Capsulorrhexis in Capsular Delamination

Separation of the anterior layer of the lens capsule, also known as true exfoliation and capsular delamination, has become an increasingly rare clinical finding. Although its pathogenesis is not precisely known, the condition has been associated with age, trauma, and exposure to toxins and/or to thermal radiation. An association with occupational infrared radiation exposure was accepted after Elschnig described the classic clinical findings in 2 glassblowers and Kubik and others noted the condition in blacksmiths, puddlers, chainmakers, and steelworkers. With improved safety standards, the condition is now reported less frequently in association with occupational hazards. Capsular delamination remains of interest particularly because there may be mild subclinical forms of the condition, and because modern cataract surgery is dependent on successful anterior capsule removal.

Report of a Case. An 81-year-old man who under treatment for a cardiac arrhythmia and hypertension reported blur and glare in both eyes. There was a family history of cataracts and glaucoma. His career involved more than 20 years in a steel mill. During 4 of these years, he experienced frequent and intense prolonged exposure to the heat of the blast furnaces.

On ophthalmic examination, his best-corrected visual acuity was 20/70 OU. The patient had hyperopia of 4 diopters. Bilateral cataracts were present, having combined cortical and nuclear elements. Within the central anterior chamber in both eyes was a folded cellophane-like membrane fixed to the anterior lens capsule’s surface, unassociated with any evidence of inflammation (Figure 1). The degree of delamination was approximately symmetrical. There were no other abnormal deposits on the lens capsule or the iris, no unusual pigmentation of the angle, and no phacodonesis. Results of tonometry, fundus, and optic nerve examinations were all normal.

The patient underwent bilateral cataract extraction with a 2-month interval between procedures. The phacoemulsification technique was standard except for a larger than usual capsulorrhexis and the submission of the capsule specimens for histopathologic study. The diaphanous membrane was gently teased to the side and the deeper capsular layer was dissected with a bent 30-gauge needle. There were no complications in either operation. Two years postoperatively, the uncorrected vision was 20/25 OU with a mild astigmatism with the rule noted on refraction. The posterior capsules remained clear and the anterior capsular edges appeared normal.

Findings from the histopathologic examination of the specimens revealed delamination of the lens capsule that was best illustrated by transmission electron microscopy (Figure 2). The capsule was moderately electron dense with a laminated granular appearance. The splitting of the capsule was documented with the anterior layer thinner than the posterior layer.

Comment. Multiple reports exist of capsular delamination specimens from successful intracapsular and extracapsular cataract surgery. In this case, the curvilinear capsulorrhexis technique was successful. With the exception of the manipulation required to...
take the surgical specimen, the cases were routine and without complication. To our knowledge, no series to date has reported a rate of complication in cataract extraction with capsular delamination, but the true incidence of complications associated with this finding will be difficult to establish because of its rarity.

While capsular delamination is rare, mild and subclinical forms of the condition may be more prevalent than currently recognized. In a series of 10 cases, Wollensak and Wollensak reported the appearance of a double contour visible at the capsulorrhexis edge. Pathologic analysis of the capsulorrhexis specimens by light and electron microscopy revealed the double contour to result from a characteristic step formation at the capsulorrhexis edge. In 7 of 10 of these cases, these authors also noted surface-parallel splits in the outer third of the capsule. They postulated that the double contour and microscopically evident surface-parallel splits may represent a subclinical form of true exfoliation that results from zonular traction on the superficial capsule over less elastic deeper layers in older patients. These findings suggest that true exfoliation may represent one extreme of a continuum representing different degrees of capsular delamination. Although Wollensak and Wollensak reported anecdotally that the incidence of radial capsular tears appeared lower when a double contour was seen, no evidence currently exists regarding the relative strength or weakness of the capsulorrhexis with the double contour. Likely, the finding goes unnoticed in most cases. No double contour was observed after curvilinear capsulorrhexis in our case. Perhaps this is because the delamination did not extend to the capsulorrhexis edge, although evidence for shearing of the capsular layers beyond the edge of true exfoliation is suggested by the vacuolization of the capsule seen ultrastructurally beyond the split (Figure 2).

