OPHTHALMOLOGY REVISION 1

----- Active space -----

Anatomy of eye

00:00:53

The shape of eyeball : Aspheric (An oblate spheroid).
Volume of eyeball : 6mL.
Volume of orbit : 30mL.

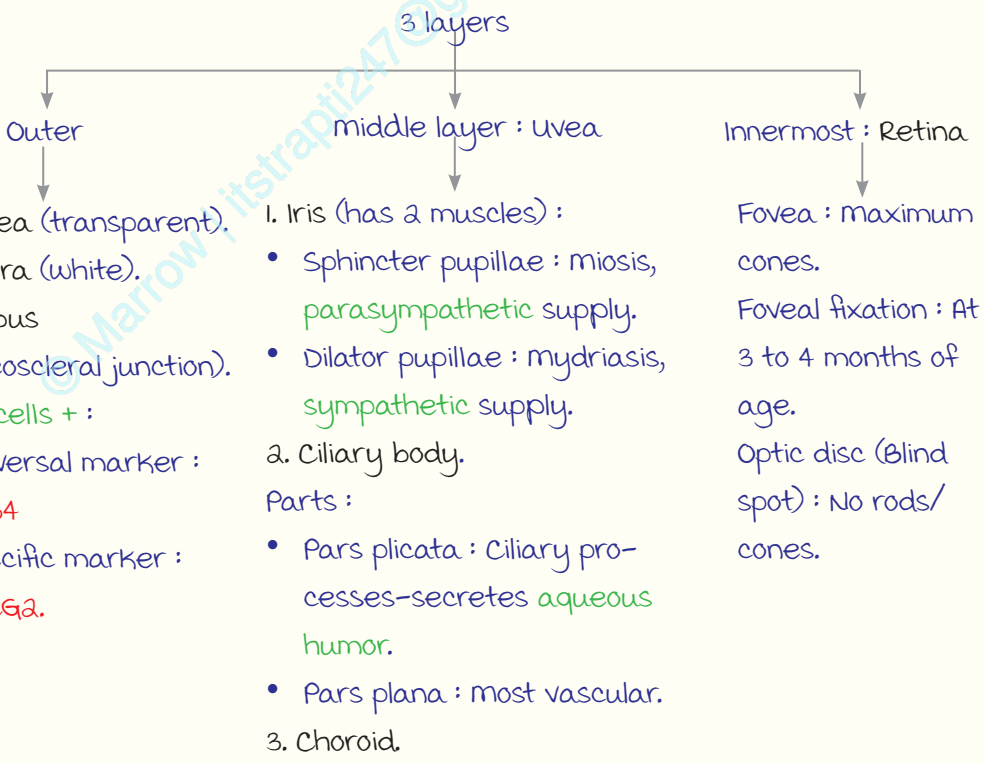
Orbit :

4 walls.

- Thinnest : Medial wall.
- Weakest : Floor of the orbit. (Fracture of floor of orbit → blow out fracture → tear drop sign).

Base : Quadrangular in shape.
Apex : Triangular (Conical).

Layers of eyeball :



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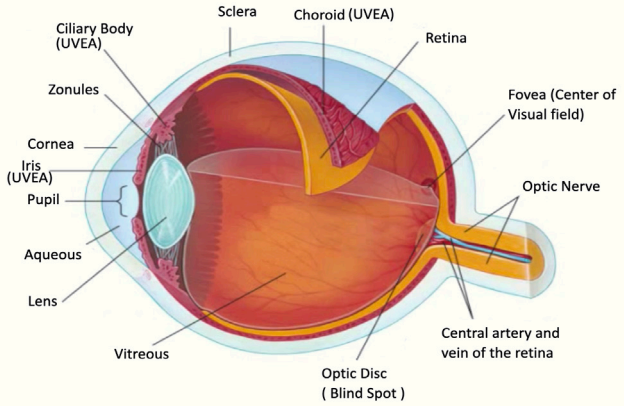


Cross section of the eyeball

Anterior segment : Anterior chamber + posterior chamber. Contains aqueous humor.

- Posterior chamber : B/w iris & lens.
- Anterior chamber : B/w cornea & iris.

Posterior segment : Contains vitreous humor.

Blood supply of eye :

00:13:19

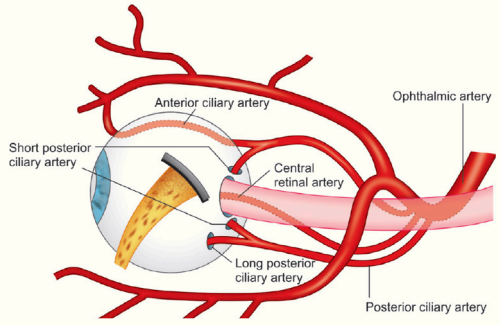
Internal carotid artery

↓

Ophthalmic artery

Posterior ciliary artery	Central retinal artery	Muscular branches
↓	↓	↓
2 branches :	Supplies inner 6 layers of retina.	Forms anterior ciliary artery.

1. Short posterior ciliary artery : Supplies sclera, choroid, & outer 4 layers of retina (Travels near optic nerve).
2. Long posterior ciliary artery : Supplies ciliary body, iris, sclera (Travels away from optic nerve).



Blood supply of eye

OPHTHALMOLOGY REVISION 2

----- Active space -----

Visual field defects

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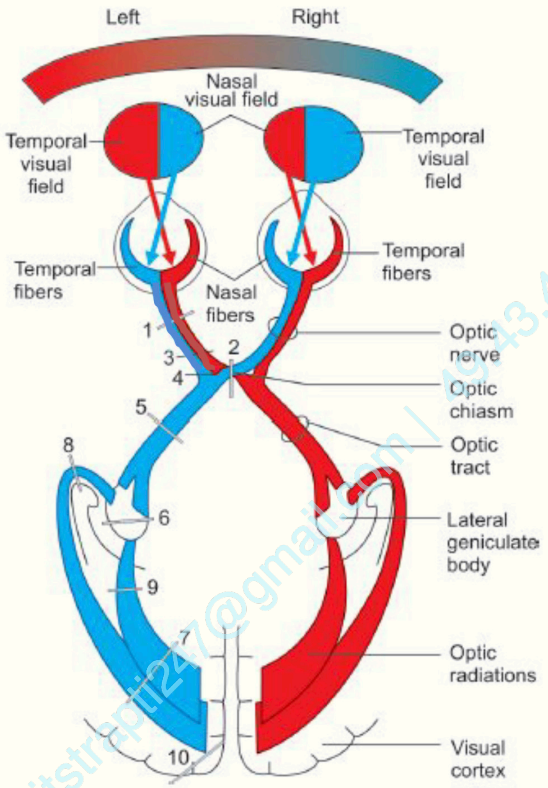
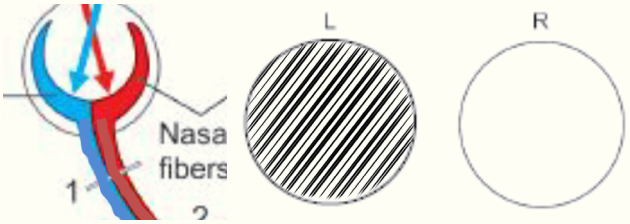
Visual Pathway :



Lesions of the visual pathway : (All lesions below will be left sided)

1. Optic nerve lesion :



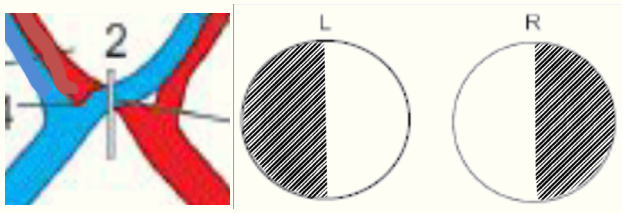
Affects I/L temporal fibres and I/L nasal fibres.

Ipsilateral anopia.

Earliest manifestation : Central scotoma.

----- Active space -----

2. Optic chiasma lesion :



B/L nasal fibres affected.

Bitemporal hemianopia (Heteronymous hemianopia).

Causes :

Buy (Bi) 3 PC & AC

3 : Third ventricular glioma.

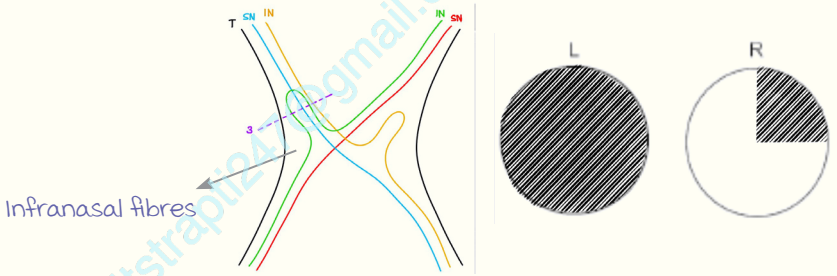
P : Pituitary adenoma.

C : Craniopharyngioma.

A : Anterior communicating artery aneurysm.

C : Cavernous sinus thrombosis.

