Late Dislocation of a LASIK Flap Caused by a Fingernail

This report of a delayed traumatic dislocation of a laser in situ keratomileusis (LASIK) corneal cap highlights the long-term dangers of the procedure. Recommendations are made on how to approach repair of a dislocated LASIK cap.

Report of a Case. A 28-year-old white woman came to our casualty service following uncomplicated, bilateral LASIK performed elsewhere. Preoperative refraction was −2.25 diopters (D) OD and −3.75 D OS. Postoperatively she achieved an unaided visual acuity of 20/20 OU. Ten months after surgery, her fingernail brushed the left eye while she was removing a sweater, resulting in painful displacement of the corneal cap.

The cap was repositioned using topical (0.5% tetracaine hydrochloride) and sub-Tenon (2% lignocaine hydrochloride) anesthesia. Operative manipulation suggested that the cap had everted, the lower edge of its nasal hinge had torn, and one of its edges had folded over (Figure 1A). The stromal bed and cap were debrided. Three 10-0 interrupted nylon sutures were used to secure the cap and the patient was discharged receiving preservative-free topical antibiotics and tear supplements.

Five days later, debris was noted in the interface between the cap and the corneal stroma, suggesting the presence of epithelial ingrowth. With the patient under general anesthesia, the nylon sutures were removed and the corneal cap was everted, revealing a sheet of gelatinous material (Figure 1B) that was wiped with a sterile surgical sponge and sent for histologic assessment (Figure 2). The undersurface of the cap and the stromal bed were cleaned with 100% alcohol to destroy residual epithelium. The cap was allowed to dry and then was hydrated before repositioning. The surface of the cap was stroked with a cyclodialysis spatula to remove excess fluid in the interface. A soft bandage lens was applied after debriding the epithelium on the surface of the cap.

Forty-three days postoperatively, irregular astigmatism had reduced unaided visual acuity to 20/200. Retroillumination photography confirmed the recrudescence of epithelial ingrowth under the nasal part of the cap (Figure 3) with the presence of microcysts compatible with those seen histologically. One hundred three days after the second operation, an attempt was made to debride the epithelial ingrowth again. On this occasion it was impossible to easily define a cleavage plane for the cap. A small central area of corneal stroma was removed followed by scraping of the residual cap area.

Figure 1. A, The LASIK (laser in situ keratomileusis) flap of the left eye is partially torn at the nasal hinge (blue arrow) and has folded over inferiorly (black arrow) as well as rotated on itself about the residual hinge (white arrow). B, Gelatinous material is wiped away from the corneal cap–stromal interface with a sterile surgical sponge.
A bandage lens was applied and keratoplasty was scheduled given the poor predicted visual outcome. However, to our surprise, the unaided visual acuity had improved to 20/40. A −1.00-D sphere/−0.00-D cylinder axis 135° correction improved the visual acuity to 20/20 OD. A corneal thickness of 429 µm in the left eye vs 528 µm in the right eye suggested that the cap had indeed been removed at the third operation. The patient is currently being managed conservatively.

**Comment.** In flap repositioning, both the stroma and cap should be thoroughly cleaned. Alcohol, though used in our case, is not considered essential. When the cap is replaced, optimal adhesion is achieved by eliminating excess interface fluid by stroking the flap with a cyclo-dialysis spatula. A sterile surgical sponge should be used to remove fluid from the edge of the cap. The eyelid speculum should be left in place for 5 minutes to allow the cornea to deturgess under the influence of the endothelial pump. Optimal cap-stromal adherence is confirmed by the absence of independent movement of the cap when depressing the adjacent cornea external to the cap.

