The retinal pigment epithelium (RPE) can undergo reactive hyperplasia and metaplasia following a variety of ocular insults. However, true neoplasms of the RPE are rare. We report a case of a papillary adenocarcinoma of the RPE arising in the blind staphylomatous right eye of a 79-year-old woman with a long history of bilateral posterior staphylomas who was seen with increasing pain and exophthalmos of the right eye. Findings from ultrasonography and computed tomography demonstrated linear calcification consistent with osseous metaplasia of the RPE. Progression of the exophthalmos and worsening exposure keratitis led to enucleation of the eye. Gross pathology showed a 79-mm-long globe. Histopathologic findings revealed a largely amelanotic papillary adenocarcinoma arising from the RPE. Positive immunoreactivity for cytokeratin supported the epithelial origin of the tumor.

Arch Ophthalmol. 1998;116:525-528

True malignancies of the retinal pigment epithelium (RPE) are extremely rare. The RPE, however, can be involved in a remarkable variety of pathologic processes including reactive hyperplasia, congenital hypertrophy, combined hamartoma, and, less commonly, adenoma. We report herein a case of an adenocarcinoma of the RPE found in a blind eye with a large posterior staphyloma.

REPORT OF A CASE

A 79-year-old white woman was seen with increasing pain and exophthalmos of the right eye. The vision in the right eye had been poor since childhood following an alkali burn. Ten years prior to our seeing her, the vision in that eye had been noted to be no light perception. Cataract surgery was performed on the left eye, but her vision remained hand motions because of extensive myopic degeneration and posterior staphyloma. Beginning 3 months prior to our seeing her, her right eye had become increasingly prominent and painful.

Findings on examination revealed that the right eye could not perceive light and was 9-mm proptotic by Hertel exophthalmometry. The cornea was completely opaque, precluding a view of the fundus, and the episcleral and conjunctival vessels were diffusely vasodilated (Figure 1). There was marked limitation of extraocular movement in all directions of gaze. The intraocular pressure OD was 55 mm Hg. The visual acuity was light perception in the aphakic left eye with an intraocular pressure of 15 mm Hg. Findings on fundus examination showed a large posterior pole staphyloma and extensive myopic degeneration.

Orbital computed tomographic findings revealed anterior displacement of the right eye by a massive staphyloma and linear calcification along the eye wall. The solid, well-circumscribed staphyloma was heterogeneous in density and was continuous with the posterior pole of the globe (Figure 2). The left eye showed a posterior staphyloma. Magnetic resonance imaging findings showed a heterogeneous signal in the right eye slightly higher than that of the left eye (Figure 3). Linear signal voids on both spin-echo sequences were related to intraocular calcification. The
massive staphyloma involving the right eye showed a heterogeneous signal with hyperintense foci on T1-weighted images and hypointense/hyperintense foci on T2-weighted images suggestive of blood products (oxyhemoglobin/methemoglobin). The staphylomatous left eye demonstrated a normal low signal intensity on T1-weighted images and high signal intensity on T2-weighted images.

The patient was followed up closely for 9 months and was found to have increasing exophthalmos of the right eye (13 mm) and worsening exposure keratitis with corneal epithelial breakdown. Because the eye was blind and painful, with chronic corneal exposure and imminent corneal ulceration, enucleation was recommended. Using a modified enucleation approach with lateral canthotomy, the globe and massive staphyloma were removed in their entirety and fixed in formaldehyde.

**PATHOLOGIC FINDINGS**

Macroscopically, a dark brown mass with a smooth multinodular surface protruded from the posterior surface of the firm right globe. The anteroposterior length of the eye and posterior mass was 79 mm. The cornea was scarred and opacified. The globe contained bone, necessitating decalcification prior to sectioning. After sectioning, tan to brown tumor tissue mixed with blood was found to fill the interior of the globe and posterior staphyloma (Figure 4).

Microscopically, a thick layer of dense fibrous tissue adhered to the posterior surface of the scarred and ectatic cornea, obliterating the anterior chamber and enveloping markedly atrophic remnants of the iris and ciliary body. A thick layer of dense collagen incorporating large quantities of metaplastic bone covered the inner surface of the choroid. Retina was not identified. A papillary neoplasm composed of polarized, cuboidal, and columnar epithelial cells with moderately pleomorphic round to oval nuclei and nucleoli filled the remaining interior of the globe and posterior staphyloma. The tumor cells formed tubules, cords, and papillae and rested on prominent connective tissue septa (Figure 5). Although the tumor was largely amelanotic, a few strands of cells contained melanin, suggesting origin from the RPE. Twenty-eight mitotic figures were counted in 40 high-power fields. Focal necrosis and extensive intraleral hemorrhage were present. Parts of the clotted blood were markedly

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**Figure 1.** External photograph of the right eye showing pannus and complete opacification of the cornea (November 1995).

**Figure 2.** Axial computed tomographic scan demonstrating exophthalmos of the right globe and linear calcification along the eye wall. Massive lesion filling the orbit is contiguous with the posterior aspect of globe.

