Eye on Glaucoma™
Case Chronicles in Glaucoma and Ocular Surface Disease

CASE 3 IN A SERIES OF 4

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LEARNING METHOD AND MEDIUM
This educational activity consists of a case report and four (4) study questions. The participant should, in order, read the learning objectives contained at the beginning of this activity, read the material, answer all questions in the post test, and complete the Activity Evaluation/Credit Request form. To receive credit for this activity, please follow the instructions provided on the post test and Activity Evaluation/Credit Request form. This educational activity should take a maximum of 0.75 hour to complete.

CONTENT SOURCE
This continuing medical education (CME) activity captures content from a roundtable discussion held July 2013.

ACTIVITY DESCRIPTION
There is a growing awareness of the impact of ocular surface disorders on the successful management of patients with ocular hypertension and glaucoma. Recent studies provide new insights into patient problems and concerns, and an increasing awareness of the significance of preservatives on ocular health. Improved versions of current therapies, and the availability of new therapies, provide opportunities for improved outcomes toward the prevention of glaucoma progression. Recently, a group of experts convened to discuss their insights and approaches for managing these patients. This CME activity brings you highlights from these case discussions in a 4-part series.

TARGET AUDIENCE
This educational activity is intended for comprehensive ophthalmologists and glaucoma specialists.
LEARNING OBJECTIVES

Upon completion of Part 3 of this 4-Part CME Case Series, participants will be better able to:

- Assess ocular surface health in patients on ocular antihypertensives
- Review the evidence on the effects of preservatives on the ocular surface as they relate to ocular hypertension treatment regimens
- Employ appropriate ocular antihypertensive strategies in patients with glaucoma or ocular hypertension to manage OSD

ACCREDITATION STATEMENT

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CASE 3

Dr Lewis: A 64-year-old woman was referred for asymmetric cupping and possible glaucoma. She has a history of high myopia and had radial keratotomy (RK) in the right eye. She wears contact lenses in both eyes, but, interestingly, she had a 16-incision RK, and her cornea became so flat that she cannot wear a contact lens in that eye beyond a certain period of time. She winters in Palm Springs, California, and her chief complaint is that the desert environment aggravates her dry eyes, limiting the use of her contacts. Medical therapy at that time was cyclosporine and artificial tears. Other than RK, she had had no prior surgery in the right eye. Her history and examination are summarized below.

HISTORY AND EXAMINATION

Presentation

Patient's Chief Complaint: 64-year-old woman with high myopia referred for asymmetric cupping and possible glaucoma. History of RK OD and soft contact lens use. She lives in Palm Springs and the desert environment has aggravated her dry eyes, limiting her use of soft contact lenses.

Ocular History

- Onset of glaucoma: referred for second opinion regarding glaucoma
- Medical therapy history: cyclosporine and artificial tears
- Surgical or laser history: radial keratotomy OD

Past Medical History: negative

Nonocular Medications: none

Nonocular Surgical History: none

Family History of Glaucoma: negative

Examination:

Visual Acuity (best corrected visual acuity at distance)

OD: 20/25 OS: 20/30

IOP in mm Hg (method of measurement - applanation)

OD: 18 OS: 17
Central Corneal Thickness Microns
OD: 510    OS: 510

Pupils: No afferent defect
Visual fields: Unreliable because of dry eyes and poor fixation

EXTERNAL
Facial characteristics: rosacea form changes to light telangiectatic changes of the malar eminences or nose (rhinophyma)

SLIT-LAMP BIOMICROSCOPY
Lids and Lashes:
Anterior lid margin: vascular lid margins
Inferior tear meniscus: dry

Conjunctiva:
1+ injection, punctate staining OU, dry tear film

Cornea:
Tear film: dry, early break-up
Epithelium: punctate staining
Stroma: OD: 16-incision RK to limbus
Endothelium: normal

Anterior Chamber: clear and deep

Lens: 1-2+ nuclear sclerosis OU

Anterior Vitreous: clear

Gonioscopy: Grade IV angle, no peripheral anterior synechia
Dilated Fundus Examination:

Myopic tilted disc OU
OD: 0.8 cup vertically elongated, tilted disc
OS: 0.6 cup healthier rim
Macula: normal

Dr Parrish: Several issues are at play in this case. What is our initial approach?

