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DRY EYE
GO BEYOND THE TEARS

PEER-TO-PEER PATIENT CHART REVIEWS

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STATEMENT OF EDUCATIONAL NEED

Dry eye syndrome, also known as keratoconjunctivitis sicca (KCS), is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear film instability with potential damage to the ocular surface. Epidemiological studies have demonstrated that approximately 6% of the U.S. population complains of dry eye symptoms; this prevalence increases to 15% in adults older than 65 years of age. While no uniform criteria exist for the diagnosis of dry eye, multiple combinations of diagnostic tests may be used to assess symptoms and clinical signs of the condition. Recent studies have highlighted several promising new pharmacologic agents for the treatment of dry eye, including the anti-CD4 monoclonal antibody, systemic linoleic and gamma-linoleic acids, and omega-3 essential fatty acids. Due to this information, ophthalmologists and optometrists have a need for education on the differences between pipeline agents for the treatment of dry eye vs. currently-approved agents, and the geographic and ethnic disparities in the prevalence of the disorder.

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LEARNING OBJECTIVES

1. Identify the treatment algorithms used to combat the rising prevalence of dry eye in the United States, pinpointing any ethnic and geographic disparities responsible for this increase in order to rationalize earlier prescription treatment vs. over-the-counter usage
2. Assess the pharmacoeconomic and treatment implications of dry eye, as well as the optimal conditions of the surface of the eye pre- and post-surgery
3. Weigh the risks vs. benefits of currently approved and late-stage pipeline agents used for the treatment of dry eye conditions and implement strategy models to help improve patient care

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Dry Eye Syndrome

BACKGROUND AND EPIDEMIOLOGY

"Dry eye is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear film instability, with potential damage to the ocular surface. It is accompanied by increased osmolarity of the tear film and inflammation of the ocular surface."[1]

For more than a decade, dry eye syndrome (DES) has been a leading reason for patient visits to optometrists and ophthalmologists.[2,3] While it was previously believed that DES was simply due to the ocular surface not producing enough tears, understanding of the condition has progressed so that researchers now recognize that DES is caused by a combination of aqueous insufficiency, ocular surface and lacrimal gland inflammation, and meibomian gland dysfunction (MGD).

DES affects between 14% and 33% of the world's population,[4] yet because it is multifactorial and there is little correlation between its signs and symptoms, a clear definitive treatment for each stage of severity has not yet been established. Consequently, dry eye is typically classified as either "aqueous deficient" or "evaporative."

According to a report from the International Dry Eye Workshop, aqueous deficiency can be further subdivided into "Sjogren's Syndrome" or "non-Sjogren's Syndrome," while evaporative dry eye includes meibomian oil deficiency and lid aperture disorders—including MGD (also called posterior blepharitis) and anterior blepharitis—symptomatic conjunctivitis, and keratitis.[1]

Older adults and women are more likely to develop DES, as are patients with arthritis, smokers, contact lens wearers, and patients who have undergone hormone replacement therapy (in particular, estrogen use). Some systemic medications, such as antihistamines, antidepressants, diuretics, or systemic retinoids, can exacerbate the condition. DES has been reported as the most frequent post-LASIK complaint,[5] and there is evidence to suggest post-LASIK refractive regression may be related to chronic dry eye.[6]

Common quality of life issues related to DES include complaints about using a computer and difficulty reading for long periods of time.[7] Prior use of preserved topical medications for the treatment of other ocular diseases (ie, glaucoma) may also be a contributing factor to DES.[1] Left untreated, DES may lead to more visually destructive infections, including bacterial keratitis.[8]

TABLE 1

DRY EYE SEVERITY	1	2	3	4*
Discomfort, severity and frequency	mild and/or episodic occurs under environ stress	moderate episodic or chronic, stress or no stress	severe frequent or constant without stress	severe and/or disabling and constant
Visual symptoms	none or episodic mild fatigue	annoying and/or activity limiting, episodic	annoying chronic and/or constant limiting activity	constant and/or possibly disabling
Conjunctival injection	none to mild	none to mild	+/-	+/++
Conjunctival staining	none to mild	variable	moderate to marked	marked
Corneal staning (severity/ location)	none to mild	variable	marked central	severe punctate erosions
Corneal/ tear signs	none to mild	mild debris, ↓meniscus	filamentary keratitis, mucus clumping, ↑ tear debris	filamentary keratitis, mucus clumping ↑ tear debris, ulceration
Lid/melbornian lands	MGD variably present	MGD variably resent	frequent	trichiasis, keratinization, symblepharon
TFBUT (sec)	variable	≤10	≤5	immediate
Schirmer score (mm/5 min)	variable	≤10	≤5	≤2

TREATMENT MODALITIES

Because of its high prevalence, DES is considered a significant public health issue.[9] In 2004, an International Task Force created treatment guidelines based on the symptoms and signs of dry eye (see table 1). Individuals with grade 1 signs and symptoms are considered to have mild or episodic dry eye, while those at the highest end of the scale (grade 4) include patients with severe keratitis and/or corneal injuries.

