

A 2-year-old female child presented with rapid onset massive proptosis of the left eye with difficulty to close and move the eye. On examination, she had proptosis of 31 mm (exophthalmometry of right eye – 11 mm) with lid edema and ciliary congestion [Fig. 1]. Congested vessels were noted on the upper lid. There was a total restriction of extraocular movements. There was a 1 cm × 1 cm firm scleral nodule 3 mm temporal to limbus with bluish discoloration and hemorrhage in it [Fig. 2]. The anterior chamber had exudate and hyphema precluding visualization of the posterior segment. The corneal diameters of the right and left eye were 11 and 12 mm, respectively. The measured intraocular pressure was 17.3 mmHg in the right eye and unrecordably high in the left eye (Schiotz tonometry). On general examination, the child had good nourishment and was febrile. There was no palpable abdominal mass. The chest was clear, and the cardiovascular system was normal.

Computed tomography of orbit and brain revealed 4 cm × 3 cm × 2.5 cm heterogenous mass with intra- and extra-ocular component filling the left orbit [Fig. 3]. There were areas of coarse calcification. The optic nerve was encased within the mass with perineural spread up to optic chiasma. The floor of the orbit was thinned. Based on the tomography, finding retinoblastoma was suspected.

Histopathological examination of incisional biopsy of orbital mass showed small round tumor cells in sheets separated by incomplete fibrous septa under low power. Examination at higher magnification revealed round to polygonal cells with high nucleocytoplasmic ratio, palisading of nuclei, and delicate cytoplasmic processes. Gemistocytoid tumor cells were observed with eosinophilic cytoplasm. Few foci with central fibrillary material with tumor cells around giving vague appearance of rosettes (Homer Wright) were seen [Fig. 4]. Immunohistochemistry was positive for neuron specific enolase and chromogranin suggestive of neuroblastoma [Fig. 5].

Systemic evaluation for primary site was done. Ultrasound abdomen and chest X-ray were normal with no mass lesion. There was no evidence of mass lesion elsewhere by the whole body computed tomography. The child had hemoglobin of 12 g, total leukocyte count of 5400, and platelet count of 141,000. Peripheral smear showed lymphocytic preponderance with no abnormal cells. Bone marrow biopsy showed no abnormal cells. Cerebrospinal fluid examination by lumbar puncture showed no abnormal cells.

Hence, a diagnosis of primary orbital neuroblastoma with intraocular involvement was made. She was treated with three cycles of chemotherapy comprising vincristine 1.4 mg/m^2, adriamycin 60 mg/m^2, and cyclophosphamide 600 mg/m^2. After completion of three cycles, the tumor melted completely, and the child was systemically well [Fig. 6].

Discussion

Based on a clinical presentation on the day 1, this child was initially treated as a case of orbital cellulitis. Later, it was mistaken for retinoblastoma with orbital extension based on the age of the child and the presence of intraocular calcification. Neuroblastoma was not considered initially as there was no abdominal mass, and primary orbital neuroblastoma has never been reported to have intraocular extension. Intraocular neuroblastoma is always considered to be metastatic.

