

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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Dr. Ismael Al Ghamdi

Presents

Amblyopia

CORE MESSAGES

2

Amblyopia is a form of reversible cerebral visual impairment

Caused by a disturbance of vision during sensitive period of development

Always associated with disease of the visual system

Amblyopia.

3

Unilateral or less commonly bilateral

No *structural* abnormality of the eye or the posterior visual pathway

The leading cause of visual impairment in children Affecting up to 4%

Definition, Diagnosis, and Clinical Features

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BCVA \leq 20/40 or a difference of 2 lines of Snellen acuity between the amblyopic eye and the normal eye

Clinical characteristics of amblyopia include

No change or even improvement in BCVA through a 3.0 neutral density filter

Improvement in vision when tested with single optotypes

Classification

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Abnormal binocular interaction

In strabismus amblyopia occur in at least 40%

Blur/distortion of the visual image due to

Uncorrected refractive errors

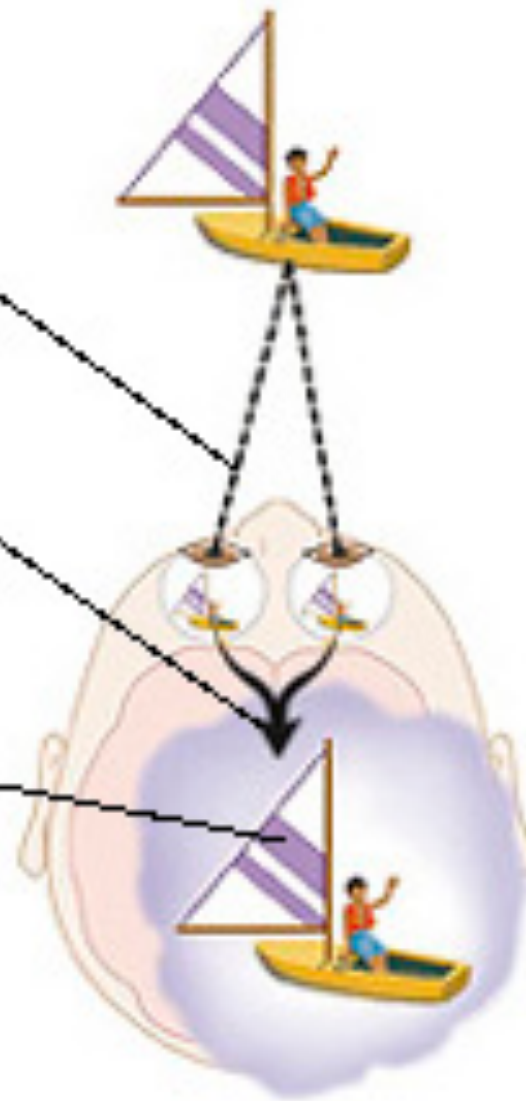
Media opacities (as lens opacity or corneal scarring)

Multiple or mechanisms can be seen

Each eye sees the boat from a different angle

Both eyes send clear pictures to the brain

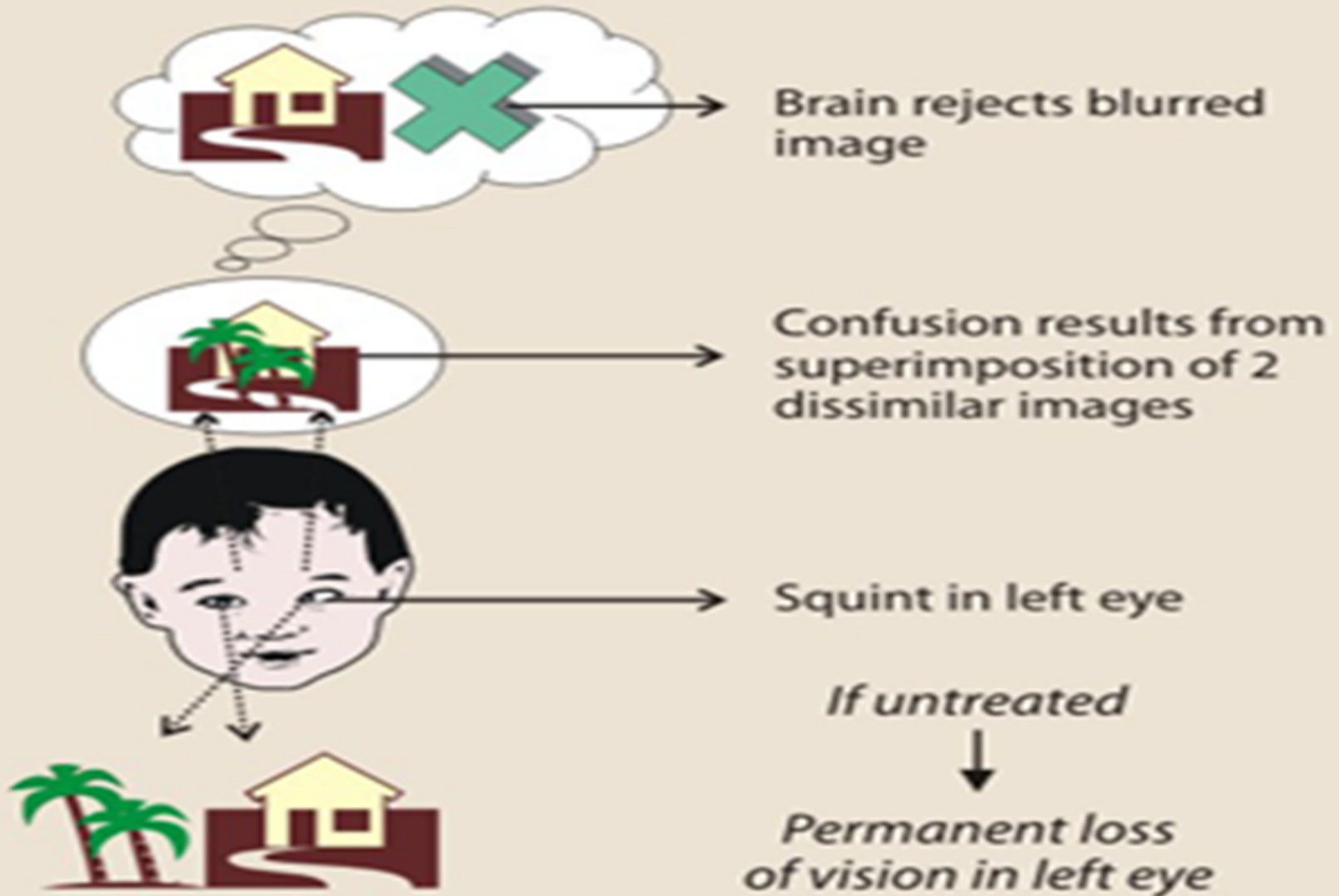
The brain fuses both pictures into one 3-D image



When the eyes work together, the brain fuses pictures from both eyes.

Amblyopia

Suppression of blurred image



STRABISMUS AMBLYOPIA

8

May result in loss of binocular function and stereopsis, despite focused retinal images in both eyes

Refractive amblyopia

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Hyperopia

Greater than +4.50 diopters

Highly hyperopia may causes strabismic amblyopia

Myopia

Amblyopia is rare if symmetric myopia, because these patients simply decrease the working distance to focus the image

Astigmatism (Meridional)

DEPRIVATION AMBLYOPIA

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Media opacities, ptosis, media opacity in cornea, lens, vitreous ..).

