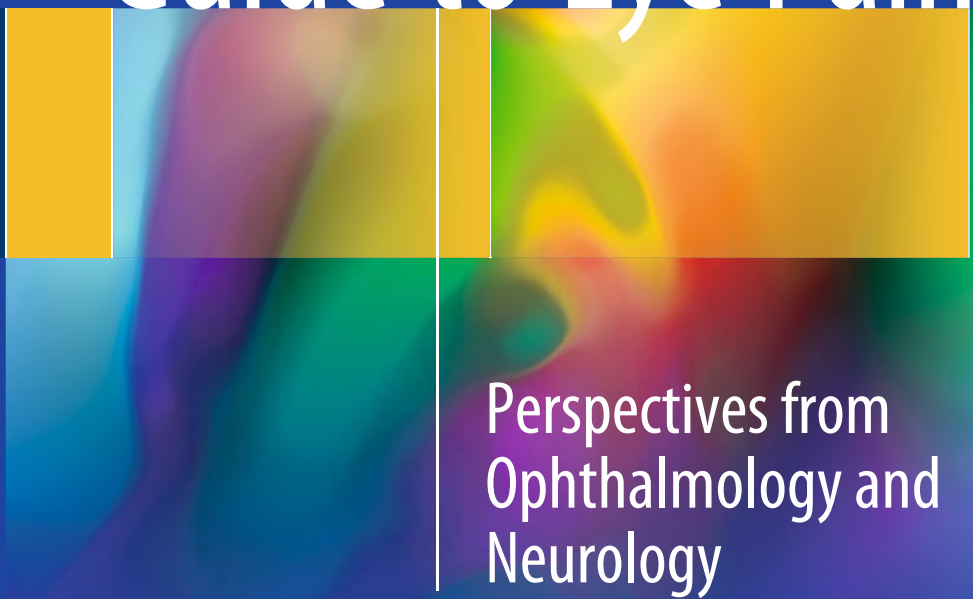
Michael S. Lee · Kathleen B. Digre

A Case-Based Guide to Eye Pain



Perspectives from Ophthalmology and Neurology

Springer

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Michael S. Lee • Kathleen B. Digre

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Foreword

"I have pain in (or around or behind) my eye." This sentence is one that most physicians, be they ophthalmologists, optometrists, neurologists, or primary care providers, dread to hear. In large part, this is because pain is such a subjective complaint. Thus, the first assumption that most physicians make when they see a patient with the complaint of "eye pain" is that they will not find the cause of the pain. This, in turn, will make them believe that it is most likely that (1) there is nothing really wrong with the patient, (2) the patient will be unhappy with them, and (3) the patient will want some type of drug for the pain.

In reality, pain is a complex symptom with many etiologies. On the one hand, its cause may be something straightforward, like a dry eye, and its treatment may be as simple as ocular lubrication or punctal occlusion. On the other hand, patients with eye pain may have a potentially vision-threatening condition such as intermittent angle-closure glaucoma or even a life-threatening condition such as an intracranial aneurysm or tumor. The ophthalmologist who finds no ocular cause for the patient's complaints is sure to be perplexed as will the neurologist who finds no neurologic cause and who obtains neuroimaging that is unremarkable. The primary care provider may not even know to whom to refer the patient or what to do when the patient returns from the general ophthalmologist and/or neurologist with no diagnosis. Even neuro-ophthalmologists are not immune to the confusion that comes in dealing with patients who have eye pain. *A Case-Based Guide to Eye Pain—Perspectives from Ophthalmology and Neurology,* written by two neuro-ophthalmologists, Dr. Mike S. Lee, an ophthalmologist, and Dr. Kathleen B. Digre, a neurologist, thus is a welcome addition to everyone's practice, particularly as it is, as the title indicates, case based—like a conversation with a colleague.

