Strabismus

Strabismus is a general term referring to ocular misalignment due to extraocular muscle imbalance. In short, the eyes are "crooked". Strabismus occurs in approximately 2% of children under 3 years of age and about 3% of children and young adults. The condition affects males and females equally.

Strabismus has an inherited pattern, i.e., it is much more likely to occur if one or both parents are affected. However, many cases occur without any family history of the disorder

Why we are concerned about strab ?

It is important for functional and cosmetic reasons. Strabismus is associated with reduction of depth perception and, if onset is in adulthood, double vision. Furthermore, strabismus presents a cosmetic concern, especially for school-age children.

strab

When an individual's eyes are straight, they are said to have orthotropia. This indicates that both eyes are aimed at the same spot. The brain fuses the two separate images into one three-dimensional image.

This allows a high degree of depth perception. If the eyes are misaligned, depth perception is substantially reduced. Furthermore, when one eye is deviated in early childhood, the brain may learn to ignore the image from that eye, and amblyopia (lazy eye) often results.

It is important to understand that it is usually not just one eye that is deviated, but rather, the eyes are misaligned in relation to one another. In essence, both eyes are usually at fault, although one eye may appear to be the "crooked" one.

If strabismus develops for the first time in adulthood, the affected individual usually experiences double vision. This occurs because the brain, which no longer has the "plasticity

strab

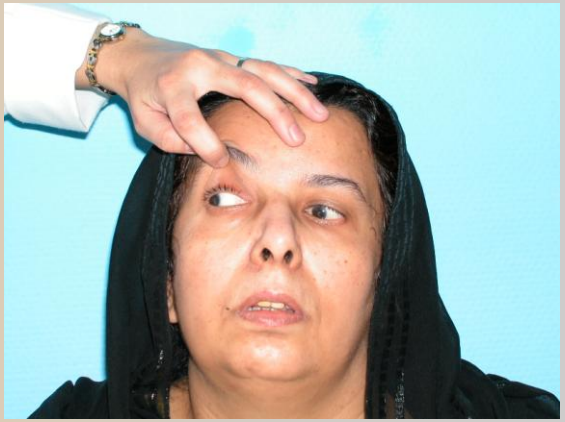
Strabismus is important to recognize, primarily because, in childhood, it is often associated with the development of amblyopia, or lazy eye. Amblyopia refers to reduced vision, uncorrectable with glasses or contact lenses, due to failure or incomplete development of the visual cortex of the brain.

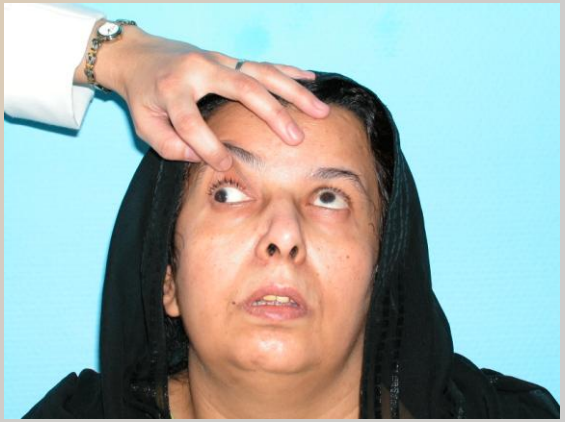
Comitant strabismus

Eye deviations known as strabismus are divided into two main types :

Comitant .

Noncomitant .





Cause of strab

unknown. However, strabismus is certainly more common in families with a history of the disorder. Several neurological conditions are more commonly associated with strabismus, including Down's syndrome, cerebral palsy, hydrocephalus, and brain tumors.

The great majority of children who present with strabismus, however, have no other associated neurological abnormalities. A cataract, eye tumor, or other eye disorder associated with reduced vision may also present with strabismus.

Types of comitant strabismus

Esotropia

Exotropia

Esotropia

The term is derived from 2 Greek words: *éso, meaning inward, and trépo, meaning turn. In esotropia, the eyes are crossed; that is, while one eye looks straight ahead, the other eye is turned in toward the nose.*

