Update on Pediatric Ocular Biometry and IOL Power Calculations

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No Financial Interest
Better information - Better Technology

- Various methods of Ultrasound and Optical Biometry,
- Newer methods of Biometry,
- IOL power calculation formulas,
- Various methods of under-correction,
- Choices of IOL in pediatric cataracts
POLL QUESTION 1

- What is your current position?

1. Pediatric Ophthalmologist
2. Comprehensive Ophthalmologist
3. Fellow/Resident
4. Medical Student
5. Biometrist
Cataract surgery in adults

Advancement in Technology

Revolution in Biometry and IOL Power Calculation

Pediatric Cataract still lagging

DIFFERENCES
Implantation of IOL in growing eyes needs under-correction and titration of IOL power
CONCERNS

• Measurements
  - Keratometry
  - Axial length

• Choices of IOL
  - Materials
  - VAO
  - Myopic shift

• IOL Power calculation formulae

• Long term issues

Target Refraction
NORMAL EYE GROWTH

- Birth-Mean AL = 16.6 – 17.0 mm; Mean K = 51.2D
- K: 51.2D → 43.5D
- Lens power: 1st yr, ↓ 10D
- 2nd–10th yr, ↓ 3-4D

Keratometry in Pediatric Eyes With Cataract

Rupal H. Trivedi, MD, MSCR; M. Edward Wilson, MD

- 299 eyes analysed
- Average K - 45.39 (3.08) (D) (range, 39.25-63.5 D).
- Age and axial length (AL) - significant linear relationship (P < .001).

- Steeper K values from birth to 6 months of age.
- **Girls** had steeper corneas when compared with boys (P = .03).
- **Monocular cases** were steeper than that of bilateral cases (P = .07).
- **For unilateral cataract**, the eye with the cataract had a significantly steeper cornea than the fellow eye (P = .02).

K in cataractous eye

- Unilateral cataract were steeper than those of bilateral cataracts.
- Corneas from eyes with persistent fetal vasculature (PFV) are steeper than the average for normal eyes at that age.


Biometry in Cataractous eyes

Biometry Data from Caucasian and African-American Cataractous Pediatric Eyes

Rupal H. Trivedi and M. Edward Wilson

- 310 EYES
- Girls - shorter ALs \((P \ 0.090)\),
- African-American subjects had longer ALs than did the Caucasians \((P \ 0.001)\).
  Female - shallower ACDs than those of male subjects \((P \ 0.026)\).

Trivedi et al IOVS 2007
Eyes with unilateral cataract had shorter ALs than those with bilateral cataracts before 60 months of age, but had longer ALs than the eyes with bilateral cataracts after 60 months of age.

AL of the unilateral cataractous eye shorter than fellow non cataractous eye (<6 months) \((P \ 0.001)\).

AL \(20.5 \pm 2.9\) mm different from Gordon and Donzis (normal eyes) \(21.9 \pm 1.6\) mm

Three phases of eye growth in children:

- **A rapid, postnatal phase** - birth to 6 months of age, \((0.62\) mm/month)
- **slower, infantile phase** - 6 to 18 months of age, \((0.19\) mm/month)
- **slow, juvenile phase** - 18 months forward, \((0.01\) mm/month)
Lorenz et al. further reported that in unilateral cataract, 5 of 12 eyes examined at the time of surgery were 7% to 16% longer than their age-matched control eyes.

Griener et al. reported that in unilateral cases, between 2 and 6 months of life the mean AL was 18.7 mm.

Moore reported that the AL in all but one patient was greater than the average AL of normal neonates in their practice.

Rasooly et al. reported that patients with bilateral congenital cataract had significantly shorter eyes than those with unilateral disease.