The least common type of amblyopia, <3% of cases **BUT** it has the most potential to cause severe amblyopia.



The various causes of Amblyopia among schoolchildren in Qassim province, Kingdom of Saudi Arabia

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Causes	Percentage
Anisometropia	77.72
High bilateral refractive error	16.84
Esotropia	3.46
Exotropia	1.98

Prevalence of amblyopia in primary school children in Qassim province, Kingdom of Saudi Arabia

Yousef Homood Aldebasi

Department of Optometry, College of Applied Medical Sciences, Qassim University, Saudi Arabia

TREATMENT OF AMBLYOPIA

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The first step is to provide a clear retinal image for the amblyopic eye

The second step consists of occluding or penalizing the dominant eye



Dr. Ismael Al Ghamdi

Presents

Leukocoria

Leuko-Coria

- Leuko :
- Coria :

White

Pupil

- Family history
- Prenatal and postnatal history
- Trauma history
- Parents examination when indicated
- OPD examination vs. EUS or EUA
(GA)

Leukocoria work up

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- Vision assessment
- IOP
- Alignment and nystagmus
- SLE
- Fundus examination

Causes

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External and Corneal causes
STUMPED

Anterior segment and Lens
causes

Posterior chamber and Retinal
causes

STUMPED

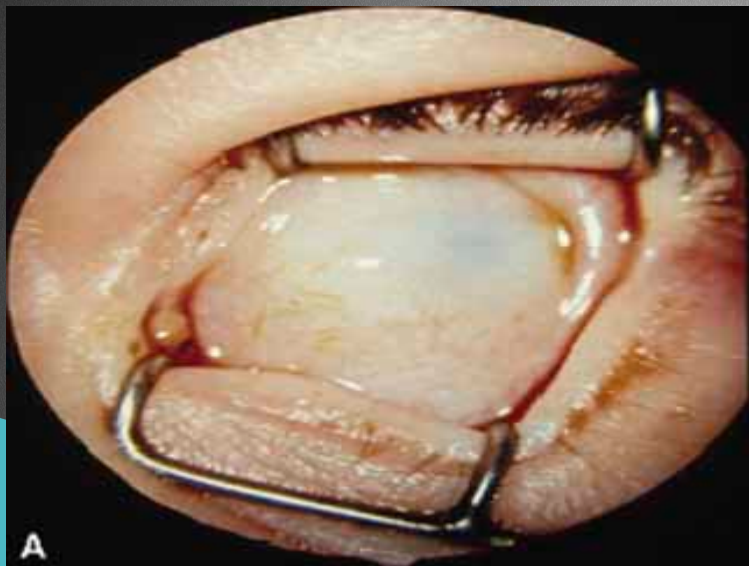
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causes of congenital clouding of the cornea:

- S - Sclerocornea
- T - Tears in the Descemet membrane secondary to birth trauma or congenital glaucoma
- U - Ulcers
- M - Metabolic
- P - Peters anomaly
- E - Edema (CHED)
- D – Dermoid

STUMPED

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A



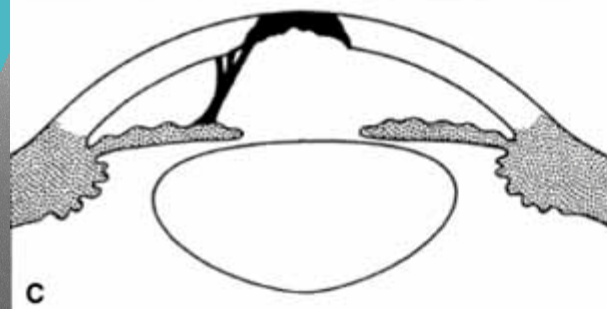
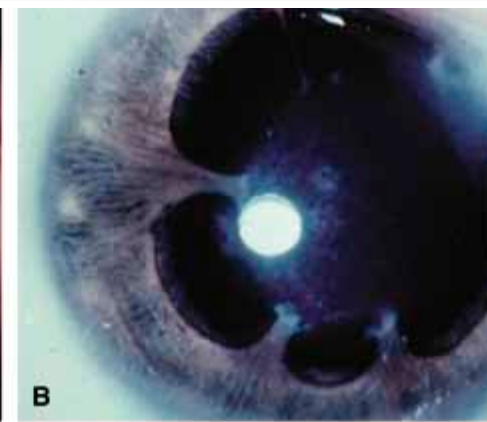
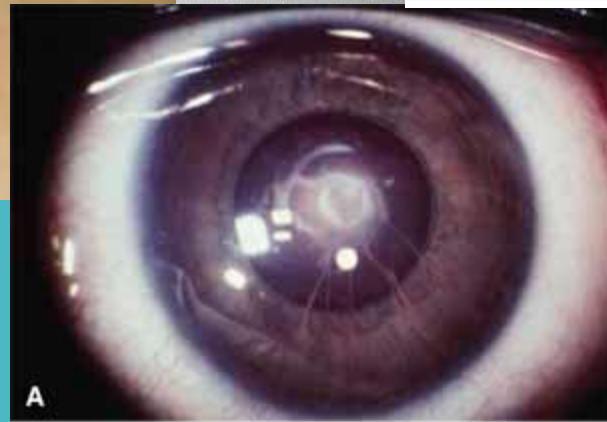
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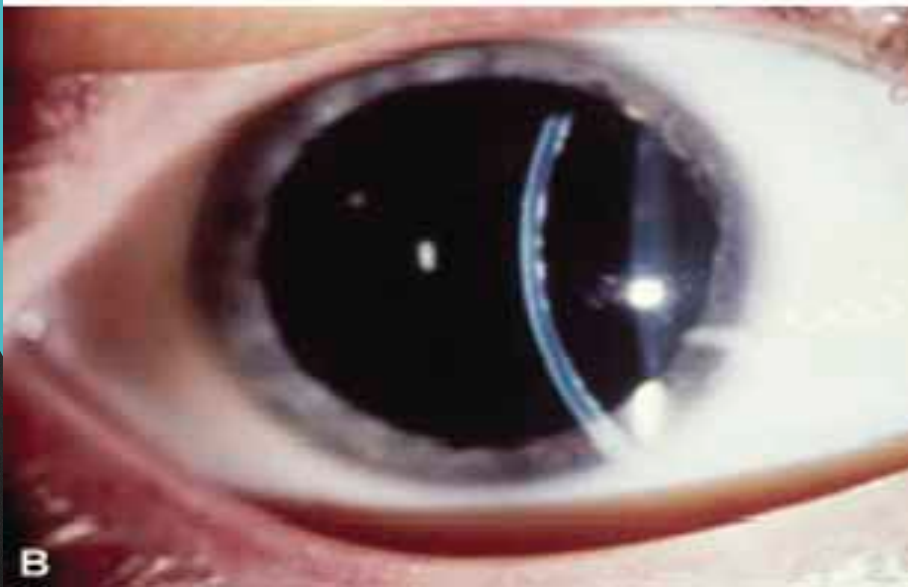
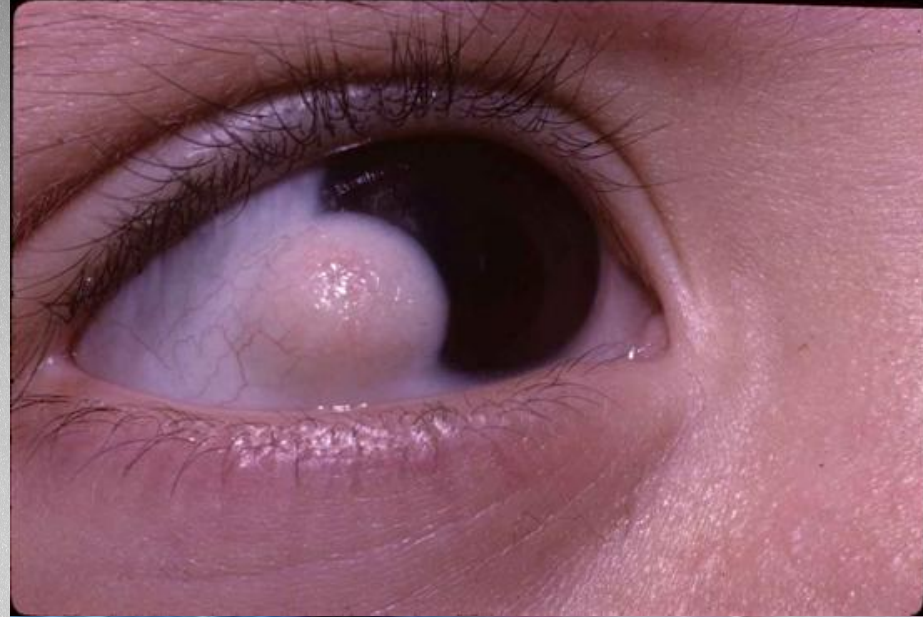