The book begins with a chapter on key signs and symptoms, emphasizing their importance in diagnosis. There follows a list of the various abbreviations used in the book. The subsequent cases, all of which contain excellent figures and illustrations, are then grouped into two main sections. The first section contains 18 cases demonstrating ocular causes of pain, ten with relatively normal examination findings and eight in which there are abnormal but often subtle findings. The second section contains 25 cases demonstrating neurologic causes of eye pain, 15 in patients with

little or no neurologic or eye findings and ten with abnormal findings. All 43 cases begin with the history and examination, followed by commentary by both Dr. Lee and Dr. Digre. Thus, the reader gets the views of both an ophthalmologist and a neurologist. Each case ends with a summary, key points, and references for the reader who wishes to pursue the topic further. The book ends with four appendices. Appendix 1 lists the tables in the book. Appendix 2 lists the figures in the book. Appendix 3 discusses how to obtain a proper history and perform an appropriate examination in a patient with eye pain, and Appendix 4 discusses the pathophysiology of eye pain.

Although eye pain is frustrating for patients and can be frustrating for the physicians who care for such patients, the diagnosis and treatment of its cause can not only improve a patient's quality of life but also can prevent major ocular or neurologic morbidity. This book fills a void in the ophthalmic, neurologic, and general medical literature and should be on the shelf in every physician's office.

Neil R. Miller, M.D., F.A.C.S.

Preface

Most of us have a "Do not schedule this with me" diagnosis list, and many of our colleagues have told us that "eye pain" resides near the top of that list. Unfortunately, there is not a good department for these patients, and there are a lot of them showing up in our offices and clinics. In our neurology and ophthalmology residencies and fellowships, we never received formal teaching or training in eye pain and, honestly, had to learn a lot by trial and error (and by fire). So when a Springer editor approached us in the fall of 2015 about writing a book about the subject, it intrigued us.

She told us that no book on eye pain existed and that readers enjoy case-based books. So, we set out to demystify the topic and create a practical approach to the patient with eye pain. At first, we thought to target neurologists and ophthalmologists, but, as we inquired around, our colleagues in the emergency room and urgency room and primary care asked if they could read some of the chapters as well.

There are 43 cases but more than 43 causes of eye pain. We use each case as a springboard to generate a differential diagnosis and a thought process based on the signs and symptoms. Some of the cases are not classic, but most of our patients don't always follow the book.

We have tried to give the International Classification of Headache Disorders whenever possible. For a complete listing of these disorders please see: International Headache Society Headache classification ICHD 3 beta. Cephalalgia 2013; 33(9):629–808.

We sincerely hope that you will enjoy this book and, after reading it, feel more comfortable serving our patients with eye pain.

Minneapolis, MN — Michael S. Lee
Salt Lake City, UT — Kathleen B. Digre

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I would like to thank my loving wife, Mina, and my children, Sam, Nate, Isaac, and Esthergrace, who mean the world to me. Your faith and your support make all the difference and you are truly a gift and a blessing from above. Thanks to Yong and Soo Lee and Hyung and Kilja Kim for your loving support and sacrifice. I would also like to thank Nicholas Volpe, Simmons Lessell, Joe Rizzo, Mike Siatkowski, and Andy Lee who have mentored me along in my career. Greg Kosmorsky has taught me a lot about eye pain and about life in general. Finally, I would like to thank my coauthor, Kathleen, who has made writing my first book an extremely positive experience. It has been a pleasure working with you.

Michael S. Lee, MD

I would like to thank people who have really taught me about eye pain and headache. My mentor, James Corbett, instilled in me an enthusiasm for the study of the eye and headache. I have also learned a lot about eye pain and headache from my wonderful colleagues Susan Baggaley, Judith Warner, Bradley Katz, and Alison Crum at the Moran Eye Center, University of Utah. Finally, I would like to thank my wonderful supportive husband, Michael Varner, and children Johanna and Gita Varner for their encouragement. Thanks to you Mike for a wonderful, educational experience writing this book—it has been fun.

