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Improving corneal tissue donation rates in the emergency department setting

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Purpose: To develop a model for improving rates of corneal tissue retrieval in an academic tertiary care emergency department. **Methods:** We collected data (including the number of emergency department deaths and corneal donations) prospectively for 1 year, both before and after the following interventions: 1) a formal education session regarding eye donation in a grand-rounds format, 2) employment of social workers to assist the emergency department physicians in approaching families during stressful situations, and 3) continuous feedback and education reinforcement to emergency department physicians throughout the year. **Results:** The number of corneal donations increased from 11 (11%) among 100 deaths to 19 (24%) among 79 deaths during the year following the interventions, an increase of over 100% ($p < 0.01$). The rate of refusal to donate did not change significantly (44% before the intervention vs. 42% after the intervention). **Conclusions:** Cornea tissue donation rates in an emergency department setting can be improved through simple interventions.

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Assessment of a disposable artificial anterior chamber

G. Rocha

Purpose: To describe the use of a disposable artificial anterior chamber for penetrating keratoplasty (PKP) and posterior lamellar keratoplasty (PLK). **Methods:** The instrument (manufactured by Katena Products, Inc., Denville, NJ) is made of Teflon and has a large base with two ports into which Silastic tubes are inserted. Independent infusion of liquid or air is possible. The corneoscleral rim is set, and a securing ring is placed via two guideposts. A rotation ring provides the final safety mechanism. **Results:** The capacity of the tubes to reach the outflow port was 0.4 mL. Viscoelastic needs to be placed in the central well. Infusion of balanced salt solution allows epithelial-side trephination for PKP, with resulting smooth edges and apposition of tissue. Injection of air allows for the creation of an endothelium–air interface, needed for dissection of the donor lenticule for PLK. **Conclusions:** This system should allow corneal surgeons access to an inexpensive yet high-quality instrument for performing PKP and PLK.

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Indications for penetrating keratoplasty in Ontario, 1996–2001

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Purpose: To prospectively determine trends in the rate of penetrating keratoplasty (PKP) following cataract and refractive surgery in Ontario. **Methods:** Standardized forms were sent to PKP surgeons with each donor cornea from the Eye Bank of Canada (Ontario Division) from 1996 to 2001. We calculated the relative proportion of a diagnosis within and between years, and tested trends for significance using the Cochrane-Armitage test. **Results:** Forms were returned for 4545 of 4808 donor corneas (return rate 94.5%). The most common indication for PKP for the entire study period was pseudophakic corneal edema (30%). There was a decrease over time in the relative rate of PKP for aphakic corneal edema ($p < 0.05$), an increase in the rate following refractive surgery ($p < 0.05$) and no change in the rate of PKP for pseudophakic corneal edema ($p > 0.05$). **Conclusions:** This large series shows an ongoing high rate of PKP for pseudophakic corneal edema in Ontario. This finding is felt to reflect local surgical practice.

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Infectious keratitis as a complication of overnight orthokeratology

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Purpose: To report a case of severe *Serratia marcescens* corneal ulcer as a complication of orthokeratology. **Methods:** Case report and review of complications of orthokeratology. **Results:** A 14-year-old girl presented with acute *S. marcescens* infectious keratitis due to orthokeratology. She had been wearing overnight retainer contact lenses for 2 years under optometric supervision. Her visual acuity on presentation was light perception, with a nearly total corneal ulcer in the right eye. Intensive topical and systemic antibiotic therapy eventually enabled healing of the ulcer, with residual corneal scarring. **Conclusions:** Orthokeratology is making a resurgence in North America in both adults and children. Patients, parents and practitioners should be aware that permanent vision loss can result from this temporary correction of anisometropia.

