Glaucoma: Diagnosis and Treatment

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Glaucoma: the problem

• Glaucoma is second most common cause of blindness worldwide
• 7 million people are blind from glaucoma
• Estimated that glaucoma costs the US $2.86 billion/year in the United States
Glaucoma: the solution

- Most blindness caused by glaucoma could be prevented with proper diagnostics and treatment

The glaucoma care team

- ASORN mission statement: “to foster excellence in ophthalmic patient care while supporting the ophthalmic team through individual development, education, and evidence based practice.”

- Glaucoma treatment is a tough sell and requires a competent and compassionate team-effort to provide good care

What is glaucoma?

- NOT JUST A DISEASE OF ELEVATED EYE PRESSURE
- An umbrella term encompassing numerous eye diseases
- All share characteristic damage to optic nerve
What is glaucoma?

• Generally asymptomatic, slow moving disease that commonly affects peripheral vision first

Primary open angle glaucoma (POAG)

• Glaucomatous optic neuropathy, with an open angle and no other identifiable cause

POAG

• The most common form of glaucoma
• No known cause, but several clearly identified risk factors
  – Historical
  – Clinical
POAG historical risk factors

- **AGE**
  - Several population-based studies have found that glaucoma prevalence increases with age.
  - Prevalence increases 5x-10x from the fifth to eighth decade.

POAG risk factors

- **RACE**
  - Four to six times more common in individuals of African origin compared to Caucasians.
  - Those of African origin develop glaucoma at a younger age and have more severe disease at time of presentation.

POAG risk factors

- **FAMILY HISTORY**
  - Glaucoma thought to be a multifactorial polygenic disease.
  - Having a first-degree relative confers up to a 10-fold increase in one's chance of getting glaucoma.
  - Recommend tailored screening in families with clustering of glaucoma; test family members at a young age.
POAG clinical risk factors

- **INTRAOCULAR PRESSURE**
  - Ocular hypertension (OHTN): IOP > 21
  - One of the strongest risk factors for glaucoma progression
  - Not only high pressure, but fluctuating pressure over hours or days and asymmetric pressures between eyes
  - Likelihood of glaucoma progression increases by 11% per 1 mmHg of IOP increase

POAG clinical risk factors

- **CENTRAL CORNEAL THICKNESS (CCT)**
  - Goldmann tonometer measurements influenced by thickness of cornea
  - CCT above or below 520 requires correction
  - CCT < 556 increases risk for glaucoma when patient has elevated IOP

POAG: making the diagnosis

- Increase cup to disc ratio hallmark of glaucomatous optic neuropathy
- Disc hemorrhages confer a risk for development and/or progression of glaucoma
POAG: making the diagnosis

- Visual fields tests (VFT) are the mainstay of diagnosis of POAG
- Classic patterns of loss are the "nasal step" and the "arcuate"
- Correlates anatomically to area of nerve damage
- Tremendous amount of damage occurs before defects on VFT

Ancillary tests are beneficial for diagnosis and monitoring for disease progression
- MOST importantly could detect pre-perimetric disease
  - Diagnose before any vision loss

POAG: initial treatment

- Determine disease severity
  - Mild: Characteristic optic neuropathy with normal visual field
  - Moderate: Optic neuropathy with visual field loss in one hemifield, but not within 5 degrees of fixation
  - Severe: visual field loss in both hemifields and loss within 5 degrees of fixation
POAG: initial treatment

- Although glaucoma is more than just eye pressure, IOP is the only known target for treatment that alters disease course

- Initial treatment goal ranges from 20-30% reduction in IOP

POAG: initial treatment

- Medical management most common initial treatment
- Several classes of medications
  - Prostaglandin analogs
  - Beta-adrenergic antagonists
  - Alpha2-adrenergic agonists
  - Carbonic anhydrase inhibitors
  - Miotics

POAG: initial treatment

- Medications work in one of two ways
  - Improve outflow of the drainage system
  - Turning down the faucet

- Pro: effective
- Con: potential for poor adherence
Medical treatment: barriers to adherence

- Most commonly cited barriers
  - Forgetfulness
  - Poor self efficacy
  - Difficulty with drop administration
  - Patient beliefs
- Each barrier increases odds of non adherence by 10%

Medical treatment: improving adherence

- Simplification of drop regimens: use the least number of bottles possible
  - Use combination drops e.g. timolol + dorzolamide, rather than each separately
- Education
  - What will happen with failure to treat
  - What to expect from medications: side effects
  - Tailor education to specific patient

Medical treatment: improving adherence

- Give the patient literature to read
- Ask the patient about adherence at every visit very important for technician as some patients have “white-coat adherence”
  - “When was your Rx last filled?”
  - “How much is left in the bottle?”
  - “How long does your bottle last?”
Medical treatment: improving adherence

- Assess ability to instill drop in the office
- Drop charts to organize number of medications and when they should be taken
- Lifestyle cues for reminders e.g. every time you have a cup of coffee in the morning—take your drop

POAG: surgical management

- **Laser trabeculoplasty**
  - Nd:YAG laser applied to the trabecular meshwork (TM)
  - Causes remodeling of TM and better outflow
  - First-line or as adjunct to medications

Laser trabeculoplasty

- As a primary therapy can delay the need for drops for 1-2 years
- Drawback: not a permanent effect with pressure lowering effect diminishes 8% per year
- Can be repeated to augment effect
Minimally invasive glaucoma surgery (MIGS)

- Typically performed at the time of cataract surgery
- Currently only one device commercially available = iStent
- Inserted into TM, may allow for better IOP control with fewer medications

Trabeculectomy

- Surgical fistula allowing drainage into subconjunctival pocket
- Indications:
  - Glaucoma progression despite maximally tolerated medical therapy
  - Requires healthy conjunctiva and minimal inflammation

Trabeculectomy

- Antimetabolites injected into sub conjunctiva to prevent scarring
- Overall success rate of surgery varies widely
- Often requires further manipulation postoperatively
**Ex-PRESS implant and trabeculectomy**

- Adjunct to standard procedure
- Placed into eye through small needle track
- May maintain patency of fistula and minimize early post operative complications

**Trabeculectomy: common complications and treatment**

- Hypotony
  - Time and other conservative measures
  - Reinforcing flap with sutures
- Infection (Blebitis)
  - Lifelong risk for infection, educate patient on warning signs (new redness, pain)
- Pressure still too high
  - Laser suture lysis
  - Bleb needling
  - Bleb revision

**Drainage devices**

- Silicone tubes inserted into the anterior chamber attached to a drainage plate
- Indications
  - Neovascular glaucoma
  - Extensive conjunctival scarring
  - Previous failed trabeculectomy
Drainage devices

- Most common devices are the Ahmed and the Baerveldt
  - Major difference Ahmed has a valve that regulates IOP
  - Baerveldt is larger
    - Requires ligature suture to regulate pressure

Drainage devices: unique complications

- Tube/plate erosion
- Double vision: plate near/under extraocular muscles

Glaucoma: final thoughts

- Glaucoma is one of the single largest causes of irreversible blindness
- Many people fear blindness more than death
- Glaucomatous vision loss is preventable with the appropriate diagnostic testing and treatment
- Thank you for your hard work in caring for our patients with glaucoma

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