Kathleen B. Digre, MD

We both would like to thank our patients who teach us about eye pain in all of its varied forms and keep us wanting to learn more.

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Signs and Symptoms

Case	Diagnosis	VA loss*	Red	White	Ptosis	Eyelid edema	Anisocoria	Proptosis	Tearing	Nasal sxs	Diplopia	Blurry vision	Photophobia	Other comment
1	Dry eye syndrome		(X)									(X)	(X)	
2	Corneal erosions		X						X			X	X	Upon awakening
3	Post-LASIK pain			X									(X)	
4	"Eye strain"			X							(X)	(X)		
5	Intermittent angle-closure glaucoma		X						X			X	X	
6	Blepharospasm			X					(X)			(X)	X	Excess blinking
7	Chalazion		(X)			(X)								
8	Trochleitis			X									(X)	
9	Lacrimal gland tumor			X	(X)	(X)		(X)			(X)			
10	Posterior scleritis	(X)		X								(X)	(X)	
11	Idiopathic orbital inflammatory syndrome	(X)	X		(X)	(X)		(X)	(X)		X	(X)	(X)	
12	Uveitis	(X)	X				(X)		(X)			(X)	X	
13	Conjunctivitis		X			(X)			X			X	(X)	
14	Thyroid eye disease	(X)	(X)	(X)		(X)		X	(X)		(X)	(X)	(X)	
15	Orbital mass	(X)	(X)	(X)	(X)	(X)		X	(X)		(X)	(X)	(X)	
16	Ocular ischemic syndrome	(X)	(X)	(X)			(X)					(X)	(X)	TVL in light

(continued)

Case	Diagnosis	VA loss*	Red	White	Ptosis	Eyelid edema	Anisocoria	Proptosis	Tearing	Nasal sxs	Diplopia	Blurry vision	Photophobia	Other comment
17	Horner syndrome		(X)	(X)	X		X		(X)	(X)				+/− anhidrosis
18	Microvascular cranial nerve palsy			X	(X)		(X)				X			Ptosis and anisocoria w/3np only
19	Migraine			X									X	Aura may cause TVL
20	Medication overuse headache			X										
21	Photophobia		(X)	(X)									X	
22	Trigeminal neuralgia			X										
23	Cervicogenic headache			X									(X)	
24	Ice pick headache			X										
25	Sinus disease			X						X				
26	Tension type headache			X									(X)	
27	Supraorbital neuralgia			X									(X)	
28	Trigeminal autonomic cephalalgia		X		X		X		X	X			X unilat	
29	Cough headache			X										
30	Traumatic headache			X									X	
31	Intracranial hypotension			X							(X)		(X)	Positional pain
32	Giant cell arteritis	(X)	(X)	(X)	(X)	(X)	(X)				(X)	(X)		>50 yo

33	Thunderclap headache			X								(X)	(X)	
34	Meningitis	(X)	(X)	(X)							(X)	(X)	X	
35	Optic neuritis	X		X								X		
36	Idiopathic intracranial hypertension	(X)		X							(X)	(X)	(X)	
37	Carotid cavernous fistula	(X)	X		(X)	(X)	(X)	(X)			(X)	(X)	(X)	
38	Herpes zoster ophthalmicus	(X)	(X)	(X)	(X)	X		(X)			(X)	(X)	(X)	Pain may antedate vesicles
39	Periocular skin cancer	(X)		X	(X)		(X)	(X)			(X)	(X)		
40	Tolosa Hunt		(X)	(X)	(X)	(X)	(X)	(X)	(X)		(X)	(X)	(X)	
41	Pituitary tumor	(X)		X							(X)	(X)	(X)	
42	Aneurysm	(X)		X	(X)		(X)				(X)	(X)	(X)	
43	Ophthalmoplegic migraine			X	X		X				X		(X)	<10 yo

