

THE MEDICAL BASES FOR OPTICAL PRESCRIPTION CHANGES

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HOMESIGHT EYE CARE | RYDAL, PA | New York, New York

On behalf of Vision Expo, we sincerely
thank you for being with us this year.

Vision Expo Has Gone Green!

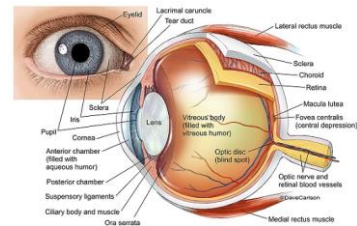
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FINANCIAL DISCLOSURE

Shana Barrett Zeitlin, O.D. has no financial interests to disclose.

OCULAR ANATOMY



REFRACTIVE POWER OF THE EYE: CORNEA

- Relaxed (non-accommodating) total eye power: ~60 diopters (D)
- Cornea (~40 D)
 - Changes in corneal shape and thickness can change refractive power
 - LASIK and other refractive surgeries take advantage of this
 - Remove 12-14 microns per diopter of myopia
 - Keratoconus

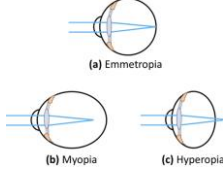
REFRACTIVE POWER OF THE EYE: LENS

- Lens (about 20 diopters)
 - Can fully accommodate to over 30D
 - Adolescents 12-16D, adults at age 40 4-8D, adults over 50 less than 2D
 - Accommodation: the eye changes focus from distant to near images
 - Produced by a change in lens shape
 - Lens substance is most flexible during childhood and the young adult years
 - Gradually becomes less flexible with age and cannot change shape



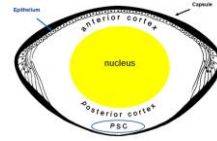
AXIAL LENGTH

- Hyperopic eyes typically have shorter axial length (or less refractive power)
- Myopic eyes have longer axial length (or more refractive power)
- Many disease states can change the axial length, and therefore change the refraction



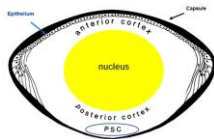
CATARACT

- Lens metabolism changes with age
- UV light absorption over time
- Blurred vision
- Glare
- Impaired night driving
- Need for increased lighting
- Color distortion



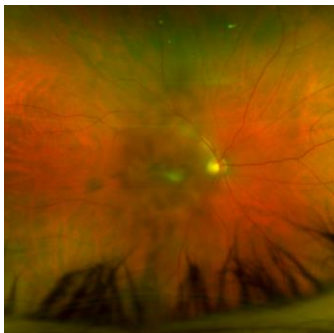
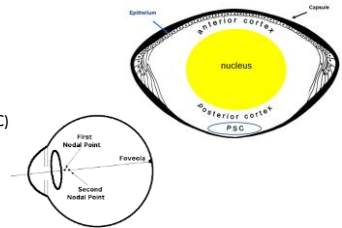
CATARACT

- Nuclear sclerosis (NS)
 - Typically a myopic shift
- Cortical (spoking, sheets)
 - DM/metabolic disease related
 - Cause more glare complaints
- Posterior subcapsular (PSC)
 - Reading issues
 - More rapid development
 - More symptomatic
- Medication-related
 - Steroids – Commonly cause PSC
 - Anti-psychotic



CATARACT: COMMON REFRACTIVE SHIFTS

- Nuclear sclerosis (NS)
 - Typically a myopic shift
- Cortical (spoking, sheets)
 - Myopic or hyperopic
- Posterior subcapsular (PSC)
 - Myopia and astigmatism
 - MUCH larger amounts!
 - Nodal point of the eye



CATARACT MANAGEMENT

- Surgical (extraction and replacement with IOL)
 - Considered when:
 - Visual symptoms interfere with daily activities and patient desires improved visual function
 - Cataract prevents treatment of another condition (AMD, diabetic retinopathy)
 - Cataract causes other diseases (glaucoma, uveitis)

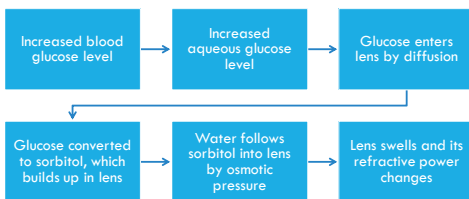
CATARACT MANAGEMENT: NON-SURGICAL

- Increased lighting, especially when reading
- Anti-glare coatings on spectacles
- Sun protection, UV coatings
 - More helpful in early stages to prevent progression
- Patient education is paramount
 - Reasonable expectations from non-surgical correction
 - "These glasses don't work!"

