DOCTOR, MY EYE HURTS

BY ADREA R. BENKOFF, M.D.
HISTORY OF THIS EYE PAIN

- CHARACTER OF PAIN
  - What makes it feel worse?
  - What makes it feel better?
  - Is the pain altered by eye movement?
  - Does the pain begin in the eye?
  - Does the pain extend beyond the eye?
  - Does the pain ever awaken you from sleep?
  - Is there a diurnal pattern?
PAST MEDICAL HISTORY

- Including trauma and surgical history
- Have there been any facial rashes or vesicles?
- Have there been any facial lumps, bumps, scaly lesions or bleeding spots?
- History of dry eyes
- Contact lens wearer
- Glaucoma
REVIEW OF SYSTEMS

- Thyroid disease
- Diabetes
- Headaches
EXAMINATION

- Complete ophthalmologic evaluation, including inspection and evaluation of ocular adnexa
IS THE EYE PAINFUL RIGHT NOW?

- Is the eye tender?
- Is there periorbital discoloration, asymmetry or edema?
- Is there conjunctival injection or chemosis?
- Does the pain vary with opening/closing the eye?
- Is the pain varied on eye movement?
IS THE EYE PAINFUL RIGHT NOW?

- Is eye movement limited?
- Is the sensation to light touch, in the distribution of V-1, V-2 and V-3 normal?
- Is the pain reduced with instillation of a topical anesthetic?
- Is facial musculature normal and symmetric in strength?
INNERVATION OF THE EYE

- Cornea and Sclera-extensive network of sensory nerves
- Conjunctiva-minimal nerve supply causes mild pain when irritated
- Choroid and Iris-small network of sensory nerves
- Ciliary Body-rich sensory supply
- Retina and Optic Nerve-ocular structures responsible for sensation of light are devoid of pain sense
ANATOMICAL APPROACH TO DIFFERENTIAL DIAGNOSIS
THE SURFACE OF THE EYE

• Anterior surface of the cornea
  - Innervated by the nasociliary branch of V-1
  - Most free nerve endings per mg of tissue in the body
• Disruption of the corneal epithelium or stimulation of the nerve endings causes significant pain:
  - History of foreign body exposure or being struck in the eye
  - Recurrent Erosion Syndrome
    - Most painful when a patient wakes up and then improves throughout the day.
CORNEAL ABRASION
METALLIC FOREIGN BODY
Dry Eye Syndrome

- Testing with TBUT and Shirmer
- Bilaterally symmetric process
- Any age, women more commonly
- Aching, pressure, pulling-retrobulbar
- Photophobia, tearing, blurring
- Worsened by wind, heat, reading, computer
- May not improve with anesthetic
- Most common cause of eye pain
KERATITIS SICCA
- **Herpes Zoster Ophthalmicus**
  - Caused by varicella-zoster virus that remained dormant in the sensory neural ganglia
  - Pain that is out of proportion to the physical examination
  - Vesicular lesions around the lids and tip of nose
  - History of previous attack of shingles

- **Thyroid Disease**
  - Bulging of the eyes or eyelid retraction
  - Dry eye syndrome
• **Bacterial, Viral and Fungal Keratitis**
  - Causes pain but patients typically have accompanying symptoms
    - Acanthamoeba Keratitis
      - Very painful, misdiagnosed as bacterial or viral keratitis

• **Scleritis and Episcleritis**
  - Pain is localized to the eye with episcleritis
  - Scleritis exhibits severe boring pain that radiates to the temple, the jaw and the sinuses
    - Severe enough to prevent sleep
    - Pain is caused by distention of sensory nerve endings as a result of edema.
    - In necrotizing disease, the severity of the pain is increased by the destruction of the nerve endings that takes place
HERPES SIMPLEX KERATITIS
EPISCLERITIS
INTRAOCULAR CAUSES

• Glaucoma
  - Very high intraocular pressure
  - Intermittent angle-closure glaucoma
    - Intermittent pain

• Uveitis
  - Toothache like pain

• Posner-Schlossman Syndrome
  - Inflammation of the trabecular meshwork
  - Quiet eye, no redness, but Very high intraocular pressure
• Giant Cell Arteritis
  ✷ Most common systemic vasculitis in Western countries
  ✷ Patients age 50 and older
  ✷ Headache with jaw claudication, anorexia and malaise
  ✷ Temporal artery tenderness, pulseless artery, scalp tenderness, fever, weight loss
  ✷ Sedimentation rate and C-reactive protein
  ✷ If left untreated, patients could experience visual loss (ischemic optic neuropathy), cardiac events or stroke
HEADACHE SYNDROMES