X = Commonly occurs
(X) = Possibly occurs

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Abbreviations

3NP	Third nerve palsy
ABMD	Anterior basement membrane dystrophy
ACE	Angiotensin-converting enzyme
ANA	Antinuclear antibody
APD	Afferent pupillary defect
BB	Ball bullet
BE	Both eyes
C	Cervical
c-ANCA	Cytoplasmic antineutrophil cytoplasmic antibodies
C-C	Carotid cavernous
CAS	Clinical activity score
CBC	Complete blood count
CI	Convergence insufficiency
CISS	Constructive interference in steady state
cm	Centimeter(s)
CN	Cranial nerve
CPAP	Continuous positive airway pressure
CRP	C-reactive protein
CSF	Cerebrospinal fluid
CT	Computed tomography
CTA	Computed tomographic angiogram
CTV	Computed tomographic venogram
DES	Dry eye syndrome
EBV	Epstein–Barr virus
ED	Emergency department
EMG	Electromyography
ENT	Ear, nose, and throat
ESR	Erythrocyte sedimentation rate
FTA-ABS	Fluorescent treponemal antibody absorption
GCA	Giant cell arteritis
GON	Greater occipital nerve

GPA	Granulomatosis with polyangiitis
Hg	Mercury
HHV	Human herpes virus
HIV	Human immunodeficiency virus
HLA	Human leukocyte antigen
HPI	History of present illness
HSV	Herpes simplex virus
ICHD	International Classification of Headache Disorders
IgG	Immunoglobulin G
IgM	Immunoglobulin M
IIH	Idiopathic intracranial hypertension
IOP	Intraocular pressure
IV	Intravenous
IVIG	Intravenous gamma globulin
kg	Kilogram
LASIK	Laser in situ keratomileusis
LDS	Latter Day Saints
LE	Left eye
LP	Light perception or lumbar puncture
LUL	Left upper lid
mg	Milligram (s)
MIDAS	Migraine Inventory Disability Assessment Score
mL	Milliliter(s)
mm	Millimeter(s)
MOH	Medication overuse headache
MR	Magnetic resonance
MRA	Magnetic resonance angiogram
MRI	Magnetic resonance imaging
MRV	Magnetic resonance venography
NMO	Neuromyelitis optica
NOVEL	Neuro-ophthalmology Virtual Educational Library
NSAIDS	Nonsteroidal anti-inflammatory drugs
OD	Right eye
OIS	Ocular ischemic syndrome
OS	Left eye
OU	Both eyes
p-ANCA	Perinuclear antineutrophil cytoplasmic antibodies
Pcomm	Posterior communicating
PCR	Polymerase chain reaction
PD	Prism diopter
PEK	Punctate epithelial keratopathy
PET	Positron emission tomography
POTS	Postural orthostatic tachycardia syndrome
prn	As needed
PSP	Progressive supranuclear palsy

PST	Pulse synchronous tinnitus
RAI	Radioactive iodine
RAPD	Relative afferent pupillary defect
RCVS	Reversible cerebral vasoconstriction syndrome
RE	Right eye
RF	Rheumatoid factor
RNA	Ribonucleic acid
RNFL	Retinal nerve fiber layer
RPR	Rapid plasma reagin
SOV	Superior ophthalmic vein
SR	Sustained release
SSA	Sjögren syndrome-related antigen A
SSB	Sjögren syndrome-related antigen B
SSRI	Selective serotonin reuptake inhibitor
SUNA	Short unilateral neuralgiform headache attacks
SUNCT	Short unilateral neuralgiform headache attacks with conjunctival injection and tearing
TAC	Trigeminal autonomic cephalgia
TB	Tuberculosis
TBUT	Tear break up time
TED	Thyroid eye disease
TMJ	Temporomandibular joint
TRAB	Thyroid receptor antibody
TSI	Thyroid-stimulating immunoglobulin
TVL	Transient vision loss
u	Units
VDRL	Venereal Disease Research Laboratory
VZV	Varicella zoster virus
WHO	World Health Organization
x/d	Times per day