Dr Hutnik: I would initially address the glaucoma issue. This patient is difficult to assess for a number of reasons. Her right cornea has been surgically altered, so we cannot know her true intraocular pressure (IOP) in that eye, although it is very likely higher than that measured. We are unable to assess the functional status of her optic nerve because we cannot get reliable perimetry. She also has myopic-appearing optic nerves, making them difficult to assess clinically from the standpoint of cupping. Notably, all 3 of the key parameters for glaucoma assessment have been compromised. Moreover, she is young, so she warrants prompt and aggressive treatment, if we decide to treat. My approach to a patient of this description is to err on the side of caution and treat her with IOP-lowering therapy.

Dr Parrish: In addition to the glaucoma issue, she also has symptomatic ocular surface disease (OSD) with both quantitative and qualitative tear film deficiencies. These are not mutually exclusive problems. The OSD is compromising her glaucoma assessment. She cannot perform a reliable visual field. Were you able to obtain optic nerve imaging studies?

Dr Lewis: We attempted optical coherence tomography, but the quality was poor because her cornea was hazy and she had some mild cataract formation.

Dr Parrish: So you are really left with only the clinical examination of the optic nerve as your primary source of clinical information.

Dr Lewis: That is correct. None of the advances of the past 20 years in structural and functional assessment are helpful in assessing this patient. I had to take a 20-year step back in time when evaluating her case.

Dr Parrish: Based on the limited information available to you, did you decide to treat her, and if so, how?
**Dr Lewis:** Primarily on the basis of her clinical optic nerve examination in the right eye, I did elect to start IOP-lowering therapy. Because she has symptomatic OSD that is aggravated by her environment and incompletely controlled with cyclosporine, I sought to choose an IOP-lowering agent that was least likely to further aggravate her ocular surface. We know from many studies that preservatives—particularly benzalkonium chloride (BAC)—can be toxic to the ocular surface, particularly in eyes with preexisting OSD. We also know from prospective studies that preservative-free formulations of IOP-lowering agents can safely and effectively lower IOP with positive effects on ocular surface status. Therefore, I chose to start therapy with a preservative-free agent.

**Dr Parrish:** Other options might include an agent that is not preservative-free, but is preserved with an alternative to BAC. Travoprost is available with a non-BAC preservative. Some studies have demonstrated that patients who switch from a BAC-preserved prostaglandin analogue to travoprost without BAC have a lower incidence of keratoconjunctival epitheliopathy. Brimonidine also is available BAC-free, preserved instead with a stabilized oxychloro complex. Among advantages to using prostaglandins first-line are superior efficacy and safety, in addition to the convenience of once-daily dosing. We have available both BAC-free prostaglandin options, as mentioned previously, and a completely preservative-free prostaglandin option in tafluprost, as well as BAC-free and preservative-free agents from other drug classes, including fixed-combination options.

**Dr Pflugfelder:** An additional consideration in the management of this patient is her use of contact lenses. The contact lens could be a depot for retaining and delivering preservatives to the cornea. We therefore have yet another reason to avoid the use of agents containing preservatives, should she continue to wear contact lenses.

**Dr Hutnik:** Dr Pflugfelder, from your viewpoint as a cornea expert, are you surprised that this patient still has OSD findings and symptoms although she is on cyclosporine? Please share your comments on the role of cyclosporine in patients with glaucoma. Does its effectiveness depend upon the type of dry eye?