Our case is the first that we know of in which dislocation of a LASIK cap has resulted from a trivial act of daily living performed in the late postoperative period. Recent reviews of LASIK state that cap dislocation occurs in 0.7% to 5.8% of cases with a mean of around 2%. These tend to occur in the first few days following surgery and may be related to patients rubbing their eyes. In this case, the fingernail was inserted at the stromal keratectomy plane and dislocated the flap. Debridement of edematous corneal epithelium during vitrectomy has resulted in iatrogenic cap dislocation. When retreatment is performed for LASIK it is possible to define the original cleavage plane between cap and stroma using a surgical hook even after 1 year. These observations clearly illustrate that corneal integrity is never fully restored after creation of a LASIK.
flap. The basis for this inherent weakness has recently been reported in a rabbit model of LASIK in which irregular corneal stromal regeneration was observed at the wound margin. Flap dislocation as a potential late complication should be discussed as part of informed consent prior to surgery. Laser in situ keratomileusis should perhaps be contraindicated in patients who are at high risk of sustaining glancing corneal injuries (eg, rugby players).

As LASIK increases in popularity, the complication we have reported may become more common. It is therefore important for patients to be informed of the risk preoperatively and for general ophthalmologists to be familiar with the optimal way to perform primary repair in case care cannot be transferred to the original LASIK surgeon.

C. K. Patel, BSc, FRCOphth
Richard Hanson, MA
Aylesbury, England
Brendan McDonald, MRCPath
Nigel Cox, FRCS, FRCOphth
Oxford, England

Corresponding author and reprints: C. K. Patel, BSc, FRCOphth, Department of Ophthalmology, Oxford Eye Hospital, Radcliffe Infirmary, Woodstock Road, Oxford OX3 0NJ, England (e-mail: ckipatel@ukgateway.net).


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**Presumed Bilateral Medulloepithelioma**

Medulloepitheliomas are rare embryonic tumors usually arising from the ciliary body. None of the rare series published in the literature describe bilateral ciliary body involvement. We describe the case of a 7-year-old boy who was diagnosed with bilateral ciliary body tumors, in whom the clinical features were highly suggestive of medulloepithelioma. Histological examination of the excisional biopsy specimen from the right eye confirmed the diagnosis of medulloepithelioma.

**Report of a Case.** A 7-year-old boy was referred to our department with bilateral ciliary body tumors. His ocular history included an episode of a red and painful right eye 1 year previously. Excision of a ciliary body mass from his right eye revealed histological results that were positive for a medulloepithelioma. The left eye tumor was treated with a 125I iodine plaque (52 Gy at the apex), with an initial good response. Relapse occurred 1 year later at the margin of the previously treated area and a second 125I iodine plaque was used (56.8 Gy at the apex). The lesion regressed, and the scar has remained inactive for 6 years, with the patient having a visual acuity of 20/20 OU after surgery on a radiation-induced cataract.

The right eye was finally enucleated after several attempts to treat the residual lesion and neovascular glaucoma. Histological analysis of the right eye confirmed the previous diagnosis of a teratoid malignant medulloepithelioma of the ciliary body with scleral invasion. (Figure 3 and Figure 4).

No orbital recurrence has been observed to date (3 years postoperatively).

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**Figure 1.** Ciliary body tumor of the left eye.

**Figure 2.** B-scan appearance of a cystic vitreous mass of the left eye.
Comment. Medulloepithelioma is a rare tumor that often leads to enucleation because of its usually large size at diagnosis. We describe an exceptional case of bilateral tumor, which was histologically confirmed as being medulloepithelioma in the right eye. The clinical features of the mass in the left eye on initial visit and the clinical course were highly suggestive of this diagnosis. A biopsy on the left eye was not performed because of the possible risks in a monocular patient. Treatment modalities are difficult to discuss because of the rarity of this entity. Enucleation seems to be the only solution for larger tumors. Small tumors have been successfully treated by surgical excision or iodine plaques. The treatment chosen for this child consisted of brachytherapy in the left eye with a \(^{125}\)Iodine plaque to avoid intraocular surgery for this monocular child, and a relapse was treated with a second plaque. Unfortunately, the right eye required enucleation. Despite an early relapse near the old scar, treatment has been definitively effective to date, with no evidence of tumor recurrence either in the right orbit or intraocularly in the left eye.