Although associations with trauma, toxins, inflammation, and heat are well recognized, the underlying etiology of true exfoliation of the lens capsule remains uncertain. Small case series of patients without a history of trauma or heat exposure suggest aging may be a major factor. It has also been suggested that capsular protein abnormalities may play a role. In this case, however, a volunteered history of prolonged exposure to the heat of a blast furnace provided the most likely etiologic factor related to both the cataract and delamination of the anterior capsule. Clinically, diaphanous transparent membranes were similar to those reported as glassblower’s cataracts. Fortunately, occupational safety standards and protective engineering have made true exfoliation from infrared exposure rare.

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Optic Nerve Teratoma and Odontogenic Dermoid Cyst in a Neonate With Persistent Fetal Vasculature

Teratomas are embryonal tumors that are derived from all 3 germinal layers (ectoderm, mesoderm, and endoderm). These neoplasms occur most commonly in neonates, and they are frequently located in the sacrococcygeal and presacral areas. Although intracranial teratomas are rare, they are the most common brain tumors of the neonatal period, and most frequently involve the pineal region, suprasellar region, hypothalamus, cerebellar vermis, and ventricles. Teratomas of the optic nerve are exceedingly rare, with few reports in the English literature.

We report a neonate with an optic nerve teratoma, an odontogenic orbital dermoid cyst, and persistent fetal vasculature (PFV). We are not aware of any previous case in which these entities have coexisted, and, to our knowledge, this is the first report in which any 2 of the 3 have been documented as occurring in the same patient.

Report of a Case. A healthy 2-day-old white boy was referred for management of PFV of the right eye. The patient was carried to term and had no family history of any unusual eye disease. On examination under anesthesia, the patient appeared enophthalmic on the right side, and had right microcornea (corneal diameters: 6.0 mm OD and 10.0 mm OS). Intraocular pressures were 5 mm Hg OD and 10 mm Hg OS. Biomicroscopy of the right eye (Figure 1) revealed patches of band keratopathy at the 4-o’clock and 8-o’clock positions, with peripheral corneal neovascularization extending 360°. Dense fibrotic membranes extended from the pupillary margin and anterior iris stroma into the anterior chamber angle. A yellow mushroom-shaped mass protruded through the pupil. B-scan ultrasonography revealed a funnel-shaped stalk that extended from an area surrounding the optic nerve to the retroperitoneal region, as is consistent with PFV. Axial lengths were 15.8 mm OD and 22.9 mm OS. Examination results from the left eye were normal.

At age 1 month, the patient underwent attempted anterior segment reconstruction, but the dense fibrotic membranes precluded lensectomy. At age 3 months, the patient developed right lower-lid ectropion, and a cystic mass was palpated in the anterior inferior orbit. Computed tomography demonstrated a hypoplastic right orbit containing an extracranial


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infraorbital cyst (10 × 23 × 13 mm) with calcifications. Magnetic resonance imaging (Figure 2) depicted a second discrete mass (10 × 10 × 13 mm) that traversed the right optic canal into the suprasellar cistern. This second lesion compressed the right optic nerve at the orbital apex and extended along the length of the optic nerve to the anterior optic chiasm. An orbitotomy was performed on the infant at age 3 months, with removal of the cystic lesion from the right inferomedial orbit. During the procedure, the lesion was isolated above the periosteum along the inferior orbital wall and was noted to be multiloculated, with 3 distinct cystic bulges (Figure 3). While dissecting the lesion at its base, we found a unic cusped tooth (0.5 × 0.5 cm) between the cyst and orbital wall, as well as a second toothlike structure that resembled a hollow crown (0.7 × 0.6 cm). The resected cystic lesion measured 2.3 × 1.5 × 1.0 cm, with a fragment of smooth white tissue (0.5 × 0.4 × 0.3 cm) attached to it. Histology revealed a dermoid cyst (Figure 4) and separate soft tissue, including dental papillae and odontogenic rests. The 2 well-developed teeth were not submitted for histologic examination.

