An Ocular Endoscope Enables a Goniotomy Despite a Cloudy Cornea

Infantile glaucoma is often initially treated with a surgical goniotomy or trabeculotomy. A goniotomy is not possible if the cornea is too cloudy, despite preoperative glaucoma medications and removal of the corneal epithelium. Bimanual endoscopic goniotomy has been reported in 1 child, but this technique requires great dexterity to maintain the endoscopic image on the needle tip. In the following case, we used a new technique, coaxial endoscopic goniotomy, that allowed a goniotomy to be performed when the anterior chamber angle could not be distinguished through the surgical gonioprism.

Report of a Case. A 19-month-old girl was referred with a several-month history of film covering both eyes. The child was photophobic, tearing, and had bilateral buphthalmos with extremely cloudy corneas. She was prescribed timolol maleate, latanoprost, and acetazolamide sodium syrup while undergoing treatment for otitis media. She had no other health problems. An examination under anesthesia 9 days later revealed intraocular pressures of 31 mm Hg OD and 33 mm Hg OS, corneal diameters of 14.5 mm OD and 15 mm OS, circumferential and horizontal Haab striae in both eyes, a cup-disc ratio of 0.8 OU, axial eye lengths of 25.4 mm OD and 27.0 mm OS, and attached retinas by B-scan ultrasound. A high-iris insertion was present in the right eye by gonioscopy, but the view was too hazy in the left eye (Figure 1A).

The child underwent bilateral goniotomies with the aid of a coaxial ocular endoscope in the left eye. Permission for this procedure had been obtained from the child’s mother and approved by the institutional review board of Vanderbilt University, Nashville, Tenn. A thin blood lancet (Micro Lance; Becton-Dickinson Co, Rutherford, NJ) had been formed to wrap tightly around a 20-gauge ocular endoscope (Endoptiks, Little Silver, NJ) and was sterilized separately. The lancet was placed on the endoscope with the needle tip observable in the endoscopic image. The coaxial endoscopic goniotomy needle was then inserted through a paracentesis after viscoelastic material was placed into the anterior chamber; the needle was directed to the anterior chamber angle (Figure 2). The image of the anterior chamber angle was viewed on a videoscreen as the lancet tip cut the high-iris insertion for 130° (Figure 3). The corneal incision...
sion was closed, and a routine goniotomy was performed on the right eye.

At the child’s next examination under anesthesia, her intraocular pressures were still uncontrolled at 35 mm Hg OD and 34 mm Hg OS with poor medication compliance, but her left cornea had substantially cleared so that regular bilateral goniotomies could be performed. Corneal diameters were 14.5 mm OD and 14.5 mm OS, and axial eye lengths were 25.4 mm OD and 26.8 mm OS. The previously treated angle in the left eye was observed by gonioscopy (Figure 1B).

Comment. A goniotomy is a relatively simple procedure to treat congenital glaucoma. However, visualization of the anterior chamber angle structures is required. Coaxial endoscopic goniotomy permits visualization, as previously demonstrated in cadaver eyes2 and in the successful treatment of rabbits with congenital glaucoma.3 The coaxial alignment requires only 1 corneal incision and permits the lancet tip to be continuously viewed on the videoscreen as it incises the angle structures. The operating time is similar to that of a routine goniotomy.

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Tissue Adhesive in the Management of Leaking Pars Plana Sclerotomy Causing Hypotony and Choroidal Detachment

Nonhealing or persistent wound leakage can be encountered in sclerotomy sites after multiple pars plana vitrectomies. Therapeutic modalities such as patch graft have been reported to manage the persistent iridal wound leaks.1 Cyanoacrylate tissue adhesives have been successfully used in the management of corneal perforation and leaking filtering bleb to circumvent the need for surgical interventions such as therapeutic keratoplasty and conjunctival flap.2,3 We describe herein the technique and successful use of cyanoacrylate adhesives to manage postoperative hypotony and associated choroidal detachment caused by leakage from sclerotomy after pars plana vitrectomy.

