Prescribing for Children

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- As the eye grows, the axial length increases while the cornea and lens flatten.
- High refractive errors which are common in the neonatal period, reduce rapidly during the first year of life through the process called emmetropization

The correction of ametropia in children presents several special and challenging problems

In adults, the correction of refractive errors has one measurable endpoint:

- **The best corrected visual acuity**

Prescribing visual correction for children often has two goals

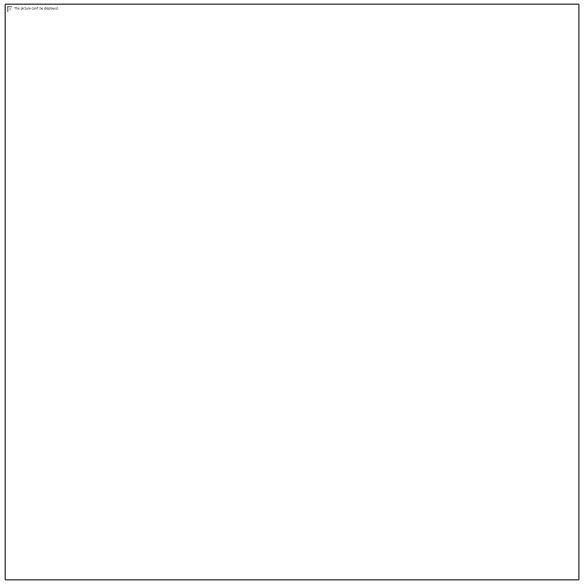
- **Achieving the optimal Focused retinal image**
- **Providing balance between accommodation and convergence**

- The prescribing of spectacles for preschool children is very different from that for adults.
- Reasons for these differences include **the inability to determine accurately a child's uncorrected and corrected visual acuity**; as well as **their lesser visual demands**; **their more proximal working distance**; and their **more plastic visual cortex**, which places them at risk for amblyopia and strabismus.
- Most guidelines for spectacle treatment in such children are based upon clinical experience rather than randomized, masked clinical trials

Clinical Refraction

- Ideally, refractive error is measured with accommodation relaxed.
- The amount of **habitual accommodative tone** varies from person to person, and even within individuals it varies at different times and ages.
- Because the examiner might not be able to estimate this variable, cycloplegic agents are sometimes used.

The indication and appropriate dosage for a specific cycloplegic agent depends on the patient's age, accommodative amplitude, and refractive error.



Myopia

- Childhood myopia falls into two groups: *congenital (usually high) myopia and developmental* myopia, usually manifesting itself between ages 7 and 10 years.
- The latter type of myopia is less severe and easier to manage, as the patients are older and refraction is less difficult.
- However, both forms of myopia are progressive; frequent refractions (every 6-12 months) and periodic prescription changes are necessary.

General guidelines for correction of significant childhood myopia

- Cycloplegic refractions are mandatory. In infants, esotropic children, and **very high myopes (> 10 D), atropine refraction** may be necessary if tropicamide (Mydriacyl) or cyclopentolate fails to paralyze accommodation in the office.
- In general, the full refractive error, including cylinder, should be corrected. Young children tolerate cylinder well.

The possibility that long-term full- time glasses wear may impede emmetropization must be considered

- Some ophthalmologists undercorrect myopia, and others may even use bifocals with or without atropine, on the theory that prolonged accommodation hastens or increases the development of myopia. Studies are under way to settle this long-standing controversy.

Myopia control is the attempt to slow the rate of progression of myopia such as cycloplegic agents, plus lenses at near, and rigid contact lenses

- Intentional undercorrection of a myopic esotrope to decrease the angle of deviation is rarely tolerated.
- Intentional overcorrection of a myopic error (or undercorrection of a hyperopic error) can be of some value in controlling an intermittent exodeviation.

- Parents should be educated about the natural progression of myopia and the need for frequent refractions and possible prescription changes.
- Contact lenses may be desirable in older children to avoid the problem of image minification found with high-minus lenses

Hyperopia

- The appropriate correction of childhood hyperopia is more complex than that of myopia.
- First, children who are significantly hyperopic (>5 D) are more visually impaired than their myopic counterparts, who can at least see clearly at near.
- Second, childhood hyperopia is more frequently associated with strabismus and abnormalities of the accommodative convergence/accommodation (AC/A) ratio

General guidelines for correcting childhood hyperopia

Unless there is esodeviation or evidence of reduced vision, it is not necessary to correct low hyperopia.