Several DES treatment modalities are currently being evaluated, including SAR 1118, a small molecule leukocyte function-associated antigen-1 inhibitor (phase II results are expected by the end of the first quarter 2010) and an iontophoretic delivery of dexamethasone in a novel delivery system. RX-10045, a resolvin administered in topical form, had positive phase II data reported last year. Others agents currently under investigation for DES include non-preserved sodium hyaluronate (already approved in Europe and undergoing trials in the United States), preservative-free drops, and rimexolone (approved for postoperative inflammation and anterior uveitis). Other agents, such as diquafosol, recently failed to meet late-stage study goals.

Treatment options generally begin with artificial tears/warm compresses and progress to include topical tear and gel replacements[10] and/or medical therapy, punctal plugs,[11] surgical options such as canalicular ligation,[12] and permanent punctal occlusion.[13]

On the following pages, you will find several case studies examining specific diagnostic and treatment challenges of DES. These case studies have been designed to address challenging issues that often confound optometrists and ophthalmologists.

See page 10 for list of references.

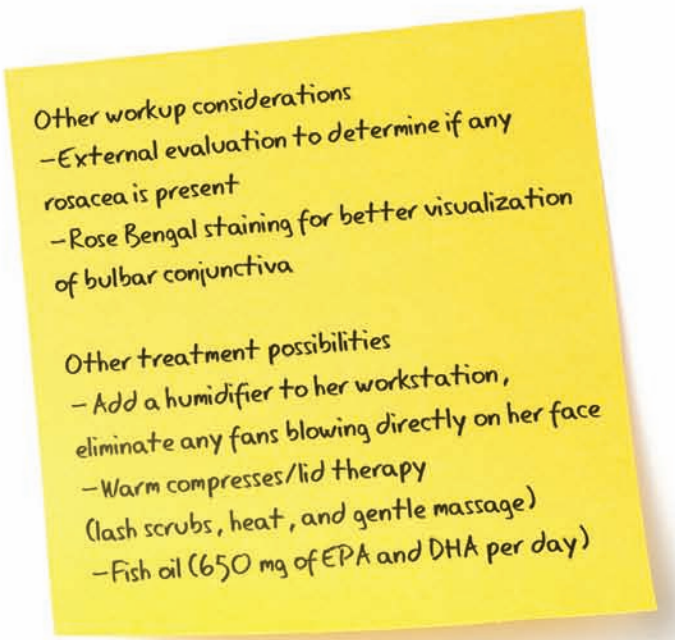
CASE STUDY **ONE**

A 32-year-old Latina female presents asking about potential LASIK surgery. She is a telemarketer during the week, reading a computer screen for 8 hours a day, and a ski instructor on winter weekends. She complains that her eyes are increasingly bloodshot and "burning" because of contact lens wear. She indicates that she is frequently symptomatic in the morning, especially due to crusty eyelids, but that the symptoms dissipate during the day before worsening again at night.

On examination, her UCVA is 20/70 OD and 20/100 OS (BCVA 20/20 OU).

IF THIS PATIENT PRESENTED IN YOUR OFFICE, WHAT TREATMENT STRATEGY WOULD YOU FOLLOW? WHAT DIAGNOSTIC TESTS WOULD YOU PERFORM?

MILTON M. HOM, OD, FAAO: This patient has many risk factors for dryness: Latino ethnicity, work in a high altitude (ski instructor), and female gender. The key symptom is the presence of crusty lids; it leads me to suspect lid disease.[1] For this patient, I would order testing via the Ocular Surface Disease Index (OSDI), tear break-up time (TBUT), staining (lissamine green and fluorescein), examination of the lids, and expression of the meibomian glands. I would also run corneal topography to see if there were any distortions in the surface regularity of the tear film that could affect visual acuity.[2]