Report of a Case. A 51-year-old white woman with a history of insulin-dependent diabetes had undergone 3 prior pars plana vitrectomies in the right eye between 1995 and 1998 for proliferative diabetic retinopathy and recurrent vitreous hemorrhage. After the first 2 surgeries, the visual acuity had returned to 20/20 for several months. Six months after the third surgery, the visual acuity OD had decreased to counting fingers owing to recurrent vitreous hemorrhage and nuclear sclerotic cataract. In the left eye she had had a persistent retinal detachment after pars plana vitrectomy in 1999 for a combined tractional and rhegmatogenous retinal detachment. She was then referred to us for further management.

On our initial examination, her best-corrected visual acuity was hand motion in the right eye and light perception in the left. Ophthalmic echography showed dense vitreous hemorrhage without retinal detachment in the right eye and a rigid funnel-shaped retinal detachment with dif-
fuse vitreous hemorrhage in the left. Because of the guarded visual prognosis for the left eye, surgery was recommended for the right. A pars plana vitrectomy, lensectomy, endolaser panretinal photocoagulation, and implantation of a posterior chamber intraocular lens were performed in the right eye. The visual acuity improved to 20/400 with a normal intraocular pressure on the first postoperative day. One week later, she complained of aching with decreased vision in the right eye. The visual acuity remained at 20/400 OD and light perception in the left eye. However, the intraocular pressure was 4 mm Hg OD and 12 mm Hg OS. Slit-lamp examination showed loosening of the 8-0 polyglactin 910 (Vicryl) suture at the superotemporal sclerotomy site in the right eye (Figure 1). An open sclerotomy with partially retracted conjunctiva and very thin surrounding sclera was noted. Findings from the Seidel test were positive. The anterior chamber remained formed with moderate Descemet membrane folds and corneal edema. Fundus examination revealed a 360° choroidal detachment more prominent in the superotemporal quadrant with overlying photocoagulation scars (Figure 1, inset).

Because of the thin remaining sclera and medical history of multiple intraocular surgeries, a decision was made to seal the leaking sclerotomy with cyanoacrylate tissue adhesives instead of further surgical intervention. For leaking sclerotomy with a soft globe in this patient, tissue adhesive was applied under a slitlamp biomicroscope using topical anesthesia and a lid speculum. After the loose suture was removed, the necrotic scleral and conjunctival tissues overlying the scleral perforation were debrided. Prior to gluing, a sterile plastic disk was cut to the size slightly larger than the sclerotomy using a 3-mm skin biopsy punch (Acu-Punch; Acuderm, Ft Lauderdale, Fla). The plastic disk was then placed on a small amount of ophthalmic ointment, which was preplaced at the end of the wooden stick of a cotton-tipped applicator as previously reported. A small meniscus (about 1 to 2 µL) of the tissue adhesive (Histoacryl; B. Braun, Melsungen AG, Germany) was placed on the 3-mm plastic disk (Figure 2, inset). The leaking area was dried with a cellulose sponge. The glue on the disk was gently pressed against the sclerotomy for 10 to 20 seconds with the end of the applicator (Figure 2). On observing the polymerization of tissue adhesive and adequate adherence of the disk over the sclerotomy, the cotton-tipped applicator was removed. The preplaced ointment facilitated the separation of the disk from the end of the applicator and prevented dislodging of the polymerized glue on the disk. Because the adhesive plug had a rough edge around the disk and could be potentially irritating, a therapeutic contact lens was used to ensure the patient’s comfort and to prevent dislodgement of the glue by eyelid blinking (Figure 3). Application of 0.3% topical ofloxacin 4 times a day and 1% prednisolone acetate every 2 hours were prescribed. On the following day, persistent hypotony with a slow leakage was noted at the inferior edge of the glued disk. Another application of the tissue adhesive on a disk to the inferior edge of the initial disk was performed. On the fourth day, no leakage was detected and the intraocular pressure was 10 mm Hg. Minimal corneal edema with residual folds of Descemet membrane was noted, but the choroidal detachment resolved.