3. Junction of optic nerve and chiasma (Anterior Knee of von Willebrand) :



Superonasal fibres cross into the opposite optic nerve.

Inferonasal (IN) fibres form a loop into the C/L ON and then enter inferiorly into the C/L optic tract.

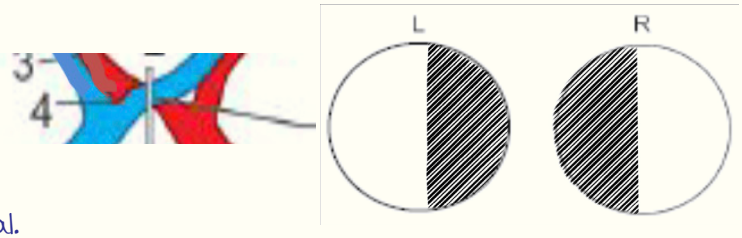
There is damage to right IN and left complete ON → C/L Supratemporal quadrantonopia + L Anopia.

This is called a junctional scotoma.

m/c cause : Meningioma.

Active space

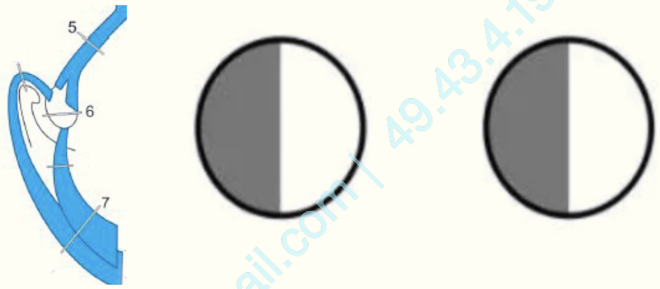
4. Lateral optic chiasma :



Always bilateral.
Theoretical lesion.
B/L temporal fields → Binasal hemianopia (Heteronymous hemianopia).

5. Optic tract.
6. Lateral geniculate body.
7. Optic radiation.

} consist of I/L temporal and C/L nasal fibres.



Injury here will lead to C/L homonymous hemianopia.
Lesion on the left side → Inability to see B/L in the right visual field.

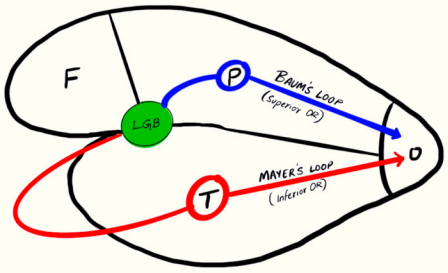
Differentiation between lesions 5, 6, and 7 :

	Optic tract	L G B	Optic radiation (OR)
Pupil	Wernicke's pupil	Normal	Normal
Optic atrophy	B/L	B/L	No atrophy

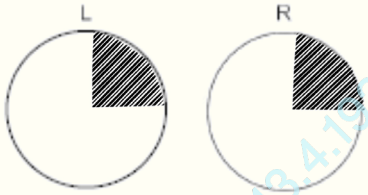
Wernicke's pupil seen as the optic tract contains pupillary fibres, which are given off before it relays into the LGB.

Fibres from the LGB reach the occipital lobe by : Baum's loop, Mayer's loop

----- Active space -----

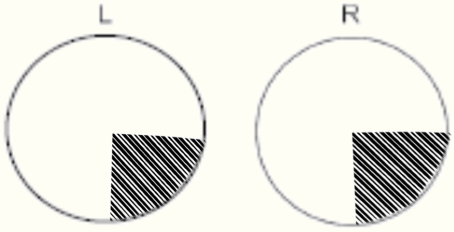


8. Inferior OR (meyer's loop) :



Half of the fibres pass inferiorly through the temporal lobe.
C/L Superior homonymous quadrantopia.
Superior visual field loss : 'Pie in the sky'.
Mnemonic : TIPS : Temporal, Inferior, Pie in the sky

9. Superior OR (Baum's loop) :

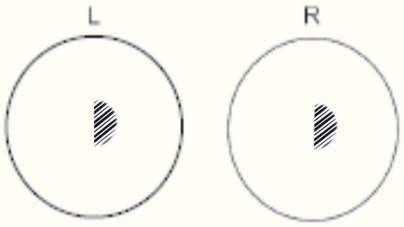


- Half of the fibres pass superiorly through the parietal lobe.
- C/L Inferior homonymous quadrantopia.
- Inferior visual field loss : 'Pie on the floor'.

10. Visual cortex :

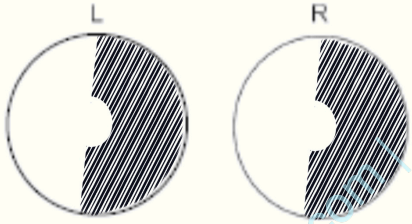
Majority supplied by the Posterior Cerebral Artery (PCA).
Small bit at the tip of the occipital cortex supplied by Middle Cerebral Artery (MCA).
The tip of the occipital lobe represents the macular visual field.

10a. If the MCA is affected :



Macular blindness if the tip of the cortex is affected .
If the left side is involved → L temporal + R nasal macular.
Right sided C/L homonymous macular defect.
Cental vision affected : 'cookie cutter effect'.

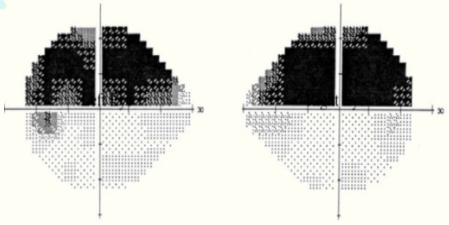
10b. If the PCA is affected :



All fibres affected except macular fibres.
If the left side is involved → L temporal .
C/L homonymous hemianopia with macular sparing.

Miscellaneous visual field defects :

1. Bi-superior hemianopia :



A type of altitudinal visual field defect.
Defect respects the horizontal plane.
Causes of altitudinal defects : GOA

- Glaucoma.
- Optic disc drusen.
- AION (Anterior ischemic optic neuropathy).

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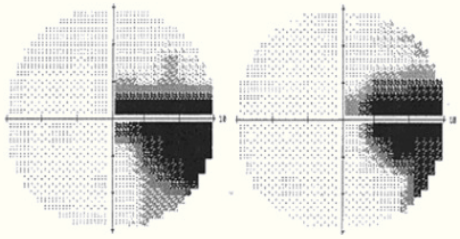
2. Keyhole visual field defect :



Incomplete LGB lesion (Site of lesion is below optic chiasma).
Signifies a developing right sided homonymous hemianopia.
(Not to be confused with Keyhole vision in retinitis pigmentosa).

Pupillary light reflex

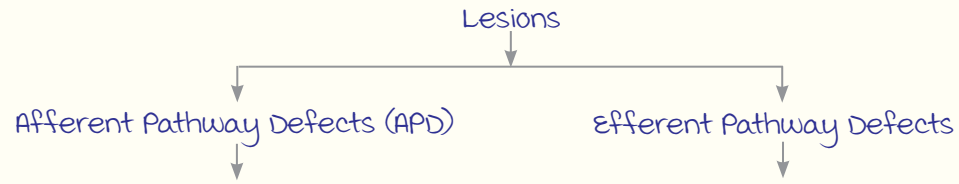
00:38:02

Light reflex pathway :

Optic nerve (Afferent)
↓
Optic tract
↓
Pre tectal nuclei (center for light reflex)
↓
Internuncial neurons
↓
B/L Edinger Westphal Nucleus
↓
B/L Oculomotor nerve (Efferent)
↓
B/L Ciliary Ganglion
↓
B/L Short Ciliary nerve
↓
B/L Sphincter pupillae

Active space

Lesions :



- Absolute APD (AAPD).
- Relative APD (marcus Gunn Pupil/RAPD).
  (Both are optic nerve lesions)
- Wernicke's pupil (lesion of optic tract).

- Argyll-Robertson Pupil.
- Tonic Pupil.

Afferent Pathway defects :

Isocoria is seen in afferent pathway defects.

a. In AAPD : Application of light on lesion eye → No pupillary constriction in both eyes.
b. In RAPD :
   - Swinging flashlight test is done to differentiate b/w AAPD and RAPD.
   - Constriction of pupils is seen on shining of light, initially.
   - Later, when light shone on diseased eye → Paradoxical dilatation of B/L pupils.
   - This is due to fatiguability of the diseased nerve.

Efferent pathway defects :

Anisocoria is seen in efferent pathway defects.

Argyll Robertson Pupil (ARP) :

Etiology : Neurosyphilis.

- Accommodation reflex present.
- Pupillary reflex absent.

Tonic pupil.

Tonic Pupil	Pharmacological mydriasis
Ciliary ganglion or short ciliary nerve damage.	Drugs like atropine.
I/L pupil never constrict.	I/L pupil never constricts.
Accomodation reflex +.	Accommodation reflex lost.
Constriction with 0.1 % Pilocarpine (Denervation hypersensitivity +).	No constriction even with 1 % Pilocarpine.