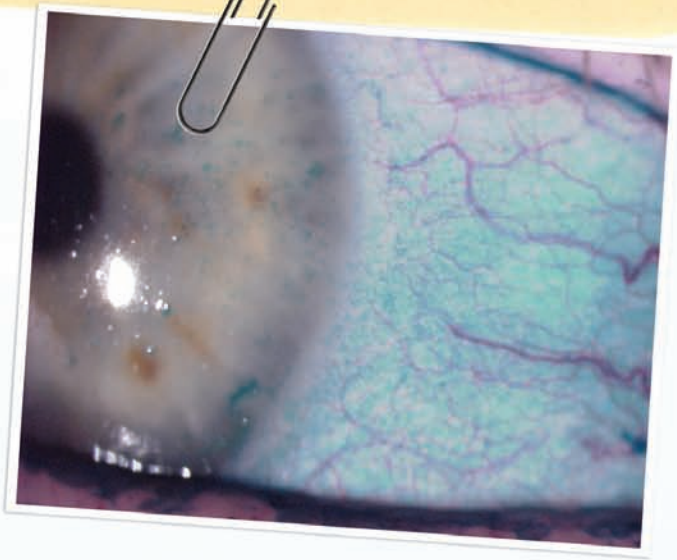


I would delay any refractive procedures until the dry eye is under control, since a pre-existing dry eye may affect overall outcomes. If lid disease were present, I would treat the patient with lid therapy/massage and azithromycin ophthalmic solution 1%. I would stay away from the tetracyclines because of photosensitivity (she's a ski instructor). If there were distortions in the tear film or other signs and symptoms of dryness, I would treat her with topical cyclosporine 0.05%.

While aqueous deficient and evaporative dry eye have been defined as separate entities, in my experience, many patients suffer from an overlap of these two conditions. For these patients, I often prescribe a "dry eye cocktail" that includes lid therapy, azithromycin ophthalmic solution 1%, and topical cyclosporine 0.05%.

STEPHEN LANE, MD: The symptoms of "burning" combined with "crusty eyelids" are characteristic of DES associated with blepharitis. Careful examination of the lids, lid margins, and palpebral and bulbar conjunctiva is important for this patient. Meibomian gland inspissation with vascularization of the lid margin would indicate posterior blepharitis. Lissamine green staining is also a valuable tool to be used in this evaluation.

Intrapalpebral conjunctival staining with or without corneal staining may be used to indicate dry eye disease or inflammatory ocular surface disease, and, in my experience, is more sensitive than either Schirmer testing (I find this test helpful only to diagnosis Sjogren's disease patients) or fluorescein staining. Her posterior blepharitis is undoubtedly playing a role in exacerbating her dry eye symptoms. In my own experience, spillover from posterior blepharitis is the most common cause of chronic conjunctivitis.



Although MGD is a common ocular surface disease, it is frequently underdiagnosed or misdiagnosed as dry eye disease.[3] Dry eye is usually chronic and associated with external factors, such as computer use and enviromental conditions, as well as internal factors, such as hormonal imbalance, autoimmune disease, anatomical changes, surgery, female gender, trauma, and aging.[4]

Signs and symptoms of DES and blepharitis must be brought under control before corneal refractive surgery can be considered. For this patient, the first agent to use to manage her DES condition probably should be a topical steroid. This would achieve rapid control of her inflammation. My steroid of choice for this indication is loteprednol, which has an attractive safety profile and is an effective treatment for ocular surface inflammatory disease.[4,5] After initial control of the inflammation (usually 2 weeks), topical cyclosporine 0.05% twice a day can be added, and the loteprednol may be discontinued.

Management of her MGD could include the use of warm compresses and lid massage plus an oral tetracycline. I favor lower doses of doxycycline, either 40 mg once daily or 20 mg twice daily. Topical azithromycin, a macrolide antibiotic that has anti-inflammatory effects similar to those seen with tetracyclines,[6,7] may also be beneficial. In addition, omega-3 fatty acid supplements, in some cases supplemented with low doses of omega-6 fatty acids, may be effective for treatment of blepharitis and MGD. These fatty acids have potent anti-inflammatory effects,[8] decreasing prostaglandin and cytokine production.

FACULTY CONSENSUS

Wait until the signs and symptoms of DES have improved before recommending LASIK. If improvement is minimal, suggest PRK or no vision correction therapy. It may also be wise to suggest scheduling her surgery during the more humid summer months.

See page 10 for list of references.