Esotropia divided into :-

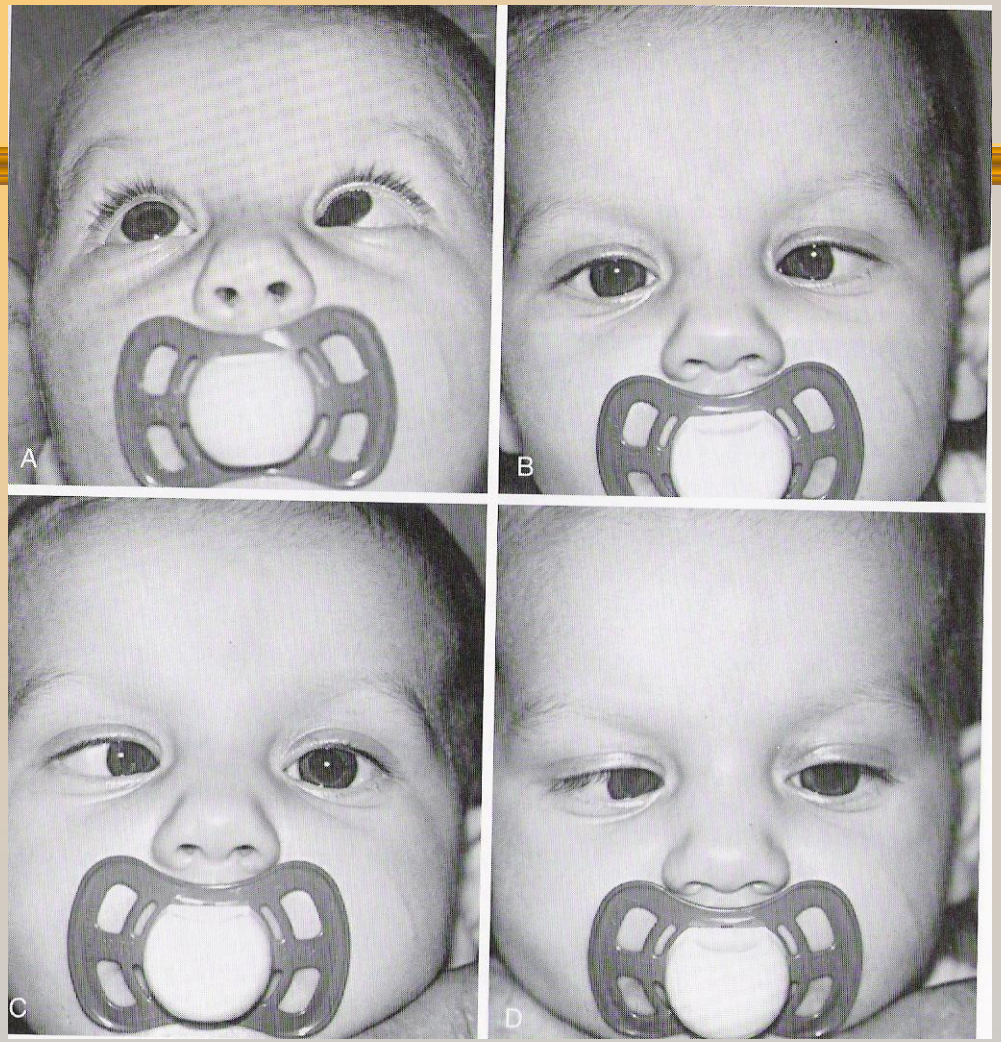
Infantile esotropia.

Acquired esotropia

Infantile esotropia

Infantile esotropia is the inward deviation of the eyes noted before the patient reaches age 6 months.

One to two percent of children have infantile esotropia. Though the cause is unknown, it is thought that the problem is in the brain's inability to coordinate the movement of the eyes, which are themselves most commonly completely normal


A
B
C
D

Infantile esotropia

When the eyes are misaligned in childhood, binocular vision, or the ability of the brain to use the two eyes together, does not develop.

depth perception

The ability to judge how far away an object is as well as how far away objects are from each other.


22 2:41PM

Inf ET

Infantile esotropia is not believed to be connatal but rather develops in the first few weeks or months after birth.

Inf ET

Classic infantile esotropia is constant and involves a large angle of deviation exceeding 20 prism diopters (PD) on corneal light reflex measurement