As in myopia, significant astigmatic errors should be fully corrected

When hyperopia and esotropia coexist, initial management includes full correction of the cycloplegic refractive error.

Later, reductions in the amount of correction may be appropriate, based on the amount of esotropia and level of stereopsis at near and at distance with the full cycloplegic correction in place.

In a school age child, the full refractive correction may cause blurring of distance vision because of the inability to relax accommodation fully.

The amount of correction may have to be reduced for the child to accept the glasses. A short course of cycloplegia may help a child to accept the hyperopic correction.

Anisometropia

- An anisometropic child or infant should be given the full cycloplegic refractive difference between the two eyes, regardless of age, presence or amount of strabismus, or degree of anisometropia.

Anisometropic amblyopia is frequently present and may require occlusion therapy.

Amblyopia, is more common in conjunction with anisohyperopia than with either anisomyopia or anti metropia.

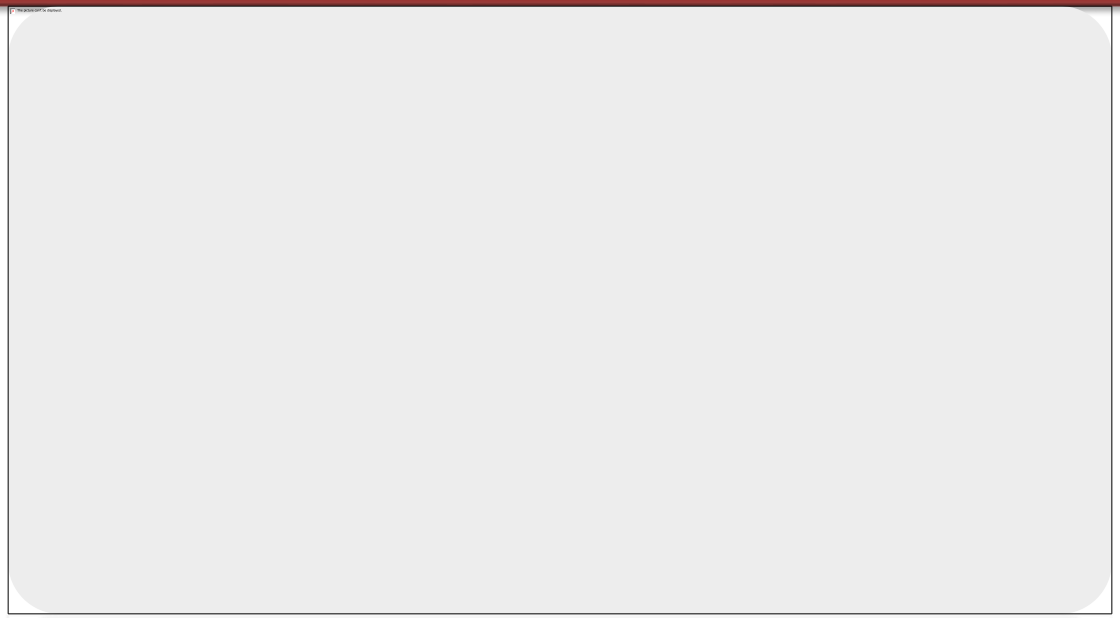
- In general, optical prescription for amblyopic eyes should correct the full refractive error as determined with cycloplegia.
- Because the amblyopic eye's ability to control accommodation tends to be impaired, it cannot be relied on to compensate for uncorrected hyperopia as would the normal child's eye.
- Sometimes, however, symmetrical decreases in plus lens power may be required to faster acceptance of spectacle wear by the child.

Isometropia

- Hyperopia greater than 5.00 diopters (D) in young children is associated with an increased risk of amblyopia and strabismus, therefore optical correction should be prescribed.
- When hyperopia is associated with esotropia, full correction of the cycloplegic refractive error should be prescribed.
- Myopia greater than 6-8 D and astigmatism greater than 2 D are common causes of isometropic amblyopia.
- Patients with hyperopic anisometropia with as little as 1 D difference between the eyes may develop amblyopia while the difference should reach 3-4 D for myopic anisometropia to develop amblyopia.

- Both anisometropic and isometropic amblyopia may improve considerably with refractive correction alone over several months.

Is there any definite guidelines for pediatric glass prescription?