Ocular axial length in children with unilateral congenital cataract
• Ulla Kugelberg, Charlotta Zetterström, Sinikka Syrén-Nordqvist

Journal Ophthalmic Paediatrics and Genetics


Three major components

• **BIOMETRY**
  Calculate IOL power
  Axial length
  Corneal power
  IOL position

• **FORMULAS**
  Generations
  Usage
  Personalization

• **CLINICAL VARIABLES**
  Patient needs
  Special circumstances
  Problems & errors
POLL QUESTION 2

- Do you perform biometry yourself in all pediatric cataracts?

1. Yes most of the time
2. Not at all
3. Mostly rely on technician/biometrist
BIOMETRY

Conventional Ultrasound biometry (AScan)

- Applanation A Scan
- Immersion A Scan

Optical biometry

- (PARTIAL COHERENCE INTERFOMETRY)- IOL MASTER 500 (CarlZeiss Meditec AG)
- LENSTAR (Haag-Streit)
- SWEPT SOURCE IOL MASTER700 (CarlZeiss Meditec AG)
- ALADDIN (Topcon)
- TOMEY (OA-2000)
- AL Scan (NIDEK)

Kathleen S. Kunert et al. Repeatability and agreement in optical biometry of a new swept-source optical coherence tomography–based biometer versus partial coherence interferometry and optically-coherence reflectometry. JCRS;2016:76-83
MEASUREMENT OF AL & K

- Difficult in office setting
  - Manual refractometer
  - Handheld Keratometer (Nidek, Alcon autokeratometer)

- EUA needed
- Errors in measurement
- Keratometry - Lack of fixation under anaesthesia
- Like Keratometry, A scan biometry should be performed for both eyes.
Ultrasound biometry uses 10-MHz ultrasonic waves to obtain optical parameters - AL, anterior chamber depth (ACD) and lens thickness (LT).
CONTACT Vs IMMERSION

CONTACT

- Advantages:
  - Convenient
  - Accurate with trained biometrist

- Disadvantages:
  - Corneal compression (0.24–0.32 mm error)
  - Corneal compression is more likely in pediatric eyes because of low corneal and sclera rigidity

IMMERSION

- Advantages:
  - Coupling fluid filled scleral cup (Prager Shell)
    - More accurate,
    - No risk of errors from excess pressure applied

- Disadvantages:
  - Cumbersome procedure
  - More time required to train the biometrist and obtain accurate reading

Settings change to immersion mode
- Anterior lens echo is 90% or more of maximum height
- Posterior lens echo is between 50%-75% of maximum
- Retina echo is 75% or more of maximum, scleral echo—well identified
- Orbital fat—should descend quick
- Echo rise angle must be clear: The take off of the retinal spike must be clear and form a 90 degree angle from the baseline. No scleral, orbital fat echoes beam is aligned with ON rather than macula.
POLL QUESTION 3

What is your preferred choice of Ultrasound biometry in pediatric eyes?

1. Applanation
2. Immersion
• **2009 e mail survey (unpublished)**

AAPOS member in which 173 (82.4%) surgeons reported using contact A-scan compared to 37 (17.6%) who reported using the immersion technique.

• **Delphi Process**

| For examination under anesthesia, do you prefer A-scan immersion or applanation? | A-scan immersion
| For a cooperative child in a clinic, do you prefer – IOL master or A-scan? | IOL master


Comparing axial measurements by contact & Immersion techniques in pediatric cataractous eyes

- Contact technique - average 0.27 mm shorter than immersion technique
- Difference mainly the result of the anterior chamber depth rather than the lens thickness value
- If axial length by contact technique is used, 1-D stronger IOL power

*If you must use applanation biometry, rely on the measurement with the greatest anterior chamber depth,*


We may be able to minimize postoperative myopic prediction errors in refraction by routinely using immersion A-scan for children having cataract surgery
Prediction Error after pediatric cataract surgery with IOL Implantation: Contact Vs Immersion

- **Prediction error (PE)** = predicted refraction - actual refraction.
- **Absolute prediction error (APE)** = predicted refraction - actual postoperative refraction.

