Refractive Surgery in Children

Current status and Future projection

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Change in Concept

- When indicated in the paediatric age group, refractive surgery is *Functional* and not *Aesthetic*.
- The aim is to salvage as much visual acuity to the child, in an eye otherwise destined to amblyopia and hence paving the way for BSV and normal child development.
- It may be the most legitimate, medically indicated and noble field of refractive surgery.
Classic treatment of juvenile anisometropia

- Patching.
- Penalisation.

PLUS

- Spectacles.
- Contact lenses.
• Not infrequently, the scenario ends with improvement of visual acuity in the amblyopic eye, but on cessation of patching some amblyopia recurs due to anisokonia of the spectacle correction.
Children With High Isoametropia (Bilateral Refractive Errors)

• When the bilateral spherical-equivalent myopia or hyperopia exceeds 7 D.
• The uncorrected myopia may translate to a distant visual acuity of 6/60 or worse (legal blindness).
• The prevalence of isoametropic amblyopia in these children approaches 50%. (Atkinson, 1996)
• In addition, the risk of refractive esophoria or esotropia approaches 80%.
Special-needs Ametropic Children

(Am<important>portant)</important>

• A variety of neurobehavioral disorders impede spectacle wear. The most common are:
  – Autism.
  – Down Syndrome.
  – Moderate to severe cerebral palsy.
  – Angelman syndrome.
Special needs children

- The uncorrected ametropia exacerbates the neurobehavioral disorder. The child lives in a cocoon of blur, promoting fear and reduced interest in the outside world (a syndrome labeled 'visual autism').

- These children dislodge their glasses repeatedly, despite heroic efforts to enforce compliance on the part of parents, teachers and therapists.
Children with special needs cont.,

• Many ophthalmologists, after examining a child with a neurobehavioral disability, succumb to low expectations. The uncorrected vision is dismissed as 'good enough for a child with a handicap'.

• Again here, refractive surgery may be God sent.
Lasik

• Refractive surgery seems logic as a PERMENANT treatment as it aims to abolish the refractive error so that when amblyopia is treated or just maximally improved, there will be no reason for it to increase again.
• The commonest procedure performed is lasik.
• A lot of questions to be answered.
Frequently Asked Questions (FAQs)

- Will it be the only treatment?
- When can it be done?
- Shall we do the patching before or after?
- What are the prognosis criteria?
- Are the nomograms the same?
- Is there a risk for ectasia after lasik in children?
Will it be the only treatment?

• NO.
• The primary treatment must be patching to eliminate as much amblyopia as possible.
Shall we do the patching before or after?

- Does not make a big difference. If we patch before until the amblyopia is maximally treated, lasik will stabilize the results.
- If you do lasik first, you can then patch the better eye postoperatively to achieve maximum VA of the treated eye.
- All according to compliance.
Are the nomograms the same?

- Yes, no constant pattern of under or over correction has been identified in children.
- Older studies suggested undercorrections, but these were attributed to anesthetic gases which absorb the laser energy. General anesthesia should be total intravenous.
Is the adult experience translatable?

• Yes.
• It should be very clear that children are MORE difficult.
• Should be done by an experienced lasik surgeon.
Is there a definite risk for ectasia?

• Never proven.
• Kaplan Meyer curves of quarter annually pachymetry readings suggest no progressive thinning of the cornea along the years. (Samuel 2001)
What are the prognostic criteria?

I- Age:
   Young age: Best response.
   Hard to treat.
   Older: Poor response.
   Easier to treat.

II- Refractive error: Inversely proportional to prognosis.

III- Depth of amblyopia: The more, the worse the prognosis.
Bad Prognostic criteria *Imp*.

- Older children.
- Higher errors.
- Deeper amblyopia.
What is the role of Steriopsis assessment?

- Should be initially evaluated and didactically monitored along throughout the treatment time line by the pediatric ophthalmologist
Technical tips

• Anesthesia should be limited to intravenous propofol to avoid gas anesthesia interference with delivery of laser energy.

• Early differentiation between children with narrow palpebral fissures and those with narrow orbital fissures:
  – Narrow Palp F. --- remove speculum.
  – Narrow Orb. F. --- perform ASA.
Food for Thought

- Although controversial, some HOA have been identified as a stimulus for amblyopia both in anisometropia and in isometropia (Agata et al. Eur J Ophth 2010).
- Will Customized wave front treatment be superior in treating amblyopia?
- Will Femtosecond laser flaps, especially those with inverted sidecuts be safer for children?
Other Refractive Surgery options

• Anisometropic children with refractive errors of +5 to -10 D are usually treated by lasik.
• Children with refractive errors beyond this range, who have anterior chamber depths of 3.2 mm or greater, can receive a phakic IOL.
• The remainder usually require RLE which is a last resort indicated only in gross anisometropia, high errors with low spectacle compliance (Sp nd).
RLE

• For children with ametropia exceeding 20 D (the upper limit for phakic IOL power) or anterior chamber depth less than 3.2 mm, RLE is indicated.

• Standard lens I/A, posterior capsulectomy and anterior vitrectomy techniques, preferably using a high-speed 23-gauge vitrector and separate anterior chamber maintainer. If emmetropia is to be achieved, a foldable, acrylic IOL (monofocal or multifocal) is implanted.
RLE

- If the axial length exceeds approximately 29 mm, indirect ophthalm. mounted diode laser therapy may be applied to suspicious areas of the retina during the procedure to reduce the risk (estimated 3%) of future aphakic/pseudophakic retinal detachment.

- RLE is especially useful in high hyperopia where lasik and PIOls may not be an option due to shallow AC and spectacle correction is difficult (Sp.Nd)

- In these children, piggy back lens implantation may be used.
PIOLs

• The preferred implant that is used most in several reports from other investigators is the anterior chamber Artisan iris-enclaved IOL.

• The myopic (Verisyse™) lens is supplied by AMO the hyperopic lens is still a problem and can be obtained by special order (not preferred). Safe insertion and lower long-term risk for loss of corneal endothelial cells requires an anterior chamber depth of 3.2 mm or greater.
Implantable Contact Lenses ICLs

• Visian ICLs are not very much preferred.
• Although more distant from the corneal epithelium than iris claw piols, problems in sizing the lens arises.
• As the child grows, the sulcus diameter may increase and so the lens may become mobile leading to cataract development and visual instability.
Conclusion

• Is refractive surgery in children effective? Yes, with a qualification.

• It is not the job of the refractive surgeon, nor that of the pediatric ophthalmologist, but of both TOGETHER.
Conclusion

• It is regarded as one of the most important and legitimate areas in ophthalmology.
• Still an area of continuous research and hence full disclosure and honest reporting of successes and failures is needed to fully understand its limitations.
Thank You

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