At age 6 months, the patient underwent a right pterional craniotomy for excision of the orbital apex lesion. The mass was fibrous and adherent to the ophthalmic segment of the internal carotid artery as well as the right optic nerve. The intracranial portion of the nerve was transected, and part of the lesion remained within the orbit. Microscopic analysis of the excised lesion revealed a mature teratoma composed of cartilage, nerve fascicles, smooth muscle, pancreatic islets, and ductular structures with focal squamous metaplasia, glands with gastric specialized type cells, fibrous tissue, and focal chronic inflammatory infiltrate (Figure 5).

The patient underwent diagnostic workup for other germ cell tumors of the mediastinum, abdomen, sacrum, and testes, with no further evidence of teratomas.

Comment. Teratomas and orbital dermoid cysts typically contain tissues that are foreign to their anatomic location. Many authorities believe that teratomas arise from pleuripotential primordial germ cells that undergo erroneous migration, later acquiring oncogenic properties. Similarly, dermoid cysts are derived from epithelial cells that, during embryogenesis, become improperly sequestered within the spaces between the sutures of orbital bones. While not anatomically joined, the association and close proximity of the teratoma and the dermoid cyst in our patient suggests a common origin or process in the early intrauterine period.

Imaging studies revealed no evidence of a connection between the optic nerve teratoma and the odontogenic dermoid cyst, indicating that the 2 lesions were distinct entities. We have classified the orbital lesion as an odontogenic dermoid cyst rather than a teratoma because this terminology more accurately describes the pathologic findings and does not mandate that the lesion arose from a neoplastic process. The presence of well-developed teeth in intimate association with the dermoid cyst suggests

Figure 1. External and anterior segment of the right eye. The patient was enophthalmic on the right side, with lower eyelid ectropion. A cystic mass is present behind the right lower eyelid.

Figure 2. Magnetic resonance imaging (MRI) scans of optic nerve teratoma and an odontogenic orbital dermoid cyst. A, T2-weighted MRI scan depicting optic nerve teratoma (arrows) involving the right optic nerve and anterior optic chiasm. B, An extraconal infraorbital cyst with calcifications (arrows) surrounds the microphthalmic right eye (arrowheads).
that both components of the orbital lesion were derived from tissue displaced from the skin and oral cavity during embryogenesis. The presence of dental structures within the orbital teratomas and orbital dermoids has previously been reported, but remains exceedingly rare.

Persistent fetal vasculature results from improper development of secondary vitreous and an incomplete regression of the primary vitreous during the ninth week of gestation. No intraocular specimens were extracted from our patient; therefore, the presence of such mesenchymal tissues could not be determined. The findings of microcornea and dense fibrotic membranes extending from the pupillary margin into the anterior chamber angle may also indicate a component of anterior segment dysgenesis in this severely malformed eye.

The congenital defects described in our patient represent unique developmental anomalies involving the eye and brain. While systemic findings associated with PFV are uncommon, the present case underscores the need to be vigilant for signs of concurrent orbital and intracranial abnormalities.

Figure 3. Gross photograph of the resected multiloculated cystic lesion (orbital dermoid cyst) and 2 teeth.

Figure 4. Portion of dermoid cyst wall containing epidermis with hair follicle (A) (arrow) and sebaceous (B) (arrow) structures (hematoxylin-eosin, original magnification ×100).

Figure 5. Some of the diverse elements within the mature teratoma included islands of cartilage (A) (arrows), pancreatic islets (B) (arrow), and gastric-type glands with adjacent smooth muscle (C) (arrow) (hematoxylin-eosin, original magnification ×200).

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Slitlamp photograph of the left eye. Bare necrotic sclera is observed between the 5- and 9-o’clock positions. The sclera was mildly thinned and stained with fluorescein.