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Reevaluation of the pathological diagnosis and natural history of conjunctival intraepithelial neoplasia

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Purpose: To establish the prevalence of conjunctival actinic keratosis (AK) and to compare the rates of recurrence of AK and dysplasia. **Methods:** Review of the cases of 43 patients (32 men and 11 women with a mean age of 64 years) with a clinical or pathological diagnosis of conjunctival intraepithelial neoplasia. **Results:** Dysplasia was more prevalent in men than in women (41% vs. 9%). There was no sex difference in the prevalence of AK. The pathological diagnosis was revised in 44% of cases. Follow-up data were available for 32 patients (74%), with a length of follow-up of 3 to 108 months. The recurrence rate was 19%; in all cases the disorder was dysplasia. Pathological indicators of AK were squamoid cell type, variable architectural disarray and variable cytologic atypia ($p < 0.001$). Strong expression of p53 was seen in both AK and dysplasia. **Conclusions:** The diagnosis of conjunctival epithelial lesions is subjective. AK accounts for 50% of such lesions and shows little tendency to recur. Differences in behaviour between AK and dysplasia remain unexplained.

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Management of late mucous plaque keratopathy following herpes zoster ophthalmicus

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Purpose: To report the successful treatment of late mucous plaque keratopathy following herpes zoster ophthalmicus with a combination of topical and oral antiviral therapy. **Methods:** We reviewed the charts of three patients who presented 3 to 6 months after the diagnosis of typical herpes zoster ophthalmicus with mucous plaque keratopathy. **Results:** All three patients had failed to respond to topical therapy with steroids and antivirals, the use of tears, contact lenses and 10% acetylcysteine, and systemic antiviral therapy. Treatment with the combination of famciclovir (500 mg given orally three times a day) or acyclovir (800 mg given orally five times a day) plus trifluridine (administered topically nine times a day) was effective in eliminating the signs and symptoms of mucous keratitis within 7 to 10 days. **Conclusions:** Late mucous plaques may be infectious. In

CASE REPORTS

Management of ophthalmic zoster mucous plaque keratopathy: report of three cases

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Herpes zoster ophthalmicus, the result of latent ganglionic varicella–zoster virus reactivation, can produce various corneal lesions, which occur early or late, in up to 65% of cases.[1] The lesions may include punctate epithelial keratitis (51% of cases), early pseudodendrites (51%), anterior stromal infiltrate (41%), keratouveitis-endotheliali tis (34%), neurotrophic keratitis (25%), delayed mucous plaques (late pseudodendrites) (13%), exposure keratitis (11%), disciform keratitis (10%), serpiginous ulceration (7%), scleral keratitis (1%) and delayed limbal vasculitis (less than 1%).[1] Two distinct types of zoster corneal epithelial disease may be seen: an early dendritic form, and a delayed form characterized by corneal mucous plaques that may take a dendritiform pattern.

Early dendritiform lesions have been reported to occur in 30% to 50% of patients with herpes zoster ophthalmicus.[1] The lesions appear as raised, translucent, usually peripheral dendritic or stellate epithelial lesions that stain reasonably well with both fluorescein and rose bengal. They occur within 2 weeks after the rash appears and resolve in a few days without complication. Virus has been recovered from eyes with early pseudodendritic lesions.[1,3]

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Delayed mucous plaque keratopathy most often occurs 8 to 12 weeks after the acute event but may appear up to 2 years later.[1,4] The plaques appear as white-gray, elevated, ropy, superficial lesions that can be wiped off the epithelium. They have sharply demarcated margins and can be linear or branching with blunt ends, occurring centrally or peripherally. They often vary in size, shape, position and number from one day to the next. Typically they stain better with rose bengal than with fluorescein. They are usually accompanied by limbitis, stromal keratitis, diminished corneal sensation or iritis.[5]