Figure 1. Leakage from pars plana sclerotomy associated with choroidal detachment (inset).

Figure 2. Application of tissue adhesive on a plastic disk (inset) over the sclerotomy.
detachment persisted. During the examination, the 2 glued disks dislodged and the tissue adhesive on a new disk was reapplied. Five days after the last gluing, the third glued disk dislodged and the scleral wound was healed without evident leakage (Figure 4). Complete resolution of corneal edema and choroidal detachment (Figure 4, inset) was noted. The visual acuity improved to 20/100 OD with an intraocular pressure of 20 mm Hg.

Comment. This report demonstrates the successful management of a leaking pars plana sclerotomy by cyanoacrylate tissue adhesive. This gluing method should be considered as an effective alternative to resuturing or to applying a scleral patch graft. The application of tissue adhesive is simple and can be readily performed in the office. Tissue adhesive applied to the thinned sclera or macerated sclerotomy may prevent further tissue degradation and facilitate wound healing and vascularization. Sutureless pars plana sclerotomy is a recently described vitrectomy technique using a localized scleral tunnel. The gluing method could also be used to reinforce these sutureless sclerotomies if leakage occurs. As demonstrated in this case, the gluing technique can be repeated in sclerotomies with persistent wound leakage.

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Spontaneous Peeling of Epiretinal Membrane Associated With Nd:YAG Laser Injury

The increasing use of high-energy laser instrumentation for scientific and therapeutic purposes has resulted in the proliferation of inadvertent retinal injuries. The expanding use of Nd:YAG technology poses new threats from accidental exposure. Reaction of retinal tissues from Nd:YAG laser insult differs from the typical thermal injuries caused by argon and krypton lasers. We report a case of laser injury to the macula in which we were able to closely monitor the evolving retinal response to Nd:YAG disruption.

Report of a Case. A 23-year-old researcher suffered sudden vision loss in his right eye while focusing a reflected beam from a frequency-doubled Nd:YAG laser. He was not wearing protective eyewear. His best-
Corrected visual acuity was 20/200 OD and 20/15 OS. He noted a large gray floater, with metamorphopsia and central scotoma identified by Amsler grid. Fundus evaluation revealed vitreous hemorrhage obstructing adequate macular visualization. Examination results from the left eye were unremarkable.

The next day, his visual acuity had improved to 20/60 OD (Figure 1A). Fluorescein angiogram showed early and late foveal hyperfluorescence, consistent with Bruch’s membrane penetration. Within 2 weeks his visual acuity had improved to 20/25 OD (Figure 1B). However, 2 weeks later, the patient had a decline in visual acuity to 20/40 OD. Fundus evaluation revealed a distinct epiretinal membrane (Figure 2A).

Seven months later the patient had a visual acuity of 20/20 OU and spontaneous regression of the epiretinal membrane (Figure 2B). On subsequent visits, the patient’s vision and retinal examination results have remained stable.

**Comment.** Previously reported cases of accidental Nd:YAG laser injuries describe several common features such as early subretinal, retinal, and vitreous hemorrhage with macular hole and pucker. We describe a single case of Nd:YAG injury that demonstrated several interesting features of the retinal response to focal thermo-mechanical disruption. Vitreous and subretinal blood likely act as stimulants for fibroglial and retinal pigment epithelium proliferation, resulting in an epiretinal membrane over the macular hole. Contraction of the gliotic membrane causes macular pucker and reapproximation of the edges of the hole. In this case, subsequent spontaneous peeling of the membrane resulted in restoration of visual acuity and resolution of the macular hole. Similar progression was reported in an idiopathic macular hole associated with an epiretinal membrane.

The vast majority of retinal laser injuries occur in the absence of appropriate eyewear, illustrating the
paramount importance of eye protection while operating lasers.