STUMPED



STUMPED

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■ Anterior segment and Lens causes
Posterior chamber and Retinal causes

- Cataract
- Retrolental mass (PHPV, ROP, RD),
- Tumor Retinoblastoma
- Exudates (FEVR, Coats' disease)
- Change in retinal pigment (high myopia, myelinated nerve fiber, retinal dysplasia)
- Infections (toxoplasmosis, endophthalmitis)

Congenital cataract



Retinoblastoma

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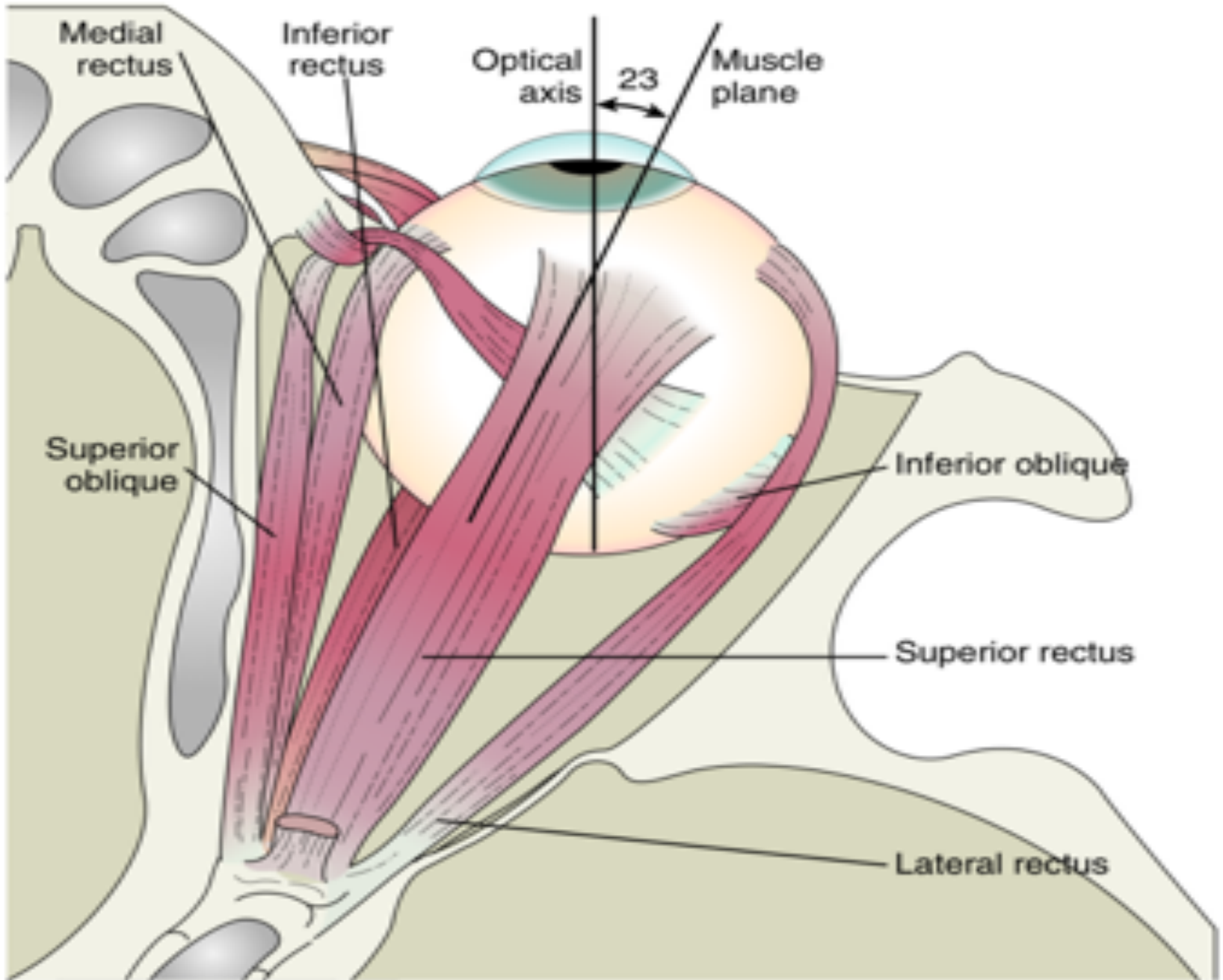
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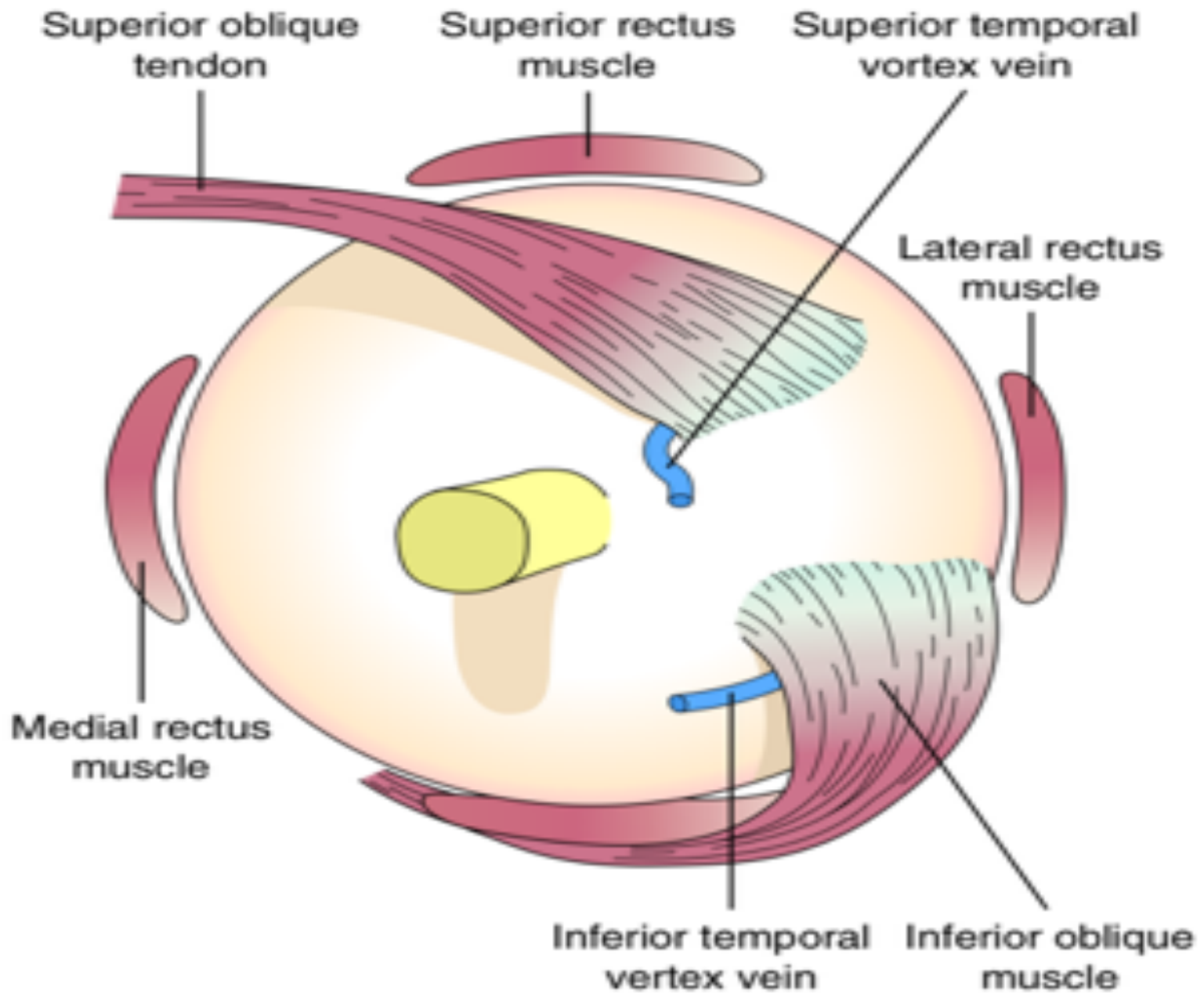
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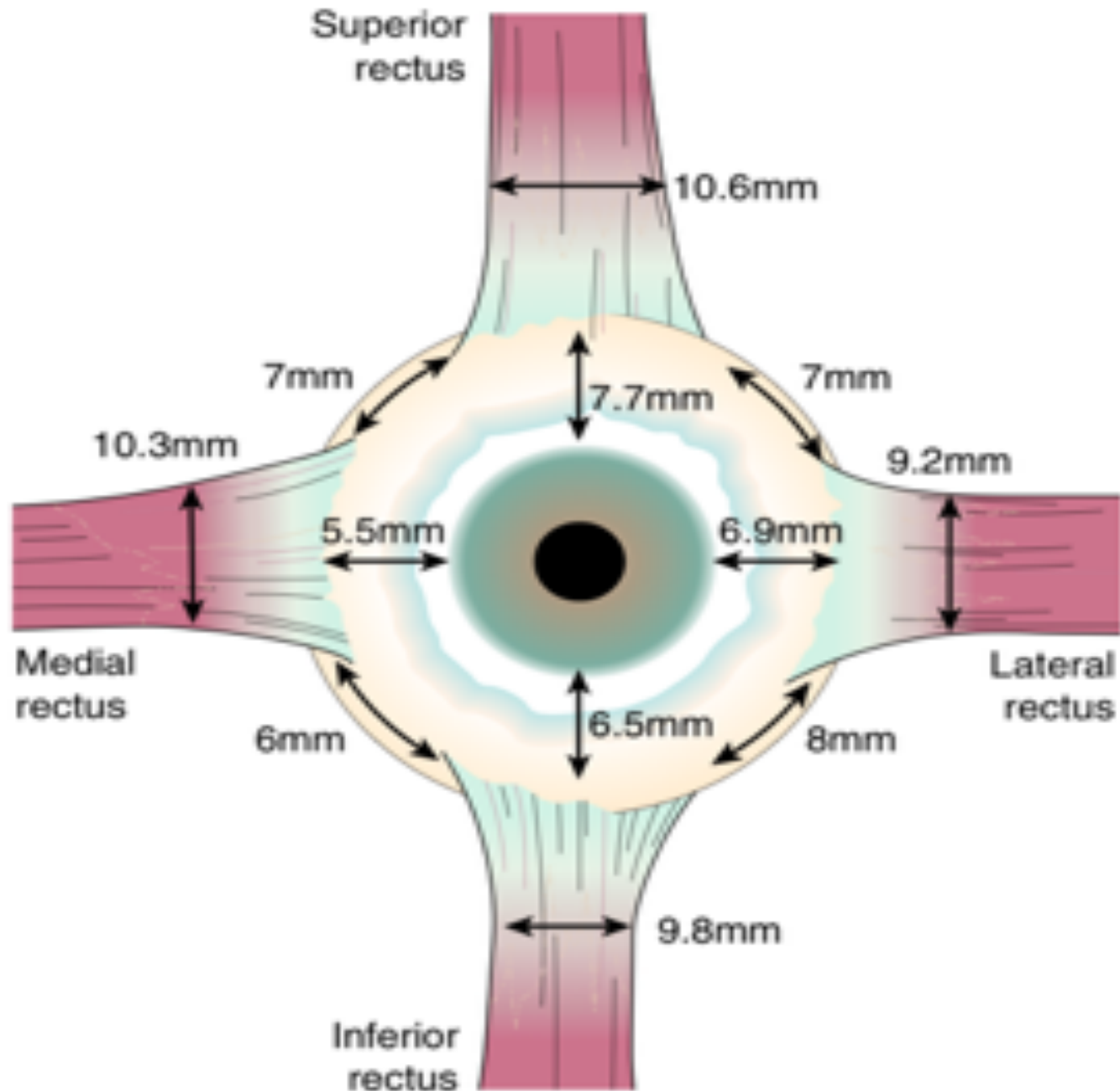
Dr. Ismael Al Ghamdi

