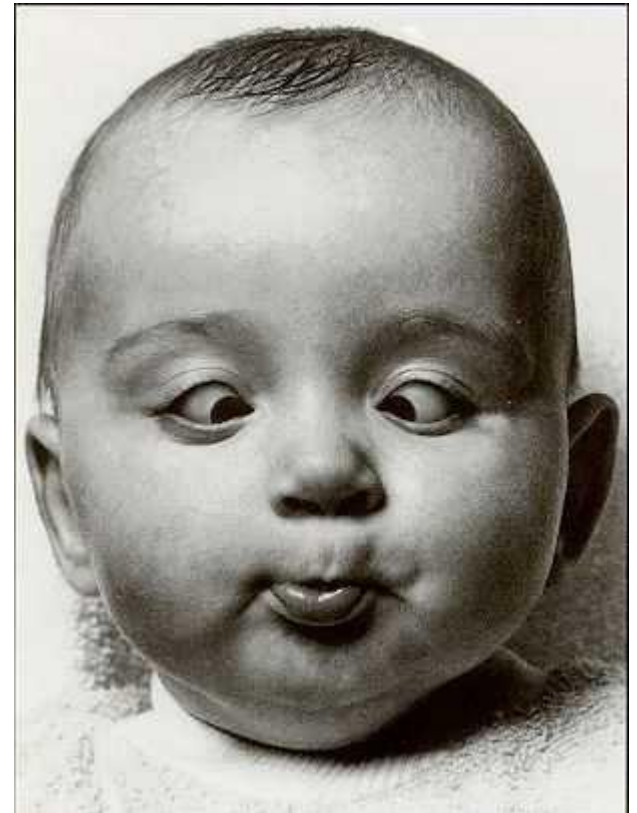


Strabismus for 5th yr medical students

Prof. Mutaz Gharaibeh, MD



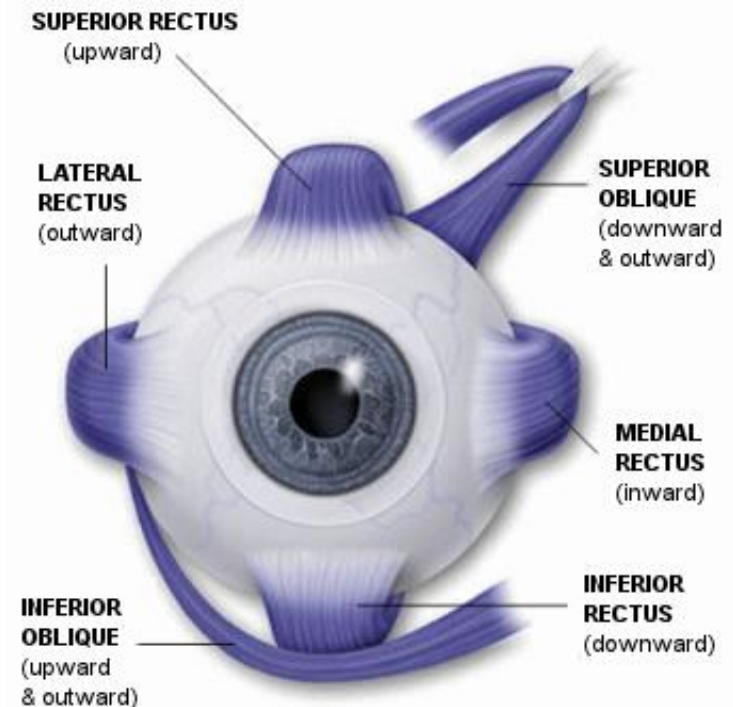
Normal movement of the eye (6 extraocular muscles)