Dry Eye Prevalence in Various Ethnic Populations

The Beaver Dam Eye Study, a large, population-based analysis of nearly 6,000 individuals, found a "substantial" incidence of dry eye, but relatively few associated risk factors.[1] Diuretics and antihistamines were considered to be risk factors, but the impact of other factors such as smoking were inconclusive. The same study was used to determine that the odds of developing dry eye increase 35% for each additional 10 years of age, and that women are more significantly affected by dry eye than men. In other studies, individuals who smoke, use multivitamins (but not omega-3 or -6 fatty acids), or have systemic diseases such as diabetes, gout, or thyroid disorders have been shown to have a higher prevalence of dry eye.[2]

Unfortunately, few studies have evaluated the prevalence of dry eye in particular ethnic groups. However, in one study of Hispanics living in Southern California, 44% had some symptoms of dryness.[3] This confirmed results found in the Dry Eye Workshop, which noted a substantially higher prevalence of severe dry eye in both Hispanic and Asian women compared to their Caucasian counterparts.[4]

Another study of 2,217 Japanese patients found that 17% had dry eye, with an increased prevalence in those patients living in urban vs. suburban areas.[5] Another population-based study of residents in Taipei found that 34% of the 1,361 participants were symptomatic for dry eye, with at least one dry eye symptom reported. Furthermore, almost half the participants (47.5%) reported using eye drops to alleviate symptoms.[6] In this same study, the prevalence of dry eye in elderly Chinese patients (older than 65 years) was higher than that reported in a Caucasian population.

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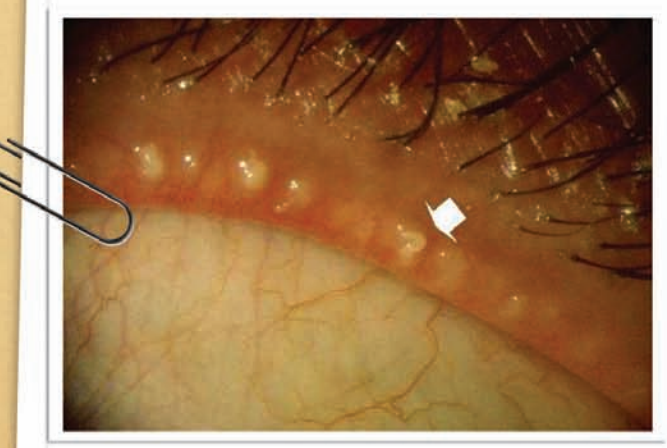
CASE STUDY TWO

A 65-year-old male with a long-standing history of diabetes and recently diagnosed diabetic retinopathy bilaterally complains that his eye feels like "there was something stuck in it" and that his vision seems to be getting blurrier. He notes that he spends his winters in Florida (he lives in Minnesota otherwise) golfing 2–3 times a week and that his symptoms worsen when he's playing golf (although there is no noticeable change in his vision). His current medications include insulin, an ACE inhibitor/beta-blocker/diuretic. Schirmer's score without anesthesia are 3 mm OD and 4 mm OS. BCVA is 20/40 OD and 20/30 OS. Slit lamp shows posterior blepharitis (MGD), poor tear meniscus, and decreased blink rate. TBUT was 3 seconds OD and 4 seconds OS.

IF THIS PATIENT PRESENTED IN YOUR OFFICE, WHAT TREATMENT STRATEGY WOULD YOU FOLLOW? WHAT DIAGNOSTIC TESTS WOULD YOU PERFORM?



MARK DUNBAR, OD: Based on the history, I think this patient has a combination of aqueous deficient dry eye as well as an evaporative form of dry eye. These are difficult situations to treat because you don't know what to target first. Assuming the patient has good insurance coverage, I would prescribe azithromycin ophthalmic solution 1% twice a day for 2 days and at bedtime for 1 month. I would also suggest the use of commercial lid scrubs as well as hot compresses.

Cleaning up the lids and improving meibomian gland function may be enough for this patient. Omega-3s and fish oils might also improve his symptoms.[1]

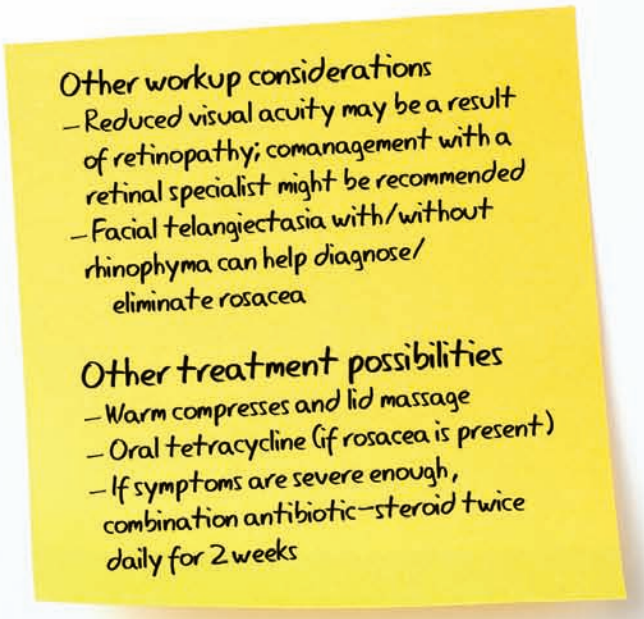
I would not start both topical cyclosporine 0.05% and azithromycin ophthalmic solution 1% at the same time, but choose one or the other depending on what I thought was contributing the most to his symptoms.