Mucous plaque keratopathy was thought to be of mechanical or immune origin[1,6] as the plaques were culture negative.[7] However, more recent reports showed that they may also be infectious. Herpes zoster virus antigen was detected on the ocular surface of patients with mucous plaques by means of the polymerase chain reaction technique or direct fluorescent antibody testing; culture had given negative results, possibly because the critical mass of infectious virus was too low.[3,8,9] The lesions are unaffected by therapeutic soft contact lenses or lubricants. Topical corticosteroid therapy has been tried, with variable success, but a long-term course was usually required, which exposed the patient to side effects.[1,10] The value of treatment with 10% acetylcysteine eyedrops is uncertain.[9] Pavan-Langston and colleagues[8] and de Freitas and associates[11] reported better response to antiviral treatment. Topical use of 3% vidarabine five times a day was successful in healing mucous plaques within 6 to 14 days; topical trifluridine therapy and systemic acyclovir therapy had little effect.

We describe three patients with mucous plaque keratopathy who did not respond to topical corticosteroid therapy or to topical or systemic antiviral therapy but responded well to a combined topical and systemic antiviral regimen.

CASE REPORTS

Case 1

A healthy 52-year-old woman presented with a 5-day history of pain in her left eye and vesicles above her left eyebrow. Slit-lamp examination showed early pseudodendrites. Herpes zoster ophthalmicus involving the left eye was diagnosed, and she was treated with famciclovir, 500 mg given orally three times daily for 1 week, and lubricants. One week later she presented with stromal keratitis, and treatment was started with 1% prednisolone acetate, applied topically every hour. She responded well but required glaucoma medication to control the intraocular pressure (IOP).

Two months after initial presentation she was referred with mucous plaque keratopathy. At that time she was using 1% prednisolone acetate four times daily, 0.5% timolol maleate twice daily and brimonidine tartrate twice daily. The visual acuity in her left eye was 20/30, and the IOP was 27 mm Hg. Corneal sensation in her left eye was markedly decreased. Slit-lamp examination showed mucous plaques (Fig. 1) and anterior stromal haze; the anterior chamber was quiet.

The patient was followed for 2 weeks, with persistence of the mucous plaques with the medication regimen. A 3-week course of acyclovir (800 mg given orally five times daily) failed to give any benefit, as did a 1-week course of 10% acetylcysteine eyedrops instilled four times daily. Use of a bandage contact lens was also unsuccessful in healing the lesions.

After 2 months of persistent dendritiform keratopathy, treatment was started with famciclovir (500 mg given orally three times daily) plus trifluridine (applied nine times daily). Within 11 days the mucous plaques had resolved completely. The trifluridine was stopped after 2 weeks, and the famciclovir was tapered slowly over 4 months. There was no recurrence of the keratitis over the following 2 years.

Case 2

A healthy 59-year-old man was referred for dendritiform keratopathy of his right eye. Herpes zoster ophthalmicus involving the right eye had been diagnosed 6 months previously and treated with famciclovir, 500 mg given orally three times daily for 1 week. At the time of referral he was using acyclovir (200 mg given orally twice a day), 0.5% timolol maleate twice a day and 1% prednisolone acetate three times a day. The visual acuity in his right eye was 20/30, and the IOP was 19 mm Hg. There was decreased corneal sensation in his right eye. Slit-lamp examination showed numerous mucous plaques with a fine ground-glass anterior stromal haze, which had been present for over 3 months. Treatment was started with famciclovir, 500 mg given orally three times a day, along with trifluridine, administered nine times a day; the timolol maleate and prednisone acetate were continued. After 10 days the mucous plaques had resolved completely. The trifluridine was stopped after 2 weeks, and the famciclovir was tapered slowly over 3 months. At the time of writing, the patient had been followed for over 2 years, without any recurrence of the keratitis.