<table>
<thead>
<tr>
<th></th>
<th>APE CONTACT</th>
<th>APE IMMERSION</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trivedi et al</td>
<td>0.7D±0.4D</td>
<td>0.7±0.6D</td>
<td>0.694 (PE P&lt;0.001)</td>
</tr>
<tr>
<td>R Ben Zion et al</td>
<td>1.11D±0.9D</td>
<td>1.03±0.98D</td>
<td>0.64</td>
</tr>
</tbody>
</table>

Importance of Accuracy

• 0.1 mm error = ~0.25 - 0.3 D post-op surprise!

• Therefore, 1.0 mm error = ~2.5 - 3.0 D post-op!

In long eyes

1mm error drops to = 1.75D

In short eyes,
1mm error jumps to 3.75 D post-op!
• Employ a well trained technician/Biometrist

• Regularly calibrate Manual Keratometers/IOL Master

• Carefully evaluate IOL master scan for reliability

• Keep contact lenses out for 2 weeks before keratometry

• IOL Undercorrection
POLL QUESTION 4

- What biometry method are you using for pediatric cataract?

1. Applanation in EUA and Optical biometry for cooperative child.
2. Immersion in EUA and Optical biometry for cooperative child.
3. Applanation in all cases.
4. Immersion in all cases.
Optical biometry – IOL Master
Partial Coherence Interferometry

- Non-contact optical biometry
- Easy-to-use,
- Accurate,
- Highly reproducible method.

Hussin HM et al; Reliability and validity of the partial coherence interferometry for measurement of ocular axial length in children. Eye (Lond). 2006 Sep;20(9)

### IOL Calculation

<table>
<thead>
<tr>
<th>Calculation Method</th>
<th>Axial Length (mm)</th>
<th>Corneal K's (mm)</th>
<th>Optical ACD (mm)</th>
<th>Surgical Eye</th>
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<tbody>
<tr>
<td>Haigis</td>
<td>23.61</td>
<td>7.33</td>
<td></td>
<td>OD</td>
</tr>
<tr>
<td>SRK II</td>
<td>23.67</td>
<td>7.35</td>
<td></td>
<td>OS</td>
</tr>
<tr>
<td>Holladay</td>
<td>23.19</td>
<td>7.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SRK/T</td>
<td>23.67</td>
<td>7.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi Formula</td>
<td>23.67</td>
<td>7.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haigis L</td>
<td>23.67</td>
<td>7.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phakic IOL</td>
<td>23.67</td>
<td>7.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior Refractive Surgery</td>
<td>23.67</td>
<td>7.19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Eye Surgeon:** Dr. Mustermann

**Target Refraction (D):** +0.5

### Accurate & Consistent Biometry

**Ideal axial length display for the IOLMaster**

### Axial length

The axial length is measured from corneal vertex to RPE at the macular center.

An internal algorithm adds back the retinal thickness at the fovea for the equivalent of the ultrasonic axial length.

Correct primary maxima display and a SNR of greater than 1.6 indicates a valid measurement.
High myopic

US is aimed at optical axis of eye to meet all interfaces perpendicularly
PCI measures along visual axis which patient uses for fixation
US 27.06mm
PCI 29.19mm, surprise 5D
**Aravind Eye Hospital, Tirunelveli**

**Name:** [redacted]

**ID:** 1176854

**Date of Birth:** 06/07/2010

**Exam Date:** 10/06/2015

**Eye Surgeon:** Aravind Eye Hospital

**Formula:** HofferQ

**Target Ref:** -0.1 D

**n:** 1.3375

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**OD (Right):**

- **AL:** 17.17 mm (SNR = 61.6)
- **K1:** 46.04 D / 7.33 mm @ 176°
- **K2:** 47.14 D / 7.16 mm @ 86°
- **R/SE:** 7.25 mm / 46.59 dpt
- **Cyl:** -1.10 D @ 176°