Part I
Ophthalmic Disorders Causing Eye Pain: Relatively Normal Examination

Case 1

History of Present Illness

A 63-year-old woman with a history of strabismus status-post childhood corrective surgery describes pain in both eyes for the last 6 months. She describes an aching pain that is absent when she first awakens then worsens as the day progresses. It is symmetric, daily, and is getting worse occurring more frequently and earlier in the day. She was given eye exercises and prisms without improvement. Nothing initiates the pain, but reading seems to worsen it. Closing her eyes makes it better. Over-the-counter NSAIDs are not beneficial. She endorses occasional redness and occasional tearing. The pain has an aching quality, does not radiate, and measures three out of ten at its worst. She denies blurred vision, ptosis, photophobia, and diplopia.

Past medical and ocular history Osteoarthritis Atrial fibrillation Depression Hyperlipidemia Hypertension Right-sided congestive heart failure Rosacea	*Past surgical history* Total knee arthroplasty
	Family history Mother—Progressive supranuclear palsy
	Review of systems Easy bruising
Medications Furosemide Sertraline Metoprolol Warfarin Vitamin D Spironolactone Atorvastatin	*Social history* One glass of wine daily No smoking or drug use Retired professor

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Examination
Acuity with correction Right eye: 20/20 distance and near Left eye: 20/25 distance, 20/20 near
Pupils Equal, round, reactive, without an afferent pupillary defect
Intraocular pressure Right eye: 17 mmHg Left eye: 18 mmHg
External exam Rosacea, mild ptosis of the left upper lid
Eye alignment and motility Normal motility Orthophoric in distance 3 PD exophoria at near Convergence amplitudes 30 PD for distance, 40 PD near Near point of convergence to nose
Slit lamp examination Blepharitis Mild nuclear sclerosis Tear break up time 4 s BE No foreign body seen
Visual field Normal
Fundus examination Normal
Neurologic examination Normal

Discussion

Ophthalmic Perspective: Dr. Lee

The fact that the pain is intermittent, bilateral, and symmetric would argue away from a fixed orbital process, where I would expect the pain to be constant and unilateral. There are no other features of orbital inflammation such as persistent or worsening redness, proptosis, or chemosis. Her pain is not present in the morning and worsens as the day goes on suggesting this is not a more sinister process. While the patient has a small eye misalignment (exodeviation), this would not constitute a convergence insufficiency (CI). Typically, the deviation in CI (see Case 4) is 10 prism diopters greater at near than distance. Her exodeviation is too small to really call it CI. The patient has very normal convergence amplitudes, well over what is needed to overcome the small misalignment at near. Her near point of convergence is also normal. Although her symptoms are worse with reading, which could suggest CI, she has tried prisms and convergence exercises without benefit.

The mild pain and aching quality sound most consistent with dry eye syndrome (DES). It is important to note that DES is the most common cause of eye pain! In

my experience, most patients with dry eye-related pain describe generally mild, aching, pressure, or pulling sensation. Some say it radiates behind the eye and others say eye movement worsens it. It would be highly unusual for DES to cause sharp, stabbing or pounding pain or for it to be severe. Many patients note that the pain seems to wax and wane with the day. When patients wake up, their corneas have been protected all night and then become painful with exposure to wind and evaporation especially with reading. Interestingly, sometimes DES pain is unilateral. Many patients will note other symptoms of DES such as burning, blurry vision, tearing, redness, and foreign body sensation but not all will. Examination may show punctate epithelial erosions, early tear break up time (TBUT), blepharitis, or abnormal Schirmer's tear testing (Fig. 1.1). In other cases, the slit lamp examination can appear quite unremarkable. In many, a topical anesthetic will greatly improve the pain. However, patients with chronic DES-related eye pain of several months duration may not enjoy improvement. This occurs because of upregulation of pain modulating proteins within the cornea. Looking at her medications, she is on two diuretics, a beta blocker and a SSRI, which may worsen DES.