Inf ET

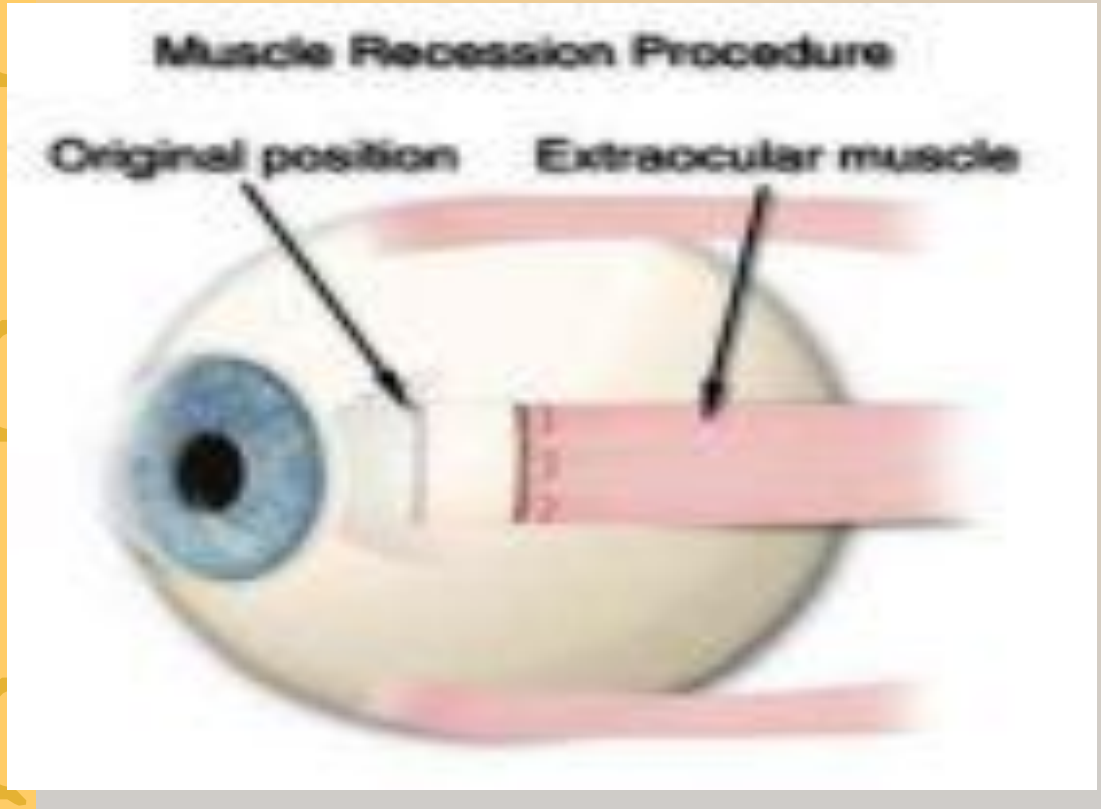
Infantile esotropia may be associated with a spectrum of clinical presentations, including amblyopia, impaired binocularity, central scotomas, and incomitance.

Infantile esotropia

Early alignment of the eyes allows for the development of brain to eye communication which results in enhanced depth perception, fine motor skills, and the best opportunity to maintain good eye alignment throughout life.

Prognosis after surgery for Inf ET ?

It is accepted that better ocular alignment and visual prognosis can be achieved if surgical correction is performed before age 2 years. Long-term follow-up studies on esotropic infants who underwent surgical alignment by age 2 years have shown that close to 60% achieve a small angle (10PD) cosmetically acceptable strabismus.


Muscle Recession Procedure
Original position
Extraocular muscle

Although some binocular vision is achieved, it generally is subnormal, often involving peripheral fusion. Factors contributing to poor ocular alignment and visual prognosis include persistent preoperative amblyopia, latent manifest nystagmus, and myopia from -2.5 to 5.0 D.

Pseudostrabismus

Pseudoesotropia is a condition in which alignment of the eyes is straight (also known as orthotropic); however, they appear to be crossed.

Pseudostrabismus

- This condition most commonly occurs in infants when a flat nasal bridge and prominent epicanthal folds tend to obscure the nasal portion of the sclera

pseudostrabismus

A careful ocular examination (eg, pupillary light reflex) reveals that the eyes are straight.
Using the cover-uncover test, the examiner finds that the patient manifests no deviation.

Clinical example

A 4-month-old child presents with a history of his eyes turning in most of the time, since about 8 weeks of age. The child is healthy with an alternating esotropia for both distance and near fixation of 55 prism diopters (D).

Ocular rotations are full otherwise. Cycloplegic retinoscopy is +1.25 D in each eye, and indirect ophthalmoscopy reveals a normal fundus in each eye. How would you manage this patient?

When to operate ?

Prognosis:

It is accepted that better ocular alignment and visual prognosis can be achieved if surgical correction is performed before age 2 years.

Factors contributing to poor ocular alignment and visual prognosis include persistent preoperative amblyopia, latent manifest nystagmus, and myopia from -2.5 to 5.0 D.

The brain's ability to see three-dimensional objects depends on proper alignment of the eyes.

Inf ET

Most clinical evidence suggests that sensory and motor functions are nearly normal if alignment (within 10 PD of orthophoria) is attained within the first 2 years of life. Virtually all patients with infantile esotropia fail to develop normal binocular vision and stereopsis

Long-term follow-up studies on esotropic infants who underwent surgical alignment by age 2 years have shown that close to 60% achieve a small angle (<20 PD) cosmetically acceptable strabismus. Although some binocular vision is achieved, it generally is subnormal, often involving peripheral fusion.