**Dr Pflugfelder:** Actually, there may be a cyclosporine responder profile. Cyclosporine is an immunomodulatory agent, so it works better on patients who have more of a T-cell infiltrative component to their dry eye condition, usually those with chronic and, probably, moderate-to-severe dry eye. The Canadian
registry data for cyclosporine showed that patients with more severe dry eye responded somewhat better than those with milder dry eye. In terms of the role of cyclosporine in glaucoma, I suspect it would not be very effective as a treatment for OSD resulting from glaucoma drop toxicity. But in people with underlying OSD that is aggravated by the glaucoma drops, cyclosporine may be of value, but only after first having taken all the steps necessary to directly address the underlying surface disease.

**Dr Parrish:** How was this case actually managed?

**Dr Lewis:** We treated her glaucoma with preservative-free prostaglandin therapy. We also continued the cyclosporine as well as artificial tears for her OSD. Eventually, however, she became essentially completely contact lens-intolerant and so underwent combined phaco/I-Stent surgery. Today she is off medications and doing well.

**DR PFLUGFELDER’S TOP 5 OCULAR SURFACE ASSESSMENTS FOR THE COMPREHENSIVE OPHTHALMOLOGIST**

1. Lacrimal Puncta

   *Are there signs of ectropion or stenosis of the puncta?* Many older patients have either a subtle ectropion or some stenosis of their puncta, which will interfere with tear drainage and thereby delay drug clearance.

2. Posterior Lids (Meibomian Glands)

   Express the lids! *Has gland dropout occurred? What is the quality of the meibum? Is vascularization present* ([Figure A](#))? Many older patients also have lid margin changes due to posterior blepharitis/meibomian gland dysfunction. Decreases in the quantity and/or quality of meibum lead to lipid deficiency that can destabilize the tears and potentiate the deleterious effects of ocular antihypertensives.

3. Tear Film Layer

   *What are the results of a fluorescein tear break-up time test?* Fluorescein tear break-up time may be the easiest test that an eye care clinician performs. When I conduct the test, I first moisten the
fluorescein strip with preservative-free saline, then touch the patient's inferior tarsal conjunctiva, and ask the patient to blink to disperse the fluorescein. Viewing under cobalt blue illumination, I ask the patient to blink and keep his or her eye open until I begin to observe discontinuities in the tear film, which usually occur in the center or the inferior cornea. I count in seconds to determine the amount of time it takes for the tears to break up. There is some debate about what the normal tear break-up time is. I consider 7 seconds or less to be abnormal. In many older patients, tear break-up is instantaneous.

4. Cornea

_Is erosion present?_ Once fluorescein is instilled, I examine the cornea to determine the presence of punctate fluorescein staining. Staining in the center of the cornea indicates greater severity of erosion, which has the potential to reduce vision.

5. Conjunctiva

_Is redness present? Is there staining with lissamine green dye (Figure B)? Is conjunctival chalasis present?_ Redness and fluorescein staining in the conjunctiva indicate epithelial disease. Conjunctival chalasis, or loosening of the conjunctiva, can interfere with the spread of tears. This condition manifests as lid parallel folds in the conjunctiva (Figure C). Conjunctival chalasis tends to compartmentalize the tears, typically in the center of the lower lid, because the condition blocks the flow of the tear meniscus both temporally and sometimes nasally. Conjunctival chalasis also interferes with tear clearance and increases the concentration of ocular medications over the cornea. Typically with ocular antihypertensive toxicity, most of the redness occurs in the lower third of the eye, on the inferior bulbar conjunctiva and the inferior tarsus, particularly medially, where the tears are swept toward the lacrimal drainage system. When I observe redness on the inferior tarsus in a patient who is using 1 or more ocular antihypertensives, I suspect toxicity.
**Figure A.** Meibomian gland disease with obstructed ductal orifices, prominent telangiectatic lid margin vessels.

**Figure B.** Nasal lissamine green staining of the conjunctiva in a patient with meibomian gland disease who also has severe staining of the lower lid.
Figure C. Conjunctivochalasis with lid parallel conjunctival folds nasally and tear pooling centrally with elevated inferior tear meniscus.

Photos Courtesy of Stephen C. Pflugfelder, MD

REFERENCES

8. Aihara M, Oshima H, Araie M; EXTraKT study group. Effects of SofZia-preserved travoprost and