



Gaza Ophthalmic Centre

7.0 SQUINT Ophthalmology FOR GP's & MEDICAL STUDENTS

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Gaza Ophthalmic Centre

2021

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.Good moning, this lecture is about squint and extra ocular muscles

Strabismus

- **Misalignment** of
 - One or
 - Both eyes
- So as the eye
 - is not looking straight
 - at the
 - object of regard

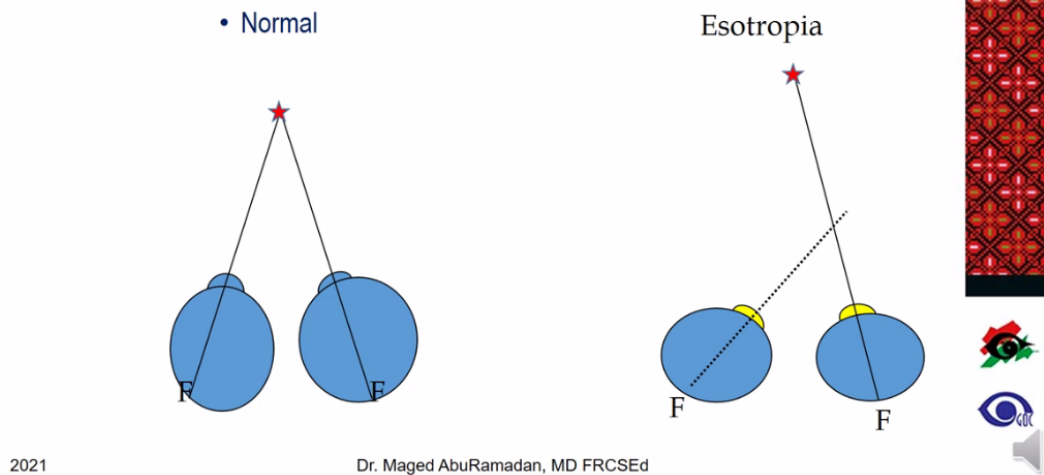


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Squint or strabismus means the misalignment of one or both eyes. So, when the eye eyes are .not looking straight at the object of regard it is called squinting eye

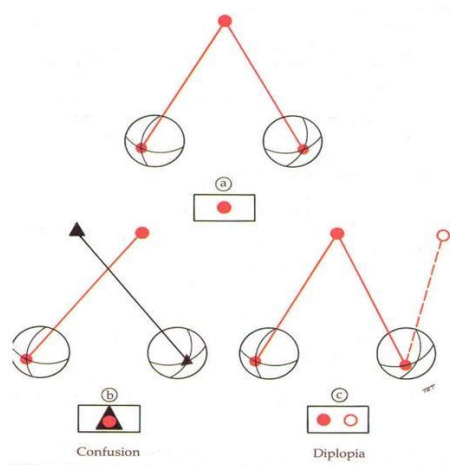
Strabismus



In normal situation, when looking at object of regard the line of sight from the object passes by the eye nodal point and falls on the fovea of both eyes. However, if one eye is squinting, we find like on the right side, we find that one line of sight goes into the fovea of one eye, while the other line from the squinting eye looks at a totally different direction. This called .misaligned eye, or squint or strabismic eye

Strabismus

1. BSV
 1. Normal
 2. BE fix object
 3. Brain → 3D
2. Diplopia
 1. Good eye fixes object
 2. Squinting eye fixes same object in abnormal location
 3. Brain → Double vision
3. Confusion
 1. Good eye fixes object
 2. Squinting eye fixes another object in same location
 3. Brain → 2 objects over each other

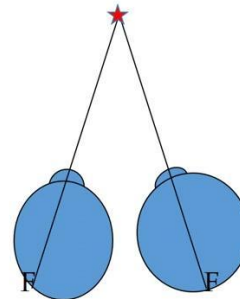


In normal situation what we call bsv, or binocular single vision, both eyes fixed the same object and the image of the object falls on both fovea simultaneously, enabling the brain to have a 3d image of the object. However, in case of Squinting, we find that the object of regard image falls on the fovea of one eye and then extra foveal element on the other side. So there are two images perceived one is clear, the other is not clear. And that's called diplopia. An occasion when the image of the object of revision of regard falls on the fovea of

the normal eye and another object image falls on the fovea of the other eye. both images are .superimposed over each other and that's cause what we call confusion

Significance In Children

- To develop **vision**
 - Children need
 - Normally aligned eyes
- Strabismus is a
 - Common presentation for
 - **Refractive errors**
- Strabismus in childhood is the
 - Second most common presentation of
 - **Retinoblastoma**



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To develop a normal vision children need normally aligned eyes. Remember that strabismus is a common presentation for refractive error. And don't forget that retinal blastoma is the .second most common presentation is strabismus in childhood

Significance in Adults

- Frequent sign of
 - **Neurological** disease
 - III, IV, VI
- Frequent presentation of
 - **Systemic** disease
 - (Thyroid disease & Myasthenia)
- Cosmetology