**Eye Status:** Aphakic

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**OS (Left):**

- **AL:** 17.00 mm (SNR = 38.8)
- **K1:** 44.47 D / 7.59 mm @ 9°
- **K2:** 46.11 D / 7.32 mm @ 99°
- **R/SE:** 7.46 mm / 45.29 dpt
- **Cyl:** -1.64 D @ 9°

**Eye Status:** Aphakic

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**BC (Aurofold):**

<table>
<thead>
<tr>
<th>pACD Const</th>
<th>Aurofold</th>
<th>pACD Const</th>
<th>Aurofold</th>
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<td>5.28</td>
<td>5.28</td>
<td>4.96</td>
<td>4.96</td>
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<tr>
<td>51.0</td>
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<td>47.5</td>
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<tr>
<td>50.5</td>
<td>-1.2</td>
<td>48.5</td>
<td>0.0</td>
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<tr>
<td>50.0</td>
<td>-0.5</td>
<td>48.5</td>
<td>0.0</td>
</tr>
<tr>
<td>49.5</td>
<td>-0.1</td>
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<td>0.0</td>
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<tr>
<td>49.0</td>
<td>-0.1</td>
<td>48.5</td>
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<tr>
<td>48.5</td>
<td>0.6</td>
<td>46.5</td>
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<tr>
<td>48.0</td>
<td>0.6</td>
<td>46.5</td>
<td>0.7</td>
</tr>
</tbody>
</table>

**Ref:**

- **TOL:** 50.9
- **Emol:** 49.31

**Acrylic (Natural):**

<table>
<thead>
<tr>
<th>pACD Const</th>
<th>TOL</th>
<th>Ref</th>
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<tbody>
<tr>
<td>5.21</td>
<td>50.5</td>
<td>-1.2</td>
</tr>
<tr>
<td>50.0</td>
<td>-0.4</td>
<td>-0.4</td>
</tr>
<tr>
<td>49.5</td>
<td>-0.4</td>
<td>-0.4</td>
</tr>
<tr>
<td>49.0</td>
<td>-0.3</td>
<td>-0.3</td>
</tr>
<tr>
<td>48.5</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>47.5</td>
<td>1.0</td>
<td>1.0</td>
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</table>

**Ref:**

- **TOL:** 48.90
- **Emol:** 50.03

**Acrylic (Natural):**

<table>
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<tr>
<th>pACD Const</th>
<th>TOL</th>
<th>Ref</th>
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<tr>
<td>5.31</td>
<td>50.5</td>
<td>-1.1</td>
</tr>
<tr>
<td>50.0</td>
<td>-0.7</td>
<td>-0.7</td>
</tr>
<tr>
<td>49.5</td>
<td>-0.7</td>
<td>-0.7</td>
</tr>
<tr>
<td>49.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>48.5</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>47.5</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Ref:**

- **TOL:** 51.50
- **Emol:** 52.67

(* = Changed manually, ! = Borderline value)
IOL Master 700 - Swept Source SS –OCT Biometry

In addition to optical biometry, it also offers OCT imaging across the entire length of the eye.

Applies Optical B scan technology allows cross sectional visualization of structures along visual axis
Posterior polar cataract
Posterior polar cataract with PC dehiscence
Lamellar Cataract     Intumescent Cataract
Anterior Pyramidal Cataract – Hersheys Kisses

3.5 year. IOL implanted 26D (Calculated 28.0D)

Postop OD 20/40, OS 20/20 Cardiff card 1m
• **Lens thickness in different morphological pediatric cataract-Pediatric Biometry by IOL Master 700**