Presents

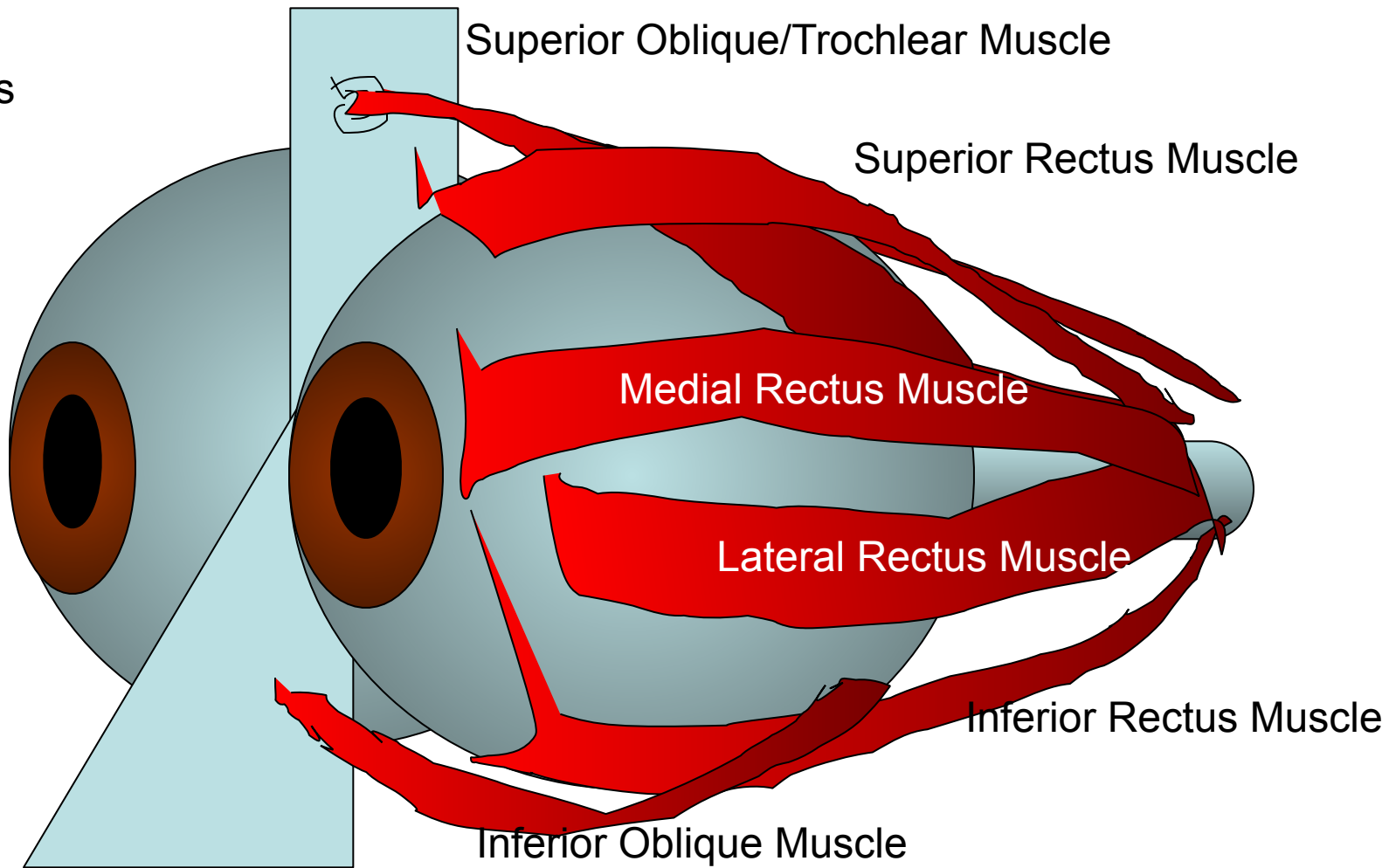
Strabismus







Eye Muscles
Left eye



Muscle	Muscle length (mm)	Tendon length (mm)	Arc of contact (mm)	Anatomic insertion from limbus	Action from primary position	Origin	32 Innervation
Medial rectus (MR)	40	4.5	7	5.5 mm	Adduction	Annulus of Zinn	CN 3, (inferior division)
Lateral rectus (LR)	40	7	12	6.9 mm	Abduction	Annulus of Zinn	CN 6
Superior rectus (SR)	40	6	6.5	7.7 mm	1. Elevation 2. Intorsion 3. Adduction	Annulus of Zinn	CN 3, (superior division)
Inferior rectus (IR)	40	7	6.5	6.5 mm	1. Depression 2. Extorsion 3. Adduction	Annulus of Zinn	CN 3, (inferior division)
Superior oblique (SO)	32	26	7-8	Posterior to equator in superotemporal quadrant	1. Intorsion 2. Depression 3. Abduction	Orbital apex above annulus of Zinn	CN 4
Inferior oblique (IO)	37	1	15	Posterior to equator in inferotemporal quadrant	1. Extorsion 2. Elevation 3. Abduction	Behind lacrimal fossa	CN 3, (inferior division)
Levator palpebrae	40	14-20	—	Septa of pretarsal orbicularis and anterior surface of tarsus	Lid elevation	Orbital apex above annulus of Zinn	CN 3, (superior division)

Strabismus

Strabismus is a general term referring to ocular misalignment due to extra ocular muscle imbalance

2% of children under 3 years

3% of children and young adults


Males = Females

STRABISMUS


- occurs when both eyes do not look at the same place at the same time; the eyes are unable to align properly under normal conditions
- eye(s) may turn in, out, up, or down
- often referred to as: cross-eyed, crossed eyes, cockeye, weak eye, wall-eyed, wandering eyes, and/or eye turn

CAUSES OF STRABISMUS³⁵

Problems with the nerves that transmit information to the eye muscles



Problems with the control center in the brain that directs eye movement



In adults, can be caused by stroke, thyroid problems, brain injury, or trauma

RISK FACTORS

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Family history

Relatives have strabismus, a person is more likely to develop it



Refractive errors

Hyperopia can cause strabismus



Medical conditions

People with down syndrome or cerebral palsy and people who have suffered a stroke or head injury

TYPES OF STRABISMUS

- **Esotropia**—inward turning of the eye
- **Exotropia**—outward turning of the eye
- **Hypertropia**—upward turning of the eye
- **Hypotropia**—downward turning of the eye

Pseudo strabismus

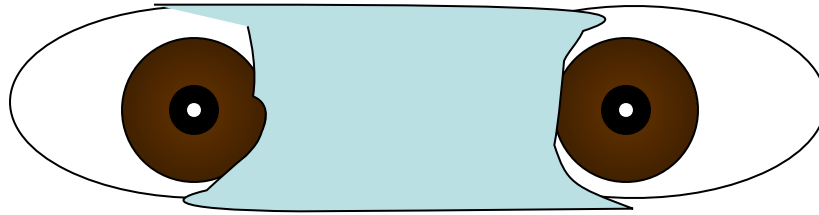
Pseudoesotropia is a condition in which alignment of the eyes is straight (also known as orthotropic); however, they appear to be crossed.

pseudo strabismus

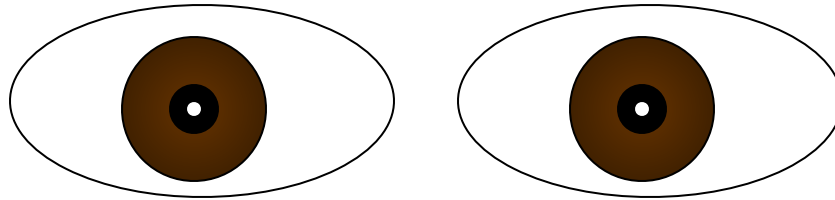
A careful ocular examination (eg, pupillary light reflex) reveals that the eyes are straight.

Using the cover-uncover test no deviation.

