Will I Go Blind From Glaucoma?

- What is your definition of blindness?
  - USA Legally blind definition
  - Based on VA
  - Based on VF
  - Monocular vs Binocular
- What kind of studies look at blindness from glaucoma?
  - Prevalence, retrospective, survey
- Where was the study conducted?
  - Different ethnic groups will have different blindness rates
- Were patients undergoing treatment in the study?
  - Treatment reduces risk of blindness

What % of glaucoma patients go blind?

Visual Disability From Glaucoma Is Significant

- Worldwide
- 60.5 Million Worldwide With Glaucoma
- 4.5 Million Blind
- United States
- 2.7 Million In 2010, 3.4 Million By 2020 With Poag
- 50% Are Unaware Of Their Condition
- 120,000-135,000 Are Blind (6.8% Whites, 26% Hispanics, 28.6% Aa)

What Is Visual Impairment And How Do We Measure It?

Monocular Visual Field Testing

- 24-2 Or 30-2 Testing Program – Full Field 120
- Is Visual Impairment Based On The Worst Seeing Eye Or Better Seeing Eye?
- Should There Be A Commerically Available Program To Simulate Binocular Visual Field From Monocular Tests?
How To Determine Visual Disability?

- Visual Acuity And Visual Field Testing
  - Central Vision Loss And Overlapping Vf Loss
  - Most Significant To Visual Disability

How To Determine Visual Disability?

Binocular Visual Field Testing

Esterman Binocular Suprathreshold

- Uses habitual distance glasses
- Bright single stimulus 10dB
- More points tested in the inferior than superior visual field
- Does not monitor fixation nor test in the central 7.5 degrees

Should I Be Driving?

Glaucoma And Driving

Risk Of Motor Vehicle Accidents

- Mcgwin Et Al. : *Invest Ophthalmol Vis Sci. 2005 Dec;46(12):4437-41*
- 120 Glaucoma Patients With Collisions Vs 120 Glaucoma Controls (No Collisions)
- Results
- Patients With Moderate To Severe Vf Defects In Central 24 Degrees Are At Increased Risk Of Mva
- As Agis Score Increases, Risk Of Mva Increase
- Also At Increased Risk Of Falls

G Man Uses a Squeegee

Should We Be Performing More 10-2 Visual Fields?

The Relationship Between Visual Field Loss and Health-Related QoL


- NEI-VFQ 25 and GQL 15
- QoL most affected by:
  - Central VF loss (reduced VA)
  - Binocular overlapping visual field defects
  - Inferior hemifield > superior hemifield
- VFL in better eye correlated with more QoL
QoL was impacted by early visual field loss and worsens with progressive loss.

What are the Two Most Important Factors to Determine Who Will Become Visually Impaired from Glaucoma?

- Amount of damage on the initial eye exam
  - Majority of patients that go blind from glaucoma were dx at a late stage
- Age of the patient
  - Younger patients have more years to go blind

First Time Patient

- 50 yoa male
- c/o difficulty reading
- Never had an eye exam
- VA 20/20 OU
- SL unremarkable OU
- IOP 36 OD 28 OS
- Gonio open angles OU
- Dilate patient but ....

Spin the Wheel of Damage

Degree of Damage at Initial Dx

Age of Patient at Dx

- Glaucoma More Common in the Elderly
- 7 X'S Greater Risk of Glaucoma in Patients Over 60 Compared to Under 40 Years of Age
- However, Younger Patients Have a Longer Period of Time to Go Blind From Glaucoma
- Younger Patients With Glaucoma Require More Aggressive Therapy Than an Older Patient With the Same Degree of Damage

Is Early Diagnosis of Glaucoma Important?