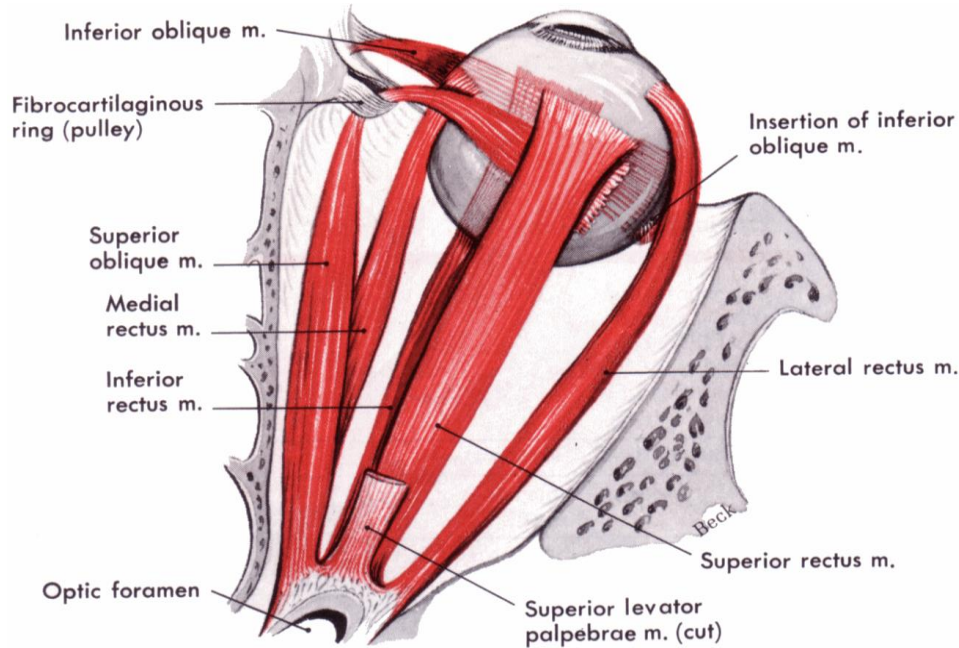
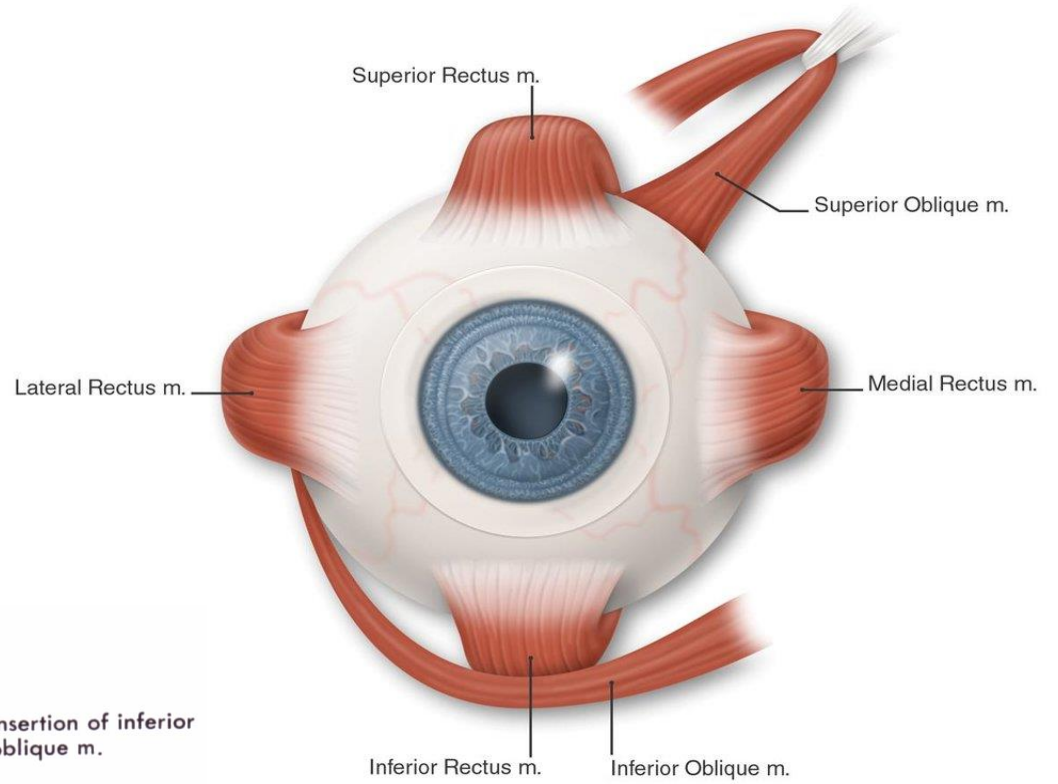
Nerve supply

Third CN : MR, IR, SR, IO

Fourth CN : Superior Oblique

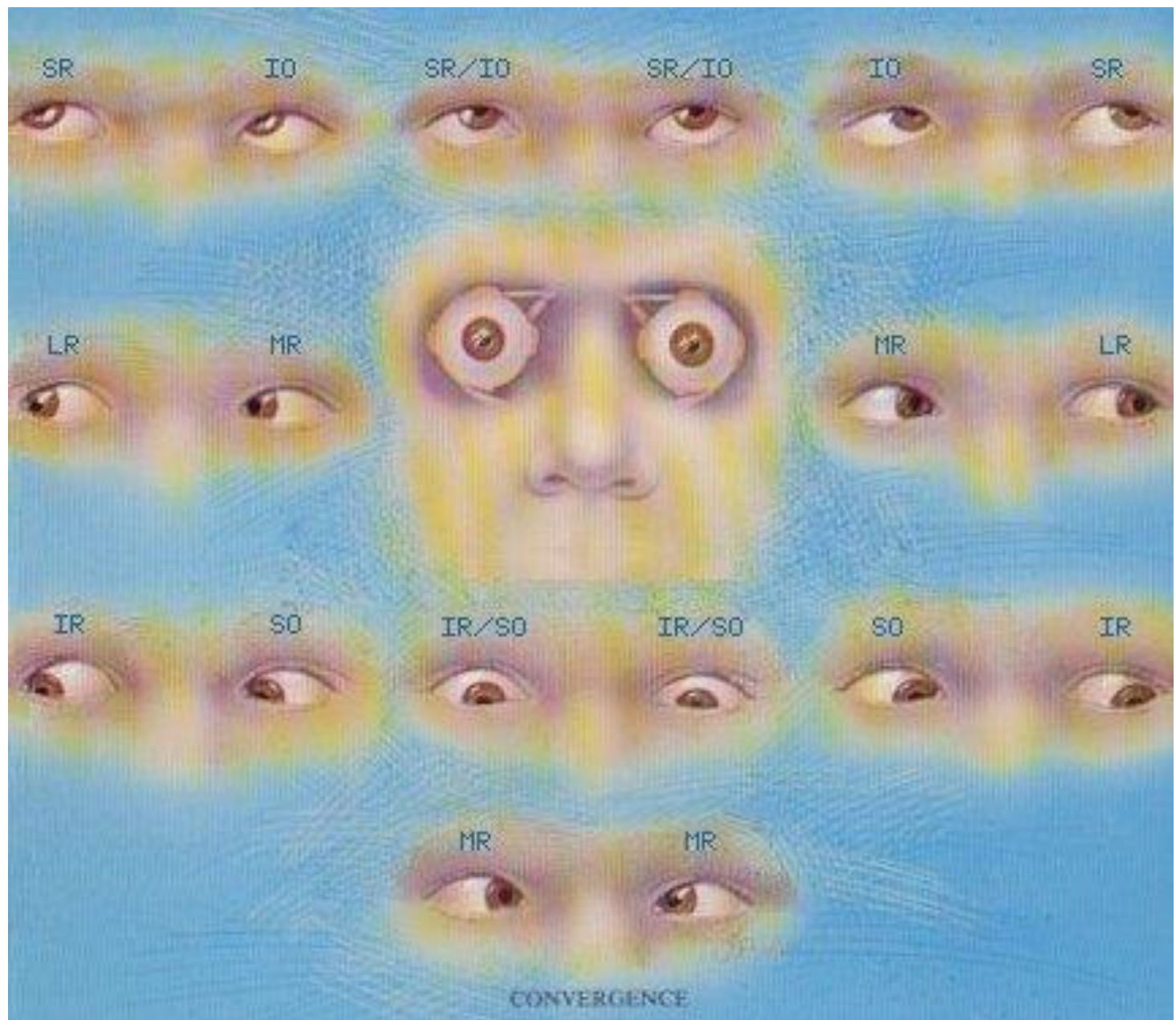
Sixth CN : Lateral Rectus





Muscles that move the right eye as viewed from above.