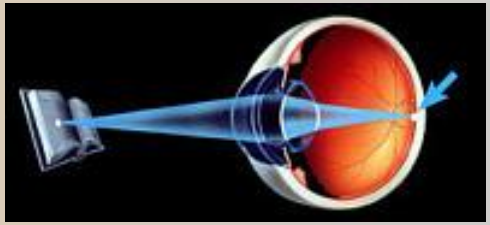
Inf ET

they may be able to develop better binocularity, good motor alignment is something that is dependent on skill at surgery and persistence, but the level of binocularity may be related to the innate ability of the child. Stepping back, If you are a good surgeon and you can move the medial recti back and do the other things you need to do, then I think there are higher powers that are going to determine binocularity.


HOTEL
BAUMGARTEN

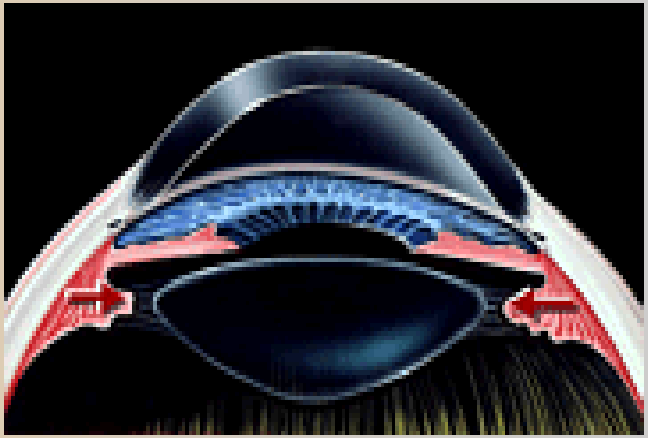
Accomodation

What is Accommodation?



When an object, such as a book, is brought within several inches of the eye, rays of light from the object diverge, these light rays are then converged by the crystalline lens in an attempt to focus them on the retina. For this to happen, the lens will accommodate, (become thicker centrally and optically more powerful) causing further bending of the rays of light until they focus on the retina.

Accomodation



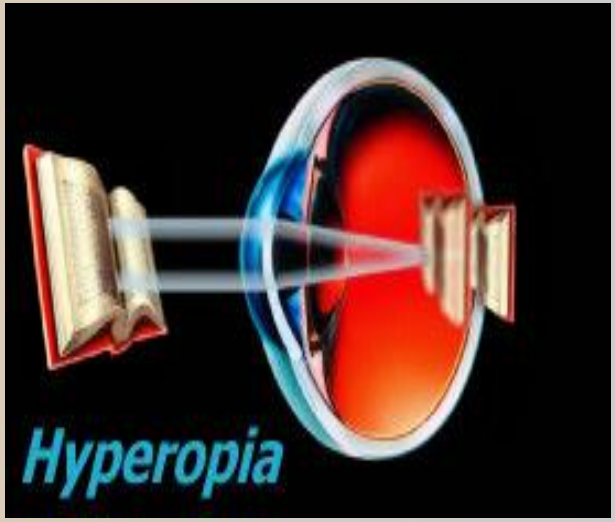
Acc ET

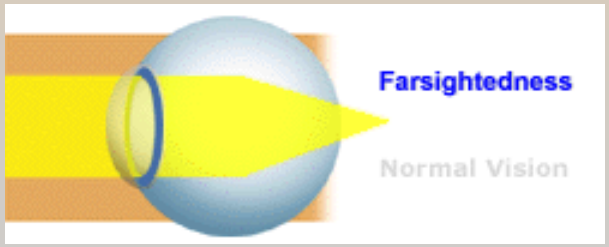
Age: This condition usually presents in patients aged 2-3 years

Acc esotropia

Accommodative Esotropia

When refractive accomodative esotropia is present, the magnitude of the eye turn is equal when viewing at near and at a distance. Symptoms include asthenopia (eye strain), diplopia (double vision), or closing one eye while doing near work. This deviation is caused by an uncorrected refractive error called hyperopia (or farsightedness). Basically, in hyperopia, light and images come into focus behind the eye instead of on the retina. Because of this, the eye's accommodative system must work harder to focus light on the retina for a clear image. The extra effort put forth by the accommodative system elicits over-convergence resulting in an inward eyeturn.





Pathophysiology of Acc ET

An uncorrected hyperope must exert accommodation to clear a blurred retinal image. This process of accommodation will stimulate convergence and strain fusional divergence. When fusional divergence is overcome, the eyes cross. The patient with uncorrected hyperopia can see either a single blurred image or a double image in which one image is clear and one image is blurred. Over time, the blurred image can be suppressed; fixation can alternate; or, more commonly, amblyopia can occur.

Acc ET

•Perform cycloplegic refraction on all children by using the retinoscope and loose lenses. Cycloplegia is achieved with Mydriacyl 1% and cyclogel 1%.

