Preoperative evaluation of the child with cataract- Biometry

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Pediatric cataracts

- **congenital** if present within the first year of life
- **developmental** if present after infancy or
- **traumatic**

Nischal K. Clinical Ophthalmology,2015

Early diagnosis and treatment

prevent

irreversible stimulus-deprivation **amblyopia**

Evaluation of a child with a cataract

1.Detailed **history** including:

- family history
- prenatal history (maternal drug use and febrile illnesses with rash)
- birth history (low birth weight may be associated with idiopathic bilateral congenital cataracts)
- developmental history (exclude metabolic or systemic related etiologies)
- history of the onset of the lenticular opacities, laterality and progression

2. Detailed **ocular examination** (office – operating room)

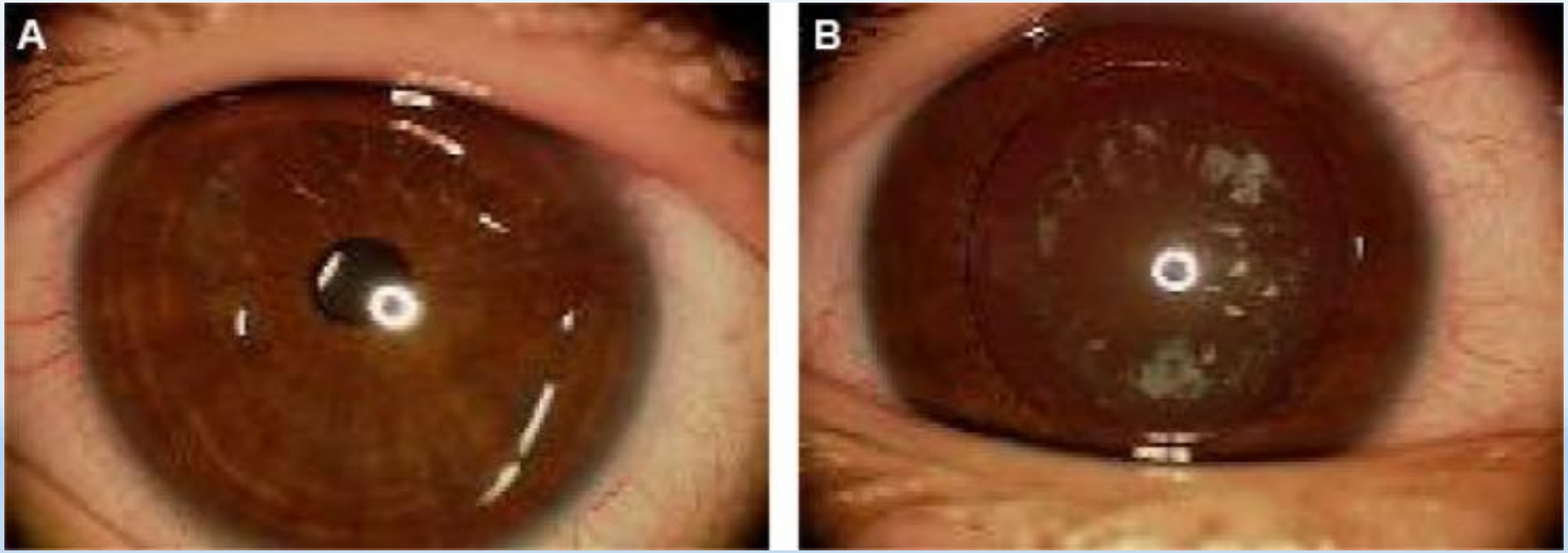
- slit-lamp biomicroscopy to assess:
  the size, location, density of lenticular opacity,
  associated anterior segment developmental anomalies

- measurement of IOP and corneal diameters

- Fundus examination (partial cataracts)

- Ultrasound examination (total cataracts) may reveal posterior-segment abnormalities

- 3.Examine **family members**



4. **Investigations**:

- Unilateral cataracts : not usually indicated
  most of them are isolated, nonhereditary and without any systemic associations

- Bilateral cataracts : may be considered in conjunction with general health assessment of the child by a pediatrician

Not all cataracts need operation !!!

