Topical Treatment for Capillary Hemangioma of the Eyelid Using \(\beta\)-Blocker Solution

The prevalence of periorbital or eyelid hemangioma ranges from 1% to 3%. There are more than 1.5 million affected children in the United States.\(^1\) Amblyopia is the most common complication of capillary hemangioma of the eyelid in children, with an incidence of 60%. If it is not treated promptly, it may lead to irreversible blindness in young children.\(^2\) The treatment options include corticosteroids, interferon alfa-2a, laser therapy, embolization, immunomodulators, surgery, and systemic propranolol.\(^3\) All therapeutic options are associated with adverse effects, some of which are serious. The treatment of a large capillary hemangioma on a child’s left upper eyelid using topical \(\beta\)-blocker solution is reported. The hemangioma significantly improved within a few weeks of the topical treatment.

Report of a Case. A 4-month-old girl had a large capillary hemangioma on her left upper eyelid that induced blepharoptosis and covered her pupil (Figure 1). Her right eye followed and fixated well, while the left eye was slow to fixate. She was orthophoric with full duction and version in all fields of gaze. Her ocular examination showed a normal anterior segment, optic nerve, and retina in both eyes. Her cycloplegic retinoscopy results were +3.50−1.50 \(\times\) 180° OD and +4.50−3.75 \(\times\) 180° OS with more than 2 diopters of induced astigmatic anisometropia. The child’s mother was instructed to apply timolol maleate, 0.5%, ophthalmic solution twice daily, 2 drops onto the surface of the hemangioma with a gentle spread using a finger. The child was not receiving systemic medication and was followed up by her pediatrician during the treatment period. After 5 weeks of treatment, the hemangioma was significantly reduced in size, thickness, and color, clearing the visual axis (Figure 2). Topical \(\beta\)-blocker treatment was discontinued at 7 weeks and repeat retinoscopy results at 11 weeks improved to +4.00−1.50 \(\times\) 180° OS. The child has been followed up for 4 months and tolerated the topical treatment well. No local or systemic adverse effects were noted.

Comment. Capillary hemangioma is the most common benign tumor of the eyelid or orbit in children. It affects more than 2% of infants.\(^3\) Indications for treatment are amblyopia, compressive optic neuropathy, and exposure keratopathy.\(^1,3\) All current therapeutic options can be associated with systemic adverse effects. First-line therapy includes oral or intraslesional corticosteroids. The complications of corticosteroid treatment include disfiguring eyelid changes, elevated intraocular pressure, central retinal artery occlusion, hypertension, and adrenal cortical insufficiency.\(^1,3,5\) Surgical excision can be complicated by hemorrhage and infection. Therapy with immunomodulators has been associated with myelosuppression and hepatotoxic effects (cyclophosphamide) and neurotoxic effects (interferon alfa-2a).\(^3\)

Most recently, systemic application of propranolol was reported to successfully treat severe hemangioma in infants.\(^3\) However, oral application of propranolol can cause severe systemic complications. These include bronchospasm, vasospasm, hypoglycemia, hypotension, severe bradycardia, heart blockage, and congestive heart failure.\(^6\) Our case demonstrates that the application of topical \(\beta\)-blocker solution produced significant reduction of a large capillary hemangioma and resulted in the clearance of the child’s visual axis within a few weeks of treatment. No local or systemic adverse effects were noted.

These results suggest that topical \(\beta\)-blocker administration provides a safe and effective alternative to systemic use in the treatment of capillary hemangioma. Our ongoing studies include a case series on the treatment of capillary hemangioma with topical \(\beta\)-blocker solution and a comparison of the efficacy and adverse effects of topical vs systemic \(\beta\)-blocker in the treatment of capillary hemangioma of the eyelid.

Suqin Guo, MD
Nina Ni, BA

Author Affiliations: The Institute of Ophthalmology and Visual Science, University of Medicine and Dentistry of New Jersey–New Jersey Medical School, Newark (Dr

Figure 1. Before topical treatment, a large capillary hemangioma involved the child’s left upper eyelid, inducing mechanical blepharoptosis and covering her left pupil.

Figure 2. After a few weeks of treatment with topical \(\beta\)-blocker eyedrops, the hemangioma was significantly reduced in size, thickness, and color. The mechanical blepharoptosis also improved significantly, clearing the visual axis.
Infantile hemangioma is the most common benign solid tumor of the ocular adnexa of children, causing significant functional and cosmetic deformity, with a 43% to 60% incidence of astigmatic or occlusion amblyopia when either the eyelid or orbit is affected. In cases involving the orbit, there can be proptosis, displacement of the globe, exposure keratopathy, compressive optic neuropathy, and strabismic amblyopia. Numerous modalities have been used to treat infantile hemangioma, but no single uniformly safe and effective method has yet been found. Léauté-Labrèze et al recently discovered that propranolol can inhibit growth and cause regression of segmental infantile hemangioma without any serious adverse effects. We report the successful use of systemic propranolol in an infant who had an isolated, extensive, and deep orbital infantile hemangioma.

Report of a Case. A healthy 4-month-old female infant had experienced progressive painless protrusion of the right eye for 3 months. Examination revealed axial proptosis of the right globe along with fullness of the eyelids (Figure 1A). A relative afferent pupillary defect was not detected. Magnetic resonance imaging revealed a predominantly intracanal mass replacing the orbital fat, pushing the globe forward but not distorting the optic nerve (Figure 1B). A biopsy was obtained through an inferior transconjunctival orbitotomy. A hypercellular tumor was composed of variably sized lobules replacing most of the orbital fat except for a scattering of surviving adipocytes (Figure 2A and B). Immunostaining with CD34 for endothelial cells highlighted the capillary nature of the proliferation with nonstaining interstitial pericytic cells (Figure 2C); the endothelial cells also expressed glucose transporter isoform 1, a marker for infantile hemangioma (Figure 2D). Propranolol treatment was initiated at a dosage of 2 mg/kg/d intravenously for 5 days and then continued at home at the same dosage by oral administration. At the 6-week follow-up visit, there was no obvious proptosis (Figure 1C). Repeated magnetic resonance imaging at the 3-month visit revealed complete resolution of the orbital tumor with restoration of an unremarkable retrobulbar fat pattern (Figure 1D). Our patient was treated with propranolol until 1 year of age (treatment for 8 months). Propranolol was then tapered over a 1-month period, and the patient experienced no adverse effects or regrowth at the 9-month follow-up.

Comment. Direct interventional treatments for infantile hemangioma such as local corticosteroid injection,