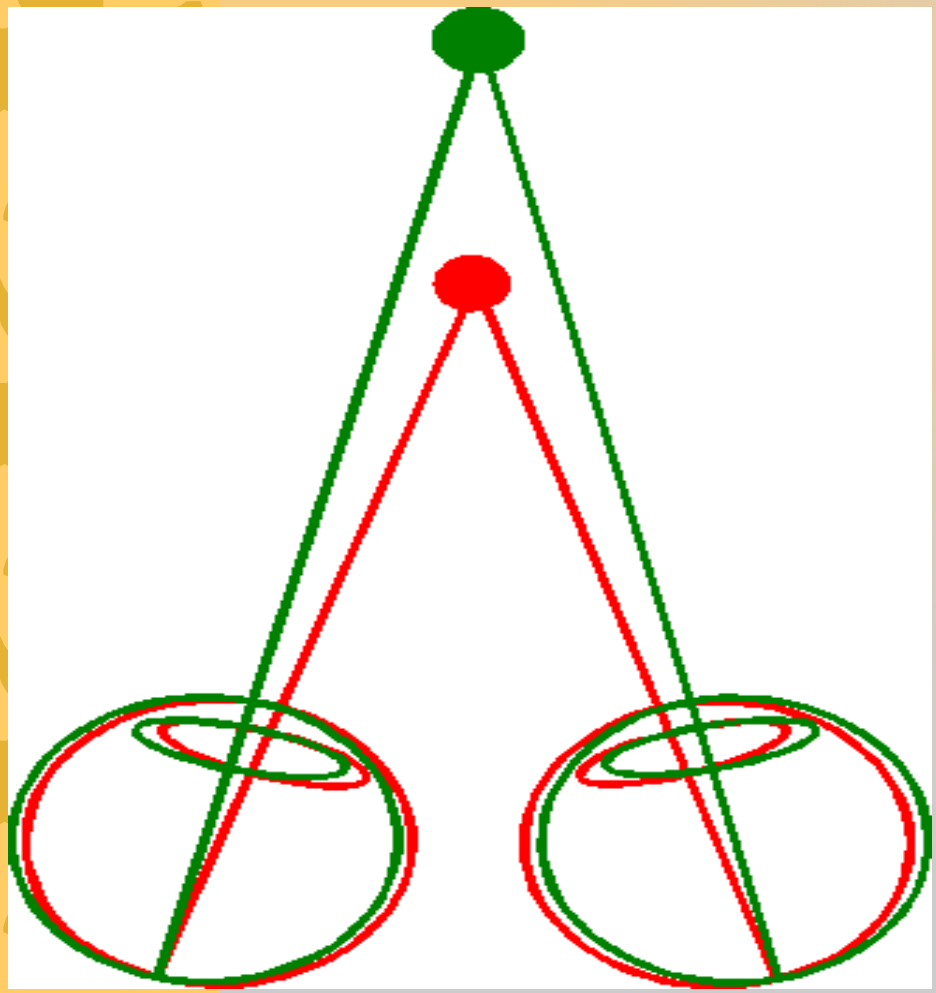
Clinical features of Acc ET

- ***Refractive error usually +3_+4***
- ***May presipitated by acute illness or trauma***
- ***Start intrmittent and if not treated become constant***

Do we do surgery for Acc ET ?

If the farsighted glasses control the crossing of the eyes, eye muscle surgery is never recommended!

Convergence



When you look at objects that are very far away both eyes point very nearly straight ahead. As objects come closer (less than about 6 meters) the eyes will noticeably turn in (converge). The nearer objects are to you the more your eyes will turn towards your nose. This inward turn is called convergence.

High AC/A ratio

The accommodative convergence/accommodation (AC/A) ratio gives the relationship between the amount of convergence (in-turning of the eyes) that is generated by a given amount of accommodation (focusing effort). Esotropia with high AC/A ratio (also termed nonrefractive accommodative esotropia) combines a high AC/A ratio with low hyperopia or even myopia.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المملكة العربية السعودية
جامعة الملك سعود
كلية الطب
مستشفى الملك عبدالعزيز الجامعي
K.A.U.H.

تقييم الابصار

ORTHOPTIC SHEET

PRESENT CONDITION: 4 4 old having ET

DATE: _____

Dsc V 20/30

Dcc V W 20/30

NYSTAGMUS 0

FIXATION

HEAD POSTURE

DEVIATIONS

Dsc 35

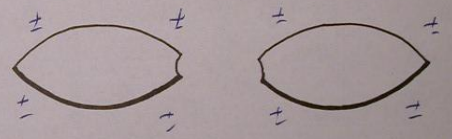
Dcc 10

Nsc 35

Ncc 25

Ncc + 3.00 10

ET



WORTH 4-DOT

STEREOPSIS

ROTATIONS

FUSION RANGE

OTHER TESTS

CYCLOPLEGIC REFRACTION

OD

OS

FUNDUS

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OS

COMMENTS: D x 2

Signature: _____ ,M.D.