only

Visually Significant Cataracts

Effect on Vision

- **Older Children** :

  Check **Visual acuity** with various **tests :**

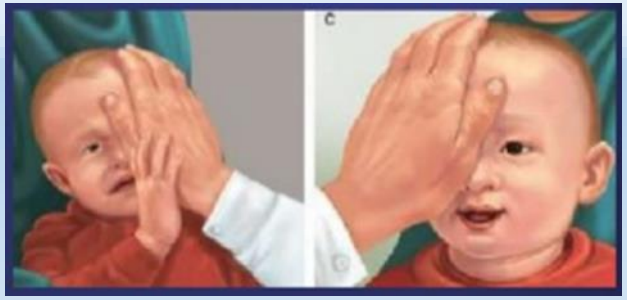
  Kay Pictures, Keeler, “E” charts ,Snellen chart,etc

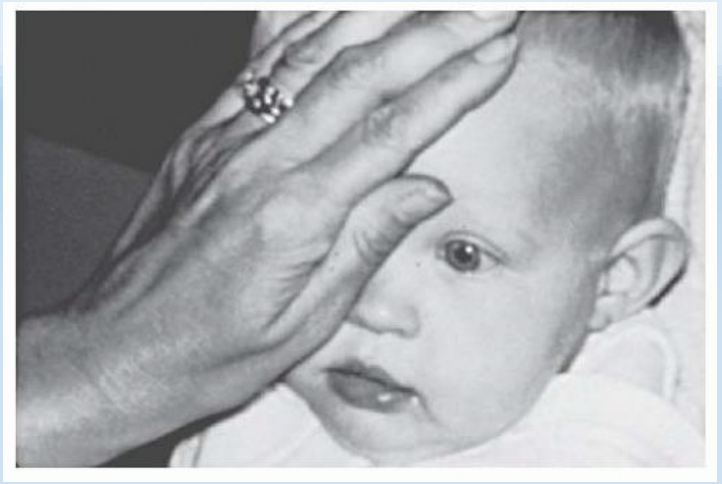
- **Preverbal children**:

  Check: **fixation** behavior

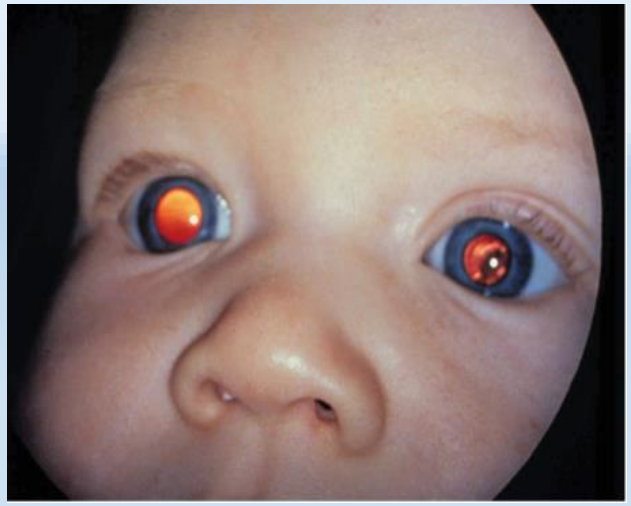
  fixation preference

  objection to occlusion



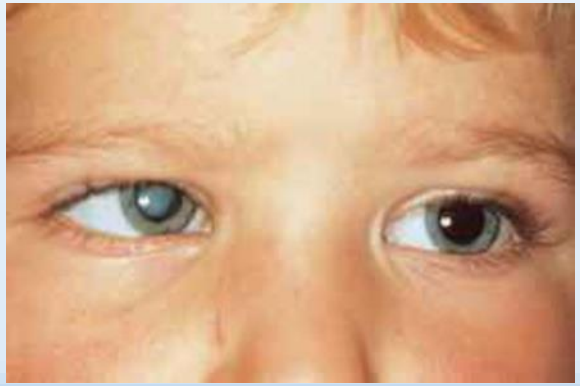


- Younger **infants** with poorly developed fixation:
  - Check **red reflex**
  - Ask about the **visual interaction** of the child at home with the family members