We know that she has rosacea, blepharitis, and an early TBUT. Rosacea can cause inflammation of the eyelid margin and disruption of the meibomian glands, which reduces tear quality. We could see if a topical anesthetic substantially improves the pain. We could also measure her tear production. Given the strong history and physical, I would favor treating with artificial tears 4–6 × /day, washing the eyelids with hot water, using warm compresses, fish oil or flaxseed oil (omega 3 oils) 2 × /day for 1 month then 1 × /day, humidifying her environment, and drinking a lot of water. At bedtime, the patient can also use ocular ointment. If this does not benefit her, then I would add topical corticosteroids 3–4 × /day tapering by one drop each week. If she had improvement, but not resolution with the corticosteroids, then I would try topical cyclosporine 2 × /d. I would also consider punctal plugs and doxycycline 100 mg 2 × /day. More extreme measures could include scleral contact lenses, which put a layer of tears between the lens and the cornea, or even autologous serum eye drops.

Fig. 1.1 Schirmer tear testing. Some practitioners put anesthetic in and others do not. The strips are placed in the lower fornix and left there for 5 min. After they are removed the degree of wetting is measured using a ruler. Less than 5 mm is considered significantly reduced

Neurologic Perspective: Dr. Digre

I agree with Dr. Lee, that this is dry eye. There are many conditions to at least consider that could be co-morbid in this patient. I would want to be sure she does not have underlying migraine. While she is 63 years old, her migraines may have tapered off, but individuals with previous migraine could be more susceptible to the pain of dry eyes. In addition, in my practice, dry eyes can worsen migraine patient's headaches. I would also be sure that she has no other neurological symptoms. Her mother had progressive supranuclear palsy (PSP) and degenerative neurological disorders can be associated with decreased blinking. While it is not known to be inherited, movement disorders such as PSP and Parkinson disease are frequently associated with both dry eyes and complaints about reading and mild convergence insufficiency. Finally, I would also ask about dry mouth as a symptom of Sjögren's disease which often affects middle-aged women. I frequently do a Schirmer's test. While this is sometimes negative, even when I know the patient has dry eyes, it is often helpful to know how dry the eyes are. As for other testing, if she had dry mouth, I might draw Anti SS A (Anti Ro) and Anti SS B (Anti La) antibodies often seen with Sjögren's disease. Because these labs can be negative with Sjögren's disease, I would consider lip biopsy, if I were very suspicious.

With the lack of any other neurological symptom or examination finding, I would not recommend an MRI scan for this patient. Setting out a written treatment plan is often helpful—outlining the steps to take in improving dry eyes. We frequently recommend warm soaks if there is blepharitis, frequent preservative free tears, and gels or ointments at night. Following up with the patient is also important since further treatment may be helpful. The importance of treating this now and getting DES under control is that, left untreated, this can lead to trigeminal nerve damage and neuropathic pain, resulting in more severe pain, which is much more difficult to treat, so primary prevention of further damage is important.

Non-ophthalmic/Non-neurologic Perspective

The history here will most likely lead you to the diagnosis. You may or may not have a topical anesthetic in the office or emergency room. The pain, if it is going to resolve, will do so within a minute. Staining the cornea with fluorescein may show small, punctate dots of green (aka punctate epithelial erosions or keratopathy) consistent with dry eye. You can use the blue filter on the slit lamp if you have one or, on the direct ophthalmoscope, view the cornea using the +10 lens (green 10). Generally speaking, the visual acuity should be normal or near normal (20/25).