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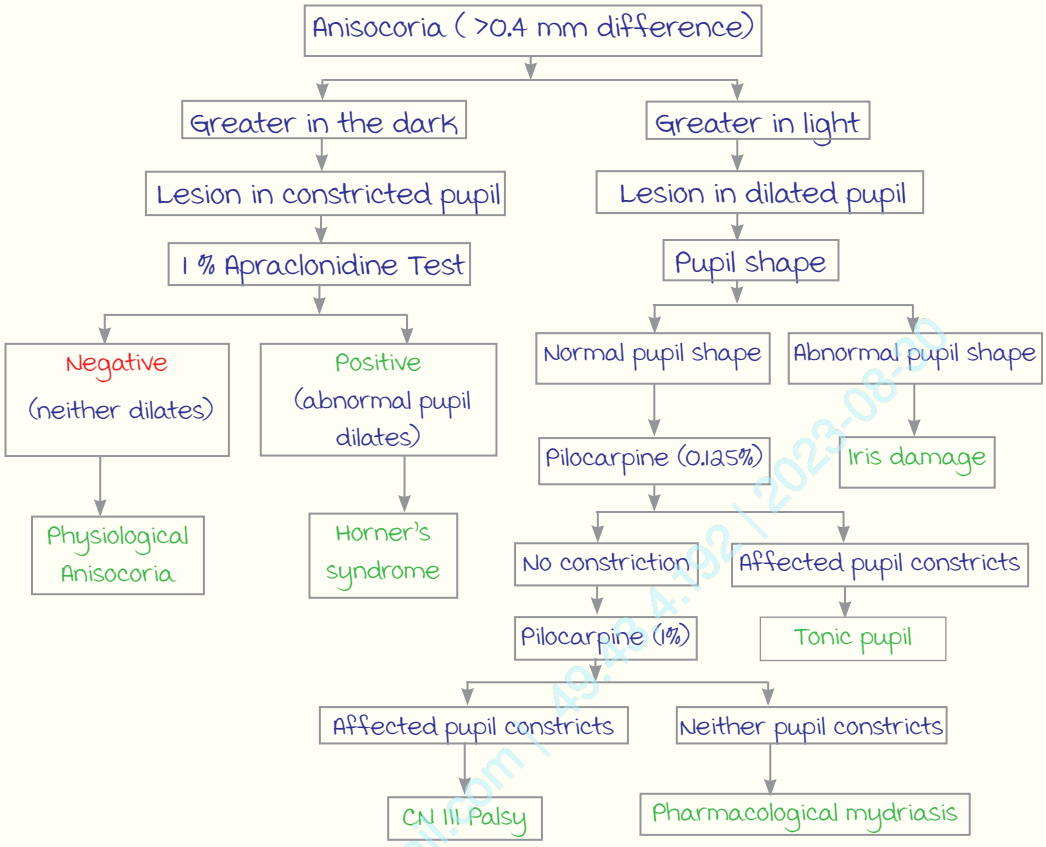


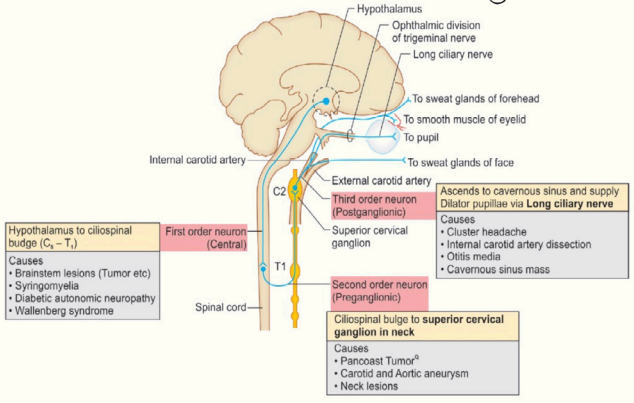
Horner's Syndrome :

Oculo-sympathetic syndrome → Dilator pupillae muscle palsy.

Clinical features (I/L) : HIMAPLE

- Hetrochromia iridis (affected eye becomes hypochromic).
- Inferior eyelid elevation.
- Miosis (dilator pupilae damage).
- Anhydrosis.
- Ptosis (muller's muscle palsy).
- Loss of ciliospinal reflex.
- Enophthalmos.

Causes based on anatomical region :



Active space

Diagnosis :

a. 4 % cocaine test : first test to be done. Horner's pupil does not dilate.

b. 1 % apraclonidine test : Horner's pupil will dilate ($\alpha 2 >>> \alpha 1$).

Localisation :

a. Amphetamine test.

b. Adrenaline test. → Pre-ganglionic → Dilation (–)

b. Adrenaline test. → Post-ganglionic → Dilation (+)

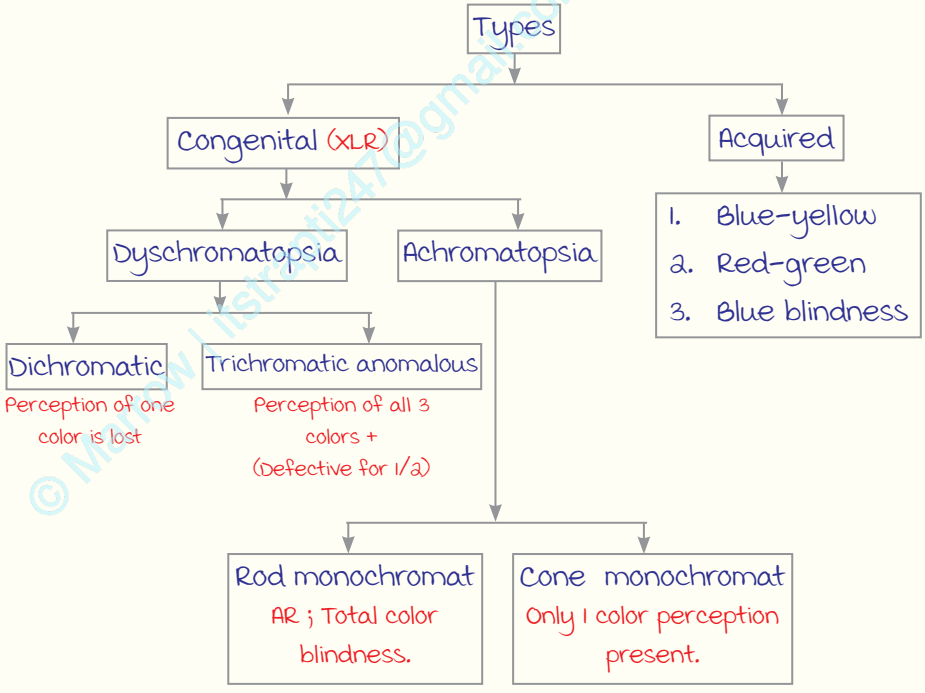
Color Blindness

01:03:36

Primary colors :

- Red (prota).
- Green (deutra).
- Blue (trita).

Types :



Acquired causes :

a. Blue-yellow : Retinal diseases except cone dystrophy and Stargart's disease. Also seen in POAG.

b. Red-green : Optic nerve lesions (except glaucoma).

c. Blue blindness : Old age.

----- Active space -----

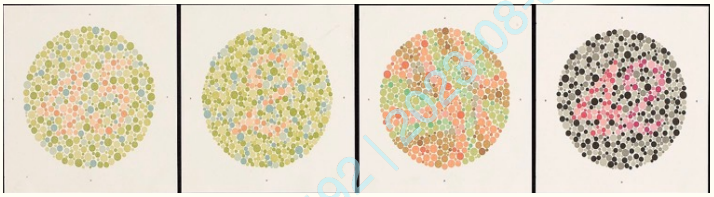
Congenital causes :

a. Dichromatic : Protanopia, deutranopia, tritanopia.

b. Trichomatic : Protanomaly, deutranomaly, tritanomaly.

Tests for color blindness :

1. Ishihara chart : Has 38 slides of three types (Slides can have number, pattern, no pattern).
   - Pseudo isochromatic chart.
   - m/c used test.
   - Cannot detect tritan.
   - Good for Red-green.



2. Hardy Rand Ritler Test :
   - Follows the same principle as Ishihara (pseudo-isochromatic chart).
   - Used for Screening in children
   - Three shapes (triangle circle, square).

3. Farnsworth Munsell 100 hue test :
   - Best test for color blindness.
   - Most sensitive.
   - Farnsworth Munsell 15 hue test has lesser sensitivity than the 100 hue test.

4. Holmgren's wool.
5. Nagel's anomaloscope.
6. Lantern.

Optic Atrophy

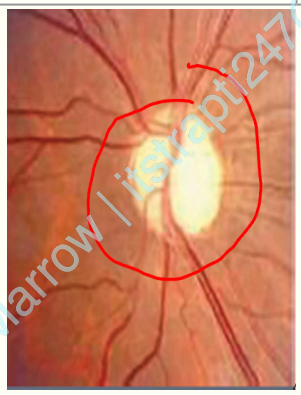
01:13:17

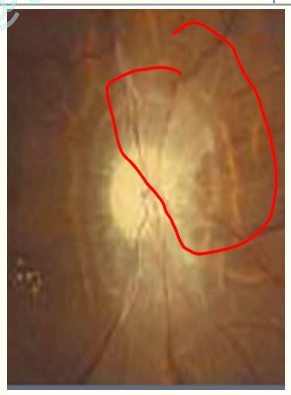
----- Active space -----

Normal color of optic disc is pale pink.