Signature: _____ Orthoptist

Date: _____

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King Saud University Press

Treatment of highh AC/A

•If glasses are worn faithfully and fusional patterns are established, many patients with refractive esotropia can maintain straight eyes without wearing glasses by the time they are teenagers.

•With patients aged 4-5 years, one can attempt to reduce the strength of the hyperopic correction to enhance fusional divergence and to maximize visual acuity.

When to stop glasses?

Some children will no longer need their glasses at an earlier age while others will need the proper farsighted glasses or contact lenses to control the esotropia even as adults.

Partial acc eso

Partial Accommodative Esotropia

When correction of refractive or non-refractive accommodative esotropia is given, a residual amount of deviation may still be present. This condition is referred to as partial (or decompensated) accommodative esotropia and is attributed to non-accommodative factors. In fact, a majority of patients exhibiting esotropias have a partial accommodative and non-accommodative component. At this time it is not known exactly what non-accommodative contributors are responsible for this particular type of esotropia, but speculation leans toward mechanical as opposed to refractive or neurological factors.

Exodeviation

Exodeviation is a horizontal form of strabismus characterized by visual axes that form a divergent angle.

Exotropia

•Esodeviations are more frequent than exodeviations, with a ratio of 3:1. Acquired exotropia is more common in the Middle East, Africa, and Asia and in those latitudes with higher levels of sunlight. It is less common in the United States and Europe.

The deviation usually begins as an exophoria.

- This deviation may later progress to intermittent exotropia

When intermittent exotropia develops in a child whose visual system is still immature, bitemporal suppression develops, and the child does not perceive 2 separate images (diplopia). As suppression increases, intermittent exotropia may finally progress to constant exotropia.

XT

intermittent exotropia can have an early onset, with 25-40% of cases occurring before the second year of life.

Subjective methods

In home control, parents assess the deviation. The assessment of deviation is categorized as follows: excellent control, where deviation occurs rarely or only at distance when tired, fatigued, or inattentive; good control,

Good where deviation occurs less than 5 times a day and only at distance; Fair control, where deviation occurs more than 5 times a day and only at distance; or Poor control, where deviation occurs frequently at distance and near.

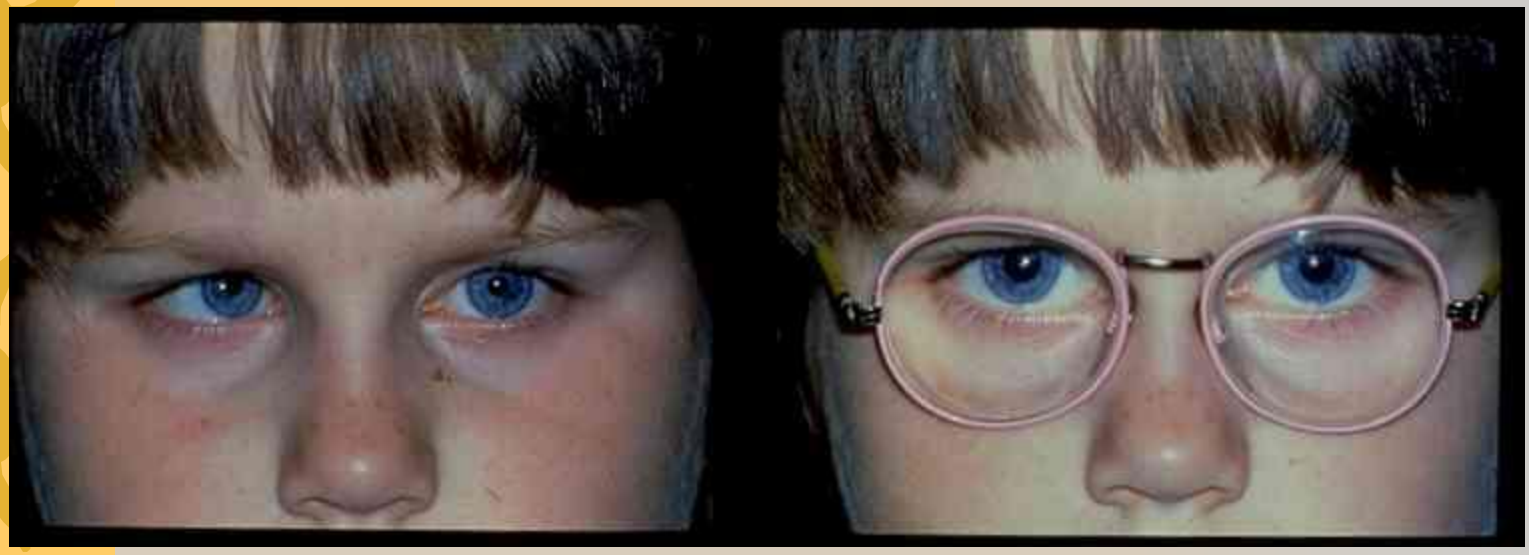
•Children characteristically close one eye in bright light. This action may precede the actual divergence of the eyes, or the parents may notice this phenomenon, which becomes the presenting complaint.