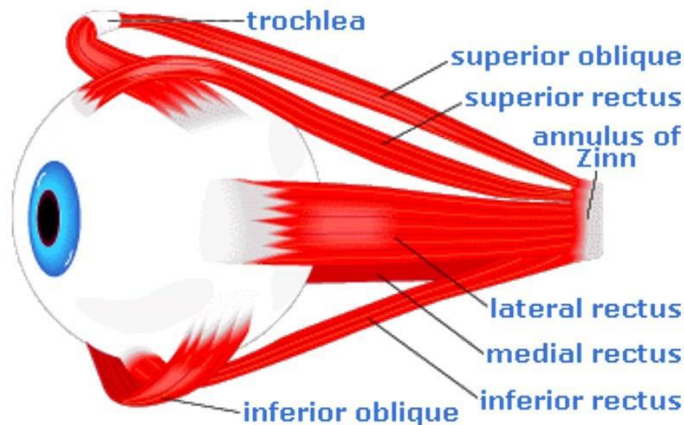


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In Adults. strabismus or squint is a frequent sign of neurological disease, especially third, fourth or sixth month cranial nerves. And it's also a common presentation of systemic disease like thyroid disease, Myasthenia or diabetes mellitus. In adults, maybe the .cosmetology is more important

Anatomy Of The EOM's



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eye have four Recti m as well and two obliques m, which moves the eye and all possible .direction of gaze

Anatomy & Physiology

Muscle	Nerve	Function	Testing
MR	3 rd	Adduction Looks Nasal	Look to nose
LR	6th	Abduction Looks Temporal	Look away

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The two horizontally acting reacti are the medial rectus and the lateral rectus. The medial rectus is supplied by the third cranial nerve and its function is to aduct the eye makes the eye looks toward the nose while the lateral recti supplied by the 6th nerve abducts the eye or .take it laterally

Anatomy & Physiology

Muscle	Nerve	Function	Testing
SR	3rd	Elevate, Intorts, Adducts	Up & Out
IR	3 rd	Depress, Extorts, Adduct	Down & Out

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The superior rectus and the inferior rectus both are supplied by the third oculomotor nerve. The superior Rectus main function is to elevate the eye however it also intorts and adducts the eye, while the inferior rectus main function is to depress the eye, but it also extorts and abducts the eye

Anatomy & Physiology

Muscle	Nerve	Function	Testing
SO	4th	Intorts, Depress, Abducts	Look Down & In
IO	3rd	Extorts, Elevates, Abducts	Look Up & In

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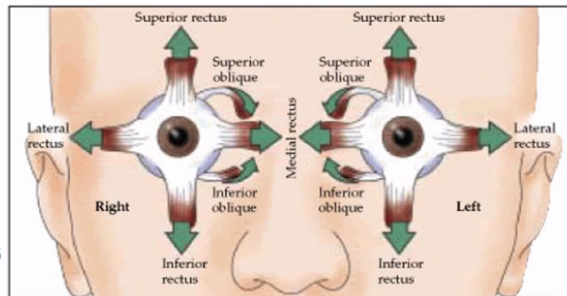
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the superior oblique is the only muscle supplied by the fourth trochlear nerve. Its main action is intorts, but it also depresses and abducts the eye, while the inferior oblique on the contrary supplied by the third, it extorts the eye, elevates and abducts

Directions of Eye Movements

1. Horizontal direction
2. Vertical direction
3. Torsional direction
All superior muscles are Intortors
All inferior muscles are Extorters



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eye movements may be in the horizontal direction on the vertical direction or torsional.
.Torsion means that the the eye rotates about its long axis

Types of Eye Movements

1. Saccades
2. Pursuit
3. Vergence

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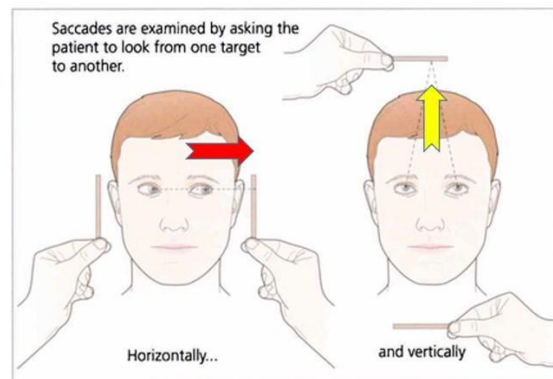
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There are three main types of eye movements saccades,pusuit, vergence

Types of Eye Movements

Saccades

- Voluntary movement
 - of both eyes
 - towards
 - object of interest
- Frontal Eye Field



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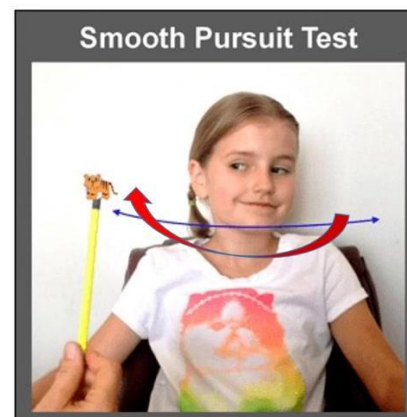
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saccades is a voluntary movement both eyes moves together towards the object of interest. For example, it might be horizontal socket when this patient is looking to his left or vertical socket when the patient is looking on the object above his head. The seconds are controlled .by the frontal eye field area eight

Types of Eye Movements

Pursuit

- Involuntary movement
 - of both eyes
 - towards
- 1. Object of interest
/
2. Following moving objects
- Occipital Eye Field