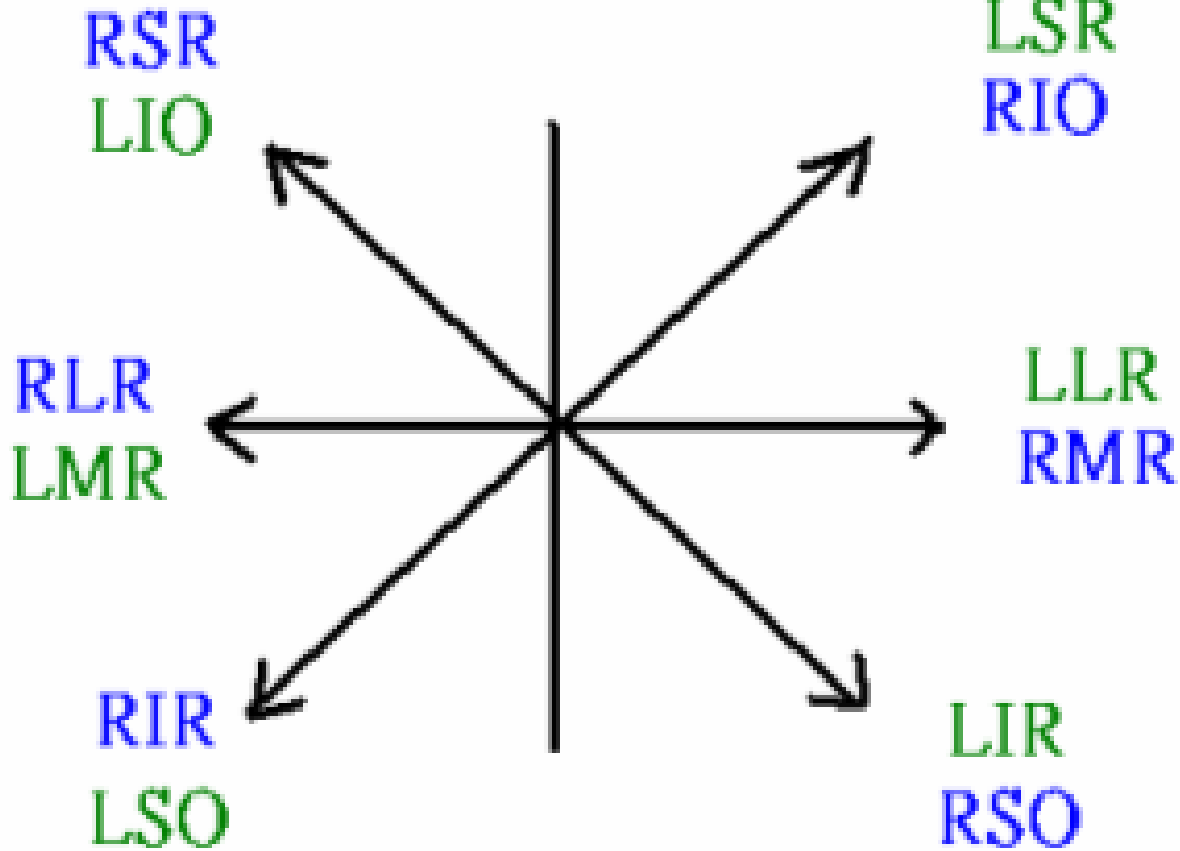
- These six positions of gaze are called the cardinal positions of gaze.
- In addition to these, there are another 3 position of gaze :
 - the primary position – looking straight ahead
 - Looking up
 - Looking down
- So the total number of the positions of gaze is 9



Yoke muscles are pair of muscles (one muscle in each eye) moving the eye into the same direction of gaze



Yoke Muscle



- Evaluation of binocular eye movement
ask the patient to follow your target in all positions of gaze

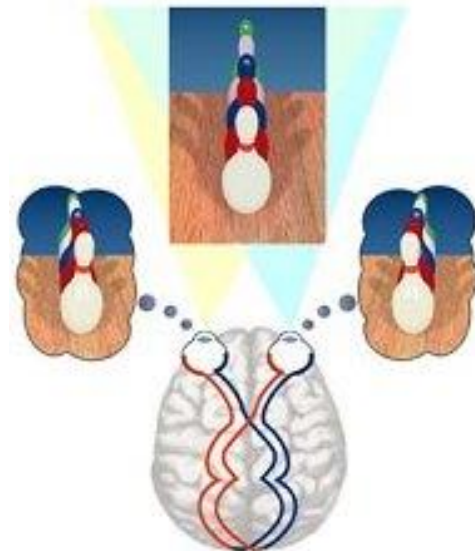
Under action of specific muscle could be :

- true paresis or paralysis
- restrictive myopathy
- underlying strabismus



Binocular Single vision and Stereopsis

Normally both eyes are directed toward the same object and an image of that object is created on each retina, these images are fused centrally and interpreted by the brain as a single image.