### Scleral Ulceration After Preoperative Injection of Mitomycin C in the Pterygium Head

A pterygium is a common degenerative corneal disorder. Adjunctive treatments, including radiation, antimetabolites, and conjunctival and limbal grafts, are used to decrease the rate of recurrence after simple excision. Mitomycin C (MMC) is an alkylating agent that is commonly used in glaucoma filtration surgery to treat conjunctival neoplasia and also to prevent recurrence of pterygia. Different routes of administration, including instillation of drops after surgery and intraoperative application of a sponge soaked with MMC on the scleral bed of excision, have been used. A single 0.1-mL injection of 0.1 mg/mL of MMC into the pterygium head in 6 patients, followed by pterygium excision 4 weeks later, was described by Donnenfeld et al. This is the only report, to our knowledge, to support the use of subconjunctival MMC before surgery to prevent recurrence of pterygia. In this case, a higher volume of the same concentration was injected, with serious adverse effects.

The use of topical MMC eye drops after pterygium excision has been associated with severe discomfort and vision-threatening complications, including glaucoma, cataract, corneal edema, corneal perforation, and scleral calcification. Rubinfeld et al recommended avoiding MMC in patients who had other conditions associated with poor wound healing, such as keratoconjunctivitis sicca and Sjogren syndrome.

In our patient, multiple factors may have predisposed to poor wound healing. We suspect that the MMC accumulated inferiorly, causing damage to the inferior sclera and inferior conjunctival tissue used for the conjunctival graft. Dry eye syndrome and long-term postoperative treatment with topical nonsteroidal anti-inflammatory drugs and steroids are additional factors that could have interfered with the healing process. Although MMC has been demonstrated to decrease the rate of recurrences after pterygium excision, a conventional route of ad-
An Ectopic Site of Lacrimal Gland Secretion Mimicking Epiphora

Epiphora, starting at or shortly after birth, is most commonly associated with obstruction of the lacrimal drainage system. It may also be due to reflex hypersecretion secondary to ocular irritation, such as that caused by glaucoma, trichiasis, and infectious or chemical conjunctivitis. We present an additional cause of congenital tearing, an ectopic lacrimal gland ductule opening on the external upper eyelid at the lateral canthus, mimicking epiphora.

Report of a Case. A healthy 8-year-old white male was evaluated for tearing of the right eye, which started within 3 months of birth. The excess tears were noted to run down the lateral aspect of the right eye. Abnormal tearing of the left eye had not been observed. Epiphora was frequent, and when most severe, was associated with environmental irritants, such as dust or sand. There was no additional complaint of ocular irritation or other symptom.

On examination, several hairs, identical in appearance to adjacent eyelashes, were present 3 mm above the lateral edge of the lash line of the right upper eyelid. With applied corneal irritation, tears were noted to originate from the same cutaneous ostium as the ectopic lashes and to run down the patient’s cheek (Figure). No baseline secretion from the aberrant opening was observed during examination. Ophthalmic examination results were otherwise within normal limits, with a best-corrected visual acuity of 20/20 OU, normal corneal examination results, normal and equal tear lakes, no palpable palpebral or orbital lacrimal gland mass, no exophthalmos, and normal ocular motility. Ocular tear production, estimated with filter paper saturation, was normal and equal in both eyes. The lacrimal drainage system was patent; dye disappearance testing and irrigation were normal and equal in both eyes. On general physical examination, the patient was healthy, with no additional congenital abnormalities. The patient declined surgical excision for control of symptoms.

Comment. To our knowledge, this is the first reported case of abnormal tear drainage due to lacrimal gland secretion through a lacrimal ductule misdirected to the external eyelid. Excessive tearing was most severe in association with ocular irritants, when reflex tearing would be maximal. There was no evidence of additional lacrimal system abnormalities. The patient had a healthy cornea, normal tear lake, and normal measured tear production.

This most likely represents a developmental abnormality. Other possible lesions that might contain glandular tissue, such as a teratoma or dermoid tumor, are unlikely in the absence of a palpable mass and do not produce tears. Although not associated with epiphora, cases have been reported of ectopic lacrimal glandular tissue and duct cysts. Moreover, misdirected lacrimal gland secretion through a congenital aberrant lacrimal gland ductule is supported by the presence of the observed neural link with lacrimal gland secretion, evidenced by an association of secretion with ocular irritation and the lack of secretion in its absence. In short, secretion from an ectopic lacrimal gland ductule should be considered when evaluating patients with congenital epiphora.