Artificial tears are over the counter. There are two kinds, those with preservatives and those without preservatives. Either one can be used, but some patients develop sensitivity to the preservatives. When asking the patient to wash the eyelids with hot water, this is directed at rubbing gently along the base of the eyelashes where the

meibomian glands sit. A warm wash cloth over the eyes is also effective. We often ask patients to do this in the shower. We would not favor a non-ophthalmologist giving out corticosteroid eye drops or a topical anesthetic to take home. There are too many risks with an incorrect diagnosis. We would recommend a referral to an ophthalmologist for a correct diagnosis.

Follow Up

The patient's pain resolved with topical anesthetic in the office. She used artificial tears and lid hygiene regularly. The pain persisted, and she tried topical corticosteroids. These did not help substantially. With continued use of the artificial tears and eyelid hygiene and humidification of her environment, her pain resolved spontaneously over several months time. *Final Diagnosis: Dry eye syndrome*.

For Further Study

1. Jackson WB. Management of dysfunctional tear syndrome: a Canadian consensus. Can J Ophthalmol. 2009;44(4):385–94.
2. Lemp MA. Advances in understanding and managing dry eye disease. Am J Ophthalmol. 2008;146(3):350–6.
3. Messmer EM. The pathophysiology, diagnosis, and treatment of dry eye disease. Dtsch Arztebl Int. 2015;112(5):71–81.

Case 2

History of Present Illness

A 75-year-old woman complains of bilateral eye pain. She describes the pain as burning, itching, and constant. Approximately every few weeks, when she awakes she has severe right eye pain. She describes it as sharp with a foreign body sensation, and her vision seems blurred at that time. The pain seems to happen as soon as she opens her eye and she is afraid to open her eyes in the morning. Both the blur and the pain resolve slowly over a few hours. With these sharp pains, her eye waters and it appears reddened. A hot towel and artificial tears make this feel better. The left eye seems normal otherwise. She denies any history of trauma or contact lens use.

Past medical and ocular history Hypercholesterolemia Osteoarthritis Atrial fibrillation Anxiety Reflux Hypertension	*Past surgical history* Cataract surgery BE Blepharoplasty BE Tonsillectomy Tubal ligation Gallbladder removal
	Family history None
Medications Pravastatin Escitalopram Losartan Estradiol Omeprazole Zolpidem Warfarin	*Review of systems* Longstanding joint pain, seasonal allergies, anxiety
	Social history Never smoked, no alcohol, homemaker

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Examination
Acuity with correction Right eye: 20/20 Left eye: 20/20
Pupils Equal, round, briskly reactive, no APD
Intraocular pressure Right eye: 19 mmHg Left eye: 17 mmHg
External exam 3 mm ptosis right upper lid 2 mm ptosis left upper lid
Eye movements Normal
Slit lamp examination Anterior basement membrane dystrophy (ABMD) BE Punctate epithelial keratopathy (PEK) BE Intraocular lenses BE
Visual field Normal
Fundus examination Mild drusen consistent with macular degeneration
Neurologic examination Normal

Discussion

Ophthalmic Perspective: Dr. Lee

Previously, in Case 1 we discussed dry eye. The patient has signs PEK and symptoms (constant burning and itching) of dry eye syndrome. I believe this is the cause of the constant dull pain that she describes. It almost sounds like she has corneal abrasions but she likely is not scratching her right eye while she is asleep several times.

However, dry eye syndrome (see Case 1) typically feels better in the morning and it does not cause sharp, acute pain. We should examine the patient for lagophthalmos (eyes still partially open after closing gently), which can cause pain in the morning, but the exposure keratopathy of lagophthalmos usually does not cause severe, sharp pain. This scenario above would be most consistent with recurrent corneal erosions. Most commonly, a patient notes a history of corneal abrasion with a sharp object such as a paper cut or a fingernail. The abrasion elevates a layer of the corneal epithelium, which does not cement itself back down well. When patients sleep, the eyelid dries to and sticks to the corneal epithelium slightly. When the patient opens their eye, the eyelid pulls that unstable epithelium off—hence the severe eye pain. This classically improves over a few hours. Oftentimes, the patient