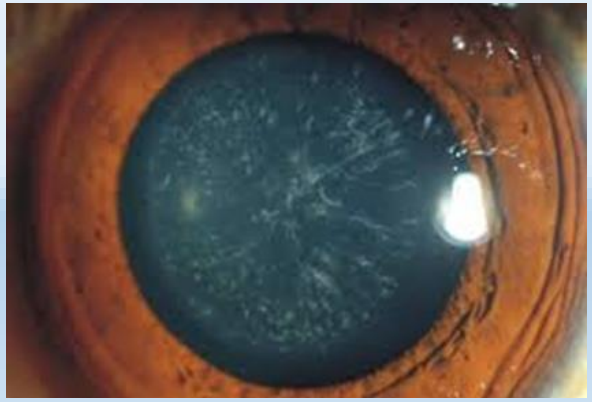
Warning Signs

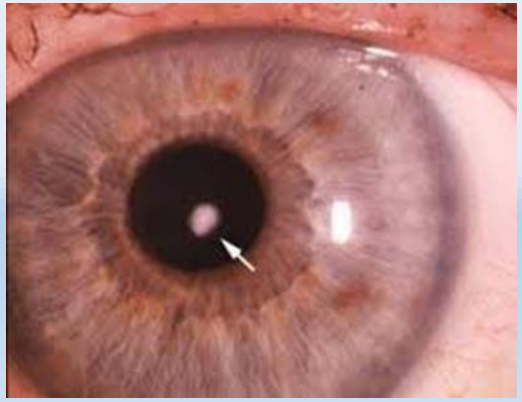
- Fixation pattern: not central, steady, maintained
- Nystagmus
- Strabismus
- Changes in behaviour



Observe – Treat Amblyopia

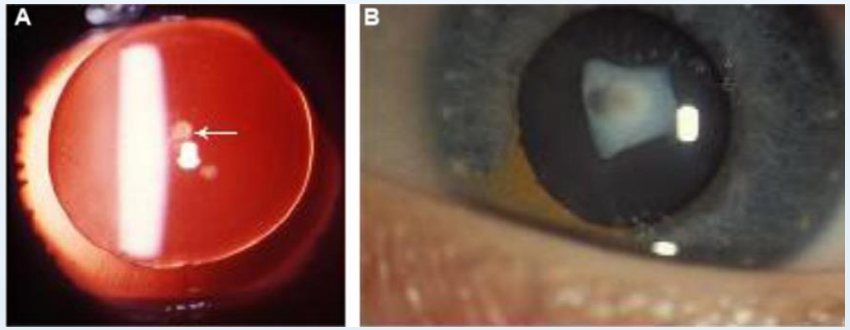
- peripheral lens opacities
- punctate opacities with intervening clear zones
- opacities less than 3 mm in diameter



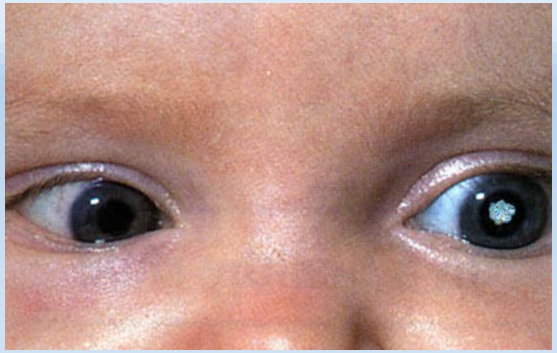


Examples:

- anterior polar and pyramidal cataracts : significant progressive corneal **astigmatism**, which can lead to decreased visual acuity and **amblyopia**.