Optic atrophy is of 3 types :

Feature	Primary	Secondary	Consecutive
	Optic atrophy without antecedent disc swelling.	Optic atrophy after disc swelling.	Atrophy due to disease of inner retina and its blood supply.
Disc appearance	Chalky white, well defined margins.	Dirty gray white, ill defined margins.	Waxy pallor of disc, less sharply defined margins.
Optic Cup	Shallow, saucer shaped	Filled up	Normal
Vessels	Normal	Peripapillary sheathing	Attenuation
Surrounding retina	Normal	Hyaline bodies/Drusen	Pathology seen
Causes	• Optic neuritis. • Tumors. • Trauma. • Hereditary (Leber hereditary optic neuropathy). • Toxic.	• Papilledema. • Papillitis. • AION.	• Retinitis (CRAO/CRVO). • Healed vasculitis. • PRP. • Retinitis pigmentosa.





Causes of toxic optic neuropathy : M DICE

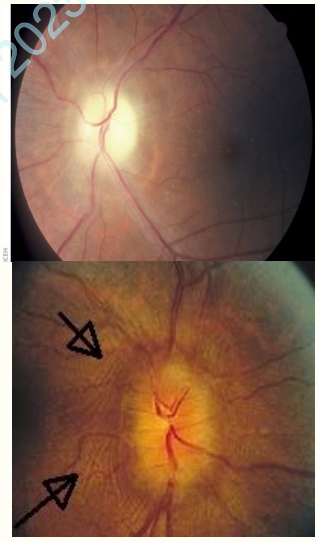
- Methanol poisoning.
- Digoxin.
- Isoniazid.
- Chloroquine.
- Ethambutol.

----- Active space -----

Optic neuritis :

- m/c cause : multiple sclerosis.
- Clinical features :
  - Central scotoma.
  - Color blindness (Red-green blindness).
  - Unilateral loss of vision.
  - Uhthoff phenomenon : Exacerbation of symptoms on exercise.
  - Pulfrich sign : Statokinetic dissociation.
  - Pain on ocular movement.
  - Marcus-Gunn pupil /RAPD (earliest sign) .

Papilledema :



Swelling of the optic disc due to raised intracranial pressure.

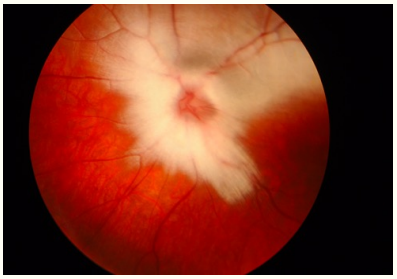
Almost always B/L and painless.

Non-inflammatory.

Signs :

- Earliest : Blurring of disc margins.
- Normal vision.
- Amaurosis fugax (transient loss of vision).
- Visual field defect : Enlargement of blind spot.
- Paton's lines : Wrinkling of the retina due to edema.

Myelinated nerve fibres :



Myelination of the optic disc and retinal fibres.

(Normally, myelination of optic nerve begins retro-orbitally and optic disc is non-myelinated).

There is no loss of vision.

OPHTHALMOLOGY REVISION 3

----- Active space -----

Squint/Strabismus

00:00:31

Deviation of one or both the eyeballs d/t problem in extraocular muscles.

Actions of extraocular muscles (EOM) :

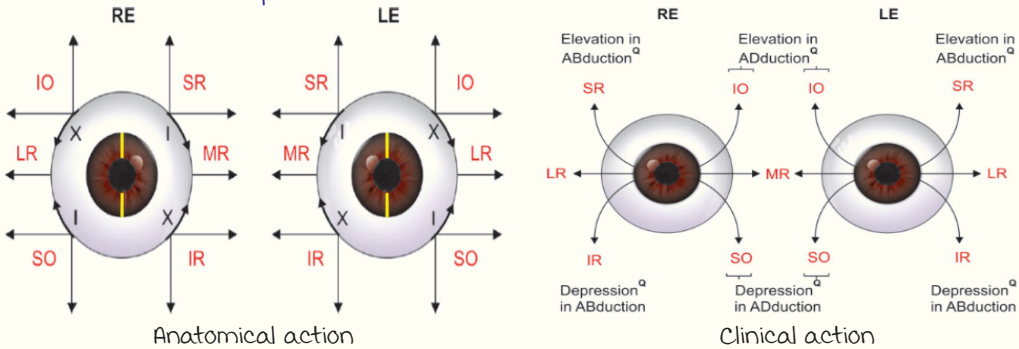
Number of EOM : 7.

6 EOM control eyeball movements + levator palpabrae superioris (Elevation of upper eyelid).

Muscles controlling movement of eyeball :

Muscles	Primary action	2°action	3° action
1. Medial rectus (MR)	Adduction	-	-
2. Lateral rectus (LR)	Abduction (LR6 : Abducents nerve)	-	-
Cyclovertical muscles			
3. Superior rectus (SR)	Elevation	Intorsion (mnemonic : SIn)	Adduction
4. Inferior rectus (IR)	Depression	Extorsion	
5. Superior oblique (SO)	Intorsion (mnemonic : SIn)	Depression	Abduction (mnemonic : ABO)
6. Inferior oblique (IO)	Extorsion	Elevation	
Rules of clinical actions	1° actions predominant in aBDuction.	2° actions predominant in aDDuction.	

Applied aspect : In superior oblique palsy, patient cannot perform depression in adduction (Look at tip of nose).



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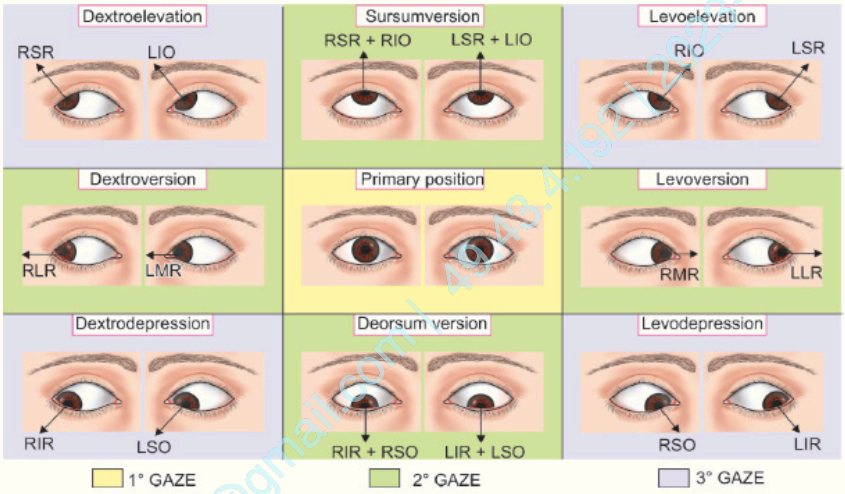
Binocular single vision

00:08:50

Pair of muscles	Action	Location	Examples
Antagonists	Opposite actions	In same eye	Rt LR & Rt MR
Agonists	Same actions	In same eye	Rt SR & Rt IO
Yoke muscles (Contralateral synergists)	Version movements (Simultaneous movement of both eyes in the same direction).	One muscle in each eye	Rt SR & Lt IO • Right → Left • Superior → Inferior • Recti → Oblique



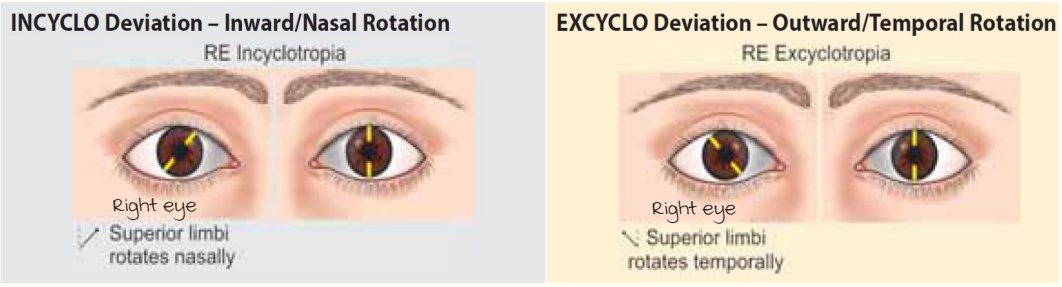
Positions of gaze & yoke muscles

Laws of innervation of EOM :

- Hering's law of equal innervation : In yoke muscles for version movements.
- Sherrington's law of reciprocal inhibition : Antagonist needs to relax to facilitate contraction of the agonist.