MILTON M. HOM, OD, FAAO: As eye doctors, we are usually focused on retinal problems with diabetes. A forgotten connection is diabetes and dry eye.[2-4] Published studies have shown that blood sugar levels correlate with dryness rates.[2] In my practice, we have also noticed a relationship between diabetes and blepharitis. To help treat and manage diabetic patients, we monitor hemoglobin A1c levels with an in-office testing unit. If the diabetes is uncontrolled, one of our first steps is to consult with the patient's primary care physician or endocrinologist.

For the MGD, our backbone treatment is lid therapy.[5] We like to use uncooked rice microwaved in a sock for about 1 minute. The heat of the sock combined with moistened sterile gauze gives the lids moist heat. After applying the sock, we have the patient massage and express their lids. We also have the patient massage a drop of azithromycin ophthalmic solution 1% into the lids after lid therapy.

If the MGD is severe, we add low-dose oral doxycycline or minocycline (20–50 mg, twice a day). If economics are an issue, we tell the patient to buy doxycycline in 100 mg tabs and split them into four pieces with a pill cutter. One pitfall of this approach is the photosensitizing effects of the doxycycline or minocycline. Based upon his passion for golfing, this patient will be at higher risk of sunburn.

Some studies show omegas 3s and 6s thin the meibomian oils, so I would also suggest adding nutritional support for this patient. Some experts favor cold fish oils or cod liver oils over flaxseed oils as they feel flaxseed oils are unstable and become rancid too easily.[6-9] If the treatment for blepharitis does not work, then the patient probably has Demodex.[10]



STEPHEN PFLUGFELDER, MD:

This patient may have several causes for his dry eye, including MGD and long-standing diabetes, which often causes ocular surface sensory neuropathy and neurotrophic corneal epitheliopathy.[4,11] The reduced blink rate suggests reduced ocular surface sensitivity.[12] If corneal sensitivity is indeed reduced, the patient's lacrimal functional unit may be unable to respond to adverse environmental conditions. I would recommend the patient wear moisture chamber spectacles within dry and windy environments to avoid excessive ocular surface desiccation.

In severe cases of neurotrophic epitheliopathy, I would use autologous serum or plasma drops[13] and consider therapeutic contact lenses, such as the Boston Ocular Surface prosthesis.[14] If his diabetes is poorly controlled, I would recommend consultation with an endocrinologist for counseling on diet and more effective therapy, including use of an insulin pump. Better control of his diabetes may prevent further worsening of his neuropathy or other systemic complications.

In the meantime, I would recommend treating his MGD and dry eye with lid therapy (lash scrubs, heat, and gentle massage) and either oral doxycycline (20 mg twice a day for 1 month) or topical azithromycin 1% (twice a day for 2 days then at bedtime for 28 days). I would also recommend he use fish oil (650 mg of EPA and DHA per day). I would likely put him on topical cyclosporine 0.05% twice a day chronically, perhaps combined initially with a 1-month course of topical preservative-free steroid (0.01% dexamethasone) administered four times a day for 2 weeks and then twice a day for 2 weeks.

Punctal occlusion with thermocautery may be considered if neurotrophic epitheliopathy is noted.[15]

○ **FACULTY CONSENSUS**

DES can be managed, but it is important to first ensure the condition is not being exacerbated by any ocular comorbidity.

See page 10 for list of references.