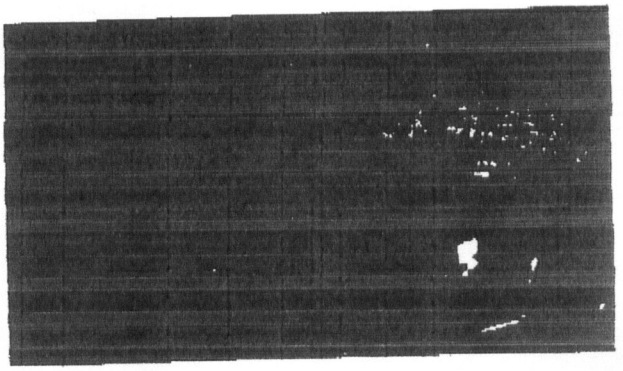

Fig. 1—Case 1: Mucous plaques in patient with delayed mucous plaque keratopathy.

Case 3

A 38-year-old woman presented with a 3-day history of pain and watery discharge from her right eye associated with blisters above her right eyebrow. The visual acuity in her right eye was 20/25, and the IOP was 22 mm Hg. Examination showed superficial punctate keratitis with conjunctivitis. There was no iritis. A diagnosis of herpetic zoster ophthalmicus involving the right eye was made, and treatment was started with acyclovir (800 mg given orally five times a day for 1 week) and polymyxin B sulfate–bacitracin and trifluridine (both administered four times daily).

Three months after her initial presentation, the woman presented with disciform keratitis in her right eye, which was treated with 1% prednisone acetate and trifluridine, both administered four times daily. One week later she experienced increasing pain and was

found to have mucous plaque keratopathy in addition to disciform keratitis. The medication regimen was continued, and lubricants were added.

One week later she was still experiencing symptoms of the dendritiform keratitis, but the disciform keratitis had resolved. The prednisone acetate and trifluridine were stopped, and after 4 days without resolution of the superficial keratitis, treatment was started with acyclovir (400 mg given orally five times a day), and a therapeutic bandage contact lens was inserted.

One week later iritis developed, and the mucous plaques persisted. The acyclovir dosage was increased to 800 mg five times a day, and 1% prednisone acetate (administered four times daily) and trifluridine (administered nine times daily) were added. Fourteen days later the patient was comfortable, with minimal stromal haze, a quiet anterior chamber and complete resolution of the mucous plaque keratopathy. The trifluridine was stopped after 3 weeks, and the acyclovir was tapered slowly over 4 months, with no recurrence of the keratitis.

Comments

Although dendritiform keratitis can resolve without therapy, in our patients all forms of treatment had been tried, including topical and systemic antiviral therapy alone, without success. It was only when we combined trifluridine with famciclovir or acyclovir at full therapeutic dosages for varicella zoster did we see complete resolution of the plaques within 2 weeks; furthermore, in no case did the keratitis recur. It is uncertain how quickly the medication can be tapered; we chose to stop the trifluridine after 2 to 3 weeks and to slowly taper the famciclovir or acyclovir over 3 to 4 months.

Varicella–zoster virus can be cultured from the acute epithelial dendritiform lesions within the first 48 to 72 hours after onset of the rash. These lesions are usually self-limited and resolve within a week. In contrast, chronic epithelial pseudodendrites may occur weeks to years following herpes zoster ophthalmicus. In the past, the lesions were felt to represent mucous accumulation over areas of immune keratitis. Using the polymerase chain reaction technique, Pavan-Langston and colleagues[8] identified herpes zoster virus DNA in lesions with a similar appearance, and Chern and coworkers[9] demonstrated varicella zoster virus by culture, polymerase chain reaction or direct fluorescent antibody staining in 9 of 12 patients with AIDS. Although all our patients were immunocompetent, given the prompt response to combined topical and oral antiviral therapy, we suspect that the plaques were infectious.

When presented with a patient with delayed dendritiform keratitis/mucous plaque keratopathy, we suggest therapy with trifluridine (administered nine times a day) combined with famciclovir (500 mg given orally three times daily) or acyclovir (800 mg given orally five times daily) over a 3-week period, with slow tapering off, as the initial treatment.

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Key words: ophthalmic zoster keratitis, late mucous plaque keratopathy, epithelial pseudodendrites, delayed herpes zoster pseudodendrites