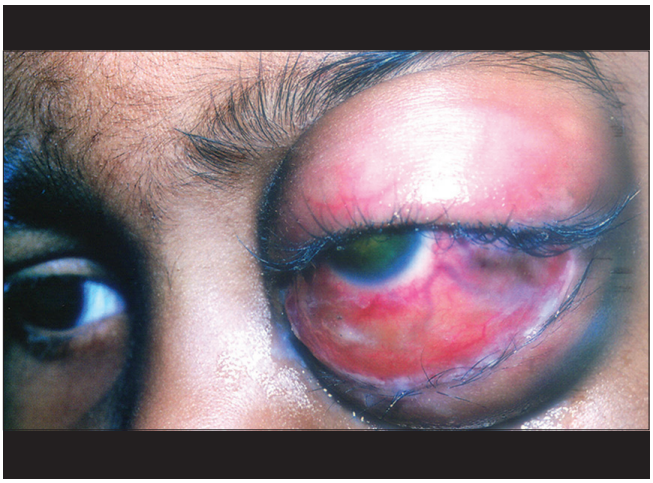

Figure 1: Proptosis with ciliary congestion and chemosis

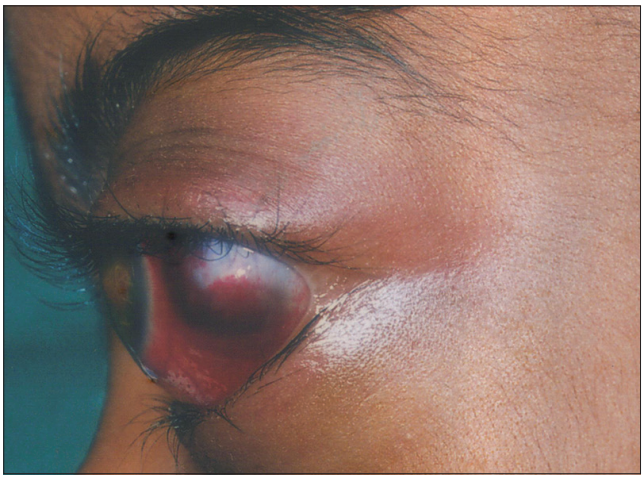

Figure 2: Scleral nodule

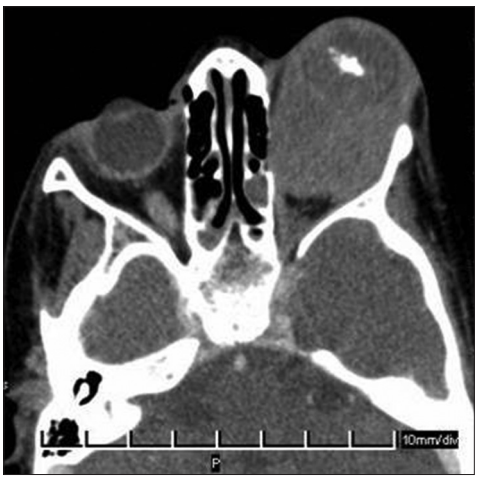

Figure 3: Computed tomography scan showing orbital mass with intraocular extension and calcification

Orbital neuroblastoma in children commonly occurs due to metastasis with primary in the abdomen.[1] Forty percent of orbital metastases are bilateral.[1] Other solid tumors that metastasize to orbit are Wilms' tumor, Ewings sarcoma, and testicular sarcoma.[4]

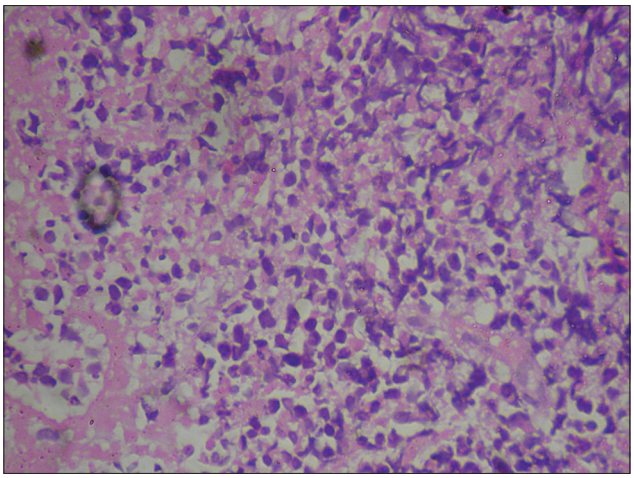

Figure 4: Tumor cells with high nucleocytoplasmic ratio

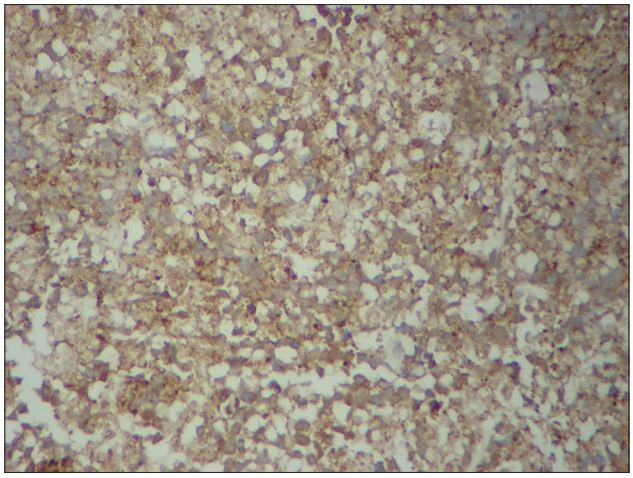

Figure 5: Immunohistochemistry–positive for neuron specific enolase and chromogranin