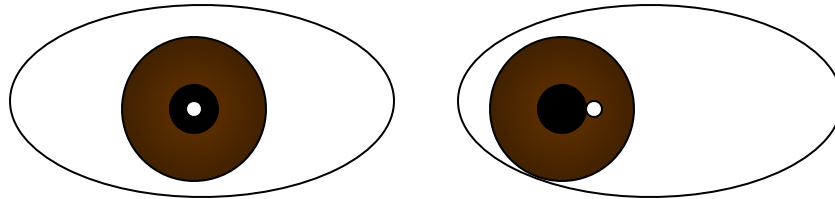
Pseudo ET



Orthophoria



Esotropia





Nomenclature

- Orthophoria O
- Esophoria E
- Esotropia ET
- Intermittent Esotropia E(T)



convergent

- Exophoria X
- Exotropia XT
- Intermittent Exotropia X(T)
- At near X(T)'



divergent

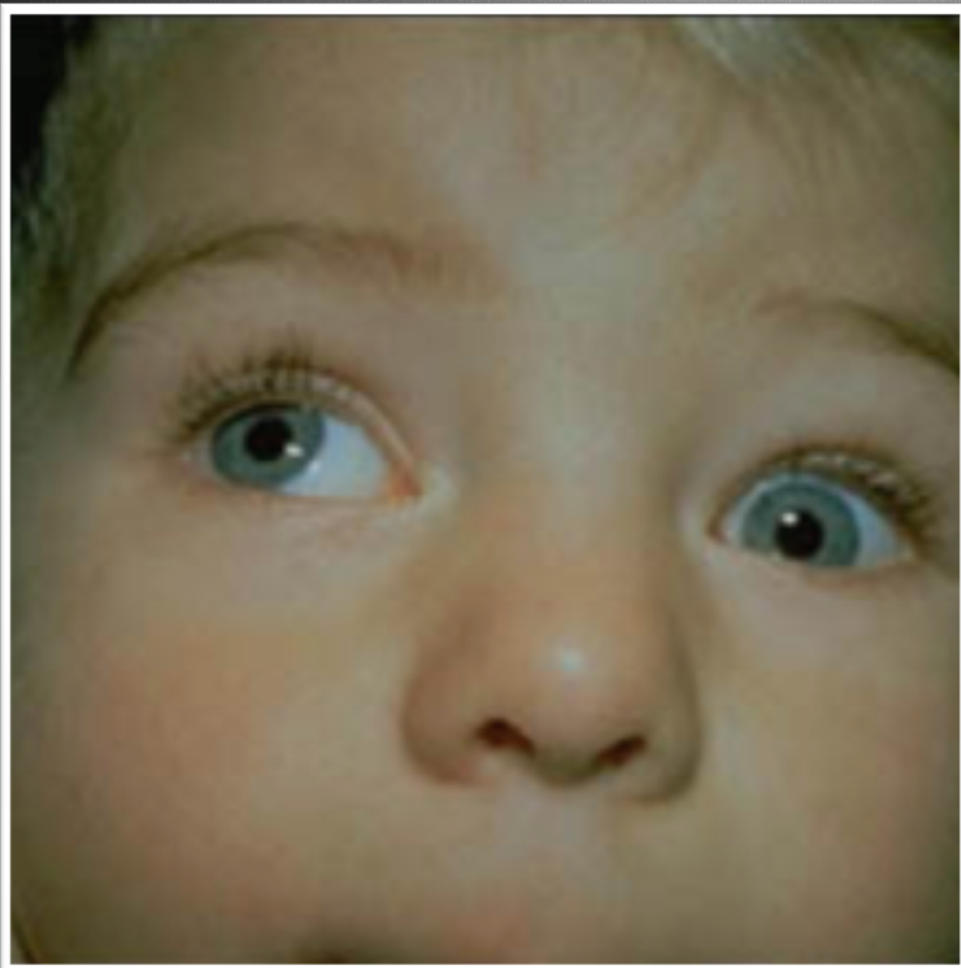
- Right Hypertropia RHT





ESOTROPIA

The left eye is turned inward note that the light reflection in the eyes is not symmetric



EXOTROPIA

The right eye is turned outward—again, not the light reflection in the eyes is not symmetrical



HYPERTROPIA

The right eye is turned upward—light reflection not symmetrical



HYPOTROPIA

The right eye is turned downward-light reflection in eyes is not symmetric

ADDITIONAL CLASSIFICATIONS

- **constant or intermittent**—the frequency it occurs
- **bilateral**—both eyes converge or diverge at the same time
- **unilateral**—if it always involves the same eye
- **alternating**—when the turning is sometimes the right and other times the left eye

WHEN DOES IT OCCUR?

- **congenital**—developing during infancy; 50% of children with strabismus are born with it
- **acquired**—developing in adulthood; can also develop as a result of lack of treatment during childhood

WHAT IT'S *NOT*

- Strabismus is *NOT* the same as Amblyopia!!
- Amblyopia is also called “lazy eye” and is a condition where vision does not develop normally during childhood
- Child may have one weak eye with poor vision and one strong eye with normal vision
- Amblyopia **DOES** occur commonly with Strabismus, but is a *vision* problem, where strabismus is a *muscle* problem

DIAGNOSIS

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Patient history

A comprehensive history is necessary to assess symptoms, health problems, and medications



Visual acuity

Measurements are taken to assess extent to which vision is affected



Refraction

Conducted to determine the lens power necessary to compensate for any refractive error



Alignment

Assessing how eyes focus, move, and work together



Eye exam

Assessing the structures of the eye (internal & external)

Why we are concerned about strab ?

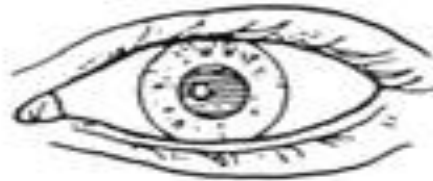
Functional

- **Preserving Stereo acuity**
- **Enlarging Visual field ET**
- **Diplopia**
- **Amblyopia**

Strabismus Why is it Important?

Cosmetic concern (Appearance)

- especially for school-age children.
 - Would you hire me?
 - Would you marry me?
 - Is there something wrong with you?...



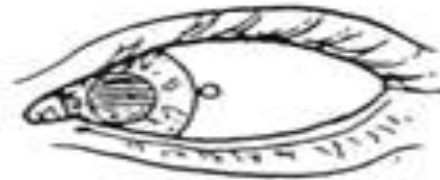
Normal



15° ET



30° ET



45° ET

Esotropia can be divided as

Infantile esotropia.

Acquired esotropia

Box 5-4. Classification of esotropia

Infantile

- Classic congenital
- Early-onset accommodative
- Duane's syndrome type I
- Abducens paralysis from birth trauma
- Nystagmus blockage syndrome
- Möbius' syndrome

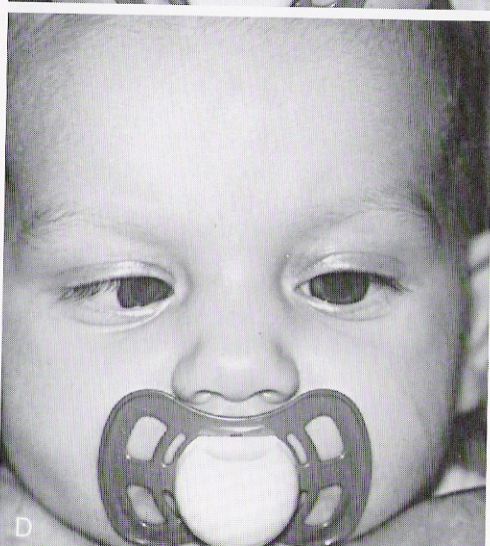
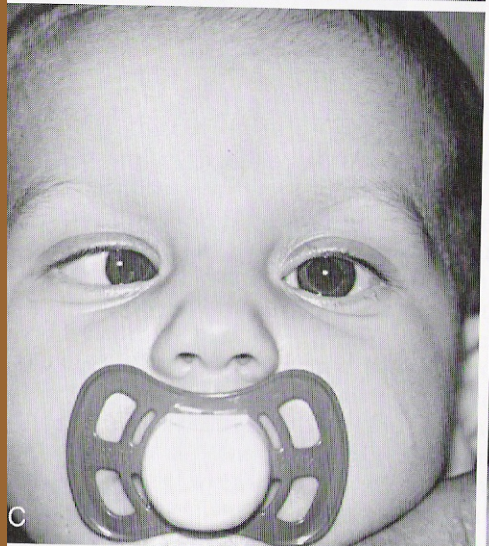
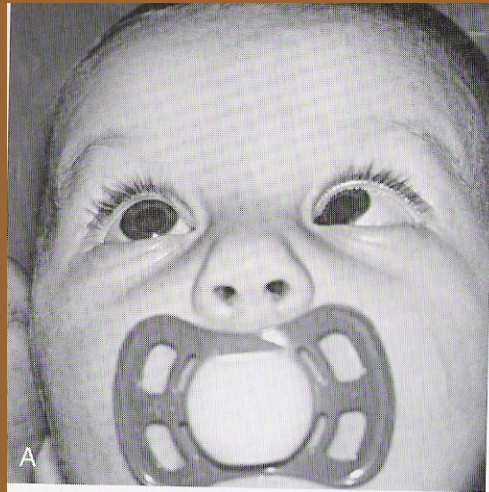
Acquired