• While not an eye condition, are a significant source of eye pain
• 3 Most common: Migraine
    Tension
    Cluster
• **Migraine**
  - Most common disorder in these syndromes
  - 20% of women and 10% of men
  - Causes pain in the eye or orbit and they can occur with or without aura
  - Associated with: light sensitivity, sound sensitivity, throbbing pain and nausea
  - Totally normal eye exam

• **Cluster**
  - Occurs directly over the eye,
  - More common in men
  - Associated Horner’s Syndrome during and in between attacks
  - Excruciating eye pain, tearing, stuffiness of the nose, lid swelling and conjunctival redness
- **Hemicrania and Paroxysmal Hemicrania**
  - Most often seen in middle-aged women
  - Attacks occur 5-40 times per day, each attack lasts between 2-45 minutes
  - Can cause continuous pain around face and eye

- **Primary Trochlear Headache (Trochleitis)**
  - Tenderness in superonasal orbit with elevation due to a tendonitis of the superior oblique muscle
  - Periorbital/hemicranial pain
  - Chronic with exacerbations
  - Triggering or worsening migraine headaches in patients with pre-existing migraines
• Trigeminal nerve disorders
  ▶ Problems in the head can manifest as pain in the eye
  ▶ First division of the trigeminal system innervates the eyes AND is responsible for all of the pain in the cranial cavity, including the dural vessels and the meninges that cover the brain
  ▶ Other nuclei go down into the cervical system C1 and C2 and can have eye pain with problems of the cervical cranial junction
• Trigeminal Neuralgia
  - Older, women more common
  - Paroxysmal episodes of excruciating pain
  - Lasts less than 1 minute
  - Several times a day
  - Trigger points: brushing hair or teeth, chewing, talking

• Cervicogenic Eye Pain
  - Occurs from pain referred from the neck and perceived in one or more regions of the head or face
  - Non-excruciating, long lasting boring pain
  - Unilateral
  - Pressure over the occipital protuberance reproduces the pain
• Post LASIK Eye Pain
  - Incomplete nerve regrowth after LASIK surgery
  - Pt. Complains of dry-eye symptoms but no objective clinical signs observed
  - Extra sensitive nerve endings due to abnormal receptive fields in the peripheral and central trigeminal nerve
INTRAORBITAL CAUSES

- Optic Neuritis
- Orbital Myositis
- Orbital Inflammatory Pseudotumor
- Dacryoadenitis
- Canaliculitis
- Dacrocyctitis
• **Optic Neuritis**
  - 92% of pts. Experienced pain on movement of the affected eye which preceded visual loss in 40% of cases
  - Pain is caused by stretching of inflamed dural sheath of the optic nerve
  - Most common etiology is Multiple Sclerosis
    - 20-30% of the time optic neuritis is the presenting sign of MS
  - Young adults 18-45 years old, female predominance

• **Orbital Myositis**
  - Pain is due to inflamed blood vessels particularly over the muscles
  - Inflammation of EOM affecting one or both eyes
  - Severe pain, restricted movement, lid swelling and photophobia
Orbital Inflammatory Pseudotumor

- Certain orbital inflammations can look like tumors and are therefore called “orbital pseudotumor”
- Affects pts. less than 50 years old
- Pain is one of the most common characteristics of this disease
- Proptosis, restricted eye movement, orbital edema
ORBITAL PSEUDOTUMOR
EXTRAORBITAL CAUSES

• Carotid-Cavernous Sinus Fistula
  ✷ Abnormal connection between the blood vessels that take blood to and from the brain: Internal Carotid Artery, External Carotid Artery, Cavernous Sinus
  ✷ Pain and bulging of the eye due to dilation of the veins draining the eye
  ✷ Facial pain in the distribution of the first division of the Trigeminal Nerve (V1)
  ✷ Red eye, diplopia, decrease vision, buzzing in the ears
  ✷ Cause: 75% cerebral trauma, 25% middle aged to elderly women with HTN and atherosclerosis
• Sinus Disease
• Cerebral AVM or Aneurysm
• Increased Intracranial Pressure
• Pituitary Adenoma
  ◆ Tumor bleeds into itself (Pituitary Apoplexy) and presents with pain initially without the classic symptoms of double vision and bitemporal visual field defect
Although isolated ocular pain can be difficult to diagnose, it is often not serious and is easily treated.

With normal eye exam, no history of headache syndrome and no other findings the chance of it being something bad is extremely low.