- There are *general guidelines only*, based on professional experience and not scientifically researched data
- ***Here are no good studies showing when a child should be prescribed glasses***

TABLE 3 GUIDELINES FOR REFRACTIVE CORRECTION IN INFANTS AND YOUNG CHILDREN

Condition	Refractive Errors (diopters)			
	Age <1 year	Age 1 to <2 years	Age 2 to <3 years	Age 3 to <4 years
Isoametropia (similar refractive error in both eyes)				
Myopia	5.00 or more	4.00 or more	3.00 or more	2.50 or more
Hyperopia (no manifest deviation)	6.00 or more	5.00 or more	4.50 or more	3.50 or more
Hyperopia with esotropia	2.00 or more	2.00 or more	1.50 or more	1.50 or more
Astigmatism	3.00 or more	2.50 or more	2.00 or more	1.50 or more
Anisometropia (without strabismus)*				
Myopia	4.00 or more	3.00 or more	3.00 or more	2.50 or more
Hyperopia	2.50 or more	2.00 or more	1.50 or more	1.50 or more
Astigmatism	2.50 or more	2.00 or more	2.00 or more	1.50 or more

NOTE: These values were generated by consensus and are based solely on professional experience and clinical impressions because there are no scientifically rigorous published data for guidance. The exact values are unknown and may differ among age groups; they are presented as general guidelines that should be tailored to the individual child. Specific guidelines for older children are not provided because refractive correction is determined by the severity of the refractive error, visual acuity, and visual symptoms.

*The values represent the minimum difference in the magnitude of refractive error between eyes that would prompt refractive correction. Threshold for correction of anisometropia should be lower if the child has strabismus.

PRESCRIBING IN STRABISMUS

Managing the Strabismic Patient

When it comes to treating the patient with strabismus many ophthalmologists think of surgery first, but there are several instances where the non-surgical method is best!

Non-Surgical Management of Strabismus

- Optical
- Medical
- Orthoptic exercises

Orthoptic exercises

Guidelines regarding the prescription of plus lenses

• Congenital Esotropia

Preoperation : hyperopia < +3.00 D not prescribed

If hyperopia > +3.00 D glasses should be tried .This may a good reason to delay surgery

Postoperatively-with recurrence or under correction of esotropia , any plus refractive error should be corrected

Acquired Esotropia

- **If there is fusion potential ,any refractive error > +1D should be corrected**
- If a manifest deviation presists with glasses and there is no amblyopia , surgery should not be delayed
- It is advisable to repeat the cycloplegic refraction every 6 months
- If the patient is not compliant
  - Atropine drop or ointment for 1 week
  - Reduce the strength of the prescription slightly
- It is wrong to discount the effect of glasses completely in non complaint patient and to proceed with strabismus surgery on the basis of the uncorrected angle of deviation

- **Any uncorrected hyperopic refractive error will trigger convergenece , therefore 0.50 D ,should be full corrected**
- It may be possible to avoid bifocal by simply slightly overplussing the patient with a single vision correction (+0.50 +0.75D)
- Bifocal strength +2 → +3.5 D
- Bifocal are often eliminated in the teenage years

Bifocal Glass

- Valuable in high AC/A ratio accomodative ET
- Restricted in whom that were orthotropic or small angle ET in far by FCR but residual ET at near that convert to orthotropia or esophoria by additional plus lens
- Contraindication is amblyopia and not complete elimination of ET in near

Bifocal Glass

- Start with +2 sph and increase power in step of +0.5 up to +3.50 sph
- **Minimal power that convert ET to E prescribed(prevent excessive relaxation of accommodation)**
- Success depend on proper bifocal segment
- Prefer straight top segment which bisect pupil or touch lower border in straight head position

Intermittent XT

Aim of IXT treatment

- Reducing episodes of manifest exotropia
- Facilitating sensory fusion and achieving constant binocular alignment and normal stereoacuity.