The authors do not have any commercial or proprietary interest in any ma-
A 45-year-old white woman was referred for evaluation of bilaterally decreased vision. She related a history of nystagmus, high myopia, and poor vision since childhood. She was not born prematurely and was systemically healthy.

Her family history was notable for poor vision, nystagmus, and early cataracts in her paternal grandmother, father, and sister.

The patient exhibited no signs of cutaneous albinism. Her best-corrected visual acuity was 20/80 OU and her pupillary responses were normal. Mild horizontal nystagmus and a 15 prism diopter exotropia were present. A 1-mm corneal pannus encompassed the superior 270° of each eye. The fundi were lightly pigmented. The optic nerves were normal. In each eye, the retinal vessels were slightly dragged temporally, and foveal reflexes were absent (Figure 1).

Fluorescein angiography revealed an irregular capillary-free zone in each eye. In the right eye, several vessels traversed the peripheral aspects of the capillary-free zone. No choroidal neovascularization was seen in either eye. Electroretinographic amplitudes were within normal limits.

Following pupillary dilation, a commercial OCT unit (Humphrey Instruments, Zeiss-Humphrey, San Leandro, Calif) was used to obtain 5.92-mm radial sections through the entire macular area of each eye (Figure 2A and B). Standard OCT software was used to generate retinal topographic measurements. In all sections, the retina was of normal thickness and no foveal depression was detectable (Figure 2D and E). Instead, there was continuity of multiple retinal layers through the area where the foveal center was expected to be located.

**Comment.** Foveal hypoplasia is an ocular abnormality that may be seen in isolation or in association with other ocular or systemic signs. Typical associated findings include nystagmus, aniridia or iris transillumination, cataract, and skin hypopigmentation. Visual acuity is in the range of 20/50 to 20/200. An autosomal dominant syndrome of congenital nystagmus, foveal hypoplasia, corneal pannus, and presenile cataracts has been reported, and our patient’s phenotype and family history are most compatible with this syndrome. In cases with only moderate reduction in vision or without associated signs, the diagnosis of foveal hypoplasia may not be straightforward. The differential diagnosis includes high myopia, early retinal degeneration, and retinopathy of prematurity.

Optical coherence tomography allows detailed examination of macular anatomy. It can thus provide insight into the foveal architecture in patients with foveal abnormalities or visual impairment as well as confirmation of clinical diagnosis, per-
glion cells and nuclear layers. These macula, with persistence of ganglion cell layer, show preservation of multiple inner retinal layers as well as retinal vasculature. Histologically, this area consists of cone photoreceptors and lacks several of the inner retinal layers as well as retinal vasculature.

In histologic specimens of foveal hypoplasia, by contrast, the structure of the central macula resembles that of the peripheral macula, with persistence of ganglion cells and nuclear layers. These histologic findings are recapitulated in our patient's OCT data, which show preservation of multiple inner retinal layers when there should be none. We are aware of no other conditions that may produce similar OCT findings. Perhaps a more accurate term for this condition, then, is foveal dysgenesis. In summary, OCT provided a definitive diagnosis of foveal hypoplasia and may prove helpful in the diagnostic evaluation of patients with unexplained visual loss.

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Photodynamic therapy with verteporfin (Visudyne; Novartis AG, Switzerland), also termed verteporfin therapy, can reduce the risk of moderate and severe vision loss in selected patients with choroidal neovascularization (CNV). The Japanese Age-Related Macular Degeneration Trial (JAT), a photodynamic therapy trial started in May 2000, was designed to evaluate the safety and fluorescein angiographic effects of verteporfin therapy. This report describes an unusual case from this trial in which subfoveal CNV was no longer apparent on fluorescein angiography after an initial application of photodynamic therapy with verteporfin. There was no obvious fluorescence from fibrosis or atrophy of the retinal pigment epithelium within the area initially occupied by CNV.
A 79-year-old Japanese woman, who had visual disturbance in her left eye for 2 years before seeking treatment, subsequently developed decreased vision in her right eye. She was referred to Osaka University Hospital, Osaka, Japan, in August 2000. Her best-corrected visual acuity (approximate Snellen equivalent) was 20/126 OD and 20/200 OS. Ophthalmoscopic examination showed a subfoveal lesion with additional slight hyperfluorescence without leakage just superior to the lesion. A color fundus photograph taken 3 months after photodynamic therapy with verteporfin shows resolution of the hemorrhage and no fibrosis or significant retinal pigment epithelial abnormalities within the region previously occupied by CNV. A late-phase frame fluorescein angiogram shows no leakage or staining within the area previously occupied by CNV. Fluorescent staining, without leakage, is unchanged just superior to the central macula. A color fundus photograph taken 6 months after photodynamic therapy with verteporfin shows no fibrosis and only slightly increased pigmentation within the region previously occupied by CNV. A late-phase frame fluorescein angiogram shows no leakage or staining within the area previously occupied by CNV.