- Not for all glaucoma patients, but it is for rapid progressors
- Rapid progressors can be stealth (especially with innocuous vfs despite advanced optic nerve damage)
- Treatment slows down progression, but it does not eliminate progression
- Our goal in glaucoma management is to keep the patient visually functional throughout their lifetime
If glaucoma is diagnosed early, there is more adequate reserve of ganglion cells to survive blindness

Case ND

- 47 yobm
- IOPs s meds: OD: 16-22 OS: 18-22
- CCT OD:610 OS:603 (thicker than average OU)
- Gonio (10.03.12):
  - OD: Open to CB superior, SS all other quadrants
  - OS: Open to SS 360
- (-) NVA, PAS 360 OU, flat approach to iris

Should We Be Worried About This Patient?

Predict the Visual Field Loss?
Redundancy only lasts so long and the visual field loss will eventually catch up to the optic nerve

Glaucma as the Disease Progresses

- Visual Field changes occur late in the disease

Do We Pay Enough Attention to the Less Damaged Eye?

- POAG is a bilateral disease, but is often asymmetric
- The fellow eye often follows the same course as the more damaged eye, but lags many years behind
- Glaucoma is a lifelong disease
- Our final grade for managing glaucoma often occurs 20-30 years after the initial diagnose or when the patient passes away
- The better seeing eye is more related to quality of life
- Don’t undertreat the fellow eye with glaucoma

Case JB

- 47 yobm
- h/o boxing
- VA 20/20 OD 20/20 OS
- CF FTFC OD misses inf nasal OS
+ L APD
SL unremarkable
IOPs s meds 21-27 OD and 22-26 OS, Tmax 34/37mmhg (1/2/13)
CCT 526/519
Gonio: 4+ open OU with temp angle recess OS

Case JB

- Patient is on latanoprost, cosopt and brimonidine
- Patient is s/p SLT OS
- IOP on meds range 13-18 OD 13-15 OS
- Would you recommend SLT OD?

Which Is Better To Uncover Glaucoma Damage?

- Clinical Evaluation of the optic nerve
- Clinical Evaluation of the RNFL
- OCT optic nerve
- OCT RNFL
- OCT GCA
- Visual Fields

How Should We Set a Target Pressure?

- “Estimated IOP where the risk of future visual impairment is balanced against the side effects of treatment”
- Based on the Baseline IOP Readings (use the highest IOP reading)
- Based on the Amount of Optic Nerve Damage
- Based on the Rate of Glaucoma Progression

Visual Field Quantification
(Mild, Moderate, Severe)

- Mean Deviation (MD)
- Number of Abnormal Points on the Pattern Deviation Plots
- Decibel Value of the Four Points Just Off Fixation

Mild Visual Field Defect

- The Mean Deviation Index (MD) Is Better Than -5 dB
- On the Pattern Deviation Plot, Fewer Than 18 (14) of the Points Are Depressed Below the 5% Level and Fewer Than 10 (8) Points Are Depressed Below the 1% Level on 30-2 (24-2)
- No Point in the Central 5 Degrees Has a Sensitivity < 25 dB

- Moderate Visual Field Defect
• The Mean Deviation Is Better Than -10 dB
• On the Pattern Deviation Plot, Fewer Than 36 (28) of the Points Are Depressed Below the 5% Level and Fewer Than 20 (16) Points Are Depressed Below the 1% Level on 30-2 (24-2)
• No Point in the Central 5 Degrees Has a Sensitivity < 15 dB

**Severe Visual Field Defect**
• The Mean Deviation Is Worse Than -10 dB
• On the Pattern Deviation Plot, More Than 36 (28) of the Points Are Depressed Below the 5% Level or More Than 20 (16) Points Are Depressed Below the 1% Level on 30-2 (24-2)
• Any Point in the Central 5 Degrees Has a Sensitivity <15
• There Are Points Within the Central 5 Degrees With Sensitivity <25 dB in Both Hemifields

**How Should We a Set Target Pressure?**
• No Damage – OHTS recommended 20% Reduction Of Baseline IOP
• Mild Damage - 30% Reduction Of Baseline IOP
• Moderate Damage - 30-40% Reduction Of Baseline IOP
• Severe Damage - 40-50% Reduction Of Baseline IOP

**What’s It Going to Take?**
• 20-30% reduction - 1 or 2 meds
• 30-40% reduction – 2-3 meds +/- ALT/SLT
• 40-50% reduction - 2-4 meds + ALT/SLT +/- filter