Intermittent XT

Nonsurgical management is indicated

- In patients with **excellent control as measured by normal distance stereoacuity**
- In **young children** who are at **risk of developing monofixational esotropia** from persistent surgical overcorrection

REFRACTIVE ERRORS

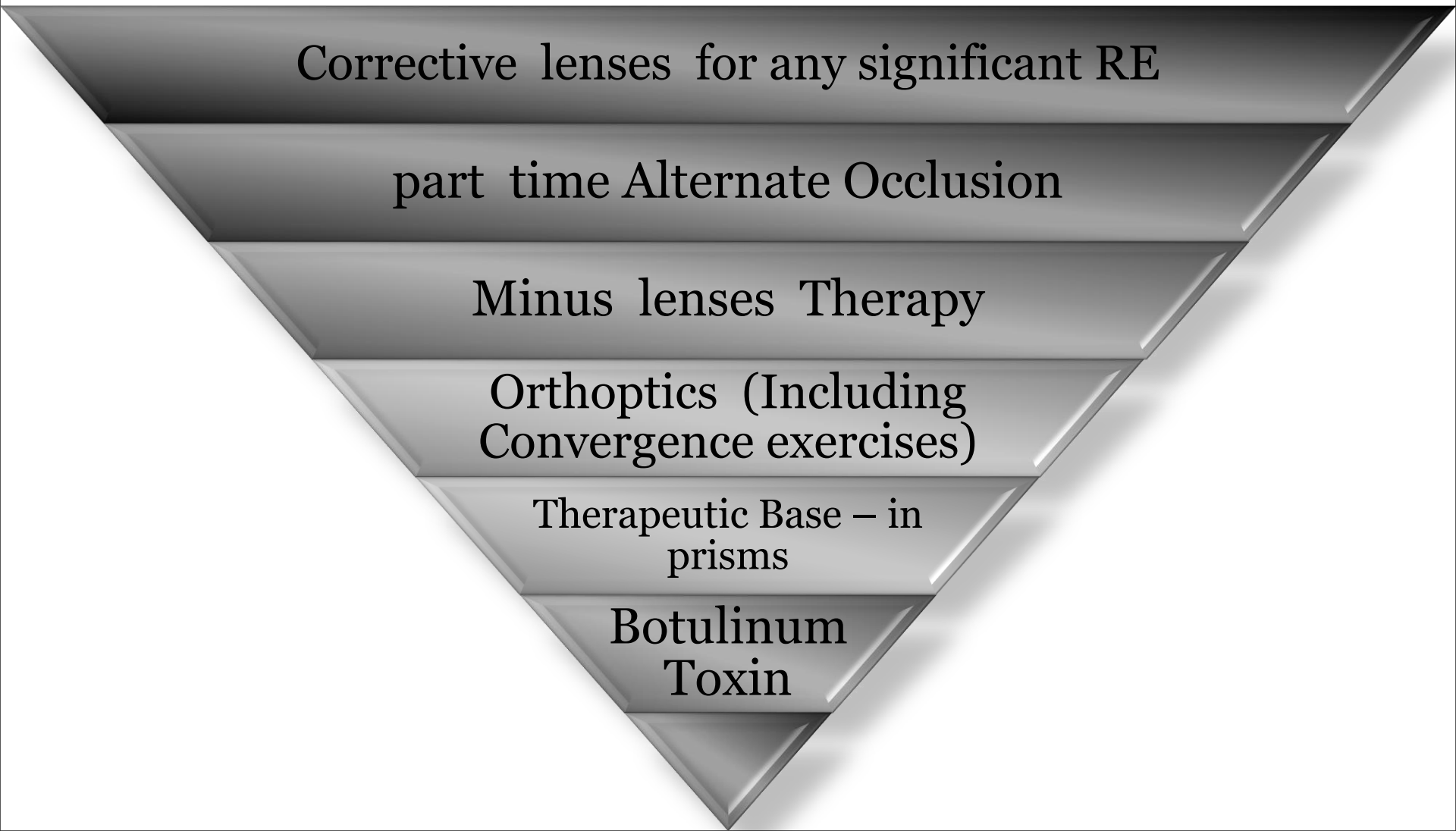
- Unequal clarity in vision represents an obstacle to fusion and can facilitate suppression, contributing to progressive loss of control in X(T).

- ***Significant RE, especially astigmatism and anisometropia, need to be corrected.***

Minus Lens Therapy

- All patients in minus lenses should be seen within 3 to 4 weeks after starting the therapy.
- Minus lenses should be discontinued if esotropia develops.
- There are studies that suggest that this treatment may induce myopia
- As the child grows older, asthenopic symptoms with over-minus lenses become prominent as the amount of near work increases

Various Non-Surgical Therapies for Intermittent Exotropia



Indications for Surgery

Once deterioration is documented

Undercorrection & overcorrection

- Undercorrectd myopia in accommodative ET rarely tolerated
- Slight overcorrection of myopia in IXT
- Optical overcorrection or under correction in treatment of amblyopia(penalization)

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