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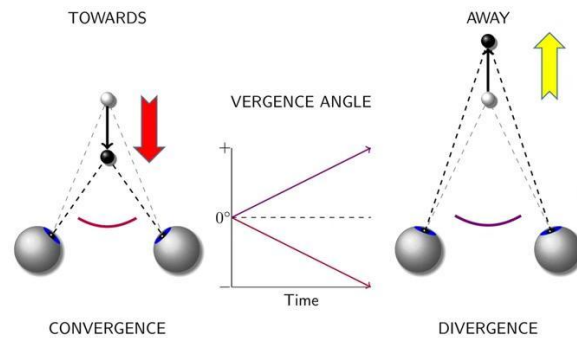
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Pursuit on the contrary or involuntary movement both eyes works together. The move toward the object of interest or following movement of objects is controlled by the occipital eye field area 18 at 19

Types of Eye Movements

Vergence

- Involuntary movement
 - of both eyes
 - Against each other
 - Towards
 - Near or Distant
 - Object of interest
- Brain Stem Centres



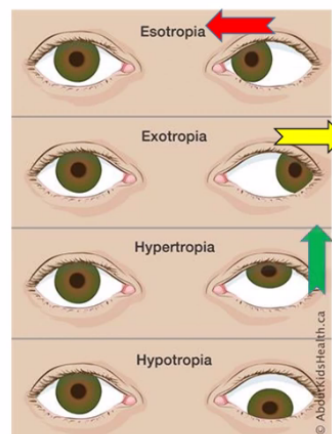
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vergence is also an involuntary movement of both eyes. However, each eye moves in opposite direction to make the object of regard at focus, they move either near or distance. Here we can see when the object moves nearer to the eye, both eyes converge and go medially. While if the object of regard goes away from the eye, then both eyes diverge, and to keep the infocus. This is controlled by brain stem centers.

Types of Strabismus

1. Esodeviation
 1. Eye turned in
2. Exodeviation
 1. Eye turned out
3. Hyperdeviation
 1. Eye turned up
4. Hypodeviation
 1. Eye turned down



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strabismus can be esodeviation when the eye goes toward the nose, exodeviation when the eye goes away from the nose, hypertropia when the squinting eye goes above the line of sight, or hypotropia when it goes down.

Latent squint or phoria is the case when both eyes are looking straight in the primary position. However, if you cover one eye, it goes squinting manifests squint is that one eyes is squinting even without the cover in the primary position. Unilateral squint is when one

Classification of Strabismus

1. Latent or manifest
 - Phoria or
 - Tropia
2. Unilateral or alternating
3. Constant or intermittent
4. Comitant or incomitant
 - Restrictive or
 - Paralytic

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eye is always squinting regardless of the position of gaze. However, alternating squint is that when one eye is squinting at the time, then it alternates the other eye becomes the squinting. constant squint that is present all the time, however intermittent squint that when sometimes the times are straightforward, and then under certain positions like tiredness, fatigue or strong light, one eye becomes squinting. comitant squint is when the angle of squint is the same regardless of the gaze position, while incomitant squint is when the angle changes by changing the direction of gaze ,it might be restrictive or due to paralysis of the .extra ocular muscle one or more

Basic Esotropia

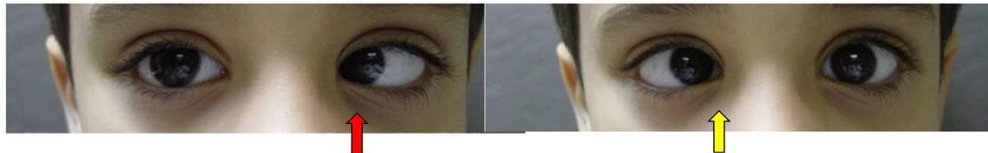


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Here in this child we can see what we call basic esotropia where the left eye is extremely squinting towards the nose esotropia

Alternating Esotropia



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here is an alternating exotropia example first we see that the left eye is squinting. And then .after a while the right eye squinting and the left takes fixation

Exotropia



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.exotropia is when the eye deviates away from the nose towards the temporal side

Causes of Strabismus

1. **Congenital (Basic)**
 - Imbalance between
 - Innervation and
 - Contraction
2. **Refractive errors**
 - (Accommodative)
3. **Loss of vision**
4. **Paralysis or Neuromuscular**
5. **Restrictive**
6. **Tumours**

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The main two causes of strabismus are congenital and secondary to refractive error. Congenital or basic squint is due to imbalance between the innervation and the contraction and usually needs surgery for treatment. However, refractive squint or accommodative squint, is due to high refractive error and usually can be corrected with proper glasses. Other causes are loss of vision or amblyopia, paralysis or neuromuscular disease, restrictive like in thyroid or tumors.

Strabismus Secondary to Loss of Vision from Cataract in Lt. eye



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Here in this case, we can see that the left eye having a cataract leading to severe loss of vision and the eye is deviating inward

Presenting symptoms of Strabismus

1. Deviation of the eye
 1. (Cosmetic)
2. Double vision (Acute)
3. Torticollis (Chronic)
 - (Abnormal Head Posture)
4. Unexplained visual loss in
 - Normal looking eye
 - (Microtropia)

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Patients with squint usually come because there is a deviation of one eye the cosmetic appearance is the drive after complaint. Some other patients especially in adults, and if the case is acute, they come complaining of double vision like in paralytic oculomotor nerve palsy for example. In children the parents may notice abnormal head position or torticollis and that's seen in chronic childhood esotropia. Sometimes the patient have unexplained visual loss. When we look at the eye it looks normal however, on proper examination we find that there is Microtropia or very minute squint

