Pediatric Glaucoma Surgical Management

Lama A. Al-Aswad, M.D.
Associate Professor of Clinical Ophthalmology
Edward S. Harkness Eye Institute Columbia University
Pediatric glaucoma

- **Primary**
  - Classic features
  - Newborn (birth to 1M)
  - Infantile (1M-2y)
  - Juvenile (early childhood or early adulthood)
  - Glaucoma associated with ocular anomalies or systemic syndromes.

- **Secondary**
  - Doesn’t result from a primary developmental anomaly
Pathogenesis

- **Congenital glaucoma**
  - Initially Barkan membrane
  - Developmental arrest of the anterior chamber leads to higher and more anterior insertion of the iris and CB.
  - The insertion to the posterior TM may cause compression of the trabecular beams

- **Juvenile**
  - Mutation in the myocilin gene. Not well understood
Pathogenesis

• Primary associated with systemic disease
  • Sturge-weber
  • Axenfeld-Rieger
  • Neurofibromatosis (1)
  • Lows
  • Aniridia

• Primary associated with ocular anomalies
  • Peters’s anomaly
Pathogenesis

- Secondary
  - After congenital cataract
  - Uveitis
  - Steroid induced
  - Angle closure
Choose of surgical procedure

- Age of the child
- Corneal clarity
- Corneal diameter
- The severity of the glaucoma
- The angle open or closed
- The etiology
- Presence of systemic disease
- Whether the patient previously had surgery for this condition

Pediatric glaucoma Treatments

- Mostly surgical

- Divided
  - Primary (angle surgery)
    - Goniotomy
    - Trabeculotomy
  - Secondary
    - Trabeculectomy with antifibrosis drugs
    - Glaucoma drainage implants
    - Laser cyclophotocoagulation
Goniometry

- First described by Carlo de Vincentiis 1893 in adults
- Barkan modified it for congenital glaucoma 1938
- Improvement of aqueous outflow. Widening of the angle and more posterior position of the angle
Goniotomy

- Complication
  - Hyphema
  - PAS, cataract
  - Iridodialysis, Cyclodialysis

- Outcome (multiple)
  - 26% if diagnosed between birth and 1 month (Shaffer)
  - 80-90% if diagnosed between 3-12 month
  - 38% after 2 years
Trabectome
Minckler
Trabeculotomy

- First described 1960 by Smith and Burian
- Direct communication between SC and anterior chamber
Trabeculotomy

- Complication
  - Hyphema
  - Tears in descemet’s membrane
  - Iridodialysis, Cyclodialysis
  - Synechiae, cataract
  - Choroidal detachment

- Outcomes
  - 84%-93% (Luntz, Akimoto)
  - Worse in less than 3 month and axial length > 24 mm
  - Reduced in different racial groups
<table>
<thead>
<tr>
<th>Goniotomy</th>
<th>Trabeculotomy</th>
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<tbody>
<tr>
<td>Clear cornea</td>
<td>Can be preformed with cloudy cornea</td>
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<tr>
<td>Good understanding of angle anatomy</td>
<td>Good understanding of SC and angle anatomy</td>
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<tr>
<td>Might requires assistant</td>
<td>Doesn’t require an assistant</td>
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<td>Less traumatic to the tissue</td>
<td>Tearing through the TM</td>
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<tr>
<td>No conjunctival scarring</td>
<td>Conjunctival scarring</td>
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<td>Shorter operative time</td>
<td>Long operative time</td>
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<td>Multiple incision to treat most of the angle</td>
<td>Potentially one incision using the suture</td>
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Combination Trabeculotomy and trabeculectomy

• Certain ethnic groups such as Indian and middle-eastern

• Outcomes
  • 94.4% percent at one year
  • 63.1% percent by the sixth year

Trabeculectomy

- Trab with our MMC success 30-35%
- Trab with MMC 55-95%
- Difficulty with follow up
- Risk of endophthalmitis
Drainage implants

- 1973 (Molteno)
- Valved and non-valved
- Success
  - 62-92% at 12M
  - 33-55% at 10 Years
- Considerations:
  - Size of the eye
  - Tube position in growing eyes or buphthalmic eyes
  - Anterior rotation of the tube
Cyclodestructive

- Cyclocryotherapy 33% (phthisis 10%)
- Transscleral laser cycloablation 50%, retreatment 70%
- Endoscopic cycloablation 43%
- Complications:
  - Phthisis
  - Hypotony
  - Chronic uveitis
  - RD

Treatment prognosis

- Poor visual outcome associated with
  - High myopia
  - Corneal diameter $\geq 14$mm
  - Striae that leads to amblyopia
  - Corneal decompensation
  - Cataract
  - Progressive optic atrophy
  - Age of diagnosis
  - Failure of angle surgery

- New born tends to have the worst prognosis
Purpose: long-term outcome PCG for more than 20 years

30 eyes of 16 patient. Follow up 34±10 years

27 eyes had goniotomy and 2 eyes had Trab MMC

Patient with no visual impairment 33%

Progression occurred in 1/3 of eyes
Kaplan-Meier survival curves

- 90.3% at 1 year, 83.1% at 5 years, 70.8% at 10 years, 58.3% at 34 years, and 48.6% at 40 years
In Conclusion

- Difficult to manage
- Need for ongoing assessment of stable PCG patients as glaucomatous progression and sight-threatening complications may occur after many years of IOP stability
- Amblyopia is risk for visual impairment
- Multidisciplinary team approach to insure success