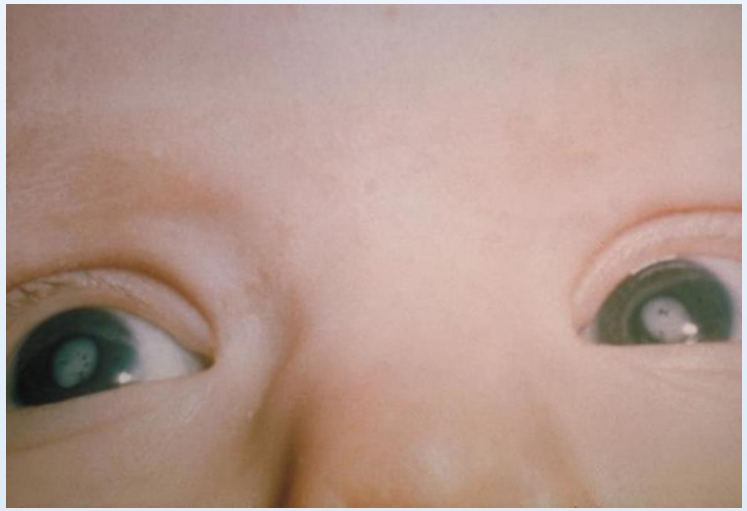
- small **central opacities**, a larger area of clear visual axis can be achieved by pharmacological **dilatation**



Time to operate

Congenital cataracts :

- Bilateral : first 10 weeks of life
- Unilateral: 4-6 weeks of life



Irreversible Stimulus – deprivation **amblyopia**

Congenital Cataracts

- ↑ Primary IOL implantation in Infants (gaining acceptance)

- Survey: approximately 70% of the American Association of Pediatric Ophthalmology and Strabismus members worldwide preferred to implant an IOL in children

Wilson ME, Trivedi R. J Cataract Refract Surg. 2007

Type of IOL

- Acrylic
- Hydrophobic

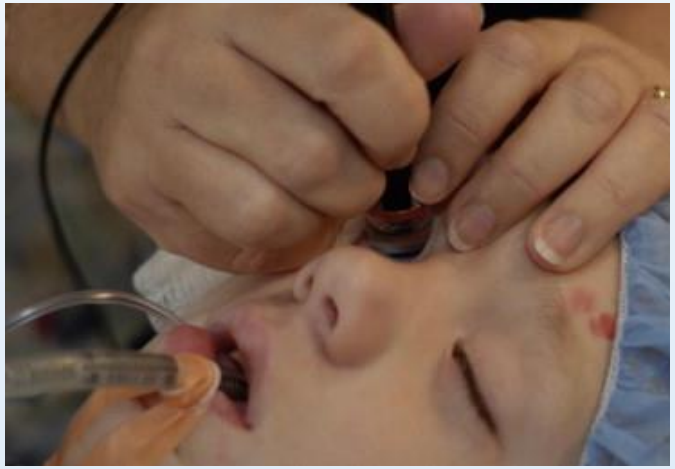
Biometry

- **Older children** :

  Outpatients department

- **Younger children/ uncooperative**:

  Operating theatre – under anaesthetic



Hand held : refraction, k-readings

Axial length : A-scan

Formulae:

- No consencus
- Recent report of IATS recommended Holladay 1 and SRK/T formulae for infant eyes. (43 eyes) Vanderveen Am J Ophthalmol 2013
- Study India 117 eyes : SRK/T and the Holladay 2 formulae

V Vasavada. Eye 2016

IOL power

- Aim -> Emmetropia later in life
- Target -> Hypermetropia after operation

IOL choice

Consider:

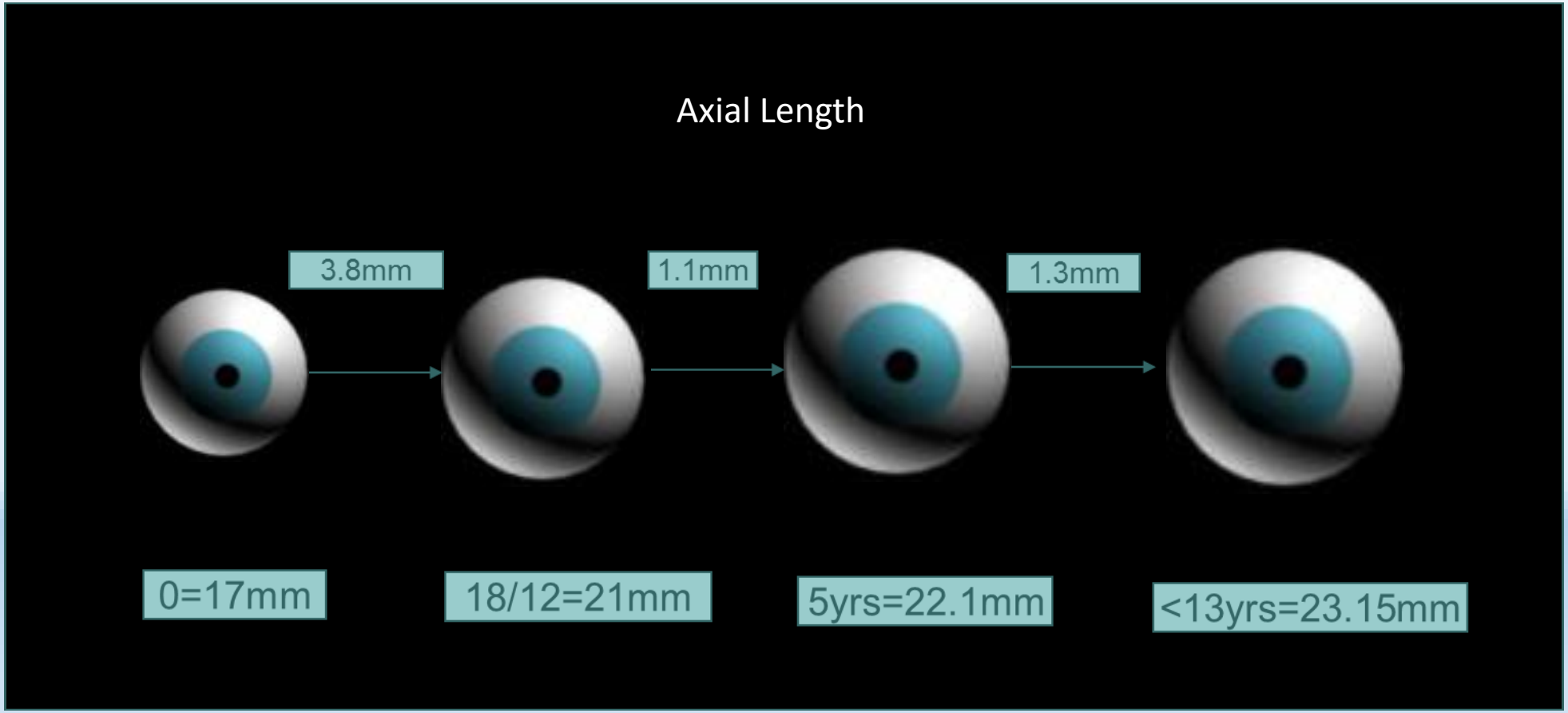
- myopic shift after surgery (specially first 18months of life)
- predict eye growth
- accurate biometry