Dry Eye & Systemic Comorbidities

Numerous medical conditions may adversely affect tear production. These can include facial nerve paralysis, chemical burns, congenital alacrima, allergies, ocular and systemic hypertension, menopause, and diabetes.[1,2] In one study, patients with self-reported diabetes had increased rates of ocular dryness.[3] In another, the prevalence of dry eye in patients with type 2 diabetes was 54.3%, although the etiology driving the relationship between diabetes and dry eye remains unknown.[4]

The use of antihistamines to treat allergies may exacerbate dry eye conditions in symptomatic patients, and clinicians should also be made aware of potential anticholinergic effects.[5] Newer clinical studies on topical treatments for seasonal allergic conjunctivitis have paid strict attention to the effects the drops have on ocular drying.[6]

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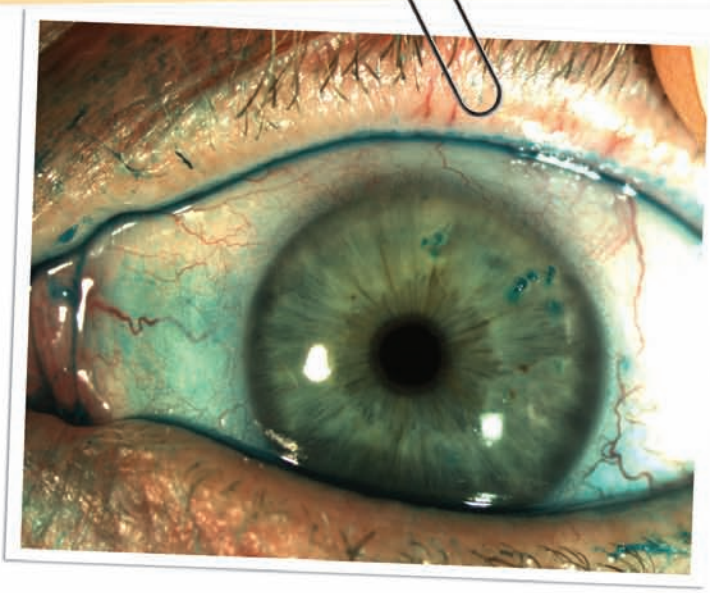


CASE STUDY **THREE**

A 62-year-old woman has used artificial tears for dry eye several times a day for the past 4 years and has been on hormone replacement therapy (HRT) for the previous 6 years. A retiree on a fixed income, she spends a considerable amount of time reading and knitting, which she is having increasing difficulty doing during the past few months. She recently came back from a Caribbean cruise and said that, while on the cruise, it was the first time her eyes didn't bother her throughout the day for a long time.

Her current medications include atorvastatin in addition to HRT. She presents due to worsening dry eye symptoms that have necessitated an increased use of artificial tears throughout the day. She says that she thinks she was on prescription drops a few years ago, but can't remember the name (topical cyclosporine 0.05% doesn't ring a bell), just that it didn't seem to work and she couldn't really afford it, so she stopped taking it. She adds that she has seasonal allergies, but her symptoms usually disperse when the pollen count decreases. Her maternal grandmother went blind from AMD; her parents are deceased (age-related causes).

Her current BCVA is 20/30, she uses spectacles, and has never undergone ocular surgery. Her tear film break-up time is 8 seconds, and Schirmer score without anesthesia is 3–4 mm. Other findings from her ophthalmic exam include clear corneas, history of blepharoplasty, and worsening symptoms in forced air environments (air conditioning and/or heating).

IF THIS PATIENT PRESENTED IN YOUR OFFICE, WHAT TREATMENT STRATEGY WOULD YOU FOLLOW? WHAT DIAGNOSTIC TESTS WOULD YOU PERFORM?

MARK DUNBAR, OD: This patient is clearly a level 2 dry eye patient based on the International Task Force guidelines.[1] I don't think she is level 3, as she does not exhibit any fluorescein staining (clear corneas) and she probably does not have any bulbar conjunctival staining based upon clinical findings.

It is interesting that in the warmer, humid climates of the Caribbean, her dry eyes are less bothersome. This is exactly what we see in South Florida. There is no question that warmer, humid climates are more forgiving for dry eye sufferers[2,3] than colder Midwest or Plains states. This could be an issue to discuss with the patient. Perhaps she would be willing to move to a warmer climate (provided she had the means) if it meant that her eyes would bother her less.

Aside from that, I think she clearly needs medical therapy. I would begin with topical cyclosporine 0.05% twice a day in both eyes. I know she is on a fixed income, but topical cyclosporine 0.05% is now considered to be Tier 2 on most insurance plans, which means a lower co-pay. If one vial is used twice a day for each eye, two trays should last 2 months.