DIABETES

- Metabolic disorders characterized by a high blood sugar level over a prolonged period of time
- Insulin deficiency
 - Insulin allows the body's cells to absorb blood glucose
 - Type 1: Pancreas does not produce enough insulin
 - Type 2: Body's cells do not respond correctly to insulin
- Symptoms: Increased thirst, hunger, urination; unexplained weight loss
- Uncontrolled diabetes can cause tissue damage, including kidney, nerve, and eye disease, and can lead to death

MECHANISM FOR DIABETIC REFRACTIVE CHANGE



DIABETIC REFRACTIVE SHIFTS

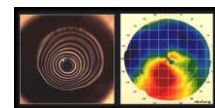
- Affects refractive power, index, and accommodation of the lens
- Myopic shift is most common
 - Acute hyperglycemia
 - Suspect undiagnosed DM with large myopic shift!
 - Becomes less myopic with BSL lowering
- Hyperopic shifts
 - Longer duration of diabetes
 - Proliferative retinopathy/Macular edema
- Earlier onset presbyopia
- Diabetic cataract

MANAGEMENT OF DIABETIC REFRACTIVE CHANGES

- Expect multiple changes over several months as BSL stabilizes
 - Educate your patients so they are prepared for this!
- At least 30 days for refraction to stabilize once BSL is stable
- A1C is best measure of BSL control
- Spectacles: may need several remakes!
 - "Doctor remake" within warranty period
 - Contact lenses for quick fix for patient safety/driving
- Explain to patients why their refraction will shift, and how you are trying to help them and save them money— they will appreciate it long-term!

KERATOCONUS

- Bilateral, asymmetric, cone-shaped deformity of the cornea due to progressive central or paracentral corneal thinning
- Irregular astigmatism
- Scarring, may become painful if hydrops occurs
- Associated with atopy and eye rubbing
- Generally presents in teens or early 20's

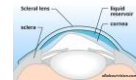
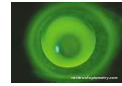


KERATOCONUS

- A difficult refraction may indicate KCN
- Distorted mires on autorefractometer
- Scissor reflex on retinoscopy
- High astigmatism
- Astigmatism that changes significantly over a short time
 - Take note of yearly astigmatic increases in optical orders
 - Visual acuity on printed rx may also be decreasing slightly with time

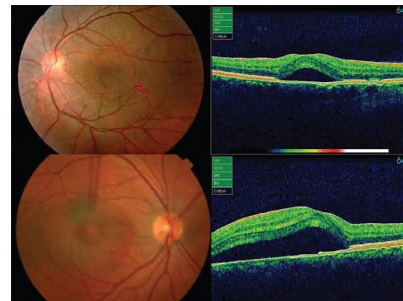
KERATOCONUS TREATMENTS

- Glasses (mild cases)
- Contact lenses- "tear lens"
 - RGP (rigid gas permeable) lenses: rest on the tear film
 - Scleral lenses: vault the cornea
- Corneal crosslinking
 - Strengthen cornea
 - Riboflavin activated with UV light
 - FDA-approved April 2016
- Keratoplasty



CENTRAL SEROUS CHORIORETINOPATHY (CSCR)

- Typical patient is male, young to middle aged, "type A" personality
- Associated with stress (cortisol release), steroid use
 - Inflammatory disease, neck/back/knee injections
- Symptoms can range from none to moderate vision loss
 - Depends on location and amount of SRF
- Mild shortening of axial length can cause mild hyperopic shift
- More likely, symptoms are vague
 - Blur, distortion, "it's still blurry" refraction



CSCR MANAGEMENT

- Observation is most common
- Possible referral to retinal specialist
- May take months to resolve
- May be left with altered macular appearance
- Often these patients see well and the CSCR is an incidental finding
 - Worth a closer look at the macula if px is 20/20 but not 20/happy in new glasses

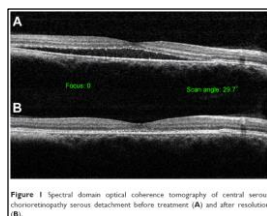
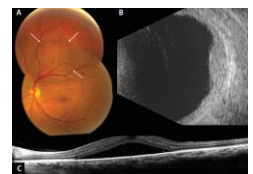
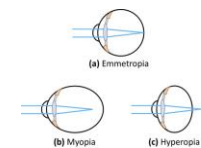


Figure 1 Spectral domain optical coherence tomography of central serous chorioretinopathy serous detachment before treatment (A) and after resolution (B).