Accommodative

- Refractive
- Nonrefractive
- Mixed (partially accommodative and partially basic)
- Decompensated

Nonaccommodative

- Stress-induced acquired
- Cyclic
- Acute comitant
- Sensory deprivation
- Divergence insufficiency
- Divergence paralysis
- Spasm of near synkinetic reflex
- Restrictive (thyroid-related, medial orbital wall fracture, overresected MR)
- Lateral rectus weakness (CN 6 palsy, iatrogenic/surgical [slipped, detached, overrecessed LR])





22 2:41 PM

Infantile Esotropia

- Associated with inferior oblique over action
- DVD, dissociated vertical deviation
- Rule out CN 6 palsy from birth? Or spontaneous resolution
- Remember some variable, intermittent strabismus is expected until 4 months of age.



Accommodative Esotropia

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Typically presents around age 2 years, may present acutely.

Why is there ET with Accommodation?

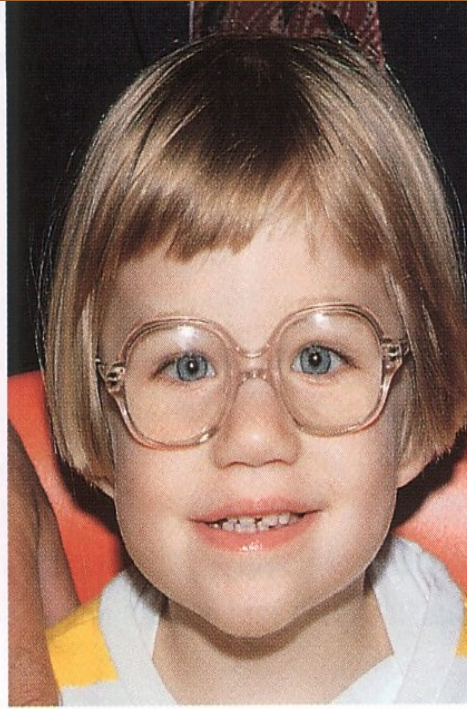
Eyes will usually converge when accommodation is attempted

If high hyperopia then must accommodate then will converge, cross, specially at near





A



B

Refractive error
usually +3 +4

May precipitated by
acute illness or
trauma

Start intrmittent and
if not treated
become constant





Accommodative ET

- Use cyclogyl to measure Rx (wait ≥ 30 minutes)
- Recheck 4 weeks later with glasses,
- Tell parents they eyes will continue to cross every time the glasses come off

Esotropia associated with Viral illness

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- Often self limited, will spontaneously resolve in 3-6 months.
- Acute
- Not improved with hyperopic glasses.
- Consider ruling out neoplastic causes.
- Treat/prevent amblyopia in the mean time



Esotropia associated with Diabetes

- Abducens, lateral, CN 6 usually affected.
- Isolated unilateral palsy
 - Ischemic
 - Usually resolves after 4-6 months.
 - Consider Botox in the meantime, to The medial rectus

Exotropia

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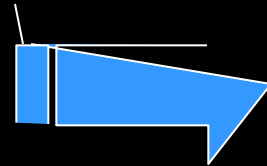
- Intermittent is very common
- Make sure they have BCVA glasses
- Often familial
- Intermittent exotropia can breakdown over time, check serial stereo. If worsening think surgery.
- Most common time of pediatric surgery is before 7 years old.



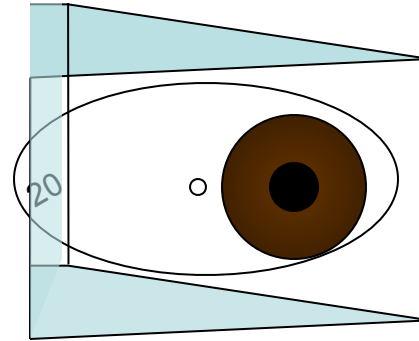
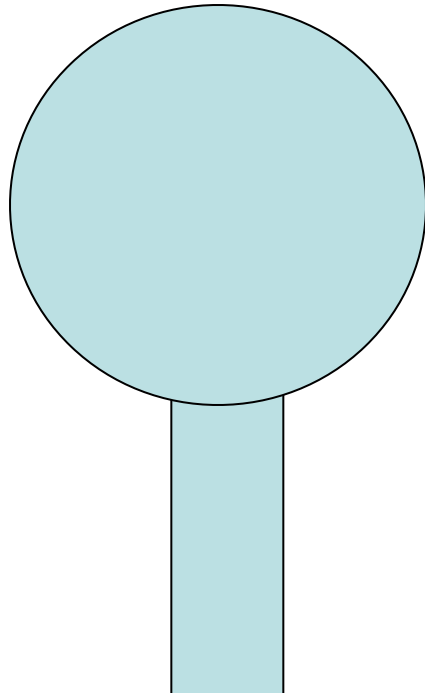
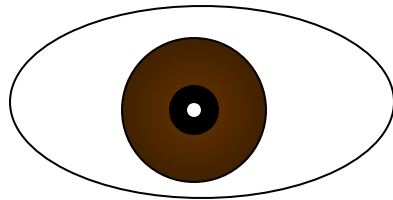


Exotropia

- The commonest exodeviation
- Large phoria, controlled by the strong fusional convergence.
- spontaneously breaks down into XT
- ☒ if child is tired, daydreaming or sick
- In adults, after taking alcohol or sedatives



How much to operate...



Alternate Cover test with Prism

Exotropia, Constant

Use prism to quantitate the deviation.

Change prism power until movement is neutralized.

Use this number to plan surgery

the same applies for esotropia 72

TREATMENT

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If amblyopia is present

1-Eye patching

2- treat other causes of amblyopia if present

The stronger eye is patched to force the brain to interpret images from the strabismic eye. Eye patches will not change the angle of the strabismus.