To determine the efficacy of the medication, I would suggest bringing her back in 6 weeks for re-evaluation. Topical cyclosporine 0.05% takes approximately 4–6 weeks to have an effect so a follow-up visit after 6 weeks could be used to determine the following:

1. Did she get the medication?

2. Is she still using it?

3. Has she noted any improvement in her symptoms?

4. Are there any negative side effects such as burning or stinging?

Assuming that she is using the medication and has started to notice an improvement in symptoms, I would reassure her that she needs to continue to use the medication as prescribed and that she can expect to see further improvement in future weeks and months. I would also supplement the topical cyclosporine with nonpreserved artificial tears. After the initial 6-week follow-up visit, I would recommend seeing her again in approximately 4–6 months. If at 6 weeks she is not adhering to the treatment regimen for financial reasons, I would switch to a topical steroid. Loteprednol would be my preference, but if she can't afford the topical cyclosporine 0.05%, then loteprednol is probably not going to be affordable either. Therefore, I would prescribe either fluorometholone or prednisolone depending on how symptomatic she is. Fluorometholone used 2–3 times a day is very effective and causes fewer steroid-induced side effects.[4] I typically see dry eye patients on steroid therapy 3–4 times a year to monitor any steroid-induced side effects.

Alternatively, if at 6 weeks she is adhering to the treatment regimen but is still considerably symptomatic, I would encourage the patient to continue with the topical cyclosporine drops and have her return for follow-up in another 4-6 weeks to reassess how she is doing. If she still is moderately symptomatic at that visit, I would insert punctal plugs. The punctal plugs should provide additional comfort based on her low Schirmer's scores. Six weeks later, if her symptoms are significantly improved, I would ask to monitor her in another 4–6 months.

One possible debate with this suggested approach is whether a topical steroid, such as loteprednol or fluorometholone, should be added instead of the punctal plugs. Based on this patient's Schirmer's score, my feeling is that the punctal plugs should provide the necessary additional relief and avoid the burden of a second medication. However, if she had significant punctate epithelial erosion or punctate epithelial keratitis (or even filamentary keratitis), then I would indeed add a steroid to her topical cyclosporine 0.05%.

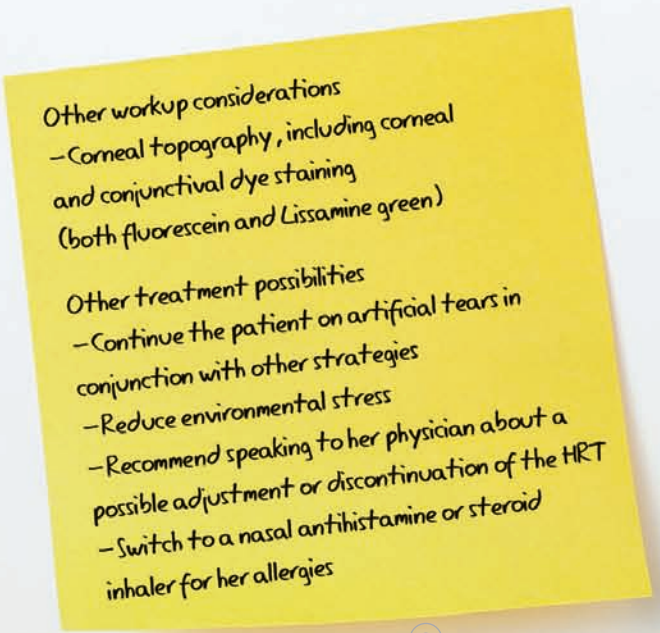
ELIZABETH DAVIS, MD: This patient exhibits several risk factors for dry eye, including female gender, older age/postmenopausal, and blepharoplasty.[5] If left untreated, it is possible that her symptoms and signs could worsen. If clinical findings demonstrate mild dry eye (no conjunctival injection, no vital dye staining of either conjunctiva or cornea, normal TBUT, normal Schirmer's), then artificial tears alone may suffice.

If her dry eye is moderately severe (presence of mild-to-moderate vital dye staining with reduced TBUT and Schirmer's), preservative-free artificial tears and topical cyclosporine 0.05% could be initiated. If she is unresponsive to therapy after 3–4 weeks, or if the dry eye is severe (more intense/diffuse vital dye staining with possible reduction in acuity), a pulse of topical steroid four times a day for 2 weeks could be employed followed by punctal occlusion, if necessary.

○ FACULTY CONSENSUS

Without treatment, this chronic DES will become worse.

See page 10 for list of references.