Weakley et al. Ophthalmology 2017

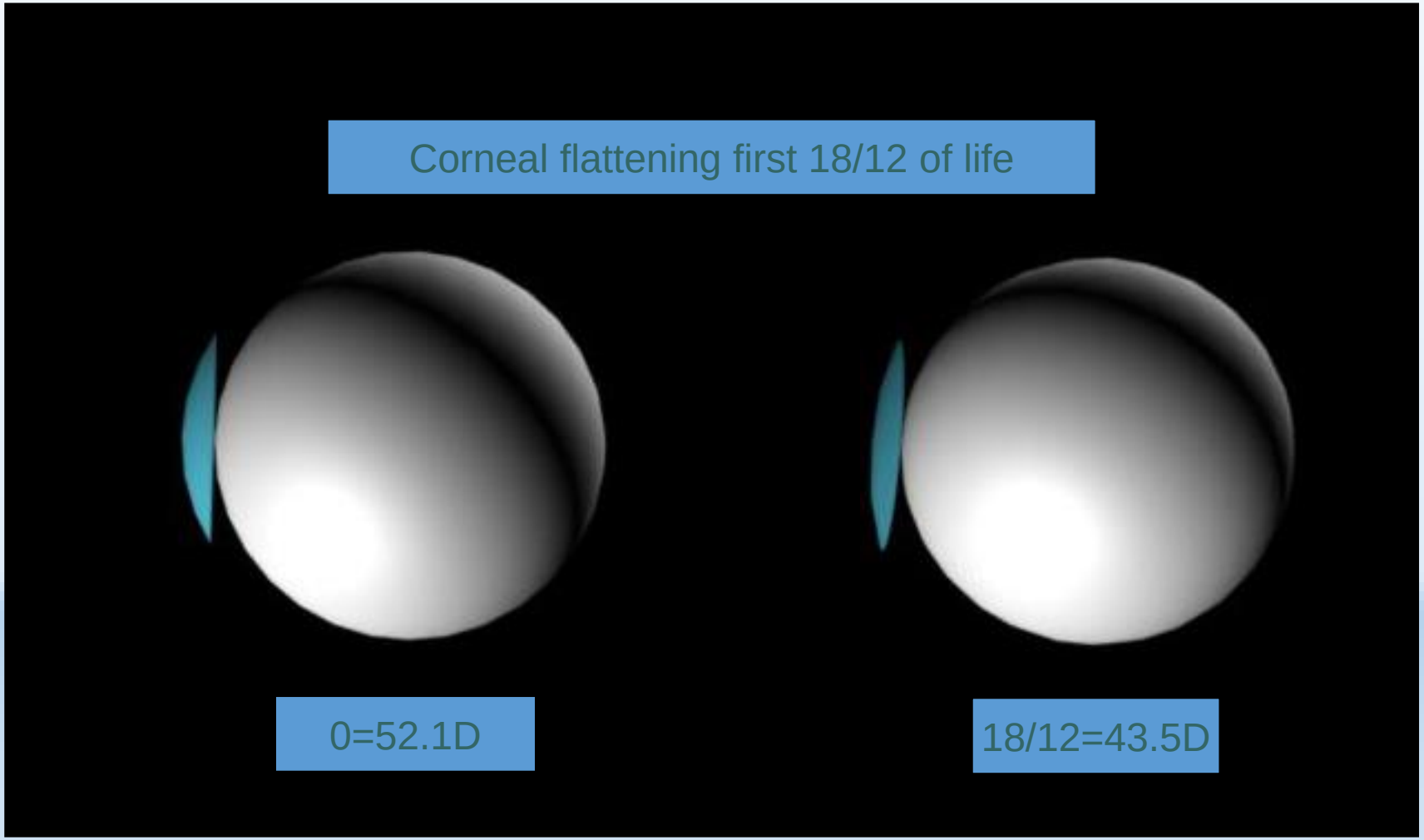
Eye Growth

- Pediatric eyes are different from adult eyes
- **Major Changes in Axial Length, Corneal Curvature and Lens Dioptric Power within the first 18/12 of life**
- Changes continue lesser degree throughout childhood