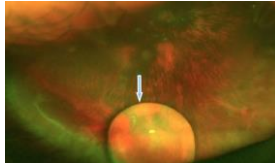
ORBITAL TUMORS

- Rapidly growing choroidal lesions
- Choroidal hemangioma, choroidal melanoma, choroidal lymphoma
- **Shorten axial length** and cause hyperopic shift
- Detect with retinal exams and on OCT



POSTERIOR DISLOCATION OF THE CRYSTALLINE LENS

- Ectopia lentis: acquired or hereditary lens displaced because of zonule defects
- Lens has about 20D of plus power
- Without it, patient will show large, sudden hyperopic shift on refraction
- Associated with connective tissue disorders
- IOL can also become displaced
- Requires surgical removal



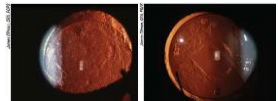
DISLOCATION OF IOL IMPLANTS

- Posterior dislocation of crystalline lens = hyperopic shift
- Trauma- ask about trauma since last visit that they may have forgotten/failed to mention
- If implant has fallen into posterior chamber, needs vitrectomy to remove
- Movement of IOL within capsular bag
 - Posteriorly = hyperopic shift
 - Anteriorly = myopic shift
 - Patient was seeing well post-sx, then VA began to decline*
 - More common within first 6-9 mo of cataract sx
 - Managed with glasses/contacts, or possible IOL exchange



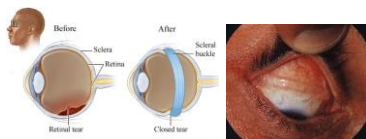
PATIENT WAS SEEING WELL POST-SX, THEN VA BEGAN TO DECLINE...

- IOL implant shift/dislocation is RARE
- PCO Posterior capsular opacification
 - "After-cataract" or "secondary cataract"
 - More common the younger a patient has cataract sx
 - When patients understand how cataract sx is performed, PCO is better understood
 - Autorefractometry will show more astigmatism, varied hyperopia/myopia
 - Referral back to surgeon to fix with YAG capsulotomy
- Remember the demographic of most cataract sx patients— older!
 - Early AMD, vascular causes, occlusions, etc.
 - Macular OCT is your friend!



SCLERAL BUCKLE

- Surgical repair of rhegmatogenous retinal detachment
- Silicone buckle within sclera or on the surface
- "Squeezes" the eye
 - Increases axial length
 - Causes myopic shift

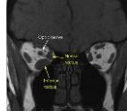
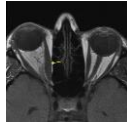


DRUG-INDUCED REFRACTIVE SHIFTS

- Anticholinergics can cause cycloplegic side effects, and therefore loss of near acuity or hyperopic shifts
 - Antihistamines
 - Chloroquine
 - Benzodiazepines (Xanax, Valium, Ativan)
 - Tricyclic antidepressants (amitriptyline, nortriptyline)
- May need bifocal/progressive sooner, or higher ADD than expected
- Myopic shift: Topamax (used for seizures/migraines)
 - With long-term therapy, refraction will usually stabilize

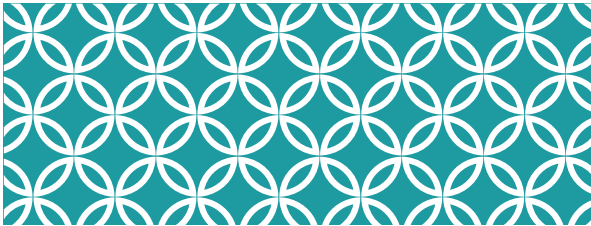
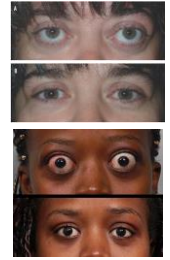
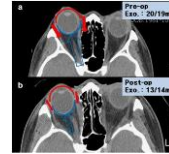
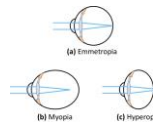
THYROID EYE DISEASE

- Antibody-mediated reaction against the thyroid-stimulating hormone receptor
- Causes infiltration and tissue edema in the extraocular muscles
- Lid retraction: from sympathetic innervation to both upper and lower eyelids
- Lid lag: on downgaze, eyelid lags behind globe
- Proptosis, restriction on EOM movement
- Most commonly superior gaze (inferior rectus dysfunction)
- Proliferated fatty tissue and engorged muscles occupy the retrobulbar space and push the eyeball forward
- Compressive optic neuropathy



THYROID ORBITOPATHY: DECOMPRESSION

- Retro-orbital space is enlarged in volume
- Reduces retrobulbar pressure, resolves exophthalmos
- Changes the axial length of the elastic eyeball
- **Increased axial length = increased myopia**



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THANK YOU!

Questions?
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