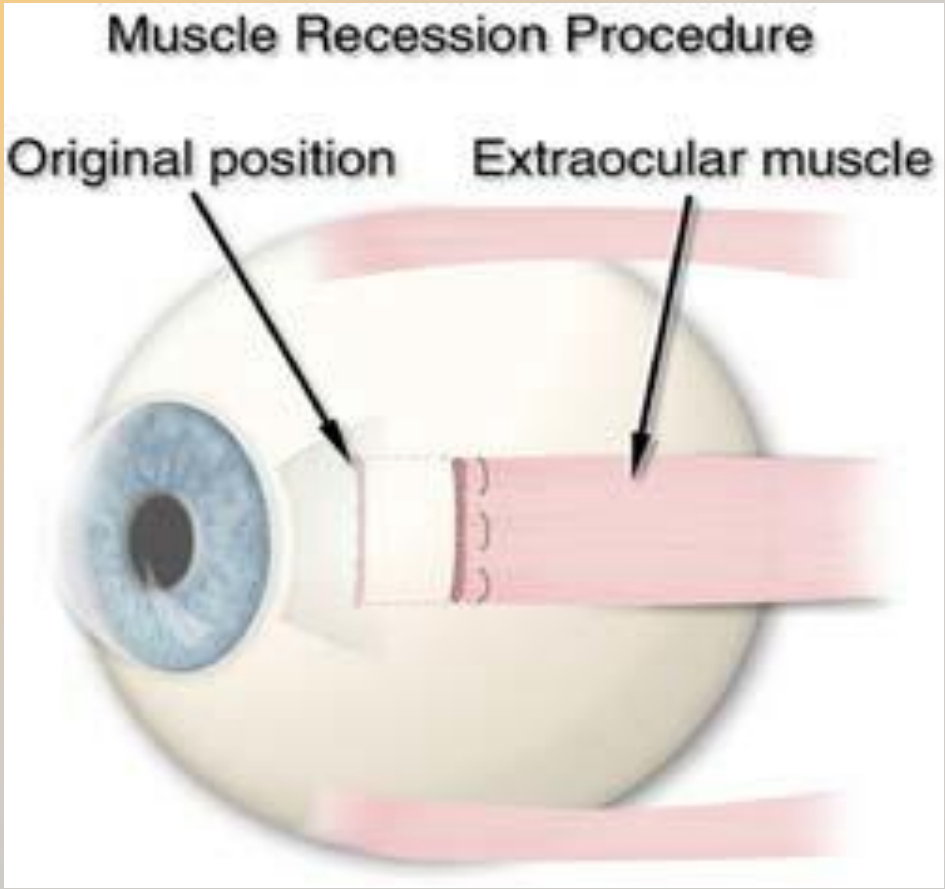
- Classification systems
  - Duane classification
    - If the deviation is greater at distance than at near, it is called the divergence excess type of exotropia.
    - If the deviation is greater at near than at distance, it is called the convergence insufficiency type of exotropia.
    - If little (<10 prism diopters [PD]) or no difference exists between distance and near deviation, it is called the basic type of exotropia

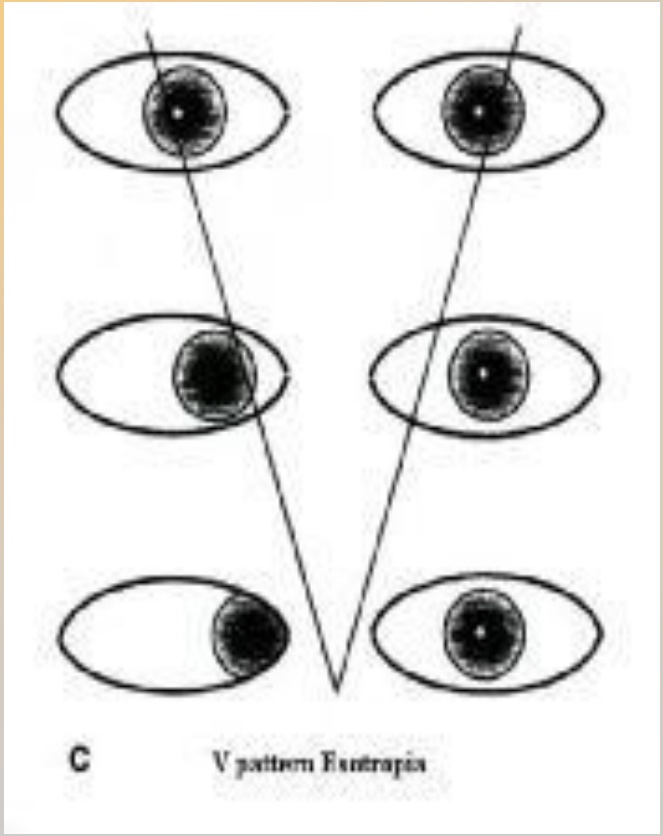
•In office control, ophthalmologists assess the deviation in a clinical setting. The assessment of deviation is categorized as follows: good control, where the patient breaks down only after cover testing and resumes fixation without a blink; fair control, where the patient breaks down after cover testing and blinks to refixate; or poor control, where the patient breaks down without any form of fusion disruption.