Importance of Stereopsis

- Increase field of vision
- Eliminate the blind spot since the blind spot of an eye fall on the opposite eye's visual field.
- Binocular acuity is greater than monocular
- Depth perception
- Estimation of Distance



Amblyopia

Unilateral permanent reduction in visual acuity with the absence of organic pathology.

Types:

1- Strabismic

2- Anisometropic

3- Form Deprivation

Strabismic Amblyopia

Occur in the squinting eye if the squint is prolonged and constant.

* In children

Anisometropic Amblyopia

When there is unequal refractive error between the 2 eyes, the eye that provide a clearer image become the dominant eye while the image in the other eye is blurred resulting in abnormal development of that side.

Form-deprivation amblyopia

- results when the ocular media become opaque such as is the case with **cataracts** or **corneal scarring** from forceps injuries during



Strabismus/Squint definition

Squint is a misalignment of the two eyes so that both the eyes are not looking in the same direction



Esotropia (eye turned inward)



Exotropia (eye turned outward)



Hypertropia (eye turned upward)

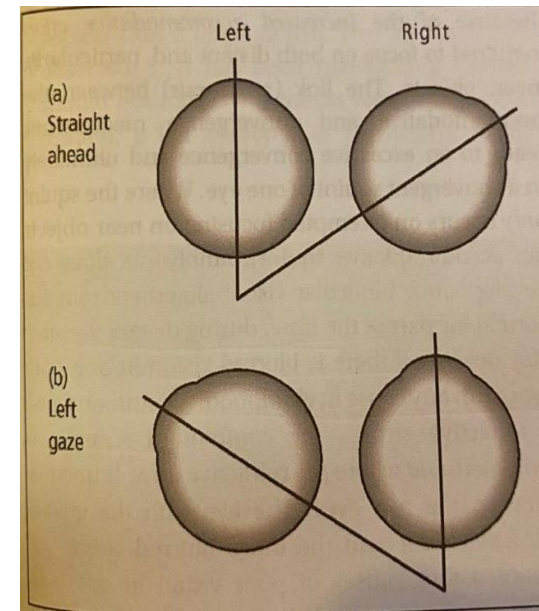


Hypotropia (eye turned downward)



Non-Paralytic Squint (Concomitant Squint)

- Both eyes are capable of performing full movement, but only one eye is directed toward the fixated target.
- Angle of deviation is constant.
- This is the type commonly seen in children
- No Diplopia but amblyopia can occur
- Usually congenital but can develop in a child with hypermetropia or blurred Vision.



Non-Paralytic Squint (Concomitant Squint)

Treatment :

1- Glasses

2- if Amblyopia is present -> patching of the better seeing eye

3- Surgery

Paralytic Squint (Incomitant squint)

- Decreased action of one or more of the extra-ocular muscles due to a nerve palsy or mechanical restriction.
- Indicates an isolated nerve palsy or an extra-ocular muscle disease
- Usually acquired
- The size of the squint depends on the direction of gaze.
- Diplopia is present.

Angle of Deviation

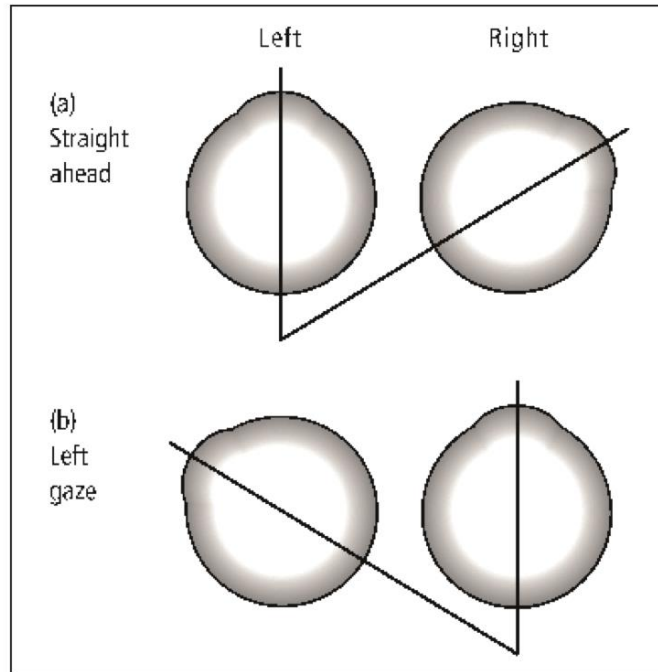


Figure 15.4 Right non-paralytic divergent squint. (a) The right eye is divergent in the primary position of gaze (looking straight ahead). (b) When the eyes look to the left, the angle of deviation between the visual axis (a line passing through the point of fixation and the foveola) of the two eyes is unchanged.

Non paralytic squint ; Angle of Deviation is Unchanged

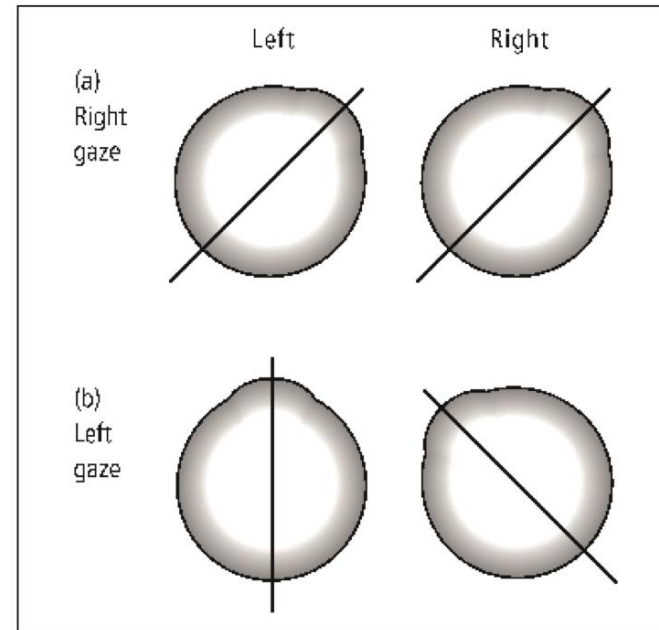


Figure 15.5 Left sixth nerve palsy with paralysis of the left lateral rectus (paralytic squint). (a) With the eyes looking to the right, the visual axes are aligned, there is no deviation between the visual axes of the two eyes. (b) With the eyes looking to the left (the field of action of the left lateral rectus), the left eye is unable to move past the midline as the left lateral rectus is paralysed. This results in a large angle squint.