Livia Lumbroso, MD
Laurence Desjardins, MD
Olivier Coue, MD
Paris, France
Yvette Ducourneau, MD
Alain Pechereau, MD, PhD
Nantes, France

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Corresponding author and reprints: Laurence Desjardins, MD, Institut CURIE, 26 Rue d’Ulm, 75248 Paris CEDEX 05, France.

Routine Neuroimaging in Retinoblastoma for the Detection of Intracranial Tumors

The occurrence of a midline intracranial primitive neuroectodermal tumor (PNET) with bilateral retinoblastoma has been called “trilateral retinoblastoma.” This rare complication of heritable retinoblastoma is associated with an extremely poor prognosis, accounting for up to 50% of tumor-associated mortality among patients with retinoblastoma.

Primitive neuroectodermal tumors usually occur 2 to 4 years after diagnosis of bilateral retinoblastoma. However, PNETs have been diagnosed in patients with unilateral retinoblastoma 6 months before diagnosis of bilateral retinoblastoma and in 2 siblings of patients with bilateral retinoblastoma with no intraocular disease. In most cases, patients with PNET are seen for symptoms of increased intracranial pressure after the...
tumor is large, and the disease is usually fatal.3 Patients diagnosed with small, asymptomatic PNETs, however, have improved survival rates when treated with chemotherapy and radiation.3 This has led to routine neuroimaging among patients with heritable retinoblastoma to detect preclinical intracranial neoplasms in many centers. However, no studies have established which patients are most likely to benefit from routine neuroimaging, how often patients should be screened, or whether routine neuroimaging improves patient outcome.

Of 226 patients with retinoblastoma evaluated between January 1990 and December 1998 at 2 large referral centers, the University of California, San Francisco, and Bascom Palmer Eye Institute, Miami, Fla, we identified 3 patients with PNET.

Report of Cases. Case 1. A 3 1/2-month-old girl had bilateral retinoblastoma, Reese-Ellsworth stage IIB in the right eye and stage VA in the left. Her family history was remarkable for retinoblastoma. Initial computed tomographic (CT) scan showed no extraocular or intracranial disease. The left eye was enucleated. At age 38 months, chemotherapy was initiated for a recurrent tumor because it was external to dural reflections in the orbit. Despite multiple cycles of chemotherapy, the tumor progressed with diffuse vitreous seeding. At age 55 months, the right eye was enucleated. Findings from histopathologic examination demonstrated well-differentiated retinoblastoma confined to the globe. Routine magnetic resonance images (MRIs) of the brain and orbits were obtained every 5 months. At age 60 months, the patient complained of headaches. An MRI scan of the brain and orbits showed no evidence of intracranial disease. At age 62 months, the patient was seen for displacement of the right prosthesis. An MRI demonstrated a new extraconal mass in the right orbit (Figure 1). The mass was felt to be an orbital PNET rather than recurrent retinoblastoma because it was external to dural reflections in the orbit seen on MRI scan. Fine-needle aspiration biopsy revealed a poorly differentiated round blue cell tumor consistent with PNET. Metastatic evaluation disclosed no other evidence of tumor. Despite prompt exenteration, chemotherapy, and radiation, the patient died 9 months after PNET diagnosis.

Case 2. A 7-week-old girl with no family history of retinoblastoma was seen for 4 months of unilateral leukocoria in the left eye. Findings on examination revealed Reese-Ellsworth stage VB retinoblastoma in the left eye and no disease in the right eye. A CT scan showed no extraocular or intracranial disease. The left eye was enucleated. Results of histopathologic examination demonstrated well-differentiated retinoblastoma confined to the globe. The patient was examined under anesthesia every month for 2 months, then every 2 months for 6 months, then every 3 months, and did not develop retinoblastoma in the right eye. At age 22 months, the patient developed nausea and vomiting. An emergent CT scan demonstrated a tumor in the pineal region consistent with PNET (Figure 2). Despite chemotherapy, the patient died 4 months after PNET diagnosis.