Conv insufficiency

"convergence insufficiency" that responds best to eye muscle exercises. This disorder is characterized by an inability of the eyes to work in unison when the child attempts to use the eyes at near only (e.g. reading). Instead of the eyes converging together on the near object, one of the eyes deviates outward.




Muscle Recession Procedure
Original position
Extraocular muscle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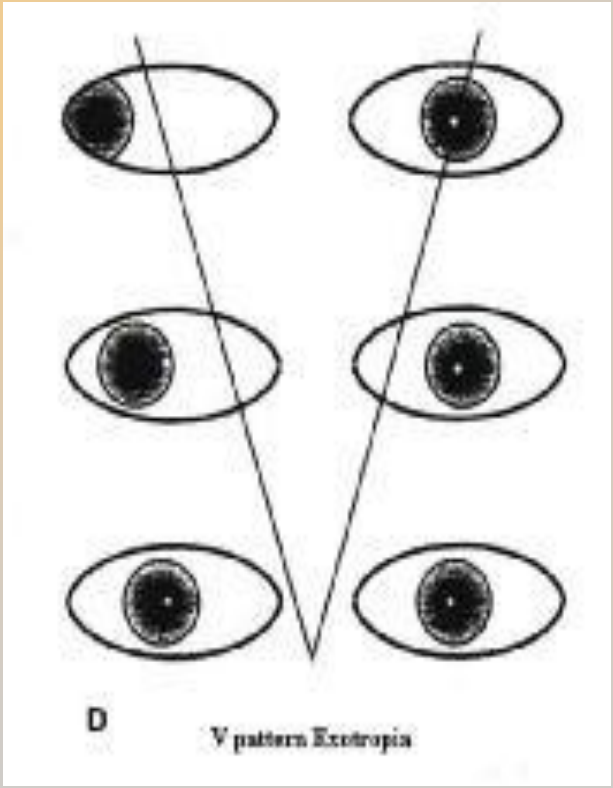
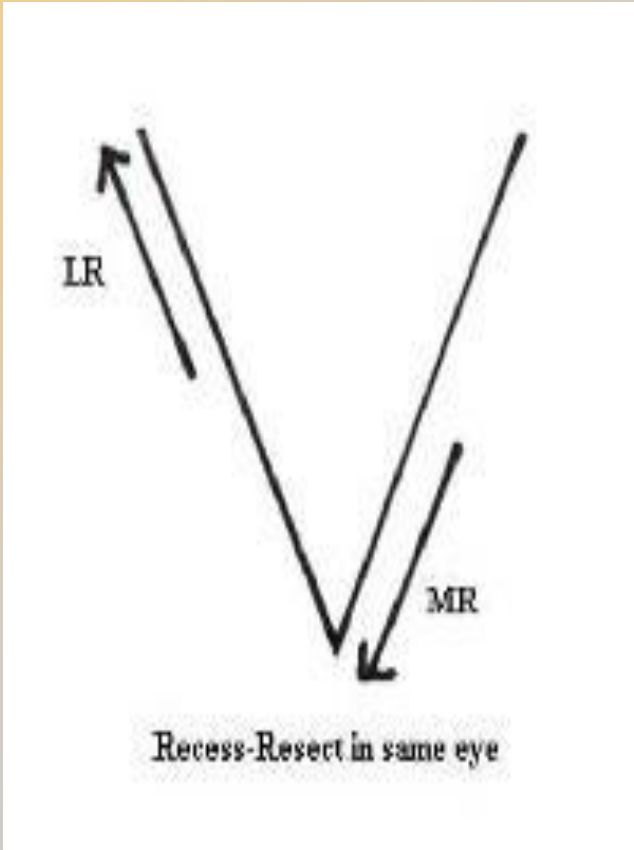
V pattern Esotropia


D
V pattern Exotropia



Recess-Resect in same eye