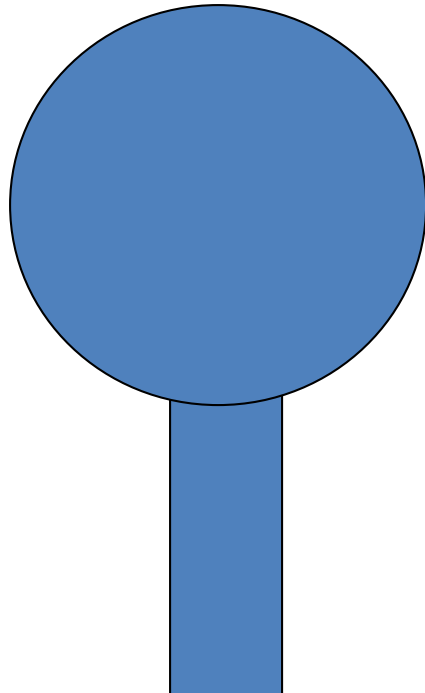
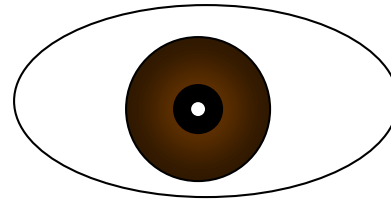
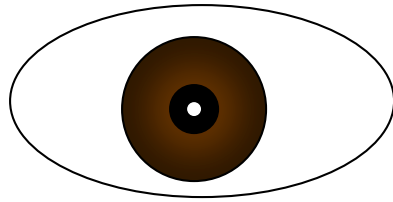
Paralytic Squint / Angle of Deviation changes with changing the gaze .

If Nerve Paralysis; (As Above) ; The Angle of deviation is **largest in the field of the muscle action**
 If Mechanical paralysis; The Angle of deviation is **largest in the field Away from the muscle action**

Work up

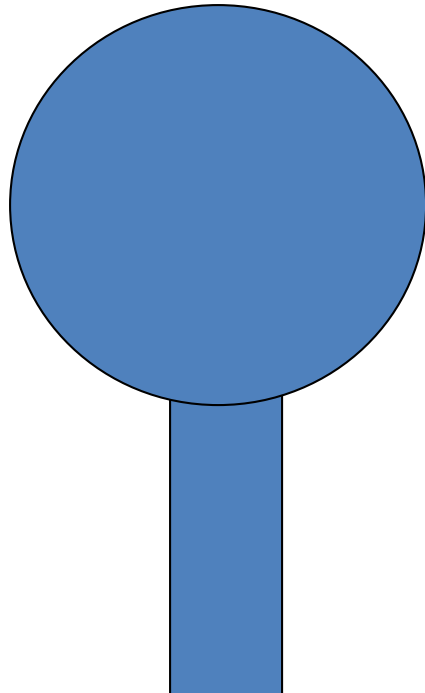
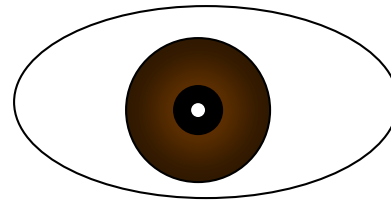
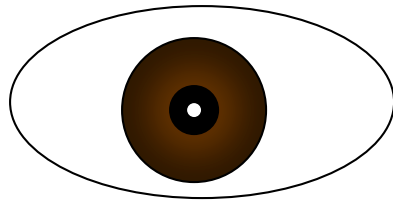
- History:
 - Frequency
 - Onset
 - Family history
 - Past medical/surgical history
- Examination:
 - Visual acuity
 - Epicanthus (Be very cautious as its presence doesn't exclude strabismus)
 - Facial asymmetry
 - Cover/uncover test
 - Alternate cover test(latent squint→phoria)
 - Refractive error (topical atropine/cyclopentolate)

Cover – Uncover test



Orthophoria

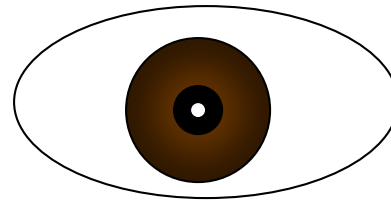
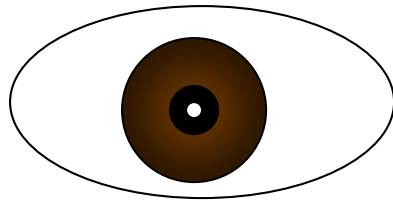
Cover – Uncover test



Esophoria

Note OS does not
move.