Directions of deviation :

Active space



Types of squint

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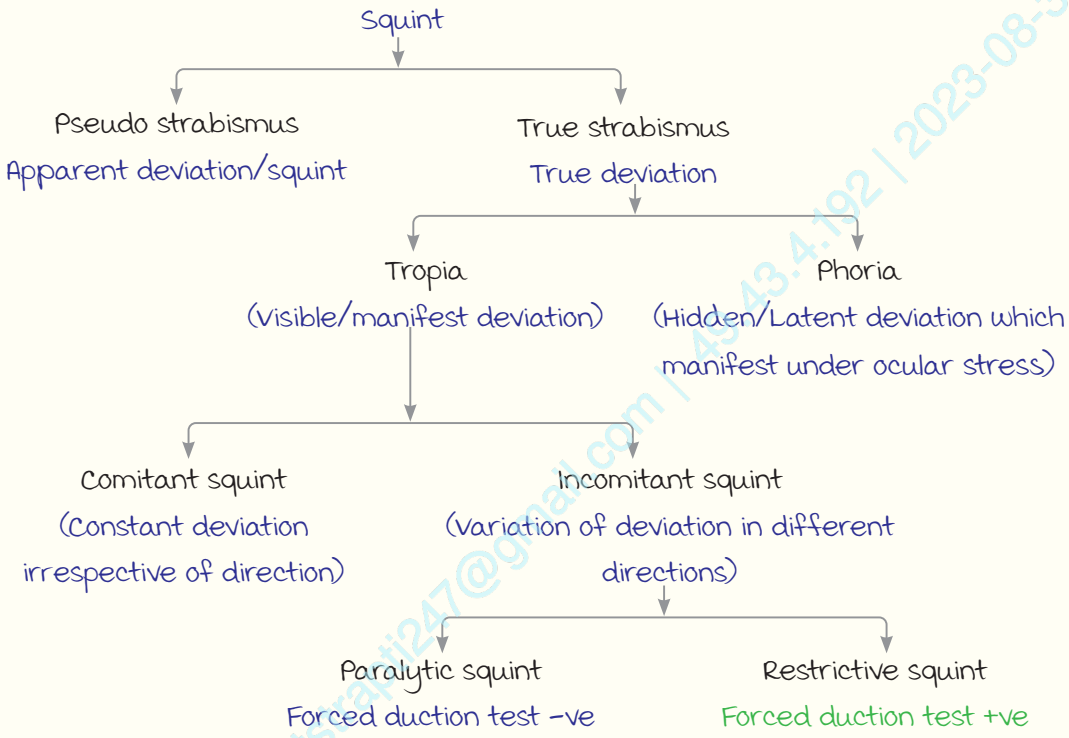


Investigations of squint

00:19:31

Work up :

- Examine ocular movements in all (9) directions of gaze.
- Calculate refractory error using retinoscopy.
  Uncorrected hypermetropia → Eso deviation/squint (mnemonic : SO HYPER).
- Measure fusional vergence : Using Royal air force (RAF) ruler.
- Measure ocular deviation.
  a. Hirschberg's test.
  b. Cover-uncover test.
  c. Maddox rod test.
  d. Prism bar cover test.

RAF ruler

----- Active space -----

- Measure diplopia :
  a. Hess chart.
  b. Lee's screen.
- Tests for sensory anomalies.
  a. Worth 4 dot test.
  b. Bagolini striated glass.

Hirschberg's test :

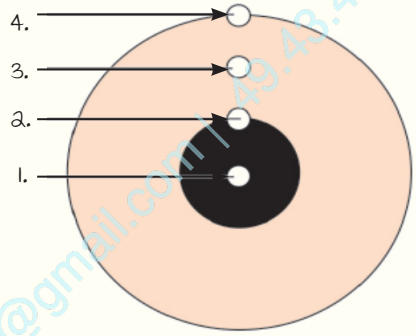
Based on the position of corneal reflection.

"DOOR" : Deviation opposite of reflection.

Uses :

- To know the direction of deviation.
- To know the degree of deviation.

1 mm deviation of corneal reflection = 7° squint/14 prism dioptre (PD) squint.



Corneal reflection position	Degree of deviation
1. Centre of pupil	Normal eye (No deviation)
2. At pupillary margin	15°/30° pd deviation
3. B/w pupillary margin & limbus	30° pd deviation
4. At limbus	45°/90° pd deviation

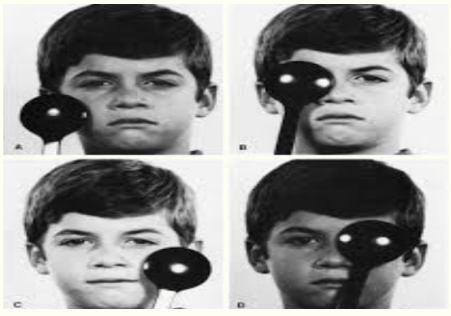
Cover-uncover test :

Cover test : To confirm tropia.

Uncover test : To diagnose phoria.

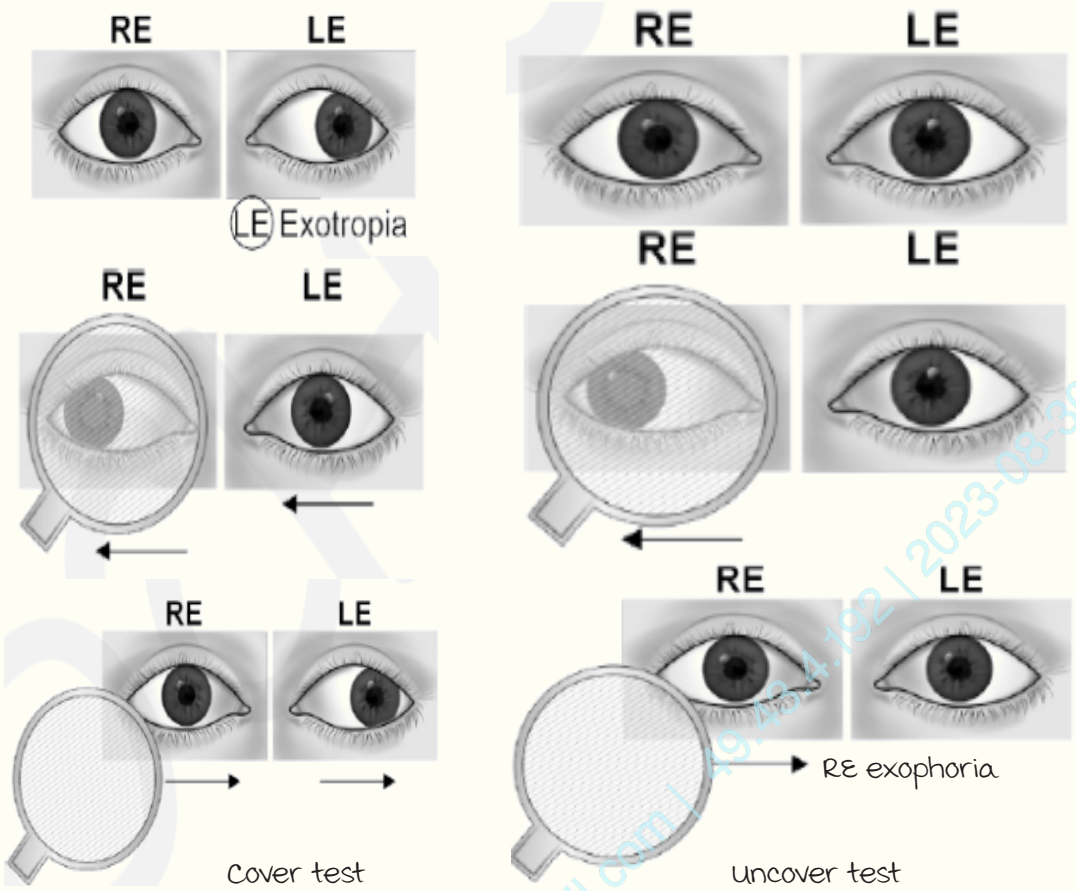
To identify the direction of deviation : "DOOM"

Deviation opposite of movement.



Cover uncover test

----- Active space -----



Cover test

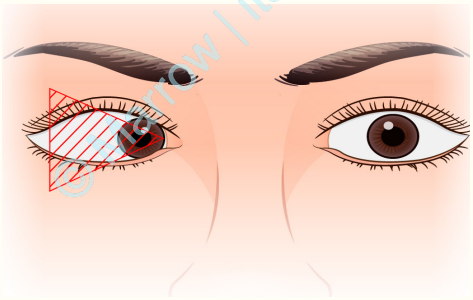
Uncover test

Prism bar cover test :

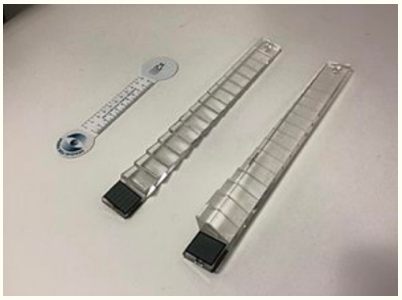
Best test to measure degree of tropia.

Degree of tropia = 2 x power of prism at which the deviated eye becomes straight.

To identify the orientation of prism : "DOOB" Deviation opposite of base.



