Aeromedical Impact of Selected Ophthalmologic Conditions – Glaucoma

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Disclosure Information

• I have no financial relationships to disclose.

• I will not discuss off-label use and/or investigational use in my presentation.
efinition

• Etiologies
• Presentation
• Clinical Course/Treatment
• Aeromedical Hazards
Glaucoma

Definition

- A progressive optic neuropathy hallmarked by structural changes of the optic nerve and related structures
  - Enlarged cupping of the optic disc (>0.4) or asymmetry (>0.2)
  - Thinning of the retinal nerve fiber layer
  - Visual field defects
  - May have elevated intraocular pressure (IOP)
  - USAF aeromedical glaucoma defined as IOP >30 mmHg regardless of presence of optic neuropathy
Glaucoma

• Etiologies
  • Primary
    • Idiopathic
    • Genetic
  • Secondary
    • Medications (e.g., corticosteroids & Topomax)
    • Traumatic (e.g., angle recession & hyphema)
    • Mechanical (e.g., pigmentary dispersion)
    • Anatomic (e.g., anatomically narrow angles)
Glaucoma

**Presentation**

- **Primary Open Angled Glaucoma (POAG)**
  - Presents typically in the 50s to 80s
  - Slowly progressive, no medical “cure”
  - Potentially blinding
    - Second leading cause in U.S.
    - Leading cause among African descent
  - Early disease ambiguous
    - Risk stratification and prophylactic treatment
  - Patients typically present with
    - Elevated IOP
    - Large optic disc cupping (>0.40)
    - Asymmetric optic disc cupping (>0.2)
    - Retinal nerve fiber layer thinning
    - Visual field defects
    - Optic disc hemorrhage
Glaucoma

• **Presentation**

• **Risk Factors (POAG)**
  
  • High IOP
  
  • Family history – primary relative
  
  • Race (African descent)
  
  • Age (higher)
  
  • Myopia (high myopia)
  
  • Central corneal thickness (< 540 µm)
  
  • Low diastolic arterial perfusion pressure
Glaucoma

- Presentation
- Secondary Glaucomas
  - Can present at any age – based on etiology
  - Progression depends on etiology
    - Can be very rapid – matter of hours
    - Some surgical cures possible
  - Potentially blinding
  - Patients typically present with
    - Dangerously elevated IOP – true ocular emergency
      - Can be >50 mmHg (mechanical/anatomic)
    - Large optic disc cupping (>0.40)
    - Asymmetric optic disc cupping (>0.2)
    - Retinal nerve fiber layer thinning
    - Visual field defects
Glaucoma

- Presentation
- Secondary Glaucomas
  - Etiologies
    - Medications (e.g., corticosteroids & Topomax)
    - Traumatic (e.g., angle recession & hyphema)
      - Damage to drainage system of eye
    - Mechanical (e.g., pigmentary dispersion/glaucoma)
      - Particulate blockage of drainage system of eye
    - Anatomic (e.g., anatomically narrow angles)
      - Anatomic blockage of drainage system of eye

Traumatic Hyphema
Pigment Dispersion
Angle Recession
Glaucoma

• Clinical Course
  • Primary Glaucomas
    • Slowly progressive
    • Majority only require topical medication
      • Goal: 20-30% IOP reduction
        • Xalatan (latanoprost) 1 drop OU Q HS
        • Timoptic (timolol) 1 drop OU Q AM or BID
    • Some laser treatments can be additive
      • Argon or Selective Laser Trabeculoplasty (ALT/SLT)
    • Treatment is focused on maintaining reduced IOP and monitoring for changes in retinal nerve fiber layer, visual fields, and structural changes of the optic disc (notching and cupping)
    • The main goal of treatment is to slow the progression of glaucoma so functional vision is maintained for the greatest period of time – POAG is not curable
Glaucoma

• Clinical Course

• Secondary Glaucomas
  • Variable progression depending on etiology
  • Majority require topical medication and other laser or surgical treatment
    • Xalatan (latanoprost) 1 drop OU Q HS
    • Timoptic (timolol) 1 drop OU Q AM or BID
    • ALT/SLT
  • Treatment is focused on maintaining reduced IOP and treating the etiology of the high IOP
    • Narrow anatomic angles – peripheral laser iridotomy (LPI)
    • Pigment dispersion (SLT)
    • Medication (stopping/changing inciting agent)
    • Trauma and inflammation (surgical repair, removal of hyphema, control of intraocular inflammation)
Glaucoma

- Clinical Course
  - Primary and Secondary Glaucomas
    - Those who do not respond adequately to topical IOP lowering medications and/or laser treatment may require incisional glaucoma surgery to maintain IOP control

TRABECULECTOMY

AHMED Tube Shunt
Glaucoma

• Aeromedical Hazards
  • Glaucomas
    • Progressive occult loss of visual field
    • Acquired color and low contrast deficits
    • Eventual incisional surgery or blindness – DQ

• Waiver Provisions:
  • Glaucomas
    • IOP by Goldmann applanation tonometry (GAT) only
    • GAT at least quarterly, different times of day, in record
    • Compliance with medication recorded
    • USAF aeromedically approved treatments
      • Timolol, latanoprost, and laser surgery (ALT/SLT/LPI)
Ocular Hypertension (OHT)

Definition

- Elevated GAT IOP (two or more IOPs over 21 mmHg but less than 30 mmHg) or 4-mmHg difference between the two eyes without evidence of optic neuropathy (retinal nerve fiber loss and/or visual field defect)

Etiologies

- Primary
  - Idiopathic
  - Genetic
- Secondary
  - Medications (e.g., corticosteroids)
  - Traumatic (e.g., angle recession)
  - Mechanical (e.g., pigmentary dispersion)
Ocular Hypertension (OHT)

Presentation

• Individuals present with IOPs higher than 21 mmHg
• They may have thicker than average central corneal thickness
• No evidence of optic neuropathy on retinal nerve fiber layer analysis, visual field testing, structural disc changes, or asymmetry of optic nerve cupping

Clinical Course

• Most individuals continue on without developing glaucoma
• Those with higher IOPs and thin corneas must be evaluated and followed closely
  • Higher risk of conversion to glaucoma
• Treatment is geared towards risk stratification
  • Those with risk factors (similar to POAG) may be treated to prophylactically lower IOP
  • Those without risk factors should be observed closely
Ocular Hypertension (OHT)

Aeromedical Hazards – Similar to Glaucoma

- Development of optic neuropathy / glaucoma
- Visual field defects, acquired color and low contrast deficiencies
- Incisional surgery or blindness – DQ

Waiver Provisions

- IOP by GAT only
- GAT at least quarterly, different times of day, in record
- Compliance with medication recorded
- Aeromedically approved treatments
  - Timolol, latanoprost, and laser surgery (ALT/SLT/LPI)