Emmetropization

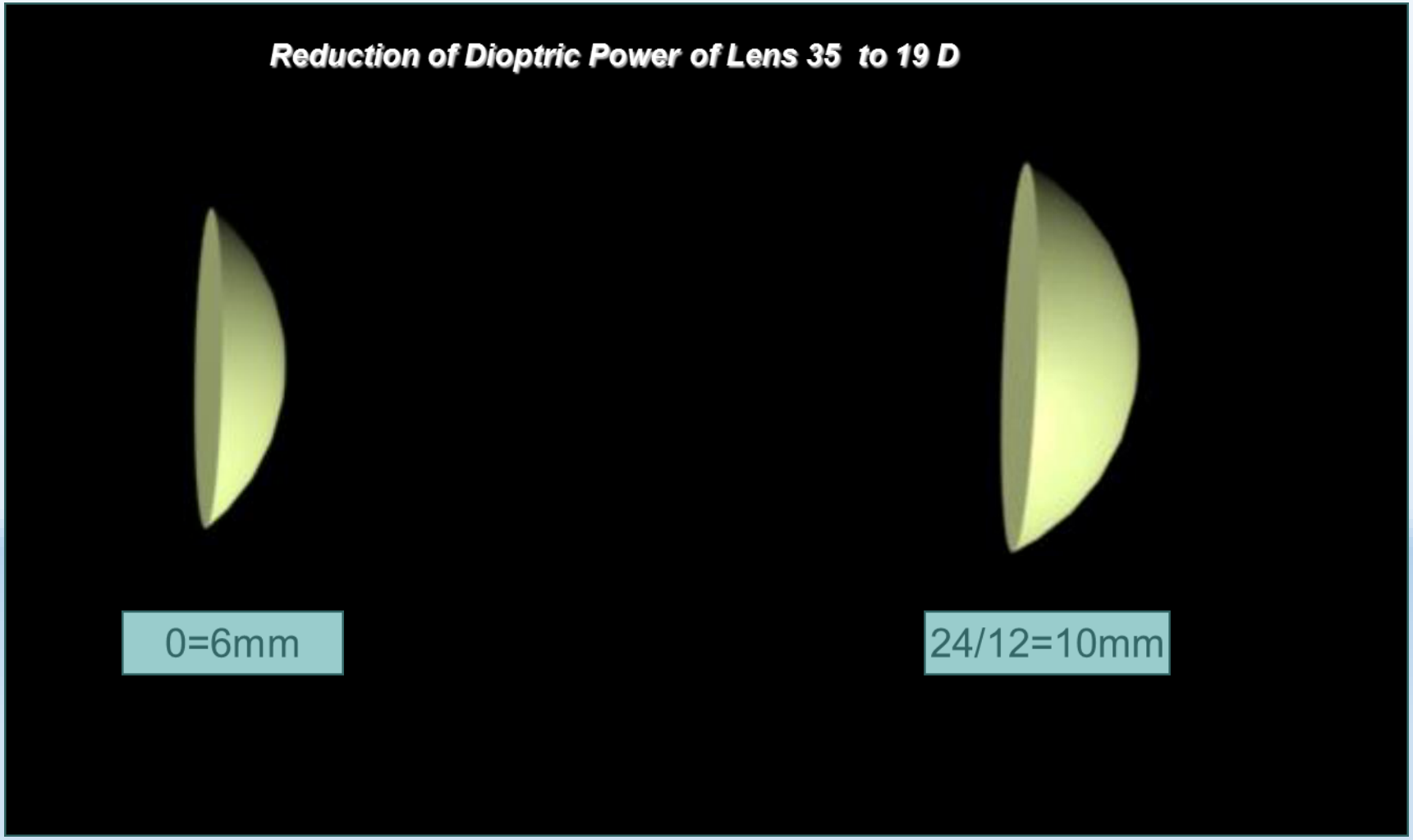


Corneal flattening first 18/12 of life



0=52.1D

18/12=43.5D


Reduction of Dioptric Power of Lens 35 to 19 D
0=6mm
24/12=10mm

Myopic Shift

- Induced by **axial elongation following infantile cataract surgery** cannot be fully offset by corneal flattening resulting in overall myopic shift.

- Myopic shift 5 years after IOL implantation in the Infant Aphakia Treatment Study: 43 eyes undergoing unilateral IOL implantation when 1 to 6 months of age. From one month after cataract surgery until approximately 1½ years of age the rate of myopic shift was 0.35 D/ month and after 1.5 years of age this decreased to 0.08 D/month.

Weakley et al.Ophthalmology 2017

Eye Growth – Emmetropization = Natural procedure

Myopic Shift = induced by cataract operation

Undercorrection – Aim for Hypermetropia

Empiric rule

- under the age of 3 months are left +8.00 D,
- 3 months to 1 year +6.00 D,
- 1–2 years +4.00 D,
- 2–3 years +3.00 D,
- 3–5 years +2.00 D,
- 5–7 years +1.00 D,
- 7 years and after +0.5 D until the age of 11 years

These numbers may be **modified** in **unilateral** cases, depending upon the refraction of the other eye, so as to cause minimal anisometropia 2 years after surgery.

Nischal K. Clinical Ophthalmology 2015

Weakley et al.Ophthalmology 2017

Summary

- Congenital cataracts = most challenging pediatric cataracts
- Not all cataracts need operation
- IOL power = aim for hypermetropia

Thank you!!