Base out prism in right esotropia



Prism bars

maddox rod test :

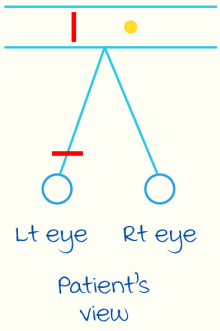
Maddox rod : Red coloured striated lens.

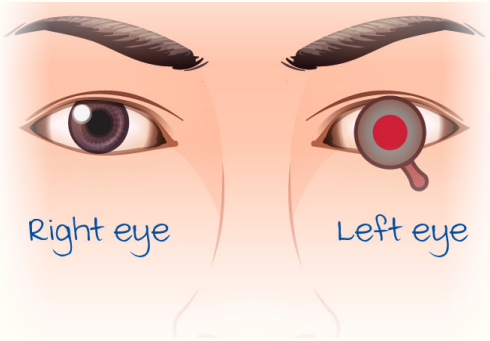
Uses :

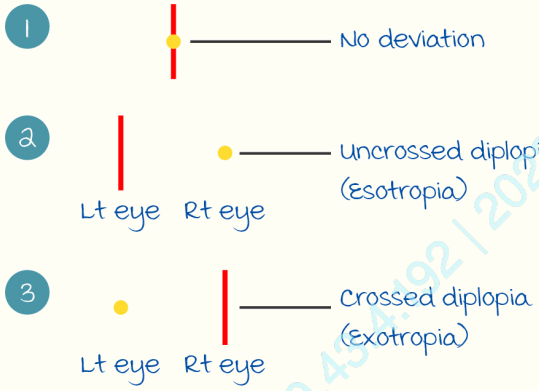
- To diagnose phoria at far fixation.
- Macular function test.
- To diagnose cyclotropia (in/ex-cyclodeviation).

maddox rod

----- Active space -----

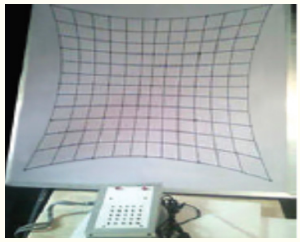






Tests for diplopia :

1. Hess chart :
   - Has concave lines (Amsler's grid : Straight lines).
   - Used for diagnosing diplopia (Amsler's grid : Used in macular function test).
2. Lee's screen.


Hess chart

Worth 4 dot test :

Differentiates between
- Binocular single vision (BSV).
- Anomalous retinal correspondence (ARC) : Sensory adaptation to diplopia.
- Suppression : Adaptation to confusion. It leads to amblyopia (LOV with no organic cause).

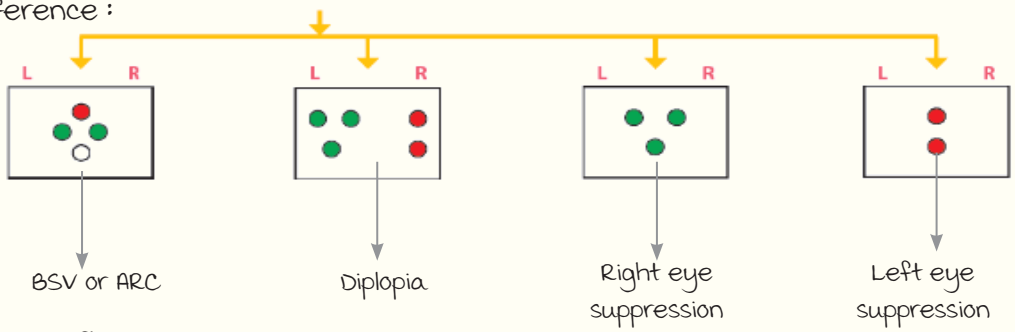
Instrument :

Light screen with 4 dots : 1 red, 2 green & 1 white.

Patient wears red-green glasses (Red over right eye).


Worth's 4 dot test

Inference :



Titmus fly test :

Test for grade 3 BSV (Stereopsis).

Depth perception seen if BSV is present.

Paralytic squint

00:44:40

Paralysis of EOM muscles d/t 3rd, 4th or 6th cranial nerve palsy.

Features :

- C/F of all paralytic squint are opposite to the action of muscle paralyzed.
- Head posture adopted is the same as action of muscle paralyzed.
- Diplopia is in the direction of the action of muscle paralyzed.

1. Third cranial nerve palsy :

C/F : "Down & out eye"

Clinical features	Muscles paralyzed
Ptosis	LPS
Hypotropia	SR & IO
Exotropia	MR
Mydriasis/Loss of pupillary light reflex	Sphincter pupillae
Loss of accommodation reflex	Ciliary muscle
Crossed diplopia	

2. Fourth cranial nerve/Superior oblique palsy:

Trochlear nerve palsy.

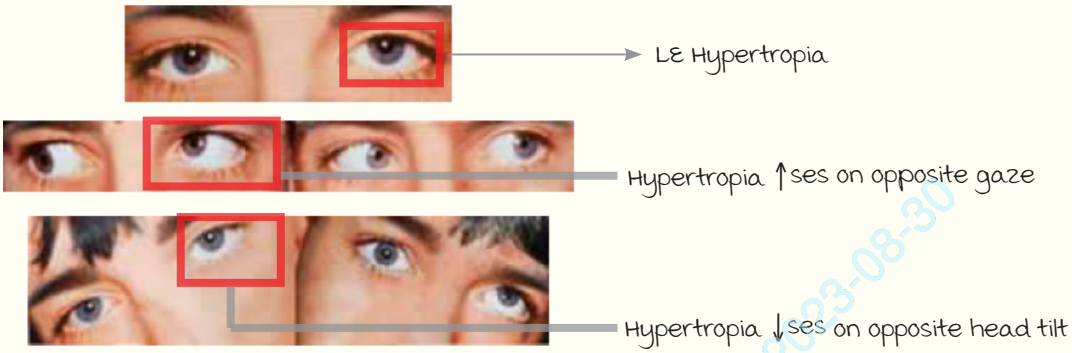
Muscle paralyzed : Superior oblique.

C/F :

Intorsion absent	Excyclotropia
Depression absent	Hypertropia
Depression in adduction absent	Hypertropia ↑ses on adduction/Opposite gaze

----- Active space -----

- Head posture :
  a. Chin depression.
  b. Head tilt towards opposite side.
- Vertical diplopia on down gaze.



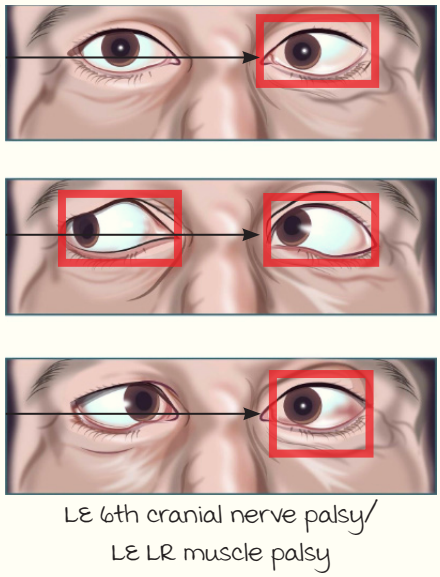
LE 4th cranial nerve palsy/ LE SO palsy

3. Sixth cranial nerve/Lateral rectus (LR) palsy :

Muscle paralyzed : Lateral rectus.

C/F :

- Esotropia.
- Uncrossed diplopia.
- Head posture : Face turn towards same side as paralyzed muscle.