Cover – Uncover test

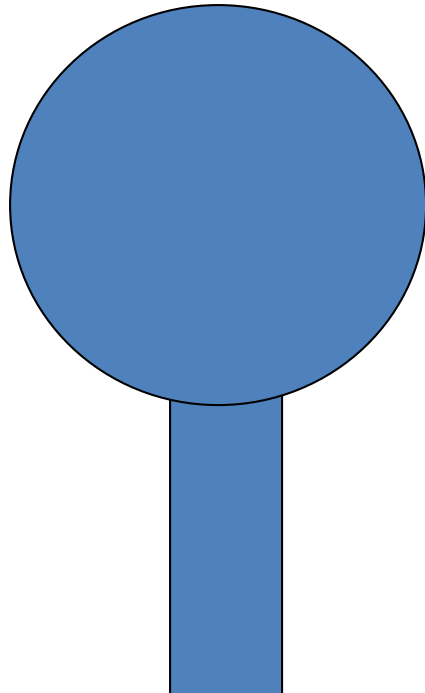
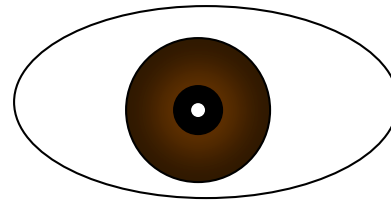
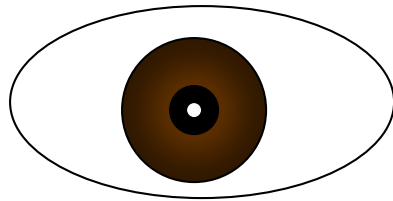


Exophoria,

Only seen when eye is covered

Note OS does not move

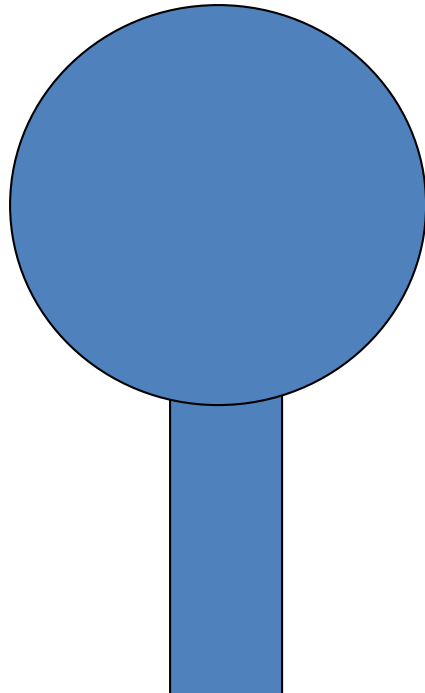
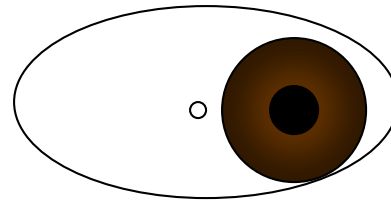
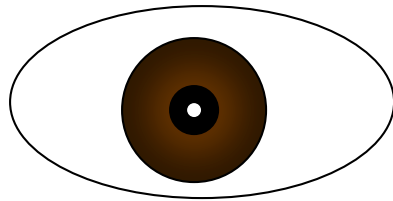
Alternate Cover test



Exotropia, intermittent

May have intermittent diplopia,
especially when tired or sick

Alternate Cover test



Exotropia, Constant

May be visible with
or without alternate
cover

Cycloplegic refraction

- To know the total amount of refractive error



Esotropia

- Right, left or alternating(variable fixation)
- Concomitant or Incomitant
- 1ry, 2ry or Consecutive(overcorrection)



Concomitant Esotropia

- 1- Congenital (Infantile) esotropia
- 2- Accommodative
- 3- Non-Accommodative

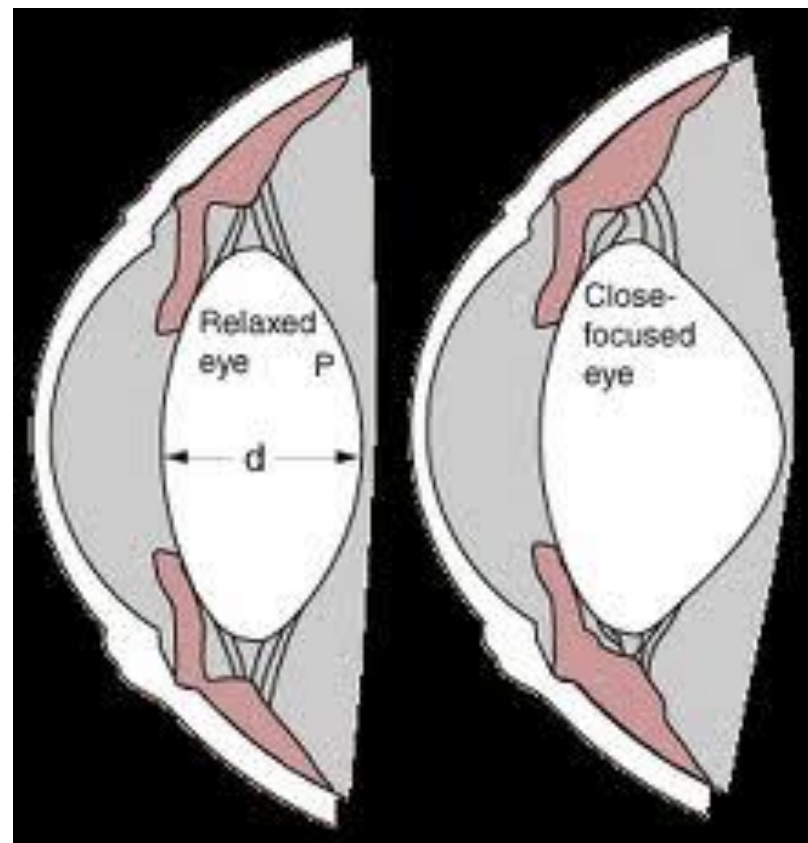
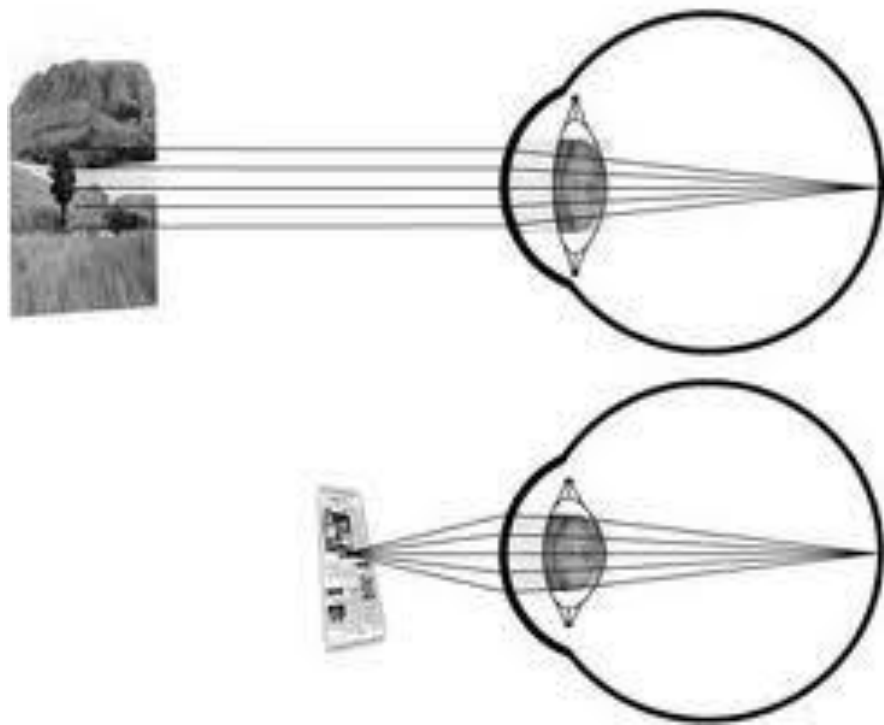
Congenital (Infantile) esotropia