Dry Eye, Gender, & the Impact of Hormonal Therapy

DES more frequently affects women than men. Epidemiologic studies have found female gender to be a higher risk factor for DES than male gender, which may be explained by differences in sex hormones.[1,2] In men, the prevalence of DES does increase with age, but it is affected more by hypertension, benign prostatic hyperplasia, and use of antidepressants.[3]

Lacrimal insufficiency in women usually begins during the fifth decade of life; clinical signs and symptoms have been associated with estrogen, taken alone or in combination with progesterone or progestin as hormone replacement therapy (HRT).[4] Both clinical studies and laboratory investigations conclude that hormonal imbalances such as those found in menopausal women promote lacrimal and meibomian gland inflammation and dysfunction.[5] However, pregnant women or those on birth control pills also have elevated levels of estrogen and prolactin, which may adversely affect the lacrimal glands and increase symptoms of dry eye.[6]

The American Optometric Association notes for postmenopausal women using HRT, the risk for clinically diagnosed DES or severe symptoms rises 15% for every 3 years on therapy.[7]

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NAME _____ DEGREE/CERTIFICATION _____

1. Which of the following <u>has not</u> been consistently identified as a risk factor for the development of dry eye syndrome in clinical trials?

a. Latino ethnicity

b. Regular use of omega-3 supplements

c. Current use of antihistamines

d. Living in a high-altitude environment

2. A 55-year-old female patient presents with filamentary keratitis, severe dry eye symptoms, but no conjunctival scarring. According to the guidelines from the International Dry Eye Workshop, what level of dry eye severity would you assign to her?

a. Level 1 severity

b. Level 2 severity

c. Level 3 severity

d. Level 4 severity

3. A 45-year-old female presents complaining of "crusty" eyes in the morning and visual fluctuation. Upon exam, she has foamy tears and confirmed lissamine green staining. Based upon this information, what would the most likely diagnosis be?

a. Meibomian gland disease

b. Aqueous tear deficiency

c. Evaporative tear deficiency

d. Allergies

4. Compared to Caucasian women, the prevalence of dry eye in Asian women has been shown to be…

a. Higher

b. About the same

c. Lower

d. No clinical studies have examined the prevalence of dry eye in a population of Asian women

5. A 62-year-old man presents with mild dry eye. Of the following choices, what would be the most appropriate option as a first treatment step?

a. Permanent punctal occlusion

b. Modify the environmental factors

c. Systemic anti-inflammatory agents

d. Bandage contact lens

6. Which of the following ocular surface disease patients would be least appropriate to undergo LASIK?

a. A DES patient on topical cyclosporine 0.05% with no evidence of corneal or conjunctival epitheliopathy and no symptoms

b. A patient with Sjogren's disease and persistent punctate epitheliopathy of the cornea despite 2 months of treatment with lubricants, topical steroids and cyclosporine

c. A patient with DES and Lissamine green staining of the conjunctiva that completely resolved with the placement of punctal plugs

d. A patient with seasonal allergies whose eyes are reddened and who is teary every spring but has symptoms relieved with topical antihistamines and mast cell inhibitors

The learning objectives designed for this activity (listed below), can help me strive toward:	Nothing at this time	Reinforcement of current practices	Moderate Improvement	Significant Improvement
Identify the treatment algorithms used to combat the rising prevalence of dry eye in the United States, pinpointing any ethnic and geographic disparities responsible for this increase in order to rationalize earlier prescription treatment vs. over-the-counter usage	1	2	3	4
Assess the pharmacoeconomic and treatment implications of dry eye, as well as the optimal conditions of the surface of the eye pre- and post-surgery	1	2	3	4
Weigh the risks vs. benefits of currently approved and late-stage pipeline agents used for the treatment of dry eye conditions and implement strategy models to help improve patient care	1	2	3	4

Please indicate the extent of your agreement with the following statements:	Strongly Disagree		Not Sure		Strongly Agree	
1. The information presented in this supplement was pertinent to my professional needs	1	2	3	4	5	6
2. The content of this supplement contributes valuable information that will assist me in improving patient outcomes	1	2	3	4	5	6
3. Based on my experience, I would recommend future similar supplements to my colleagues	1	2	3	4	5	6
4. Were you able to locate information about faculty disclosure at the beginning of the supplement?	YES		NO			
5. Did you perceive any bias or commercial influence in the supplement? If so, your help in identifying it is appreciated: _____ _____	YES		NO			

6. Which of the following would you consider to be the most significant barrier to treating ocular surface disease in your current practice?

a. Lack of availability of appropriate diagnostic tests
b. Insufficient knowledge about the tests themselves
c. Reimbursement issues
d. Patient adherence
e. Other

7. The following is the primary barrier to implementing change at my facility:

a. Lack of knowledge regarding evidence-based strategies
b. Misperceptions of or negative attitudes about research and evidence-based care
c. Demanding patient workloads
d. Fears about practicing differently from peers
e. Other

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