intravitreal triamcinolone acetone in cases of diabetic macular edema refractory to focal grid laser photocoagulation, caution and close follow-up care is advised in these patients with a locally immunosuppressed intraocular status. In cases of endophthalmitis occurring after intravitreal injection of a long-acting corticosteroid, atypical Mycobacterium species should be considered in the differential diagnosis.

Matthew S. Benz, MD
Timothy G. Murray, MD
Sander R. Dubovy, MD
Randy S. Katz, MD
Charles W. G. Eifrig, MD
Miami, Fla

Corresponding author and reprints: Timothy G. Murray, MD, Bascom Palmer Eye Institute, PO Box 016880, Miami, FL 33101 (e-mail: tmurray@med.miami.edu).


Surgical Removal and Histopathologic Findings of a Subfoveal Neovascular Membrane Associated With Choroidal Osteoma

Choroidal osteomas are rare benign tumors that typically arise in young women who are otherwise healthy. Approximately 80% are unilateral, although Gass1 describes patients with unilateral osteomas who later develop bilateral disease. Ophthalmoscopic features include a well-defined, slightly elevated, white-to-crème or orange lesion in the peripapillary or macular choroid. Histopathologically, these tumors are composed of cancellous bone and lie between an altered choriocapillaris and the outer choroidal layers.5,3 There is thinning and atrophy of the overlying retinal pigment epithelium (RPE).

Many patients with choroidal osteomas are asymptomatic because vision in the affected eye may be remarkably well preserved. However, visual loss and metamorphopsia can occur due to geographic changes involving the central fovea or serous and hemorrhagic detachment of the macula; the latter is commonly the result of choroidal neovascularization.

No therapies currently exist to eradicate a choroidal osteoma. The subretinal neovascularization that complicates some cases is sometimes observed without treatment, particularly when the membrane extends beneath the fovea. In some cases, good vision can be maintained with spontaneous resolution of subretinal neovascularization.2,4,5 Other cases have been treated with laser photocoagulation, with variable results.2,8 Multiple treatments may be necessary to close the membrane, presumably because of the scarcity of melanin in the atrophic RPE.

A subfoveal location is considered to be a relative contraindication to laser photocoagulation because central vision may be immediately reduced. In recent years, surgical excision of subfoveal neovascular membranes has been described in association with various conditions, including age-related macular degeneration,10 presumed ocular histoplasmosis syndrome,11 punctuate inner choroidopathy,12 and traumatic choroidal rupture.13 We report a case of surgical removal of a subfoveal neovascular membrane in a patient with a choroidal osteoma.

Report of a Case. In May 1994, a 30-year-old woman sought treatment at the Retina Service, Massachusetts Eye and Ear Infirmary, Boston, for blurred vision in her right eye of 2 days’ duration. Examination revealed visual acuities of 20/25 OU, normal anterior segments, and a normal left fundus. In the right eye, peripapillary subretinal hemorrhage was present inferiorly from the 3- to the 9-o’clock position (Figure 1A). A neovascular membrane appeared to extend toward the fovea, and a large area of hypopigmentation of the RPE was present in the posterior pole concentric to the optic disc. Fluorescein angiography confirmed the presence of a neovascular membrane (Figure 1B), and B-scan ultrasonography revealed significant acoustic shadowing consistent with a choroidal osteoma (not shown). The neovascular membrane temporal to the disc was treated with argon laser photocoagulation. The subretinal hemorrhage resolved during the following 3 months, and the patient’s visual acuity remained at 20/25 in the affected eye.

In July 1995, 14 months after the laser treatment, visual acuity was 20/20–1 OD. However, the subretinal hemorrhage had recurred (Figure 1C), and fluorescein angiography revealed diffuse leakage that was more prominent inferiorly. Another laser treatment was discussed, but the patient did not wish to proceed.

The patient was followed up without treatment for another 16 months, during which time her visual acuity gradually decreased to 20/100 OD and the subretinal membrane grew beneath the fovea (Figure 1D and E). In December 1996, the membrane was surgically removed. After vitrectomy, a temporal retinotomy was created, and the neurosensory retina was elevated with balanced salt solution. The membrane

©2003 American Medical Association. All rights reserved.
was found to be directly under the retina and was mobilized with a subretinal spatula and removed with forceps. An air/fluid exchange was performed, and the eye was left with a 20% sulfur hexafluoride/air mixture. The specimen was sent for histologic and electron-microscopic examination. Four months after sur-

Figure 1. A, In the right eye, peripapillary subretinal hemorrhage was present inferiorly from the 3- to the 9-o’clock position. B, Fluorescein angiography confirmed the presence of a neovascular membrane. C, In July 1995, 14 months after laser photocoagulation treatment, the subretinal hemorrhage recurred. D, In November 1996, the subretinal membrane grew beneath the fovea, and visual acuity decreased to 20/100 OD. The subfoveal neovascular membrane is visible on the fundus photograph and the fluorescein angiograph (E). F, Four years 7 months postoperatively, visual acuity had decreased to 20/320−2 OD. There was no recurrence of neovascularization during the follow-up period.
gery, the visual acuity of the affected eye was 20/160+1. Four years 7 months postoperatively, acuity had decreased to 20/320−2 OD. There was no recurrence of the neovascularization during this follow-up period (Figure 1F).