Abnormal Head Posture



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and this child there is an abnormal head posture first there is a face turn to his right as well as a face still head tilt to the left side this is an abnormal head posture secondary to trochlear nerve palsy

Role of GP

1. Confirm Diagnosis
2. Decide on urgency
3. Teach patients
4. Referral to Ophthalmologist

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The role of the GP in treating with squint cases is first to confirm the diagnosis and to decide how urgent he needs also to teach the patient about the nature and Then properly refer to a ophthalmologist just .for further treatment

Management of Strabismus

History

4 most important questions:

1. Age of onset
2. Constant or intermittent
3. Unilateral or alternating
4. Diplopia or torticollis

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Management of strabismus includes four main questions that have to be asked in the history the age of onset, whether it is present all the time or some of the time whether one is .squinting or it is alternating and whether there is diplopia or torticollis

Management of Strabismus

Examination:

Three objectives:

1. Confirm the diagnosis
2. Diagnose type of strabismus
3. Differentiate
 - Paralysis from no paralysis

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On examination there are three main objective first to confirm the diagnosis, then to decide the type and then to differentiate paralysis from no paralysis

Examination of Strab Patient

To achieve the **first** and **second** objectives we do:

1. Simple observation
 - For the nasal white of the eye
2. Corneal light reflex
3. Cover test

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the first two goals can be achieved by just simple observation for the nasal white of the eye .looking at the corner light reflex and doing a simple cover test

Nasal White



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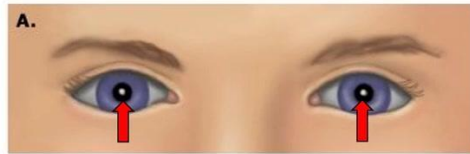
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Look at the nasal white of the eye you can see that here it is disappearing on the left side .means the eye is drifted towards the nose or is esotropia

Corneal Light Reflection

Normal



Esotropia



Exotropia



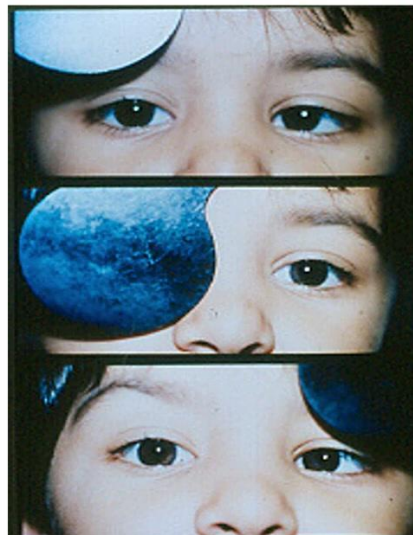
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The corneal light reflex is when you ask the patient to fixate a torch light then ideally it should have a reflection at the almost near the center of the pupil. However, in this case of esotropia, you can see that while the left eye is fixing the light corner reflex to the corner light reflex is in the middle, you see that on the right side it is drifted temporarily that means the eye is shifted nasally and in exotropia cases, the left eye is fixing while the right eye is .EXO tropic with the corneal light reflex shifted nasal

Cover Test



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In the cover test, we asked the patient to fixate the torch light and then we cover one eye and then remove the cover and this is cover uncover test and we look on the other eye position. The other type is alternating cover test which we cover one eye and then we move .the occluder to the other eye and back forth again

Examination of Strabismus Patient

Third objective we look for:

1. Presence of torticollis
2. Is the strabismus the same in
 - all directions of gaze
 - or not
 - **Same** = no paralysis
 - **Different** = paralysis or restriction

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Also by proper examination, you can decide whether there is a torticollis or not denoting a chronic visual problem and also you can check the strabismus in all directions of gaze if the it is the same angle then there is no paralysis. However, if it's more to one side than the .opposite side, then a paralysis or restriction is suspected

Examination

3. Test the extraocular movements
 - All directions of
 - Gaze
 - **Paralysis / restriction**
 - ⇒ Limitation
 - **No Paralysis**
 - ⇒ No limitation

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Then we go to examining how much the eye move in all directions of case this is an examination of the extra ocular muscle if there is a paralysis or restriction there will be limitation of one muscle or more in a certain direction. And if there is no paralysis, the extra .ocular movement will be full whether there is a squint or not

Doll's Head Manoeuvre

Used for

- Testing the
- Eye movement
- When
- The patient is “uncooperative”!
 1. Young Child
 2. Coma

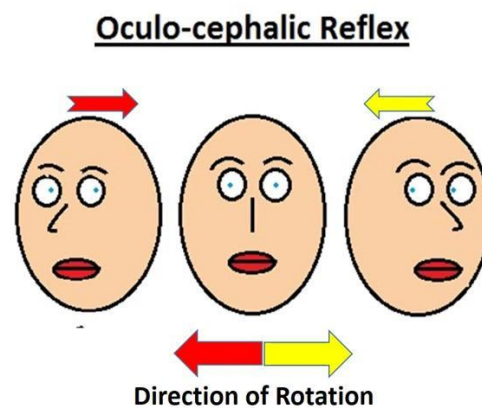
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doll's eye maneuver or doll's head maneuver is used for testing eye movement when the patient is uncooperative, especially in very young children or in comatose patient