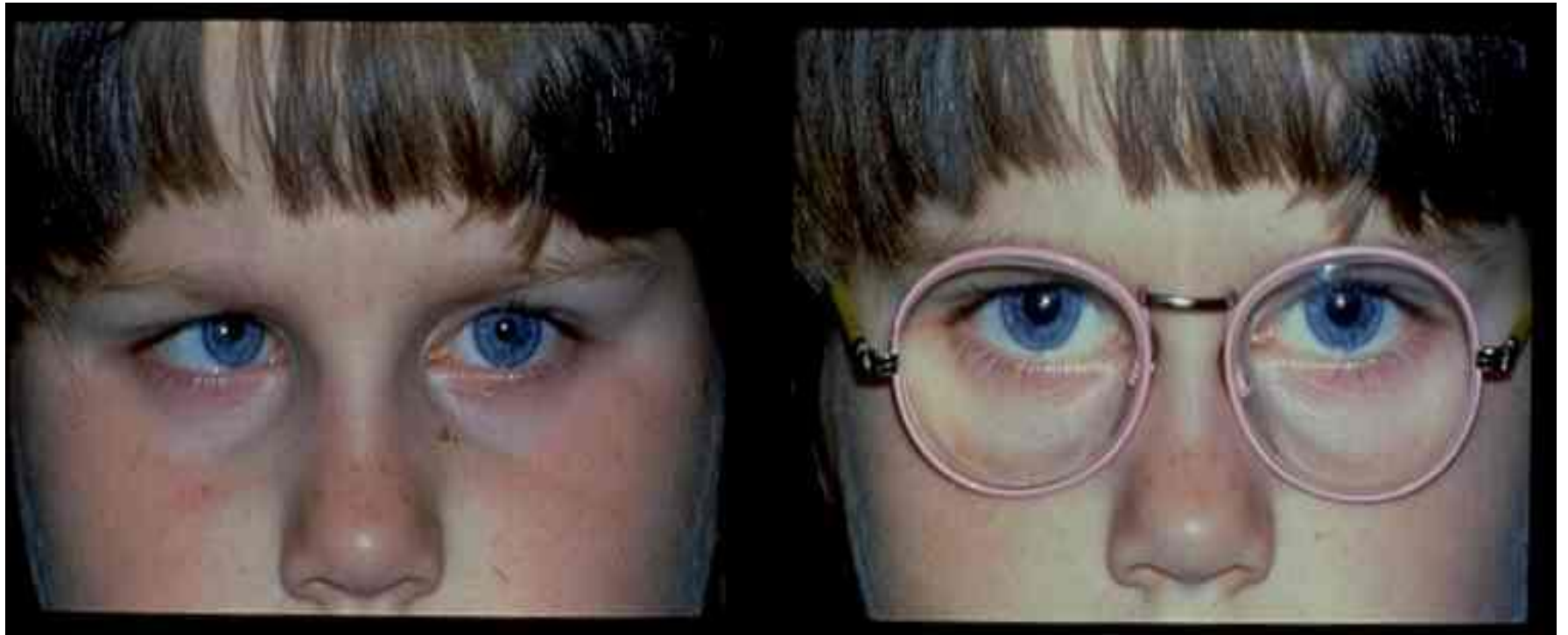
- Occur in the first 6 months of life in otherwise neurologically healthy child.
- Not associated with hypermetropia
- Large angle of deviation
- Treatment: Recession of both medial recti



Accommodative Esotropia

- *Accommodative esotropia* is often seen in patients with a moderate amount of hypermetropia.
- The hypermetrope, in an attempt to "accommodate" or focus the eyes, converges the eyes as well, as convergence is associated with activation of the accommodative reflex (synkinesis).





Glasses are not an alternative to surgery or visa versa

Non- accommodative esotropia

Induced by :

- 1- Emotional or physical stress (illness)
- 2- Sensory deprivation (untreated congenital cataract, optic atrophy)
- 3- Retinoblastoma

Exotropia

- 1- Intermittent Exotropia
- 2- Constant Exotropia

Intermittent Exotropia

-Onset before 5 years.