Case 3. An 18-month-old girl with no family history of retinoblastoma was seen for 4 months of unilateral leukocoria in the left eye. Findings on examination revealed Reese-Ellsworth stage VB retinoblastoma in the left eye and no disease in the right eye. A CT scan showed no extraocular or intracranial disease. The left eye was enucleated. Results of histopathologic examination demonstrated well-differentiated retinoblastoma confined to the globe. The patient underwent examination with anesthesia. At age 21 months, the patient developed unremitting headaches. An emergent MRI showed a tumor in the pineal region, consistent with PNET. Following chemotherapy and radiation, the patient remained without disease 18 months after PNET diagnosis.

Comment. In the current study, routine neuroimaging among patients
with heritable retinoblastoma did not lead to presymptomatic diagnosis of PNET in any patient. At the time of retinoblastoma diagnosis, all patients were screened with CT of the brain and orbits under anesthesia, without contrast, with 3.75-mm cuts through the brain and 1-mm cuts through the orbits. Patients with recognized heritable retinoblastoma (patients with bilateral retinoblastoma or a family history of retinoblastoma) underwent additional routine MRIs of the brain and orbits every 6 months. In any patient with new neurologic symptoms, an MRI of the head was obtained immediately. No family refused neuroimaging studies.

Of 226 patients seen at these institutions over 9 years, 83 had heritable retinoblastoma and underwent routine neuroimaging every 6 months. The 143 patients with unilateral, unifocal disease and no family history of retinoblastoma did not undergo routine neuroimaging after the initial baseline study at the time of retinoblastoma diagnosis. Mean follow-up time was 44.8 months, with a range of 0 to 139 months.

A limitation of this study is that 56 (25%) of 226 patients were followed up for less than 2 years, and some of these patients may develop PNET in the future, during the 2 to 4 years following retinoblastoma diagnosis. In the current series, 1 of the 86 patients who were screened developed PNET, which was diagnosed after the patient was seen for symptoms and not as a result of routine neuroimaging. Two of 3 PNET patients were not recognized to have heritable retinoblastoma and did not undergo routine neuroimaging.

The current series of 226 patients with retinoblastoma did not demonstrate improved outcome due to early diagnosis of PNET by routine neuroimaging of patients with recognized heritable retinoblastoma. Because PNET occurs infrequently, many patients with retinoblastoma must be studied to investigate the utility of routine neuroimaging in diagnosing this condition. An international, prospective, multicenter collaborative trial is necessary to determine the appropriate regimen for routine neuroimaging in patients with both heritable and presumed nonheritable retinoblastoma.

Jacque L. Duncan, MD
Ingrid U. Scott, MD, MPH
Timothy G. Murray, MD
Dan S. Gombos, MD
Kurtis van Quill
Joan M. O’Brien, MD
San Francisco, Calif

Corresponding author: Joan M. O’Brien, MD, Box 0730, University of California, San Francisco, San Francisco, CA 94143-0730 (e-mail: aleja@itsa.ucsf.edu).


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examination should be referred for complete renal, neurologic, audiologic, and genetic assessment.

Patricia Ioschpe Gus, MD
São Paulo, Brazil

Carolina Fischinger M. de Souza, MD
Porto Alegre, Brazil

Sarah Porteous
Michael Eccles, PhD
Dunedin, New Zealand

Roberto Giugliani, MD, PhD
Porto Alegre

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Correction

Error in Unit of Measure. In the case report titled “Late Dislocation of a LASIK Flap Caused by a Fingernail,” published in the March issue of the ARCHIVES (2001; 119:447-449), on page 448, lines 6 through 9, the text should have read “A −1.00DS/−0.00DC axis 135 correction improved the visual acuity to 20/20 OD.”

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