**Millennials Target Pressures**
Generally set 3 initial target pressures:

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1. Patient with high risk ocular hypertension – elevated pressure but no glaucoma damage
   • Treat with 1-2 meds max

2. Patients with definite glaucoma damage, but in the mild-moderate stage of damage
   • Target pressure < 18 (consistent)
     -- Will use multiple meds and laser to achieve, but not filtering surgery

3. Patients with definite damage in the moderate to severe stage of damage
   • Target pressure < 15 (consistent)
Will use multiple meds and laser to achieve and will consider filtering surgery in select cases early and will not delay filtering surgery in cases of progression on MMT. However, it must be consistent!!

AGIS 7
Sustained IOP below 18 mm Hg:
Positive Correlation with Stability of Visual Field
How should I lower the IOP?
Prostaglandins, Beta Blockers, CAIs, Alpha Agonists
Latanoprost qd vs Dorzolamide tid
and Timolol bid Over 24 Hours
Can I interest you in a combo?

Glaucoma Management

- Start with a prostaglandin
- Add Beta-blocker as second line
- Change beta-blocker to Cosopt (or Combigan)
- Add Alphagan (or topical CAI) as third drug
- OR consider ALT/SLT
- Filtering surgery
  - Only if the benefits outweigh the risks

Does Glaucoma Ever Sleep?
IOP is higher at night in supine position
How does this affect your dosing schedule?

- Prostaglandins and CAIs lower IOP at night
- Beta Blockers and Brimonidine have no effect on night IOPs
  - These medicines should not be dosed at bedtime
  - Recommend qam and then around dinner time

How important is it to judge for progression?
Glaucoma progresses at different rates
Re-assessment of Target Pressures
- Glaucoma progression is general slow
- Important to identify rapid progressors
- Patients are followed with various tests to judge progression
- Patient who progress at a certain target pressure need further IOP lowering
- Consider filtering surgery for patients who are rapid progressors

Corneal Hysteresis and Glaucoma Progression
- Congdon et al showed lower corneal hysteresis but not lower corneal thickness was associated with glaucoma progression
- Moraes et al showed progressing glaucoma patients had a lower corneal hysteresis than non-progressing glaucoma patients 7.5mmHG vs 9.0 mmHG and lower central corneal thickness 525um vs 540 um.

Diurnal IOP Range and Disease Progression

How to Determine Progression?

Cirrus GPA™ Analysis
Judging Progression Can Sometimes Be Confusing or Conflicting

G Suspect based on IOP 19-23

Would You Start This Patient on Tx?
One Year Later – Stable?
Does This Patient Have Glaucoma?
What is a Significant Change?
Look at Repeatability Limits

Significant OCT Change
- GCA thickness >3um change
- Ave NFL thickness > 5um change
- Quadrant Sector NFL thickness > 10um change
- Sector NFL thickness > 15um change
- Must be confirmed with additional scans
VFIs Are Best for Judging Progression in Advanced Glaucoma
Variability Issues with Standard Perimetry
GPA Overview

Goals of Glaucoma Therapy

• Maximize the Patient’s Quality of Life
• Patient Maintains Functional Vision to Meet the Requirements of Daily Activities Over Their Lifetime
• We Don’t Stop Glaucoma Progression With Treatment, But We Can Slow It Down
• 10% of Glaucoma Patients go Blind from the Disease
• Diagnosing Glaucoma Early is Important Because Patients will Need a Reserve of Ganglion Cells to Lose over a Life Time even on Treatment
• Difficult to Predict the Rate of Glaucoma Damage and How Long the Patient Has To Live
• Don’t Undertreat the Less Damaged Glaucoma Eye as Quality of Life is Based on the Better Seeing Eye
• Blinding or Killing A Patient to Achieve a Desired Target Pressure is Not Good Practice
• Identify the Rapid Progressors ASAP (Six VFs in 1st Two Years), Treat Them Aggressively (TP<15) and Monitor Them more Closely (VFs at Least q6mo)