- To evaluate and compare the lens thickness and its relation to type of cataract and axial length by IOL MASTER 700 in pediatric cataracts
- Observational case study was conducted in 35 eyes (19 patients)
- The mean age was 8.5±3.5 years.
- The average lens thickness, axial length, ACD, Spherical equivalent was 3.09±0.5mm, 22.31±1.3mm, 3.64±0.4mm, 44.65±1.6 respectively.
- The p values shows there was significant difference between, lamellar vs posterior subcapsular cataract PSCC (mean difference = 0.722 P<0.001) & PSCC vs Total (mean difference 1.14367 p<0.001). There was no correlation between axial length and lens thickness (Spearman’s rank correlation) Spearman's rho = 0.0726, P value = 0.6740.
<table>
<thead>
<tr>
<th></th>
<th><strong>IOL MASTER 500 (CarlZeiss Meditec AG)</strong></th>
<th><strong>LENSTAR LS900 (Haag-Streit AG, Koeniz, Switzerland)</strong></th>
<th><strong>IOL MASTER 700 (CarlZeiss Meditec AG)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology</strong></td>
<td>PCI</td>
<td>OLCR (optical low coherence reflectometry)</td>
<td>Swept Source OCT</td>
</tr>
<tr>
<td><strong>Source</strong></td>
<td>Semiconductor diode laser (780 nm)</td>
<td>Superluminescent diode laser (820 nm)</td>
<td>Tunable laser (1055 nm)</td>
</tr>
<tr>
<td><strong>Corneal thickness</strong></td>
<td>N/A</td>
<td>300 – 800 μm</td>
<td>0.2 – 1.2 mm</td>
</tr>
<tr>
<td><strong>Lens thickness</strong></td>
<td>N/A</td>
<td>0.5 – 6.5 mm</td>
<td>1 – 10 mm (phakic eye)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.13 – 2.5 mm (pseudophakic eye)</td>
</tr>
<tr>
<td><strong>Anterior chamber depth</strong></td>
<td>1.5 – 6.5 mm</td>
<td>1.5 – 5.5 mm</td>
<td>0.7 – 8 mm</td>
</tr>
<tr>
<td><strong>Axial length</strong></td>
<td>14 – 40 mm</td>
<td>14 – 32 mm</td>
<td>14 – 38 mm</td>
</tr>
<tr>
<td><strong>White-to-white distance</strong></td>
<td>8 – 16 mm</td>
<td>7 – 16 mm</td>
<td>8-16mm</td>
</tr>
</tbody>
</table>
## Optical Biometry Vs Ultrasound

<table>
<thead>
<tr>
<th>Study</th>
<th>Eyes</th>
<th>Method</th>
<th>Value</th>
<th>Difference</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Lenhart et al</td>
<td>21</td>
<td>PCI</td>
<td>22.41 ± 1.37</td>
<td></td>
<td>0.002</td>
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<tr>
<td>JCRS 2010</td>
<td></td>
<td>Immersion US</td>
<td>22.27 ± 1.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gursoy et al</td>
<td>179</td>
<td>Lenstar</td>
<td>24.14 ± 1.06</td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Optom Vis Sci 2004</td>
<td></td>
<td>US</td>
<td>24.00 ± 1.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In all eyes with an AL of 23.5 mm or less, the PCI values that were less than or equal to the immersion ultrasonography values.

Carkeet et al reported - IOLMaster measurements were slightly larger than contact US (Echoscan) measurements for axial length (by 0.14 mm).

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Determine the Target Postoperative Undercorrection

- **Age at cataract surgery**: When an IOL is implanted in a child, a marked myopic shift must be expected.