TREATMENT



Treat refractive errors
with

- Eyeglass or Contacts

Eyeglasses or Contacts are used to improved the positioning of the eye(s) by modifying the patient's reaction to focus. (accommodation)

TREATMENT

Prisms

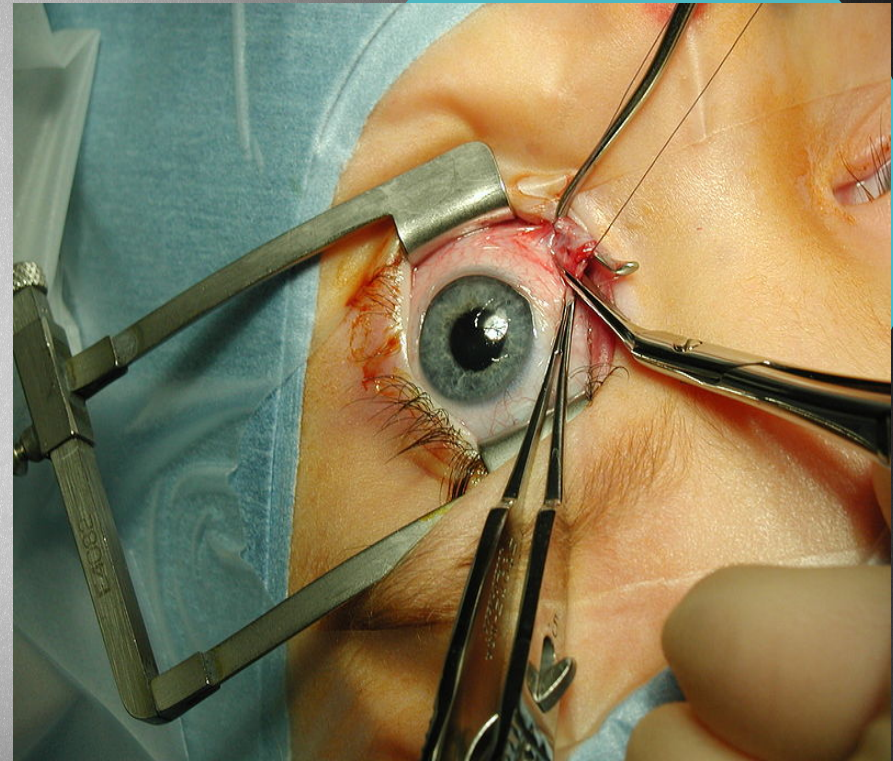
Prisms are used to modify the way light and images hit the eye, it can help in double vision



TREATMENT

Eye Surgery

- Surgery may be necessary in an attempt to align the eyes
- During surgery, the muscle positions will be changed or the length of the muscles will be changed

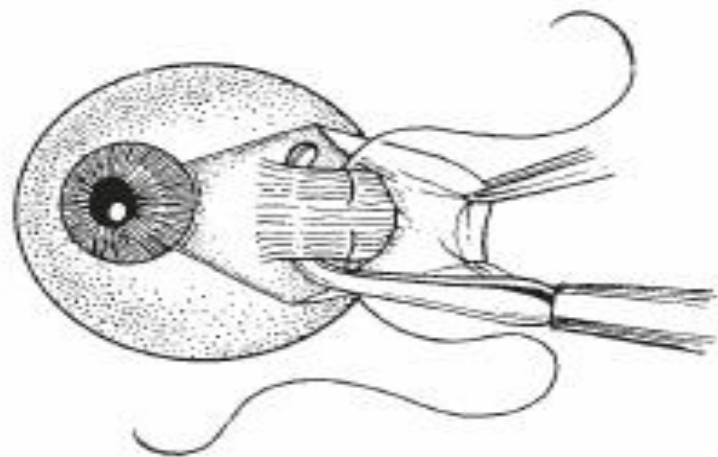
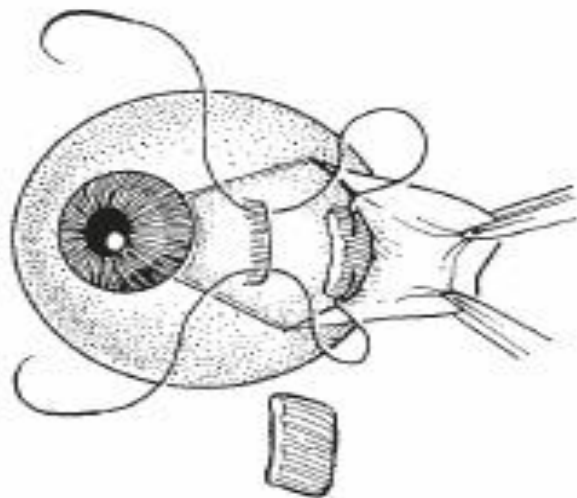
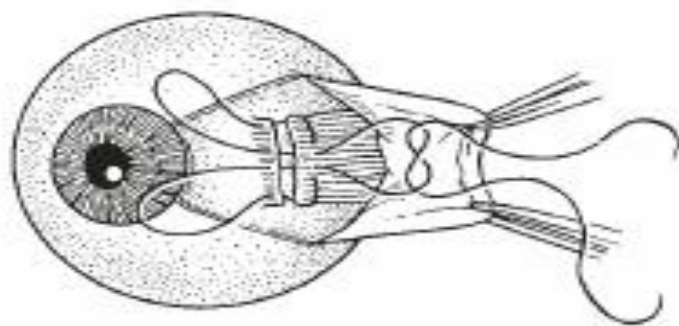
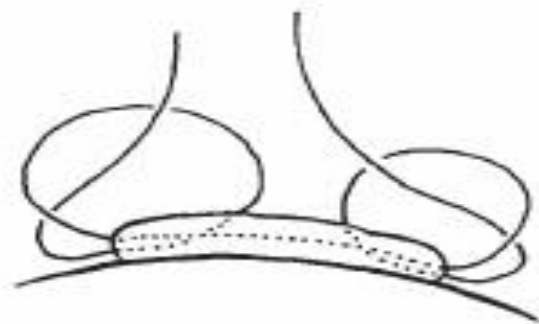
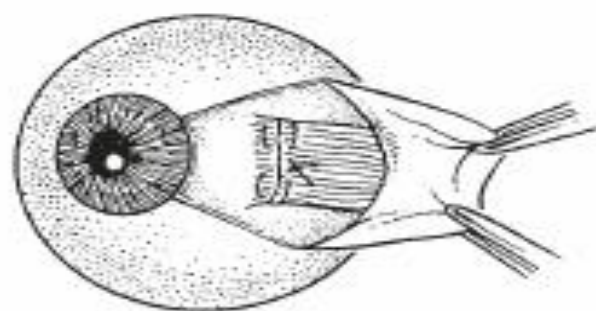


Surgery on medial rectus muscle of the left eye.

**Muscle Surgery either to
weakening the muscle or to
strengthening it**

Recession – weakening

Resection – strengthening

A**B****D****C****E**

How much to operate?

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- How much to operate

- Tables:

- Dosages (surgical)
- bilat , 2 muscles
- ie for ET 40PD recess 5.5mm both MR

	ET		XT		
PD	Rec	Rst	Rec	Resect	
15	3	3	4	2.5	
20	3.5	4	5	3	
25	4	5	6	4	
30	4.5	6	7	5	
35	5	7	7.5	5.5	
40	5.5	7.5	8	6	
50	6	8	9*	7	
60	6.5	8.5	10*	8	

- Personal experience

TREATMENT

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Botox Therapy

- Used as an alternative to eye muscle surgery
- The drug will temporarily relax the eye muscle (paralyze), which will allow the opposite eye to tighten and straighten.
- The effects are short term about 3 to 8 weeks.







Thank you

Dr. Ismael Al Ghamdi

Thank you.