### Report of a Case

A 79-year-old Japanese woman, who had visual disturbance in her left eye for 2 years before seeking treatment, subsequently developed decreased vision in her right eye. She was referred to Osaka University Hospital, Osaka, Japan, in August 2000. Her best-corrected visual acuity (approximate Snellen equivalent) was 20/126 OD and 20/200 OS. Ophthalmoscopic examination showed a subfoveal lesion with subretinal hemorrhage in the right eye (Figure A) and atrophy in the macular area of the left eye. Fluorescein angiography showed leakage from CNV in a pattern composed of at least 50% classic CNV (a predominantly classic lesion) with a greatest linear dimension of 3400 µm (Figure B). After reviewing the risks and benefits of participating in the JAT, the patient signed a consent form previously approved by the local institutional review board and enrolled in the JAT in October 2000. Verteporfin therapy was performed without...
any complications, following the pro-
tocol used in the Treatment of Age-
Related Macular Degeneration With
Photodynamic Therapy (TAP) investi-
gation.

One week after treatment, the
patient’s best-corrected visual acuity
(approximate Snellen equivalent) was 20/160 OD. Ophthal-
moscopic examination of her right eye showed no change to the subreti-
nal hemorrhage. Fluorescein angi-
ography showed no leakage from CNV and no fluorescein staining in
the macular area previously occu-
pied by CNV.

At 3 and 6 months after treat-
ment, best-corrected visual acuity
(approximate Snellen equivalent) improved to 20/100 OD and 20/80
OD, respectively. No CNV was
detected in her right eye on ophthal-
moscopic examination at either of
these visits. Fluorescein angiogra-
phy at the 3-month (Figure, C and
D) and 6-month (Figure, E and F) examinations showed no abnormal
fluorescence within the region origi-
nally occupied by CNV, although
some fluorescence superior to the
macula was noted.

Comment. This case from the JAT
provides an apparent disappearance
of CNV at 6 months on fluorescein angiography follow-
ing a single application of photody-
amic therapy with verteporfin.
There was no fluorescein staining of
fibrosis or atrophy of the retinal pig-
ment epithelium within the area origi-
nally occupied by CNV. The new area of fluorescence noted su-
perior to the treated area cannot be explained at this time. This out-
come has not been seen by any of us before, including one of us (N.M.B.)
who served as an investigator at the
Photograph Reading Center, Johns
Hopkins University, Baltimore, Md,
and who reviewed 1-week, 4-week,
and 12-week posttreatment fluores-
cein angiograms from phase 1 and 2
studies and angiograms from phase 3 trials. 3 Although complete ab-
sence of fluorescein leakage from
CNV 1 week after photodynamic
therapy has been reported, leakage
usually reappears within 12 weeks in approximately 90% of
treated cases, 1 with fluorescein stain-
ing of fibrovascular tissue in the re-
main ing cases (N.M.B., unpub-
lished observations, 2001). The absence of fluorescein following
verteporfin therapy may be due to
isofluorescence within the area of
treatment, wherein the pigmen-
tation in the macular area was suffi-
cient to obscure any fluorescence
that might otherwise cause stain-
ing of the choroidal neovascular
lesion. As this is the first verteporfin
therapy trial exclusively in a Japa-
nese population, the fluorescein
findings may be related specifically
to this population, although such
findings have not been reported in
any of the few Asian participants in
a previous verteporfin therapy trial. 3
Longer-term follow-up continues.