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>+6</td>
<td></td>
<td>+6</td>
</tr>
<tr>
<td>2</td>
<td>+5</td>
<td></td>
<td>+5</td>
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<tr>
<td>3</td>
<td>+4</td>
<td>+5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>+3</td>
<td>+4</td>
<td>+4</td>
</tr>
<tr>
<td>5</td>
<td>+2</td>
<td>+3</td>
<td>+3</td>
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<tr>
<td>6</td>
<td>+1</td>
<td>+2.25</td>
<td>+2</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>+1.5</td>
<td>+1.5</td>
</tr>
<tr>
<td>8</td>
<td>-1 to -2</td>
<td>+1</td>
<td>+1</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>+0.5</td>
<td>+0.5</td>
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<tr>
<td>&gt;14</td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

Dahan et al 1997
Dahan et al; Choice of lens and dioptic power in pediatric pseudophakia. JCRS 1997;23 Suppl 1:618-23

<table>
<thead>
<tr>
<th>Axial length</th>
<th>IOL Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>17mm</td>
<td>28D</td>
</tr>
<tr>
<td>18mm</td>
<td>27D</td>
</tr>
<tr>
<td>19mm</td>
<td>26D</td>
</tr>
<tr>
<td>20mm</td>
<td>24D</td>
</tr>
<tr>
<td>21mm</td>
<td>22D</td>
</tr>
</tbody>
</table>

Less than 2 years – 20% under correction,
2-8 years – 10% under correction.
More than 8 years – Emmetropia.
POLL QUESTION 5

- What IOL Power calculation formula do you prefer?
  1. SRK 2
  2. SRK/T and Holladay 2
  3. Hoffer Q for short eyes and SRK/T for long eyes
  4. others
No single formula accepted.
Theoretical formulas (SRK-T, Holladay 1&2, Hoffer Q and Haigis) preferred over regression formula like SRK.

In pediatric eyes, **SRK/T** and the **Holladay 2** formulae had the least PE.

Personalizing the lens formula constant did reduce the PE significantly for all formulae except Hoffer Q.

In extremely short eyes (AL<20 mm), SRK/T and Holladay 2 formulae gave the best PE.
Protocol for IOL Power implantation-What/When?

- Age at the time of cataract surgery.
- Status of the fellow eye.
- Visual acuity.
- Compliance of child’s family to glass / occlusion/CL
- Implantation in Bag or sulcus.
- Secondary IOL implantation.
- Parents refractive error.
Status and visual acuity of fellow eye

- More hypermetropia if surgery is done bilaterally.
- If poor compliance is expected then better to leave least possible refractive error.
- In Uniocular cataract – minimize the anisometropia.
- Presence of dense amblyopia – Lesser hypermetropia – Better compliance with occlusion and lesser need for glasses.

Parents refractive error

Child with cataract and myopia can be left more hypermetropic
INFANT APHAKIA TREATMENT STUDY

- **IATS** - 114 infants were enrolled in a randomized, multi-center clinical trial comparing the treatment of unilateral aphakia in patients under 7 months of age with a primary IOL implant or contact lens.

There was no difference in the vision in the treated eyes when comparing CL to IOL treatment.
There were more patients with intraoperative complications (28% vs. 11%, \(p=.031\)), adverse events (81% vs 56%, \(p = 0.008\)) and more additional intraocular surgeries (72% vs 16%, \(p < 0.0001\)) in the IOL group than the contact lens group.

Most common adverse event - visual axis opacification
Most common additional intraocular surgery - clearing of visual axis opacification.

American Journal of Ophthalmology 2014
What IOL to Implant

- Acrysof Single piece Hydrophobic Acrylic (SA series) - most preferred.
- Three piece Acrylic lenses - preferred for sulcus fixation.
- Avoid Silicone and hydrophilic Acrylic lenses.
- Incidence of posterior capsular opacification (PCO) and postoperative uveal inflammation is significantly less with acrylic lenses.
- PMMA - other option

Aasuri et al. Indian J Ophthalmol. 2006;54(2):105-9 Comparison of acrylic and polymethyl methacrylate lenses in a pediatric population


SECONDARY IOL IMPLANTATION

• Scleral fixated IOLs


• Iris Fixated Lens


Is an iris claw IOL a good option for correcting surgically induced aphakia in children? A review of the literature and illustrative case study.
PEDIATRIC TORIC IOL