-Manifests during times of :

1- visual inattention.

2- Fatigue

3- Stress

4- During illness

-If exposed to bright light causes reflex closure of one eye



Non-accommodative exotropia

Crouzon's syndrome:

Defect in Fibroblast growth factor receptor 2

Autosomal dominant, chromosome 10

shallow eye sockets after early fusion of surrounding bones

Craniosynostosis

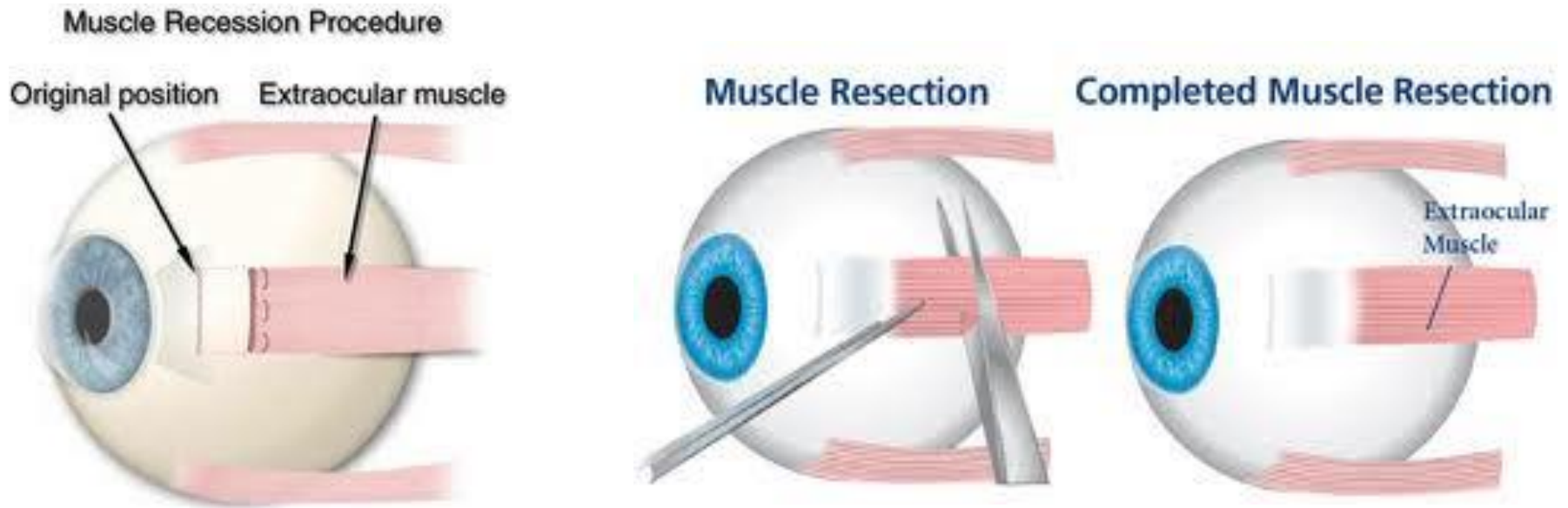
Hypertelorism (greater than normal distance between the eyes)

PDA and aortic coarctation



Management

- 1- Early detection
- 2- Glasses
- 3- Surgery (Recession or Resection)

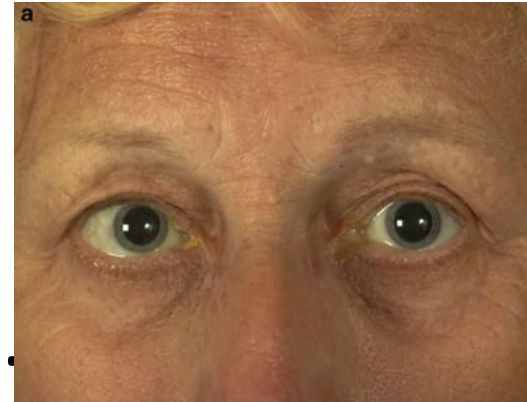


Paralytic Squint (Incomitant squint)

- **The causes of isolated nerve palsy :**
- 1)Orbital diseases-neoplasia
- 2)Vascular disease -Diabetes , Aneurysm (3rd nerve), HTN
- 3) Trauma
- 4)Neoplasia -(meningioma/acoustic neuroma/glioma)
- 5)Raised ICP -may cause a 3rd or 6th nerve palsy
- 6)Inflammation -Sarcoidosis/ vasculitis (e.g giant cell arteritis) /GB syndrome
- 7) Cavernous sinus thrombosis

Isolated Nerve Palsies

- 6th nerve: Failure of Abduction.
- 4th nerve: defective depression of the eye when in adduction.
- 3rd nerve: failure of adduction, elevation and depression of the eye, ptosis and in some cases dilated pupil.



Paralytic Squint (Incomitant squint)

Extraocular muscles diseases:

Dysthyroid eye disease

Myasthenia gravis

Ocular myositis

Ocular myopathy

Browns Syndrome

Duane's Syndrome

Dysthyroid eye disease

- Infiltration of the extraocular muscles with lymphocytes and the depositions of glycosaminoglycans in the tissues causing proptosis, exposure of the globes and limitation of eye movements.
- Occur mainly in hyperthyroidism but can occur in hypothyroidism



Myasthenia gravis

Acetylcholine receptor targeted antibodies

Females > males, 15-50 years of age

40% show involvement of Extraocular muscles only.

Variable diplopia and ptosis due to fatigue.

Diagnosis: Edrophonium test

Treatment: neostigmine (acetylcholine esterase inhibitor), thymectomy.

Take home messages



- Strabismus is a symptom/sign (similar to fever) which might be the presenting sign of life threatening conditions.
- Parents are always true about their complaint of presence of squint.
- There is nothing called Pseudo strabismus.
- Never patch the eye of a child.