LE 6th cranial nerve palsy/
LE LR muscle palsy

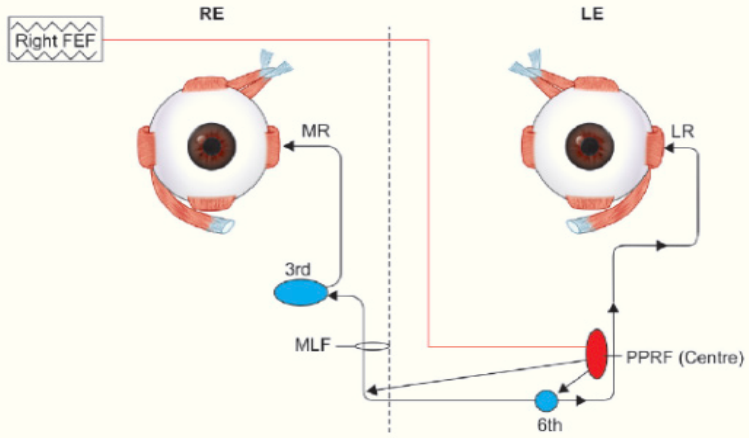
Horizontal gaze

00:56:31

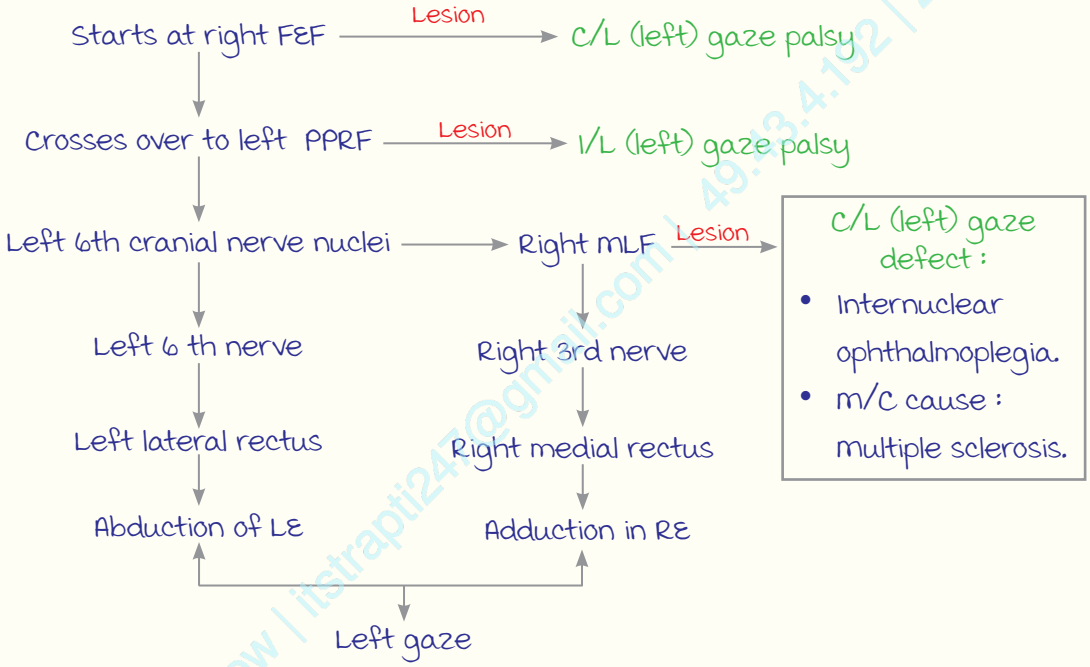
Horizontal gaze is controlled by :

1. C/L Frontal eye field (FEF).
2. I/L Para pontine reticular formation (PPRF) : Centre for horizontal gaze.
3. C/L medial longitudinal fasiculus (MLF).

Example :



Left horizontal gaze



Restrictive squint

01:01:50

Duane's retraction syndrome (DRS) :

C/F :

Type	a. Limitation of movement	b. Palpebral fissure closure c. Retraction of globe
1	Abduction	During adduction
2	Adduction	During adduction
3	Abduction & adduction	During abduction & adduction

----- Active space -----

Comitant squint

01:05:21

Constant deviation in all gaze directions.
m/c presents as esotropia.

Esotropia
- Accommodative
  - Refractive
    - D/t hypermetropia (mnemonic : so hyper)
    - Squint : Esotropia (Dist > near)
    - Rx : Spectacles
  - Non- refractive
    - Esotropia (Near > dist)
    - Rx : Spectacles, miotics (Pilocarpine)
- Non- accommodative
  - Aka Essential infantile esotropia
  - Large angle squint → Suppression of one eye → Amblyopia
  - Management : Prevention of amblyopia by occlusion therapy

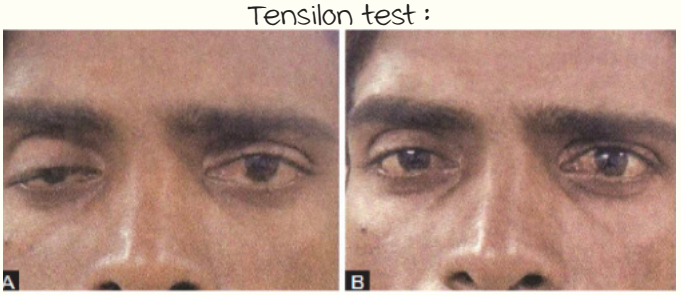
Occlusion therapy :
For prevention of amblyopia.
Patch the normal eye.
Occlusion of eye for 'x' days where 'x' = age of the child.
Followed by occlusion of the deviated eye for 1 day.

Myasthenia gravis

01:09:27

Clinical features :
- B/L ptosis, worsens at day end.
- Diplopia.
- Cogan lid twitch sign.

Tensilon test :



Right eye ptosis

Ptosis improves on Inj Edrophonium.

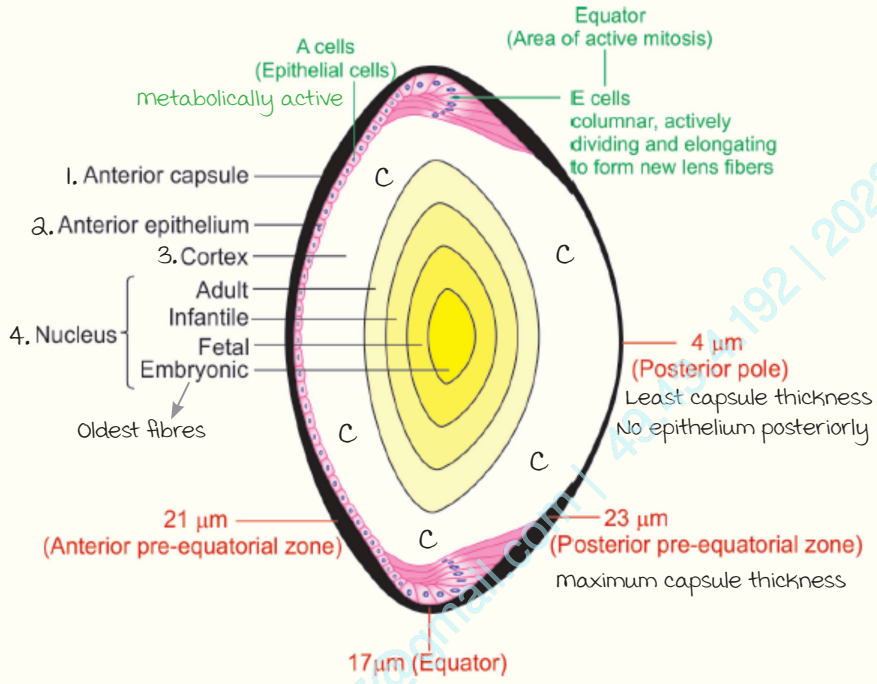
OPHTHALMOLOGY REVISION 4

----- Active space -----

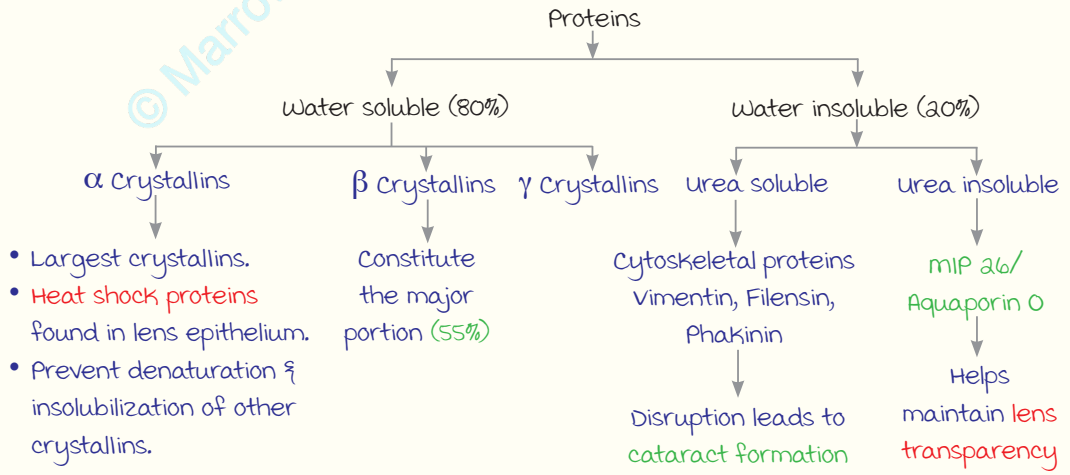
Lens : Anatomy & Metabolism

00:01:15

Parts of lens :



- Shape : Biconvex (Anterior surface : Flatter).
- Refractive Index (RI) : 1.39 (maximum RI : 1.41 in the centre of lens).
- Develops from surface ectoderm.
- 2 Sutures : Fetal Nucleus; Shapes : Y (Anterior), Λ (Posterior).



Note : In cataract, water insoluble proteins ↑↑↑ & water soluble proteins ↓↓↓.

----- Active space -----

Metabolism in lens :

- >80 % : Anaerobic glycolysis (Since lens is avascular).
- <5 % : Sorbitol pathway (Overactive in DM & galactosemia → Cataract).