Doll's Head Manoeuvre

- The eyes move in
 - Opposite direction
 - to the
 - Head movement



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In this example, we look at the eyes of the patient when the head is in the midline and then we rotate the head to the right for example and you look on the eyes you find the eyes goes to the left side, the opposite happens when you rotate the head to the left side and then the eyes will go and to the right side. So in those head movement to keep the fixation the eyes move in a direction quite opposite to the direction of head movement rotation

Rx of Common Forms of Esotropia

- Congenital (NA)
 - ⇒ Surgery
- Accommodative
 - ⇒ Glasses
- Partially Accommodative
 - ⇒ Glasses
 - ⇒ Surgery
- Sixth Nerve Palsy
 - ⇒ Observation 6/12
 - ⇒ Surgery

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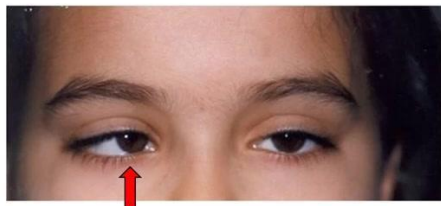


Treatment of common forms of esotropia for basic type, which is congenital is usually surgery however, the accommodative type is mainly treated by glasses. If glasses partially correct, then you might need surgery later. on the paralytic cases especially sixth nerve palsy, you have to observe for at least six months before you can do surgery

Accommodative Esotropia

Before Glasses

After Glasses



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So this is accommodative esotropia here this is the patient with right Convergent squint before and when we have proper glasses. You can see that both eyes are looking straight forward

Non-Accommodative Squint

Non-Accommodative Esotropia Before and After Surgery



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.This patient have left esotropia and after surgery both eyes are looking normal

Rx of Common Forms of Exotropia

- Congenital Exotropia
 - ⇒ Surgery
- Sensory deprivation
 - ⇒ Rx of the cause
- Third nerve paralysis
 - ⇒ Observation 6/12
 - ⇒ Surgery

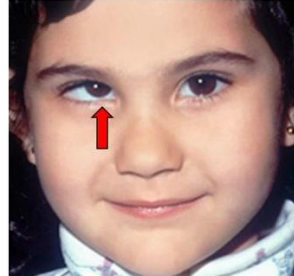
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In exotropia congenital cases usually need surgery the sensory deprivation you need to treat the cause where there is severe refractive error or media opacity or other things however, with the third nerve palsies, you have to wait at least six months for spontaneous recovery. .And then you might do surgery to correct the residual strabismus

Common Causes of Hypertropia or Hypotropia

1. Fourth nerve palsy
2. Third nerve palsy
3. Thyroid disease
4. Myasthenia gravis
5. Orbital floor fracture



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Vertical strabismus hypertropia or hypotropia are common in fourth nerve palsy some cases of third nerve palsy thyroid eye disease, myasthenia gravis, and orbital floor fracture. Here we can see the eye going insight and little bit up

Why We Treat

1. Restore Stereopsis
2. Prevent Amblyopia
3. Prevent Confusion and Diplopia
4. Appearance



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The goal after treatment is first to restore vision as stereopsis second to prevent amblyopia prevent symptoms like confusion, or diplopia and improve the appearance the first priority is to restore stereopsis and cosmesis can be done the last thing

General lines of treatment of Squint

1. Correction of Amblyopia
2. Glasses / CL
3. Occlusion
4. EOM Surgery
5. Botox
6. Prism

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generally, the first lines need to do is to correct the amblyopia with glasses or contact lens we might occlude one eye in order to oblige the brain to use the other eye. We can resort to extra ocular motor surgery if there is a basic or residual angle. Botox might be used in some cases of treatment and lastly, prism might be the only result in refractory post paralytic cases. The following slides are just to show you what we can see in the cover and cover test it is only required to know by ophthalmologists and those who are interested to watch it

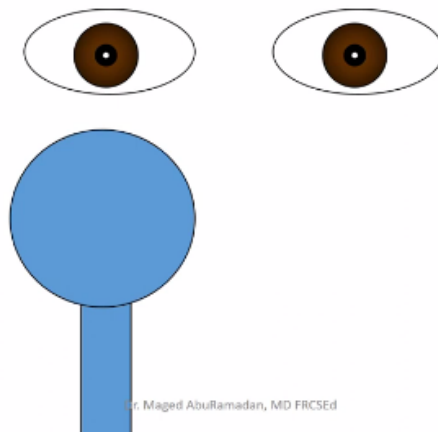
Cover Uncover Test

Cover – Uncover test

Orthophoria

Normal

No complaints,
Asymptomatic



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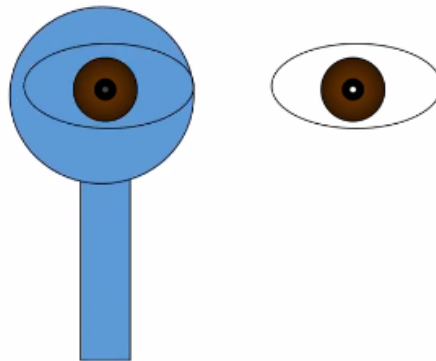
Cover Uncover Test

Cover – Uncover test

Orthophoria

Normal

No complaints,
Asymptomatic



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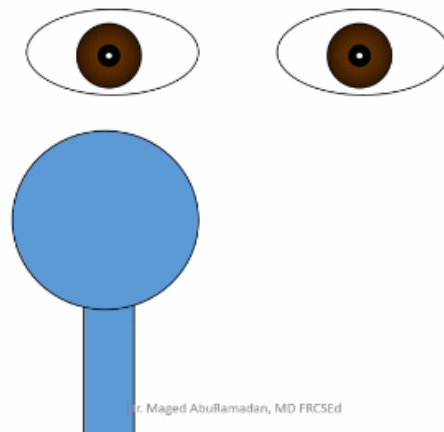
Cover Uncover Test

