The Prominent Secondary Glaucomas

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2º Open Angle Glaucoma

Pseudoexfoliation
Pigment Dispersion Syndrome
Steroid Induced
Traumatic, Angle Recession
Inflammatory
Increased Episcleral Venous Pressure
Lens Induced Phacolytic
UGH
Pseudoexfoliation (PXF)

- Most common cause of secondary glaucoma
- Most frequent cause of unilateral glaucoma
- Framingham Eye Study: U.S. population
  - 0.6% in 52-64 yo
  - 2.6% in 65-74 yo
  - 5% in 75-85 yo
PXE risk factors - elusive

- Northern European descent
  - cause of >50% of glaucoma in Scandinavian countries
  - LOXL1 (lysyl oxidase-like 1) gene variant
    - Norway Study: 99% of PXF but 80% of normal
- Age
- Living at higher altitudes or in northern latitudes
  - Factors: UV Exposure? cold temperature?
referred for elevated IOT

- 62 YO WF
- c/o OD blur x 4-6 mos, fb sens, watery
- “h/o high eye pressure several yrs ago”
- No nausea, headache, or eye ache
- No treatment or f/u
history

- Paternal grandmother – glau
- AMD – father
- “Head trauma” 5 yrs ago – eyes were not involved
- Meds – never taken prednisone
objective

- VA unaided
  - OD CF 5 ft, ph 20/60-2, near VA 20/30
    - (Myopic-induced NS)
  - OS 20/20-2
- APD OD
- Initial Ta 36 / 12
slit lamp

- Inferior SPK OU
- OD 2.5NS, pseudoexfoliation; OS trace NS
Ophthalmoscopy

- C/D: 0.9 x 0.8 / 0.5 x 0.5
Diagnosis

- Pseudoexfoliation glaucoma OD
  - Advanced severity
    - >12MD loss (cataract involved)
    - Loss within 5 degrees fixation
    - Loss in both hemifields
- NS OD>>OS
  - Moderate severity
  - Myopic shift
Treatment

- Educate patient – 62 YO advanced GL
  - Severe VF loss; initial target? 15?
- 2 med topical therapy
  - PG (latanoprost)
  - brimonidine
- Realistic: 50% reduction?
Follow-up

- 2 weeks after topicals:
  - Ta: R 14  L 13  @ 4:37pm
  - Pre-tx: 36/12; significant relative drop
  - Yet.... IOT drop not sustained
    - Combined CE and trab surgery
    - VF improved ≠ CE; new baseline!
    - IOT ≤15 for 24 months
Discussion - PEX

- Lindberg 1917
- Systemic disorder
  - PEX material abnormal BM of epi cells
  - Besides eyes, lungs, skin, liver, heart, kidney, gallbladder, blood vessels, EOMs, meninges
- Fibrillar, proteinaceous, powdery material
- Prevalence is US 5% for ages 75-85
- 40% develop PEX in contralateral eye
PEX converting to glaucoma

- An aggressive glaucoma
- 15-25% conversion
- Varies by ethnicity
Clinical consequences PEX

- Poor dilation – atrophy of dilator
- Weak zonules, attachments
- Often recalcitrant to therapy, meds
- SLT – viable option
- Complicates cataract surg
  - IOL dislocation, zonular dehiscence
  - Elevated IOT
  - Posterior synechiae
Summary and concerns

- Pseudoexfoliation glau: generally bad
- Young age
- Often present w/ severe RNFL damage
- Cataract surgery, SLT ≈ beneficial
- Develop good rapport w/ patient
  - A chronic, relentless condition
Clinical Course

- ≈ unpredictable
  - IOT can increase within months
- PEX without glaucoma: monitor
  - Evaluate every 6/12 months
- If topical therapy initiated
  - recheck IOT 3-4 mos if at target
Pigment Dispersion Syndrome (PDS) and Pigmentary Glaucoma (PG)

- Incidence:
  - Approximately 4.8 per 100,000 (PDS),
  - 1.4 per 100,000 (PG)

- 25-50% conversion
Posterior bowing iris surface comes into contact with lens zonules
- Mid-peripheral transillumination defects

Occurs with physiologic dilation/constriction of pupil
Krukenberg Spindle
Scheie Stripe/Zentmayer Ring
Demographic

- Onset 20-40 yrs
- Moderate Myopic: -3 to -4 D
  - Hyperopia present 5-10%
- Caucasian
  - <5% African descent
- PDS: men $\approx$ women
  - Men: develop glaucoma 2-3x as often, present earlier in age
Symptoms of PDS

- Large fluctuation in IOT
- Worsens with exercise, pupil dilation
- Episodes: intermittent blurry vision
  - ocular pain, headache
Treatment: Medical

