10.6.3. Childhood Glaucoma (III): Evaluating the Pediatric Glaucoma Patient

- See Table 6-5
- History
  - infant
    - fussy or irritable
    - not feeding well
    - losing weight
    - cries when taken outside, into the sunshine
    - corneal clouding
      - intermittent or constant
  - school-aged children
    - cries when taken outside, into the sunshine
    - failed vision screenings
    - change in academic performance
    - trouble seeing the blackboard
    - extracurricular activities
  - family history of congenital glaucoma and other ocular and systemic disorders
  - medication use (with particular attention to all forms of steroids)
  - allergies
  - names of previous physicians
  - all prior ocular and systemic medical and surgical treatments
- Visual Acuity
  - refraction
    - myopia from axial enlargement
    - astigmatism from corneal irregularity
  - decreased vision may result from
    - end-stage glaucomatous optic nerve damage
    - amblyopia
    - corneal scarring
    - other associated ocular disorders (retinal detachment, macular edema, cataract, lens dislocation)
- External Examination
  - buphthalmos
  - epiphora
  - blepharospasm
  - examination should be directed at features of
    - chromosomal abnormalities
    - phakomatoses
    - connective tissue disorders
    - Axenfeld-Rieger syndrome
- Anterior Segment Examination
  - corneal diameter
    - measure with calipers or ruler
    - normal corneal diameter
      - full-term newborns
        - 10–10.5 mm
      - by age 1
        - 11–12 mm
    - congenital glaucoma
      - >12 mm in the first year of life
  - corneal opacification
    - mild haze to dense opacification of the corneal stroma
  - retroillumination after pupillary dilation may help visualize Haab striae
  - evaluation for other anterior segment anomalies
    - aniridia
    - iridocorneal adhesions
    - corectopia
- Tonometry
  - infants <6 months
    - can successfully measure the IOP without general anesthesia or sedation
      - while the infant is feeding or immediately thereafter
    - Tono-Pen
    - pneumotonometer
    - Perkins tonometer
    - rebound tonometer
      - does not require topical anesthesia
      - measurements higher with rebound tonometry than with the Perkins tonometer
  - infants >6 months and young children
    - IOP falsely elevated in
      - uncooperative or struggling child
    - anesthesia usually required
      - most general anesthetic agents and sedatives can profoundly lower IOP
        - exceptions
          - chloral hydrate
            - does not affect IOP
          - ketamine
            - may raise IOP
      - increased IOP during general anesthesia
        - endotracheal intubation
        - upward drift of the eyes
        - possible induced laryngospasm
      - in preparation for general anesthesia, infants may become dehydrated
      - take IOP measurement immediately after induction of general anesthesia (preferably before intubation)
  - normal IOP in newborns is in the low teens
    - increasing to adult levels of 10–20 mm Hg by middle childhood
  - glaucoma should be suspected if IOPs are elevated or asymmetric in a cooperative or anesthetized child
- Central Corneal Thickness
  - average central corneal thickness (CCT)
    - 540–560 μm in children without glaucoma
    - lower than average
      - congenital glaucoma
      - Down syndrome
    - higher than average
      - aphakic glaucoma
      - aniridia
  - role of pachymetry unclear
- Gonioscopy
  - younger children
    - EUA is usually required
    - direct visualization of angle structures
      - Koeppe lens
  - older children
    - indirect visualization of angle structures
      - 4-mirror gonioleins at the slit lamp
  - anterior chamber angle of an infant differs from the normal adult angle
    - trabecular meshwork is less pigmented
    - Schwalbe line is less prominent
    - junction between the scleral spur and ciliary body band is less distinct
  - PCG
    - anterior chamber is deep
    - high anterior iris insertion
    - angle recess is absent
    - iris root appears as a scalloped line of glistening tissue
      - Barkan membrane
        - thickened and compacted trabecular meshwork
          - not a true membrane!
  - JOAG
    - angle usually appears normal
  - aniridia
    - rudimentary iris root with progressive narrowing and synechial closure
- Optic Nerve and Fundus Evaluation
  - indirect ophthalmoscopy
    - usually inadequate for accurate assessment of the optic nerve
  - direct ophthalmoscopy
    - can be performed in the office or operating room
    - patients with small pupils
      - direct ophthalmoscopy through a Koeppe lens without a dimple
  - slit-lamp biomicroscopy
    - older children
  - photographs
    - documentation of changes over time
  - newborn without glaucoma
    - small physiologic cup (<0.3)
  - PCG
    - stretching of the optic canal
    - backward bowing of the lamina cribrosa
    - generalized cup enlargement
  - enlarged/increasing CDR or CDR asymmetry >0.2 is suggestive of glaucomatous cupping
  - cupping may be reversible if the IOP is lowered
  - lowering IOP cannot reverse any existing atrophy of the optic nerve axons
- Axial Length
  - A-scan ultrasonography
  - progressive globe enlargement in patients with PCG
  - axial length may stabilize or decrease with control of IOP
    - critical marker of successful surgical control of IOP
- Other Testing
  - B-scan ultrasonography
    - whenever media opacities (corneal edema) preclude fundus evaluation
  - scanning laser ophthalmoscopy
    - useful longitudinal data in older children with clear media
  - optical coherence tomography
    - useful longitudinal data in older children with clear media

Ophthalmology Mind Maps/Arman Mashayekhi, MD