Cover – Uncover test

Orthophoria

Normal

No complaints,
Asymptomatic



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in orthophoria, or in normal vision. The patient is usually asymptomatic with no complaints. Both eyes here note the corneal light reflex is in the middle of the pupil and then we move the occluder to cover the right eye nothing changed and we remove it again and you can see .neither eye moved

Cover Uncover Test

Cover – Uncover test

Esophoria

Abnormal, common

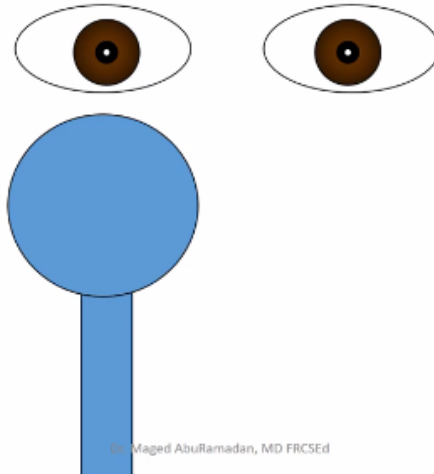
Latent

Only seen when eye is covered

Often asymptomatic,
No complaints

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Cover Uncover Test

Cover – Uncover test

Esophoria

Abnormal, common

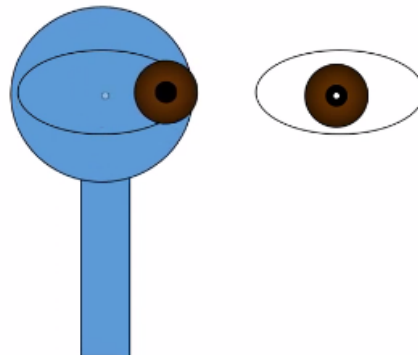
Latent

Only seen when eye is covered

Often asymptomatic,
No complaints

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Cover Uncover Test

Cover – Uncover test

Esophoria

Abnormal, common

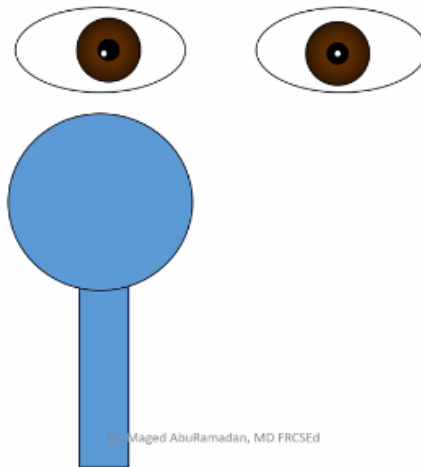
Latent

Only seen when eye is covered

Often asymptomatic,
No complaints

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in cases of esophoria which means that in primary position, both corneal light reflexes are in the middle , if you cover one eye, and then you will find under the occluder the eye moves inward and when you remove the occluder the eye regains the straightforward in primary position. This is late nystagmus it didn't appear unless we covered the eye. Usually it is .asymptomatic with no complaints

Cover Uncover Test

Cover – Uncover test

Exophoria

Abnormal, common

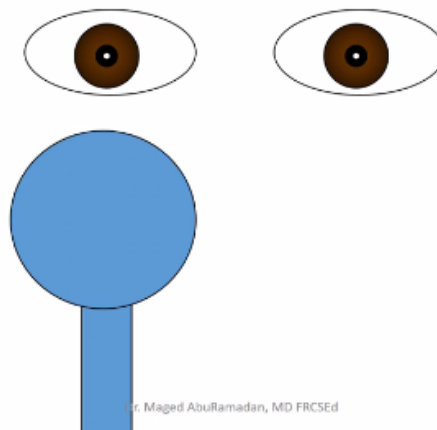
Latent

Only seen when eye is covered

Often asymptomatic,
No complaints

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Cover Uncover Test

Cover – Uncover test

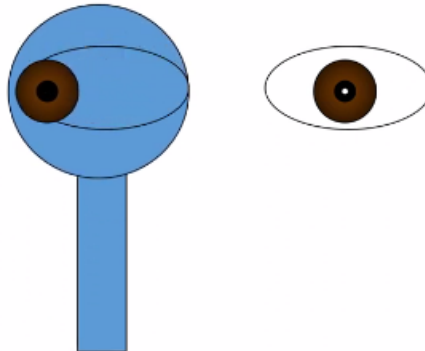
Exophoria

Abnormal, common

Latent

Only seen when eye is covered

Often asymptomatic,
No complaints



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Cover Uncover Test

Cover – Uncover test

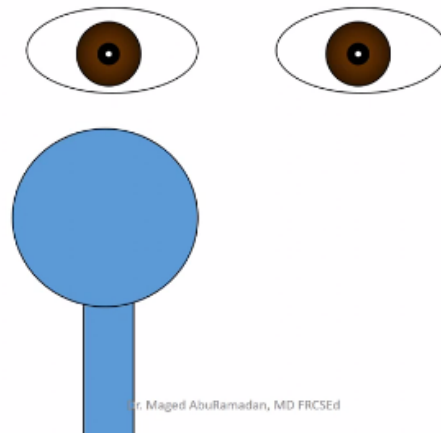
Exophoria

Abnormal, common

Latent

Only seen when eye is covered

Often asymptomatic,
No complaints



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exoPhoria on the quite the same but to the opposite direction. You cover the eye undercover .eye moves to the outward and when you remove the cover it regains fixation again