**Figure 3.** Axial T1-weighted magnetic resonance imaging scan showing orbital mass behind the right globe with a heterogeneous signal that shows high signal intensity.

**Figure 4.** Large, thin-walled posterior staphyloma filled with a mixture of blood and tumor tissue protrudes from the posterior aspect of the eye. Light-colored necrotic tumor fills the vitreous cavity. C indicates the cornea; arrows, abrupt transition to staphyloma.

**Figure 5.** Microscopic image of the tumor tissues showing papillary neoplasm with eosinophilic cells and focal necrosis.
adenocarcinoma rest on prominent connective tissue septae. Cells show mild nuclear pleomorphism (hematoxylin-eosin, original magnification ×100). Bottom, Arrows denote septa in this higher-magnification photomicrograph (hematoxylin-eosin, original magnification ×250).

**Figure 6.** Neoplastic epithelium composed of papillary tumor exhibits intense positive immunoreactivity for cytokeratin cell adhesion molecule marker CAM 5.2 (immunoperoxidase, original magnification ×50).

In our case, the soft tissue definition of computed tomographic studies was insufficient to differentiate a solid neoplasm from a hemorrhagic process. The excellent soft tissue contrast of magnetic resonance imaging studies was also unable to differentiate the hemorrhagic from the neoplastic component within the lesion. Furthermore, the relatively poor histopathological specificity of magnetic resonance imaging does not readily allow differentiating primary from secondary uveal or retinal tumors.

This papillary malignancy was found coincidentally on histopathological sectioning of the globe. Following histopathological diagnosis, it was decided not to treat the patient with radiation and/or systemic chemotherapy due to her age, fragile health, and because the mass was excised in its entirety with no evidence of orbital seeding. At 6 months following the enucleation, the patient continues to do well with no evidence of metastatic disease or orbital recurrence. It is known that reactive hyperplasia of the RPE may occur secondary to trauma or inflammation. It has been suggested that hyperplasia of the RPE may rarely transform into a malignant tumor. In the case reported here, there was a history of ocular trauma and chronic inflammation. Although the most frequent malignant intraocular tumor in phthisical eyes is choroidal melanoma, other malignancies including adenocarcinoma of...
the RPE must still be considered. We speculate that this malignant neoplasm may have arisen from RPE hyperplasia secondary to chronic inflammation, similar to previous published cases.\textsuperscript{4,7} In any eye with opaque media and a history of trauma, an underlying neoplasm should be considered.

Accepted for publication December 19, 1997.

Supported by the Eye Tumor Research Foundation, Philadelphia, Pa. Dr Edelstein is the recipient of the McLaughlin Foundation Fellowship.

Reprints: Jerry A. Shields, MD, Director, Ocular Oncology Service, Wills Eye Hospital, 900 Walnut St, Philadelphia, PA, 19107.

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IN OTHER AMA JOURNALS

ARCHIVES OF OTOLARYNGOLOGY—HEAD & NECK SURGERY

The Effect of Blepharoplasty on Eyebrow Position
Andrew S. Frankel, MD; Frank M. Kamer, MD

Objective: To determine if upper eyelid blepharoplasty causes eyebrow position to drop in a cosmetic surgery population.

Design: Retrospective, observational study. A treatment group that underwent upper eyelid blepharoplasty was compared with a matched control group that did not undergo the surgery.

Setting: Private facial plastic surgery practice. All surgery was performed at an ambulatory surgical facility on an outpatient basis.

Patients: A total of 82 patients (164 eyes) were included in this study: 54 (8 men and 46 women; average age, 46.8 years) in the treatment group and 28 (6 men and 22 women; average age, 43.8 years) in the control group. The treatment group was chosen in a retrospective fashion to include only those patients (1) for whom preoperative and postoperative photographs were available and (2) who had undergone upper eyelid blepharoplasty by the senior author (F.M.K.). These patients underwent no other procedures, either before or during the time span between the photographs, that could affect eyebrow position. The control group consisted of patients who had an available set of matching photographs taken over time. These patients did not undergo blepharoplasty or any other procedure that could alter eyebrow position between their initial and final photographs.

Intervention: Upper eyelid blepharoplasty performed by the senior surgeon (F.M.K.). The surgical technique was identical in all cases.

Outcome Measure: The change in eyebrow height reflected as a percentage of the pretreatment height. Results are based on measurements taken from standardized photographs.

Results: Original treatment and control groups of 108 and 56 eyes, respectively, were restricted to a smaller number to create similar populations for comparison. Therefore, 40 eyes in the treatment group were matched with 28 eyes in the control group to control for the duration between measurements. A t test found no significant difference (P = .94) in eyebrow height between patients who had a blepharoplasty and those who had not.

Conclusion: In a cosmetic surgery population, upper eyelid blepharoplasty does not cause a lowering of the eyebrow. Arch Otolaryngol Head Neck Surg. 1997; 123:393-396

Reprints: Andrew S. Frankel, MD, 201 S Lasky Dr, Beverly Hills, CA 90212.