The specimen measured 1 mm in maximum dimension. It was embedded in epoxy resin and processed for light and electron microscopy. Most of the tissue was composed of pigmented cells with large melanin granules characteristic of neuromelanin but not uveal melanin. These cells were likely RPE cells or histiocytes that had ingested melanin granules from the RPE (Figure 2A). The blood vessels had endothelial cells lining their lumens (Figure 2B) and pericytes adjacent to the endothelial cells (Figure 2C). Rare multinucleated cells with features characteristic of osteoclasts, such as pseudopods and numerous mitochondria, were seen (Figure 2D). Fibroblasts, histiocytes, and smooth muscle cells were also present (not shown).

Comment. In a variety of macular diseases, new blood vessels arising from the choroid may extend through the Bruch membrane to grow within the sub-RPE space (type 1 choroidal neovascularization) or the sub–neurosensory retinal space (type 2 choroidal neovascularization).14 Although the first type is characteristic of age-related macular degeneration, type 2 is found in younger patients, often in association with conditions such as presumed ocular histoplasmosis syndrome, punctuate inner choroidopathy, choroidal ruptures, or choroidal osteomas.

Histologic studies of both type 1 and type 2 choroidal neovascular membranes show fibrovascular tissue (fibrocytes and endothelial cells), RPE, and macrophages.15 However, among the type 2 membranes studied histologically, there are no examples of membranes associated with a choroidal osteoma,10 and our case is thus unique. Our case featured pigmented cells with large melanin granules, blood vessels with endothelial cells and pericytes, fi-
broblasts, histiocytes, and smooth muscle cells. The presence of osteoclasts in our case is novel.

The reason for the development of subretinal neovascular membranes in eyes with choroidal osteoma is unknown. One hypothesis is that the thinned, degenerated RPE overlying the osteoma allows the growth of new blood vessels.17 Our observation that osteoclasts are present in the neovascular membrane raises the possibility that neovascular membranes in this condition might represent an extension of the osteoma.

The therapeutic value of surgical removal of choroidal neovascular membranes has been studied. Excision of type 1 membranes, such as in age-related macular degeneration, typically involves the removal of the overlying RPE and generally results in poor visual acuity. Type 2 membranes may be more amenable to surgical removal. A recent report of a series of surgically removed type 2 subfoveal neovascular membranes documented substantial visual improvement in 11 of 17 patients aged 55 and younger.18 It has been hypothesized that the better surgical prognosis in patients with type 2 membranes is a result of relative sparing of the RPE.

In our case, a type 2 subfoveal neovascular membrane was successfully surgically removed, which resulted in relatively stable visual acuity. This occurred despite the fact that numerous pigmented cells, possibly RPE, were included in the excised tissue. It is unclear whether these pigmented cells were part of the original RPE monolayer or were a reactive proliferation in response to the osteoma.

The present case suggests that surgical intervention may be considered as one treatment option for patients with subfoveal choroidal neovascular membranes associated with choroidal osteomas. However, its effectiveness compared with observation of new modalities such as photodynamic therapy is unknown. A recent report described the results of photodynamic therapy of an extrafoveal choroidal neovascular membrane in association with a choroidal osteoma.19 There was a substantial reduction in the size of the neovascular membrane and no decrease in visual acuity. To our knowledge, there have been no previous reports describing subfoveal membranes in patients with a choroidal osteoma treated with surgical or photodynamic therapy. It is too soon to tell whether surgical excision is superior or inferior to other therapies.

### Corresponding author and reprints:

Donald J. D’Amico, MD, Massachusetts Eye and Ear Infirmary, 243 Charles St, Boston, MA 02114 (e-mail: djdamico@mei.harvard.edu).

---


---

**Prostatic Adenocarcinoma Metastatic to the Anterior Uveal Tract**

Prostate cancer rarely metastasizes to the eye. When it does, it usually involves the choroid. The most common primary sites of carcinoma metastatic to the uveal tract are the breast, lung, and gastrointestinal tract. We report a case of prostate carcinoma metastatic to the ciliary body.

**Report of a Case.** A 76-year-old man had complaints of acute visual blurring in the right eye and dull aching pain. Nine years earlier he was diagnosed as having prostatic adenocarcinoma (Gleason score, 7) with concurrent metastasis to the left fifth rib bone (Figure 1). Because of distant metastasis at diagnosis, he opted to receive hormonal treatment (Flutamide and goserelin [Zoladex]). Ocular history was unremarkable. Examination revealed visual acuity correctable to 20/20 OU. Ocular motility and visual field examination findings were unremarkable. Intraocular pressures were within normal limits. Slitlamp examination findings revealed a brown, cohesive mass containing prominent blood vessels projecting into the anterior chamber of the right eye displacing the iris (Figure 2). A microhyphaema was present. There was no tumor-cell shedding into the anterior chamber. Funduscopic examination revealed no retinal detachment. No masses were present in the left eye. Ultrasound biomicroscopy (Figure 3) showed the ciliary body...