WORRY ABOUT:
- Elderly people who might have Giant Cell Arteritis
- Patients who have neuropathic pain
CASE STUDIES
Girl presents with headache and Binocular diplopia
8-year-old girl was seen by PMD one week earlier for persistent headache
CT scan was negative and MRI showed evidence of sinusitis
Pt. started on oral amoxicillin and 2 days later developed fevers, intermittent nausea and binocular diplopia
No other medical or ocular history
EXAMINATION

- Va: OD 20/20, OS 20/30
- 30D esotropia in primary and left gaze and 16D esotropia in right gaze (Left abduction deficit)
- No proptosis, IOP-normal, color vision-normal, confrontation visual fields-normal, pupillary exam-normal
- Slit lamp and funduscopic exam were unremarkable
LEFT 6\textsuperscript{TH} CRANIAL NERVE PALSY
WHAT IS YOUR DIAGNOSIS?
DIFFERENTIAL DIAGNOSIS

• INFECTIOUS CAUSES
  - Orbital cellulitis with or without subperiosteal abscess
  - Cavernous sinus thrombosis
  - Intracranial abscess
  - Meningitis
DIFFERENTIAL DIAGNOSIS

- NONINFECTIOUS INFLAMMATORY CAUSES
  - Orbital pseudotumor
- POST-VIRAL NERVE PALSYS
- OPHTHALMOPLEGIC MIGRAINE
COURSE OF TREATMENT

• BLOOD WORK
  - Elevated white count
  - Negative blood cultures, monospot and Lyme antibodies

• REPEAT MRI
  - Diffuse sphenoid and ethmoid sinusitis
  - Enlargement of left cavernous sinus (concern for pseudoaneurysm or mycotic aneurysm)
• Pt. admitted to the hospital and placed on IV antibiotics
• Endoscopic sinus surgery for sinusitis causing a 6th cranial nerve palsy
• 3 days after surgery Pt. develops left-sided ptosis and restricted motility – a pupil-sparing 3rd nerve palsy
• Pt. underwent surgery for a left Internal Carotid Artery aneurysm
• ACUTE SINUSITIS
  ▶ Predominant cause of orbital infection in children
  ▶ Headache, fever, URI sx, periorbital erythema and edema, proptosis and limited extraocular movements
  ▶ Ethmoid sinusitis - most common
  ▶ Sphenoid sinusitis –intraorbital and intracranial complications (meningitis, cavernous sinus thrombosis)
DISCUSSION

- **DIPLOPIA**
  - In acute sinusitis, caused by inflammatory reaction of EOM or cranial nerves (6\textsuperscript{th} and 3\textsuperscript{rd} cranial nerves)
  - CT scan rules out post-septal involvement or abscess formation
  - MRI scan rules out intracranial involvement
WOMAN EXPERIENCES
PROGRESSIVE VISION LOSS
AND PAIN
WITH EYE MOVEMENT IN RIGHT EYE
HISTORY

- 22 y/o woman with initial symptom of pain with eye movement in the right eye
- Peripheral vision loss OD over 3 weeks progressing to include central vision
- 2 days of nausea
- No Hx of headache, fever, chills, rashes, joint pain, shortness of breath or recent weight change
Pt. owns a dog and a cat but denies being scratched by her cat.
EXAMINATION

- Va: OD-HM OS-20/15
- Color plates: OD-unable to see OS- no misses
- OD afferent pupillary defect
- Normal IOP, EOM
- Slit lamp exam was unremarkable
• RETINAL EXAM
  - OD: Edematous and hyperemic optic nerve with a wedge-like extension of fluid from the optic nerve to the macula. Retinal veins were dilated and tortuous
  - OS: Normal

• OCT of Macula
  - Disruption of the photoreceptor and outer nuclear layer with some intraretinal fluid
OPTIC DISC EDEMA
WHAT IS

YOUR DIAGNOSIS?
DIFFERENTIAL DIAGNOSIS

• INFECTIOUS SOURCE
  ▪ Lymes Disease

• MULTIPLE SCLEROSIS

• COMPRESSIVE OR INFLTRATIVE LESIONS
COURSE OF TREATMENT

• MRI
  - Enhancement of right optic nerve and optic nerve sheath with NO demyelinating lesions
  - No enlarged ventricles, thrombosis, masses or lesions

• Blood testing
  - Negative: VDRL, CMV, EBV
  - Positive: Lyme ELISA
DISCUSSION

- **LYMES DISEASE**
  - Caused by the spirochete Borrelia burgdorferi
  - Transmitted by ticks
  - Classic rash is “bull’s eye rash
  - Causes meningitis, cranial nerve palsies and radiculoneuritis
BULL’S EYE RASH
DISCUSSION

• OCULAR MANIFESTATIONS OF LYMES DISEASE
  ◆ Conjunctivitis, keratitis, iritis, choroiditis, neuroretinitis, or endophthalmitis
  ◆ Disc edema secondary to either elevated intracranial pressure or direct inflammation of the optic nerve
TREATMENT

• OUR PATIENT WAS DIAGNOSED WITH LYME-RELATED OPTIC NEURITIS
  ◦ Pt. hospitalized and given IV steroids and antibiotics
  ◦ 1 month later: VA OD 20/20-1
  ◦ 3 months later: VA OD 20/15, no afferent pupillary defect, color testing OD was full