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Cardiac Metastasis From Uveal Melanoma

Ruiz and coworkers\(^1\) recently described an elderly woman who developed cardiac metastasis from choroidal melanoma and died of a ruptured myocardium. Because of a scarcity of other reports, they concluded that cardiac metastasis from uveal melanoma was extremely rare, perhaps with the exception of patients with widespread micrometastases that might go undetected without autopsy.\(^1\) In our experience, macroscopically detectable metastasis from uveal melanoma to the heart is not uncommon, although it is true that it has seldom been reported in the literature. We are aware of 4 reports of cardiac metastasis from uveal melanoma in 14 patients.\(^1,4\) A fifth article mentions 2 patients with cardiac metastasis from an ocular primary melanoma, but it does not specify whether the primary site was the uvea or conjunctiva.\(^5\) The purpose of the present report is to describe 5 patients with cardiac metastasis to estimate the frequency of metastasis to the heart from uveal melanoma.

Report of Cases. To get a reliable estimate of the spectrum and frequency of cardiac metastasis, we reviewed clinical and autopsy data of a consecutive series of 167 patients who had an eye enucleated between 1972 and 1981 because of a choroidal or ciliary body melanoma.\(^6\) These patients have complete, validated follow-up data. By December 1999, tumors had disseminated in 80 patients (48%). Autopsy had been performed on 27 (34%) of these 80 patients, who all died of disseminated uveal melanoma. Sites of metastases that were identified clinically or by macroscopic examination at autopsy were recorded. Metastases that were detected only incidentally by microscopy, including 1 in the heart, were disregarded. Statistical analysis was based on exact probability distributions (StatXact-3; Cytel Software, Cambridge, Mass).

Five patients (Table) had cardiac metastases, all of which were clinically asymptomatic. Macroscopic autopsy reports gave the following descriptions: Case 1. Three pigmented metastases in the left ventricular wall. Case 2. Multiple pigmented metastases 2 to 3 mm in diameter in the left ventricular epicardium and myocardium, and a subendocardial metastasis 2 mm in diameter in the anterior papillary muscle. Case 3. Multiple, small metastases in the pericardium, epicardium, and myocardium (Figure 1) in the apex of the heart. Case 4. One pigmented myocardial metastasis 1 cm in diameter in the posterior wall of the heart, together with several endo- and pericardial metastases 2 to 3 mm in diameter. Case 5. A solitary metastasis in the epicardium.

The frequency of cardiac metastasis at autopsy was 19% (5 of 27 cases) (95% confidence interval [CI], 6%-38%). This finding is essentially identical to that of a 1963 population-based Danish study, which reported pericardial and myocardial metastases in 9 (24%) of 38 patients who were autopsied (95% CI, 11%-40%).\(^2\) The frequency of cardiac metastasis in the entire series of 167 patients who had an eye enucleated was thus 3.0% (95% CI, 1.7%-7.7%), and the frequency of symptomatic cardiac metastasis was 0% (95% CI, 0%-2%). We recognize the limitations of our study in that the autopsy rate was not high and patients were not selected for autopsy at random. Autopsies were done on an individual basis according to the preference of the attending physician and the relatives of the deceased.

Retrospective evidence did not suggest any obvious bias regarding selection of patients for autopsy. Of the 27 patients who underwent autopsy,