Cover Uncover Test

Cover Uncover test

Left Exotropia

Manifest squint

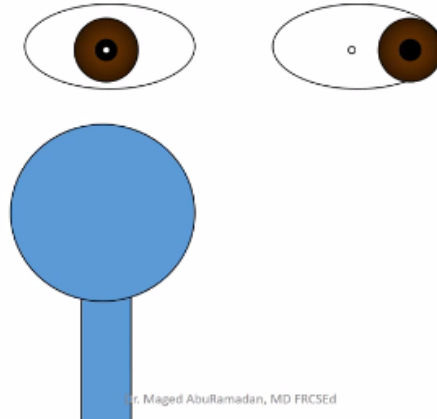
Covering good eye

Covered eye deviates

Squinting eye fixates

Removing cover

Return to original status



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Cover Uncover Test

Cover Uncover test

Left Exotropia

Manifest squint

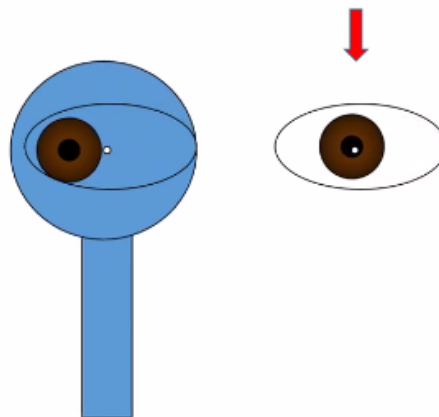
Covering good eye

Covered eye deviates

Squinting eye fixates

Removing cover

Return to original status



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Cover Uncover Test

Cover Uncover test

Left Exotropia

Manifest squint

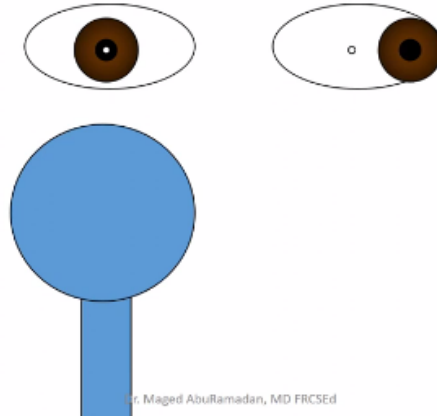
Covering good eye

Covered eye deviates

Squinting eye fixates

Removing cover

Return to original status



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In this case we see that the right eye is fixing the corner light is in the middle on the left side the corneal light reflection is the on the nasal side means this is a case of exotropia, if you cover the normal eye, which is the right you find that the left takes a corrective movement to fix while the right goes eXO and when you remove the occluder the right takes the fixation once more and then the left goes exo, this is a constant type of exotropia

Alternate Cover Test

Alternate Cover test

Exophoria

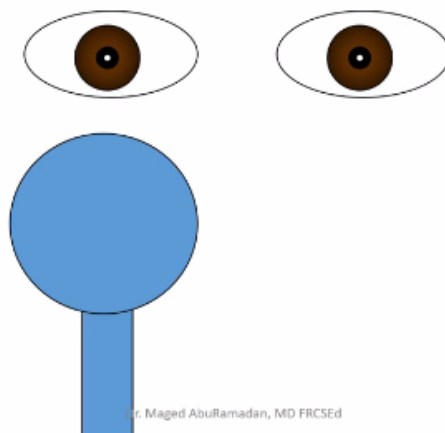
Latent squint

Covering one eye

Covered eye deviates

Moving cover to other eye

Covered eye deviates



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Alternate Cover Test

Alternate Cover test

Exophoria

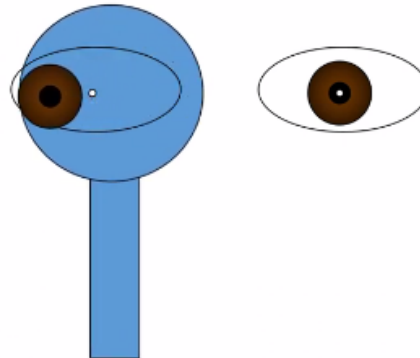
Latent squint

Covering one eye

Covered eye deviates

Moving cover to other eye

Covered eye deviates



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Alternate Cover Test

Alternate Cover test

Exophoria

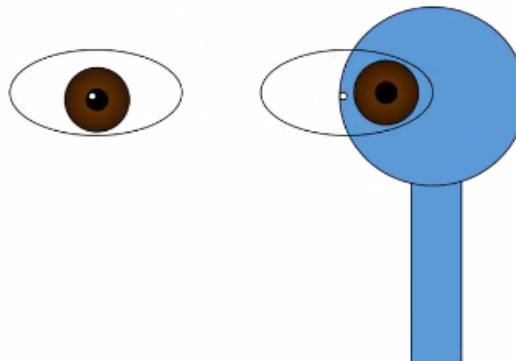
Latent squint

Covering one eye

Covered eye deviates

Moving cover to other eye

Covered eye deviates



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Alternate Cover Test

Alternate Cover test

Exophoria

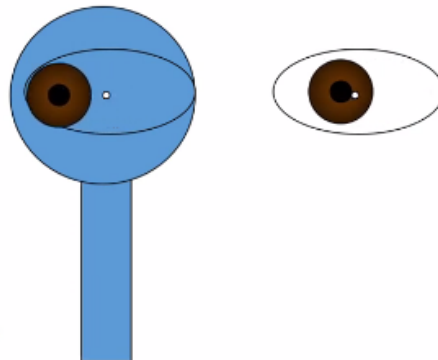
Latent squint

Covering one eye

Covered eye deviates

Moving cover to other eye

Covered eye deviates



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Here this is alternate cover test, exOphoria The eye under cover deviates and once you remove the cover both eyes regain fixed