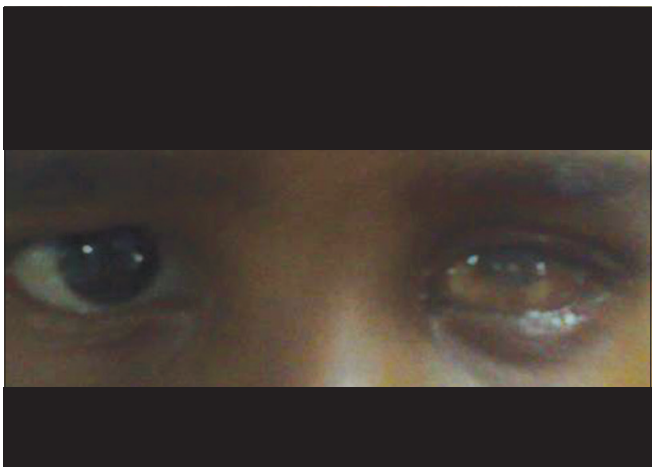

Figure 6: Tumor melt after chemotherapy

These tumors rarely metastasize to the eye itself.[4] Primary orbital neuroblastoma arises from the ciliary ganglion,[4,7] derived from neural crest cells. Differentiated neuroblastoma is made of mature ganglion cells, Schwann cells, and nerve bundles.[3] Tumor cells form rosettes with central matrix composed of neural cell processes.[3] Immunohistochemistry plays an important role in differentiating neuroblastoma from other small round cell tumors such as retinoblastoma, rhabdomyosarcoma, and lymphoma. Tumors cells are stained for neuronal markers such as neuron specific enolase, chromogranin, and synaptophysin which aids in the diagnosis of neuroblastoma.[1]

Delayed diagnosis in a rapidly growing tumor would have led to intraocular extension of the tumor. Reports of tumor cells being found in the choroidal vasculature in histological section without obvious intraocular extension of solid tumors have been reported.[4] The remote possibility of the tumor arising within the choroid and spreading out into the orbit may be considered. Bilateral choroidal neuroblastomas, diagnosed on histopathological examination, to be primary rather than metastatic, have been described.[10]

The diagnosis of neuroblastoma is often delayed due to its varying and nonspecific presenting symptoms.[11] The biologic puzzle of tumor behavior remains an enigma.

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Conflicts of interest

There are no conflicts of interest.

References

1. Mirzai H, Baser EF, Tansug N, Nese N, Isisag A. Primary orbital neuroblastoma in a neonate. Indian J Ophthalmol 2006;54:206-8.
2. Venkatesh R, Trivedi HL. Neuroblastoma with orbital secondaries. Bombay Hosp J 2009;51:55-62.
3. Matthay KK. Neuroblastoma: A clinical challenge and biologic puzzle. CA Cancer J Clin 1995;45:179-92.
4. Bowns GT, Walls RP, Murphree AL, Ortega J. Neonatal neuroblastoma metastatic to the iris. Cancer 1983;52:929-31.
5. Jakobiec FA, Klepach GL, Crissman JD, Spoor TC. Primary differentiated neuroblastoma of the orbit. Ophthalmology 1987;94:255-66.
6. Bullock JD, Goldberg SH, Rakes SM, Felder DS, Connelly PJ. Primary orbital neuroblastoma. Arch Ophthalmol 1989;107:1031-3.
7. Levy WJ. Neuroblastoma. Br J Ophthalmol 1957;41:48-53.
8. Zhang N, Lin LK. Presumed primary orbital neuroblastoma in a 20-month-old female. Ophthal Plast Reconstr Surg 2010;26:383-5.
9. Inazawa N, Hatakeyama N, Hori T, Yamamoto M, Igarashi K, Tadashi H, *et al.* Primary orbital neuroblastoma in a 1-month-old boy. Pediatr Int 2014;56:122-5.
10. Cibis GW, Freeman AI, Pang V, Roloson GJ, Case WF, Ost M, *et al.* Bilateral choroidal neonatal neuroblastoma. Am J Ophthalmol 1990;109:445-9.
11. Bond JV. Unusual presenting symptoms in neuroblastoma. Br Med J 1972;2:327-8.