### Table: Clinical Characteristics of 5 Patients With Malignant Uveal Melanoma

<table>
<thead>
<tr>
<th>Patient No./Sex/Age at Enucleation, y</th>
<th>Site</th>
<th>Cell Type</th>
<th>Largest Basal Diameter, mm</th>
<th>Microvascular Loops</th>
<th>Time From Enucleation to Metastasis, y</th>
<th>Time From Metastasis to Death, mo</th>
<th>Sites of Metastasis at Autopsy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/M/47</td>
<td>Choroidal</td>
<td>Mixed</td>
<td>12</td>
<td>Networks</td>
<td>15.9</td>
<td>2</td>
<td>Heart (myocardium), liver, pancreas, and lymph node</td>
</tr>
<tr>
<td>2/F/48</td>
<td>Choroidal</td>
<td>Mixed</td>
<td>6</td>
<td>None</td>
<td>6.9</td>
<td>6</td>
<td>Heart (myo-, endo-, and epicardium), liver, pancreas, lung, stomach, kidney, thyroid, adrenal, brain, and lymph node</td>
</tr>
<tr>
<td>3/F/72</td>
<td>Choroidal</td>
<td>Epithelioid</td>
<td>6</td>
<td>Loops</td>
<td>1.2</td>
<td>3</td>
<td>Heart (myo-, epi-, and pericardium), liver, pancreas, lung, kidney, bladder, thyroid, and skin</td>
</tr>
<tr>
<td>4/M/72</td>
<td>Choroidal</td>
<td>Necrotic</td>
<td>10</td>
<td>NA</td>
<td>9.3</td>
<td>1</td>
<td>Heart (myo-, endo-, and pericardium), liver, pancreas, bladder, and lymph node</td>
</tr>
<tr>
<td>5/M/57</td>
<td>Ciliochoroidal</td>
<td>Necrotic</td>
<td>25</td>
<td>NA</td>
<td>1.3</td>
<td>4</td>
<td>Heart (epicardium), liver, kidney, lung, adrenal, lymph node, and skin</td>
</tr>
</tbody>
</table>

*All 5 patients had cardiac metastasis at autopsy. NA indicates not assessable.*

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5 were autopsied without suspicion of metastasis, which argues against selection for autopsy of patients with known widespread dissemination. Furthermore, no difference between autopsied and nonautopsied patients who died of disseminated uveal melanoma was observed in the age at enucleation (P = .25, Mann-Whitney test), the presence of metastatic symptoms (P = .16, Pearson χ² test), or the time from enucleation to the onset of symptoms and signs of metastatic disease (P = .96, log-rank test). Comparison of the number of clinically known metastases at the time of death between autopsied and nonautopsied patients indicated no statistically significant difference between groups (mean, 1.3 vs 1.7, respectively; P = .18, Mann-Whitney test).

Presence of cardiac metastasis was statistically significantly associated with a large number of macroscopic metastatic sites detected at autopsy (Figure 2) (P < .001, Pearson χ² test). None (95% CI, 0%-17%) of the 20 patients who had 3 or fewer metastatic sites had cardiac metastases, whereas 5 (71%; 95% CI, 29%-96%) of 7 patients with 4 or more metastatic sites had cardiac metastases. Presence of cardiac metastases among the 80 patients who died of disseminated uveal melanoma was not associated with the age at diagnosis of uveal melanoma (P = .47, Mann-Whitney test) or with the time from enucleation to death (P = .82, log-rank test).

Comment. Based on our data, we estimate that cardiac metastasis from uveal melanoma is found in approximately one fifth of patients who die of this tumor. It is possible that the ability to spawn widespread visceral metastasis, often with cardiac involvement, is a property developed by a subset of uveal melanomas, as opposed to being the result of longer survival time that would allow more extensive dissemination. Such metastases, however, seldom cause clinical symptoms. In addition to the case report of Ruiz and coworkers, we are aware of one lethal cardiac metastasis from uveal melanoma. 4 This 69-year-old man developed an atrioventricular block and atrial fibrillation and died of cardiac arrest. At autopsy, he was found to have metastases in the heart, liver, pancreas, adrenal gland, and lymph nodes. The cardiac metastases involved the atrioventricular node and left and right bundle branches. 4 On the other hand, patients who die of uveal melanoma are generally 56 years or older, and many of them have concurrent heart disease, which may obscure the origin of cardiac symptoms or of electrocardiographic findings related to metastatic uveal melanoma.

Since submission of the manuscript, Rosario et al 7 recently described a woman who experienced syncpe attacks because of endocardial and left ventricular metastasis from choroidal melanoma. She died of complications during cardiac surgery.

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