Alternate Cover Test

Alternate Cover test

Left Exotropia

Manifest squint

Covering good eye

Covered eye deviates

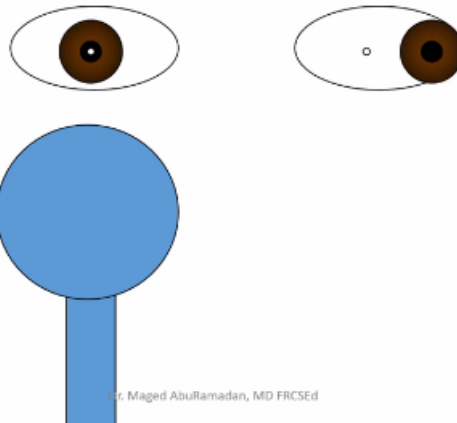
Squinting eye fixates

Removing cover

Return to original status

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Alternate Cover Test

Alternate Cover test

Left Exotropia

Manifest squint

Covering good eye

Covered eye deviates

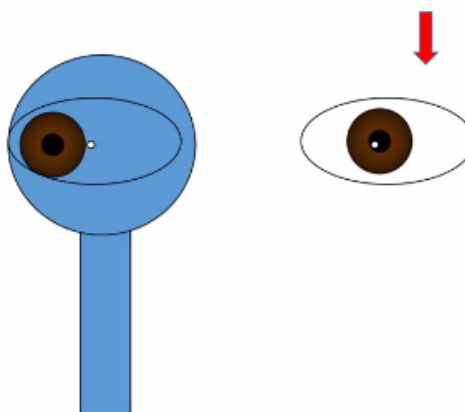
Squinting eye fixates

Removing cover

Return to original status

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Alternate Cover Test

Alternate Cover test

Left Exotropia

Manifest squint

Covering good eye

Covered eye deviates

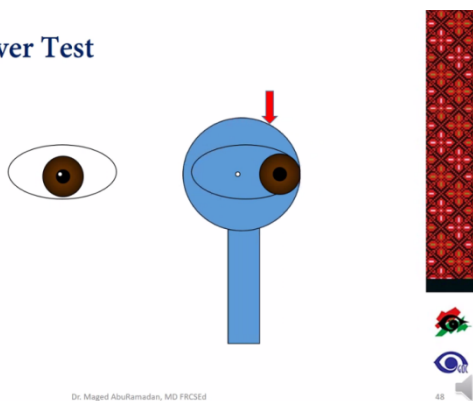
Squinting eye fixates

Removing cover

Return to original status

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Alternate Cover Test

Alternate Cover test

Left Exotropia

Manifest squint

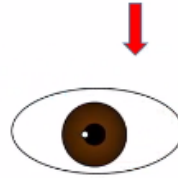
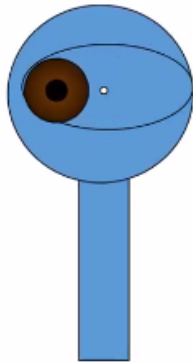
Covering good eye

Covered eye deviates

Squinting eye fixates

Removing cover

Return to original status



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Example of left exotropia

Convergence Testing

Fixates an object

Get object nearer to eyes

Both eyes **Converge**



Get object further from eyes

Both eyes **Diverge**



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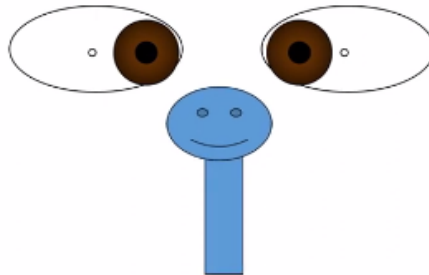
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Convergence Testing

Fixates an object

Get object nearer to eyes

Both eyes **Converge**



Get object further from eyes

Both eyes **Diverge**

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Convergence Testing

Fixates an object

Get object nearer to eyes

Both eyes **Converge**

Get object further from eyes

Both eyes **Diverge**



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here how We test convergence you ask the patient to look at a near object and you move the object nearer to the eye and then further away from the eye. Look how both eyes move against each other. Both of them converge and now both of them diverge again

Convergence Testing

Fixates an object

Insufficient Convergence

Get object nearer to eyes

One eye **Converge fully**

Other eye start to **converge**

Stops before end point

Diverge again

Get object further from eyes

Both eyes **Diverge**



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Convergence Testing

Fixates an object

Insufficient Convergence

Get object nearer to eyes

One eye Converge fully

Other eye start to converge

Stops before end point

Diverge again

Get object further from eyes

Both eyes Diverge



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Now they are move, however, the left eye loses convergence and goes out. This is called .convergence insufficiency

Thank yo11u