- Needs Cooperation
- Precise Toric IOL power calculations
- IOL rotation


MULTIFOCAL IOL

- Controversial
- The multiple images - amblyogenic stimulus.
- PCO, Tilt, decentration - Potentially deteriorate optical performance

Table 2: Intraoperative pediatric cataract management: Questions and answers where consensus was achieved*

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think pediatric ophthalmology fellows should perform a complete pediatric cataract surgery, under supervision (assisting tasks delegated to the fellow's examination of the fellow's ability to perform the surgery)?</td>
<td>Yes</td>
</tr>
<tr>
<td>Do you think ophthalmology residents should perform pediatric cataract surgery under supervision (assisting tasks delegated to the fellow's examination of the fellow's ability to perform the surgery)?</td>
<td>Yes</td>
</tr>
<tr>
<td>What is your preferred tunnel incision location?</td>
<td>Superior</td>
</tr>
<tr>
<td>Which intraocular lens implantation technique do you routinely perform at age &lt;2 years?</td>
<td>Manual continuous curvilinear capsulorhexis (CCCR) vitrectomy</td>
</tr>
<tr>
<td>For children age 2-4 years, do you prefer continuous capsulorhexis and anterior vitrectomy?</td>
<td>Yes</td>
</tr>
<tr>
<td>Do you agree with the distances from the pars plana/plastica for entry site?</td>
<td>Yes</td>
</tr>
<tr>
<td>Do you routinely use any drug (e.g., triamcinolone) to verify there is no residual vitreous in the anterior chamber after posterior capsulorhexis and anterior vitrectomy?</td>
<td>Yes</td>
</tr>
<tr>
<td>Do you agree with the dates for second-look postoperative examinations?</td>
<td>Yes</td>
</tr>
<tr>
<td>Do you agree with the recommendation for follow-up visits for children &lt;1 year old?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 3: Postoperative pediatric cataract management: Questions and answers where consensus was achieved*

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think this follow-up medication protocol could be adopted for routine surgery? (It can be modified based on inflammation or the complications.)</td>
<td>Yes</td>
</tr>
<tr>
<td>Antibiotic drops 4 times/day for 1-2 weeks; steroid drops 4-6 times/day for 4 days with taper as necessary (or 1% 0.5% if &lt;1 year old); 1-2 times/day for 2-4 weeks can eliminate in older children.</td>
<td>Yes</td>
</tr>
<tr>
<td>Is this schedule acceptable for postoperative visits in child more than 1 year old? (1 day after surgery; 1 week; 1 month; 3 months; 6 months; once a year)</td>
<td>Yes</td>
</tr>
<tr>
<td>Do you agree to a more frequent postoperative follow-up visits for children &lt;1 year old?</td>
<td>Yes</td>
</tr>
<tr>
<td>Do you think these capsular support options are acceptable for children &lt;1 year old?</td>
<td>Yes</td>
</tr>
<tr>
<td>What type of contact lens do you use for aphakic patients under 1 year old?</td>
<td>Silicone</td>
</tr>
<tr>
<td>What type of contact lens do you use for aphakic patients 1-3 years old?</td>
<td>Silicone</td>
</tr>
<tr>
<td>Do you ever use unilodal aphakic glasses?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Refer to online supplementary table S2 for detailed results. ** consensus; *: minor consensus.
Femtosecond Lasers / Zepto capsulotomy in Pediatric cataract

Precise IOL Power calculation still remains main challenge

Laser may be able to perform both anterior and posterior capsulotomies in pediatric cases.

Safety and outcomes of femtosecond laser–assisted cataract surgery remain to be determined.

Robin G. Abell, Lateral canthotomy for femtosecond laser–assisted cataract surgery in infants, JCRS 2014
Future lies in yours hand

Technology and Innovations may come

Choose best for your pediatric patients

IF this were YOUR CHILD

Future of your country.
Thank you
Minutes before leaving........

• WELCOME       TO       QUESTIONS       ?????????