- Traditional IOT lowering drops
- But, what about.....pilocarpine?
- “are you kidding me...”
  - (academic advantage:
    - Constricts iris → minimize pigment dispersion
    - Increase outflow
  - Disadvantages:
    - RD, myopia, HA, cost
Treatment: Laser

- **LPI**
  - Minimize posterior bowing of iris
  - Post-laser IOT spike
  - Debatable benefit
  - Not ideal for
    - PDS without OHTN
    - Advanced PDG

- **SLT**
Disease development

- **Burnout/improvement with age**
  - Fades @ middle age (40-50s)
  - Growth of lens → Iris diaphragm forward
  - Varies by extent of TM pigment, damage

- **Signs**
  - Reversal pigmentation: superior angle may appear more pigmented
Steroid-Induced Glaucoma

Armaly and Becker:

- **High responders (≈5%)**
  - IOP > 30mmHg or
  - >15mmHg increase

- **Moderate responders (1/3 population)**
  - IOP 20-31 mmHg or
  - >6-15mmHg increase

- **Non-Responders (2/3 population)**
  - IOP <20 or
  - <6mmHg increase
Pathogenesis

- Exact etiology unknown
- Increased outflow resistance
- Structural and biochemical changes
  - Accumulation of ECM in TM
  - Suppression of phagocytic activity of trabecular endothelium
  - Reorganization of TM cytoskeleton
Patient Risk Factors

- POAG, glaucoma suspects
  - 4-6% general population vs. 46-92% POAG
- 1st degree relative with POAG
- Connective tissue disease (RA in men)
- High Myope? * Type I DM? *

* Mixed Results
Route of Administration

- IntraVitreal
- Periocular/depot
- Topical
- Systemic

Most Likely to cause Steroid Response

Least Likely
Timing of response

- Intravitreal: ≈ 1-2 weeks
- Subtenons
  - Begins 3 weeks, lasts +/- 3 months
- Topical – lasts 3-6 wks
- Systemic: latest to show
- * Failure of IOT to increase after 6 weeks does not rule out responder
Type of Topical Steroids

- Dexamethasone (TobraDex, Maxitrol)
- Difluprednate (Durezol)
- Prednisolone

Most Likely to cause Steroid Response

- FML
- Loteprednol (Lotemax, Alrex)
- Rimexolone (Vexol)

Least Likely
Cessation Of Steroids
- IOP returns to baseline 1-4 weeks
- Longer if on steroids several months

Topical IOP lowering agent
- Combigan
- Miotics - *contraindicated* in uveitis
- PG meds - +/- promote inflammation
  - May be useful
Case: topical steroids after Deep Anterior Lamellar Keratoplasty (DALK)

- 26 YO India male w/ keratoconus
- Re-located across the US for job
- Last exam 5 months ago
- H/o DALK OD and CXL OS one year ago
- Using topical FML OD
  - 1 drop 2 times a day
Initial exam

- VA OD: 20/70, ph 20/30
- IOT OD: 47mmHg
- OD: APD
- Graft clear OD; early PSC
- C/D: OD 0.8 / 0.75; OS 0.6 / 0.6
Fixation Monitor: Blind Spot
Fixation Target: Central
Fixation Losses: 0/17
False POS Errors: 1%
False NEG Errors: 8%
Test Duration: 06:28

Stimulus: III, White
Background: 31.5 ASB
Strategy: SiTA-Standard

Pupil Diameter:
Visual Acuity:
RX: +0.00 DS +1.50 DC x 26
Age: 25

Date: 07-18-2016
Time: 11:09 AM

FoVEA: 34 dB

Total Deviation

Pattern Deviation

GHT
Outside Normal Limits

VFI: 81%
MD: -11.35 dB P < 0.5%
PSD: 4.87 dB P < 0.5%

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10330 Meridian Ave. N., Suite 370
Seattle, WA 98133
206-528-6000
Fixation Monitor: Gaze/Blind Spot
Fixation Target: Central
Fixation Losses: 0/17
False POS Errors: 2.0%
False NEG Errors: 0.0%
Test Duration: 05:47

Fovea: 32 dB

Stimulus: III, White
Background: 31.5 ASB
Strategy: SITA-Standard

Pupil Diameter:
Visual Acuity:
RX:+0.00 DS +2.50 DC X 66
Age: 26

Date: 01-09-2017
Time: 4:18 PM

Total Deviation

Pattern Deviation

MD = 7.20 dB  P < 1%
PSD = 2.29 dB  P < 2%

NORTHWEST EYE SURGEONS
10330 Meridian Ave. N., Suite 370
Seattle, WA 98133
Case prognosis

- Guarded
- More long term data needed
Every 4 weeks for 2-3 months. If stable then 4-6 months.
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