Managing Patients with Glaucoma is

- Exciting
- Interesting
- Challenging
- But can often be frustrating!

Clinical Challenges

- To identify patients with risk factors for possible glaucoma.
- To identify which patients need additional testing (what tests?).
- To identify which patients need to be followed (how frequently?) versus treated.
- To identify which patients need more aggressive treatment.

Overview of Glaucoma

- Heterogeneous group of disorders, not a single clinical entity
- Characterized by pressure related damage to optic nerve & subsequent visual field loss
- Affects more than 67 million people worldwide
- Third leading cause of blindness worldwide (cataract & trachoma); leading cause in blacks
- Uncontrolled, glaucoma can lead to permanent loss of vision due to death of retinal ganglion cells and their axons
- Treatment aimed at lowering IOP and slowing or stopping progression of damage

Epidemiology of POAG

- 2.25 million Americans are believed to have POAG
- Only half of them know they have glaucoma
- Second most common cause of blindness
- 9-12% of all cases of blindness in the USA
- App. 120,000 are blind from glaucoma
- About 2% of the population ages 40-50 and 8% over 70 have elevated IOPs
- Increasing frequency due to increased longevity in USA
- Number one cause of blindness in African Americans & Mexican Americans
Major Types of Glaucoma

- Open-angle - most common in USA
  - Normal (low) tension
  - Secondary
- Closed-angle
- Juvenile
- Congenital
  - Primary: when the cause of the elevation is unknown
  - Secondary: when increase IOP is secondary to another ocular or systemic disease
  - Ocular hypertension: IOP greater than 21 with normal ONH and visual fields

Normal Drainage of Aqueous Humor

Risk Factors for Glaucoma

- Elevated intraocular pressure (IOP)
- Diurnal fluctuation in IOP
- Patient characteristics
  - Cup/disc - large cupping or asymmetric
  - Advanced age
  - Race (Blacks 6-8 X Non-Blacks)
  - Family history
  - Concomitant conditions (e.g., diabetes, BP)
  - Myopia
  - Thin cornea
- Compromised ocular hemodynamics
- Others: Steroid use & eye injury

Open Angle Glaucoma is

- a progressive optic neuropathy with functional and structural impairment
- dependent on optic nerve susceptibility of individual person
- often accompanied by a characteristic VF loss
- most often asymptomatic: sneak thief of sight
- associated with a problem with aqueous drainage
- not defined by a specific IOP
- often a constant or intermittent abnormal IOP
- No known ocular or systemic condition accounting for the increased IOP

Ocular Hypertension is

- Elevated IOPs (>21 mmHg): rule out thick corneas
- 7-8% of people over the age of 40 (7-8M)
- 10% of OHT will develop glaucoma over 5 yrs
- Normal appearing optic nerve
- Normal visual fields
- Open angle
- No known ocular or systemic condition accounting for the increased IOP

Normal Tension Glaucoma is

- IOPs lower than 22mmHg: rule out diurnal variations & thin corneas
- 20-40% of new POAG have IOPs less than 21mmhg
- Acquired pits more common: infra or supratemporal poles
- Peripapillary atrophy more common
- Drance hem: more common (10-25% of NTG, 6% of COAG)
- Visual field defects often closer to fixation & denser
Glaucoma Evaluation

- Detailed history
- BCVA
- Pupil (RAPD)
- Slit lamp (rule out secondary forms)
- Tonometry (diurnal > in glaucoma): check CCT
- Gonioscopy: R/O open vs closed & secondary
- Optic nerve assessment (stereoscopic evaluation through a dilated pupil)
- Nerve fiber layer assessment with red free illumination

Glaucoma Evaluation (cont’d)

- Optic nerve stereo photography
- Visual fields with automated threshold perimetry
- Other tests
  - Blood pressure and pulse
  - Optic Nerve Imaging
  - Contrast sensitivity
  - SWAP
  - Frequency Doubling Perimetry

Thin Corneas-Falsely Lower IOP

- Goldmann applanation assumes a central corneal thickness (CCT) of 520μm
- CCT varies to a clinically significant extent among otherwise normal patients
- Applanation over- or under- estimates IOP by as much as 5 mmHg for every 70μm of CCT difference from < 520 μm

Pascal Dynamic Contour Tonometer

- Accurate direct measurements of true IOP?
- Independent of inter-individual variations of corneal properties ie. CCT

PASCAL at work:

Pascal Dynamic Contour Tonometer

© 2003 SMT AG

Structural vs. Functional

Visual field

Functional

Disc

Structural

Broad layered fiber layer

Time
Optic Nerve Head Assessment

“Hallmark sign is excavation of cup”

- Generalized Signs of Optic Nerve Damage
  - Generalized enlargement of the cup >.7
  - Cup-to-disc asymmetry >.2
  - Loss of the neuroretinal rim: generalized or focal: ISN’T rule: Important optic nerve size
  - Increased depth of cupping: laminar dots
  - Vertical elongation of the cup-to-disc ratio
  - Vessel displacement and splinter hemorrhages: “Drance Hem”
  - Loss of nerve fiber layer
  - Peripapillary atrophy

Edge of ONH
Asymmetry OS > OD

Baring of Circumlinear Vessel

Optic Disc Hemorrhages
- Most commonly seen in inferotemporal or superotemporal location
- 25% on nasal side of optic nerve
- Associated with localized nerve fiber loss and neuroretinal rim loss
- May suggest progression if diagnosis has been made