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Chronic Subdural Hematoma: An Unusual
Sequela of Laser Photocoagulation of the
Retina at the Siltlamp

Report of a Case. A 61-year-old
healthy patient was seen for a sec-
ond opinion regarding whether ad-
ditional laser treatment was needed
to treat a retinal break in his left eye.
He had been seen elsewhere for
monitoring of retinoschisis, where a
superiorly located horseshoe tear,
unassociated with the schisis cav-
ity, and a smaller break were found
in his left eye. Laser treatment was
recommended. At that time, a con-
tact lens was placed on the left eye
under topical anesthesia, and ap-
proximately 100 moderate-inten-
sity argon laser lesions were ap-
plied at the siltlamp, some of which
were uncomfortable. Treatment re-
quired him to remain motionless,
and after about 10 minutes, he told
his laser surgeon that he felt ligh-
theaded. The surgeon stopped treat-
ment but the patient lost conscious-
ness, fell off his stool, and struck his
head against the floor. The physi-
cian immediately went to summon
assistance. On return with ancil-
lary medical personnel, the patient
was found on the linoleum floor,
semiconscious.

He was examined in the emer-
dency department, where x-rays and
a computed tomographic scan of his
head were obtained. As all findings
were negative except for an ecchy-
mosis on his scalp, the patient was
released with the diagnosis of a va-
sovagal event and returned home.
During the ensuing weeks, his wife

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noted some short-term memory loss, and he complained of a fullness in the head. On his return from a business trip, he was reunited with a physician friend of his who had not seen him for some time. She noted a change in his friend’s affect. Both she and another physician questioned the patient and were concerned that he might have experienced a subdural hematoma from the fall. A repeated computed tomographic scan was ordered, and a marked shift (30 mm) of the falx cerebri was found, confirming the diagnosis (Figure).

The patient then underwent a craniotomy, 8 weeks after the photocoagulation session. A second craniotomy was necessary 1 month later because he developed paresis of his left hand, secondary to a reaccumulation of the hematoma. His paresis eventually resolved.

Four months after the accident, the patient was seen at our center. The retinal break had been incompletely treated, and additional photocoagulation was necessary. This time, an indirect laser delivery system was suggested to allow him to lie in a more comfortable, supine position during treatment and to avoid the necessity of placing a contact lens on his eye. He returned 2 months and then 8 months later and has remained stable and free from neurologic and visual symptoms.

Comment. Laser photocoagulation is customarily a safe outpatient procedure associated with few complications. However, laser surgery to an eye is never trivial. Proper facilities, equipment, and extensive training are necessary to safely perform it and to manage potential complications. While treatment with excessive powers can cause chorioretinal hemorrhage and subsequent choroidal neovascularization, the development of subdural hematoma precipitated by discomfort occurring during laser treatment is distinctly unusual.

Many laser surgeons are currently exploring the use of several newer laser strategies for the treatment of macular degeneration, such as photodynamic therapy and transscleral thermal therapy. Such treatment, along with the application of many lesions during conventional panretinal photocoagulation, requires that the patient remain motionless, often for extended periods of time. In this case, the production of strong chorioretinal lesions for retinopexy necessitated the use of moderately intense laser spots. These conditions and perhaps pressure on the eye from the contact lens ultimately precipitated a vasovagal response in this case, which in turn resulted in severe consequences.

The head-mounted binocular indirect ophthalmoscope laser delivery system is preferred by many surgeons for panretinal photocoagulation and for the treatment of retinal breaks in the outpatient setting. With this delivery system, patients can be treated while lying down in a relaxed, supine position, which minimizes their discomfort and eliminates their chance of falling backward during photocoagulation. Such an option should be considered for the initial treatment of a patient with a peripheral lesion, and especially in a patient for whom discomfort and instability of positioning have been apparent during previous slitlamp laser delivery.

Regardless of the technique used, this case underscores the fact that very serious and unexpected sequelae can develop secondary to laser treatment of the human eye. All laser surgeons should have the appropriate medical training to deal with such issues.

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