Acquired Cataract

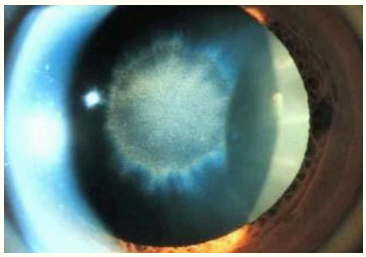
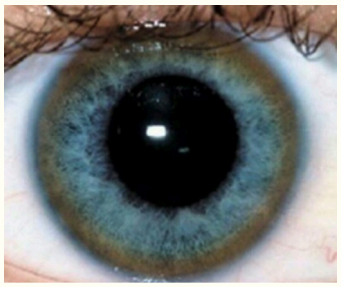
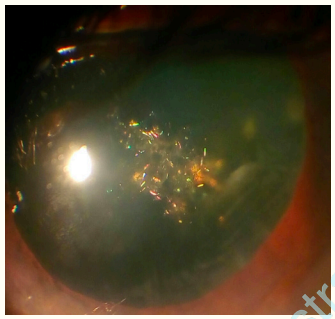
00:09:30

A. Metabolic Cataract

D/t metabolic diseases.

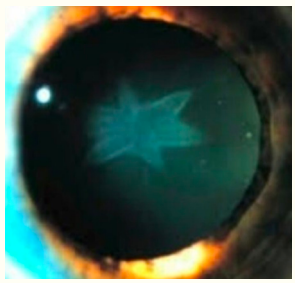
Type of cataract	Features
1. Parathyroid tetany → Hypocalcemia → Cataract.	
2. Snowflake cataract 	• Cause : DM type 1. • Site : Cortical. • D/t carbamylation of crystallins. Note : Pre-senile cataract is d/t type 2 DM, myotonic dystrophy, atopic dermatitis.
3. Oil droplet cataract 	• Cause : Galactosemia. • Site : Posterior subcapsular. • D/t deposition of substrate (Galactose) & metabolite (Galactitol). • Only reversible cataract (On treatment of galactosemia).

----- Active space -----

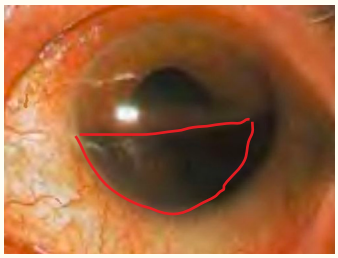
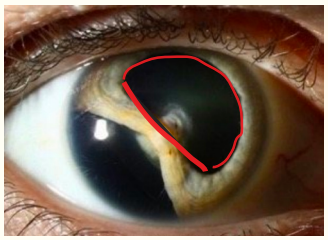
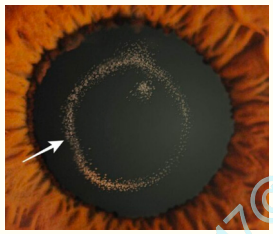
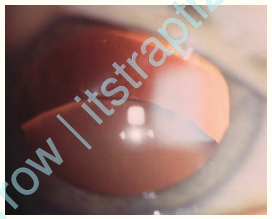
Type of cataract	Features
4. Sunflower cataract  Sunflower cataract  KF ring	Cause : Wilson's disease. Also, causes Kayser–Fleischer (KF) ring : • D/t Cu deposition. • Site : Golden-brown ring in periphery of cornea (Descemet's membrane). • Starts superiorly → Inferiorly → 360°. • Seen in : a. 100 % cases of neurological involvement. b. 50% cases of hepatic involvement. Note : • Fleischer ring : Seen in Keratoconus d/t Iron (Fe)/hemosiderin deposition. • Pseudo-Fleischer ring : Seen in hypermetropia.
5. Christmas tree cataract 	• Cause : Myotonic dystrophy. • Site : Posterior subcapsular cataract.

B. Traumatic Cataract :

1. Glassblower's cataract : D/t infrared rays → True exfoliation of lens capsule.
2. Anterior capsular opacities : D/t lightning/electric shock.
3. Blunt trauma cataract : D/t fist/tennis ball injury.
   - Site : Posterior subcapsular.
   - Shape : Rosette shaped.


Rosette shaped cataract

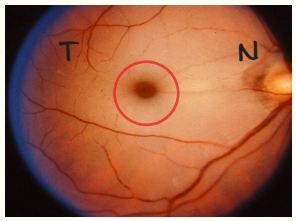
----- Active space -----

Blunt Ocular Trauma/Contusion Injury/Closed Globe Injury	
1. Anterior chamber (AC) signs : 	Hyphema (Collection of blood in AC). • m/c complication.32 • Bleeding from major arterial circle of Iris.
2. Iris signs :  Iridodialysis	• Iridodonesis : Tremulous iris. • Iridodialysis : Detachment of root of iris from ciliary body → D-shaped pupil.
3. Lens signs :  Vossius ring  Inferior ectopia lentis	• Phacodonesis : Tremulous lens. • Rosette shaped cataract. • Vossius ring : Imprint of the miotic pupil on the lens surface. • Ectopia lentis : Subluxation of lens.

Active space

Blunt Ocular Trauma/Contusion Injury/Closed Globe Injury

4. Retinal/Fundal Signs :

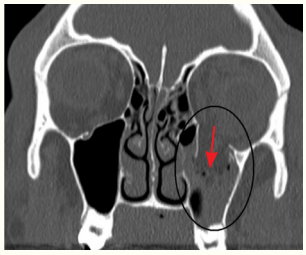


Cherry red spot

- Cherry red spot at macula : Deposition of fluid/metabolites in ganglion cell layer (GCL) → Loss of transparency. Absence of GCL in foveola → Foveola remains transparent → Cherry red spot seen.
- Berlin's edema : Deposition of fluid d/t blunt trauma.
- Retinal detachment : Rhegmatogenous (m/c), tractional.
- Commotio retinae : Pale, greyish fundus.
- Traumatic optic neuropathy, resulting in 1° optic atrophy.
- Angle recession glaucoma (2° open angle glaucoma).

Causes of cherry red spot	
Cherry	Central Retinal Artery Occlusion (CRAO)
Trees	Trauma (Blunt)
Never	Niemann-Pick disease
Grow	GM1 gangliosidoses
Tall in	Tay Sach's disease } GM2 gangliosidoses
Sand	Sandhof disease } GM2 gangliosidoses
Mud	Metachromatic leukodystrophy Multiple sulfatase deficiency
& Grime	Gaucher's disease (Only Type 2, not in Type 1 & 3) (Least common cause)

Orbital Trauma



m/c : Floor fracture (Blow out fracture).

- Tear drop sign.
- Double diplopia.
- Infraorbital nerve anesthesia.

----- Active space -----

C. Complicated cataract :

Causes : "UMAR".

- Uveitis (m/c).
- Myopia.
- Angle closure glaucoma.
- Retinitis pigmentosa.

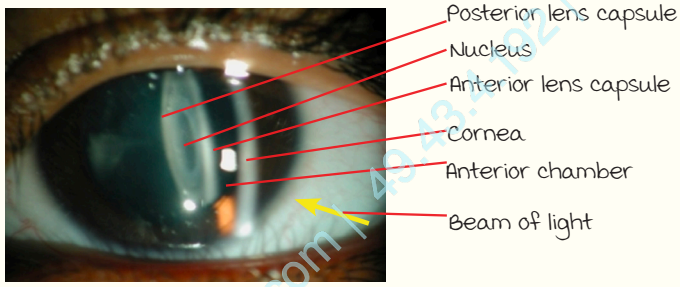
Appearance : Breadcrumb appearance, polychromatic lustre.

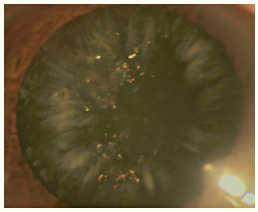
Site : Posterior subcapsular.

D. Senile/Age-related Cataract :

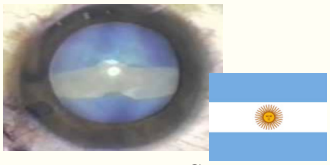
Age : 50 – 70 years (mean : 60 years).

Oblique illumination on a slit lamp :



Types of Senile Cataract	Features
1. Nuclear cataract  Yellow coloured nuclear cataract	D/t nuclear sclerosis (Hard cataract). C/F : • Refractory error : Index myopia. • Second sight phenomenon. • Loss of vision : Worsens during day & improves at night. • Xanthopsia : Yellow coloured vision d/t uro-chrome pigment.
2. Cortical (Peripheral) cataract :  Cuneiform cataract	D/t hydration → Formation of water clefts and vacuoles (Earliest change) → Lamellar separation. Loss of vision is more during night time. Stages : 1. Cuneiform cataract : Wedge shaped opacities, m/c seen inferonasally.

Active space

Types of Senile Cataract	Features
 Intumescent cataract  Argentinian flag Sign  Morgagnian cataract	2. Intumescent cataract : • D/t swelling of lens. • m/c complication : Phacomorphic glaucoma (2° angle closure glaucoma). • Surgical complication : During CCC, d/t ↑sed pressure, on puncturing the capsule → horizontal linear tear (Argentinian flag sign). 3. Hypermature/Morgagnian Cataract : • Liquefaction of cortex → Sinking of nucleus. • m/c complication : Phacolytic glaucoma (2° open angle glaucoma).
3. Posterior subcapsular (Cupuliform) cataract	C/F : Loss of vision (Near > far; more in daytime). Maximum visual loss for amount of opacity. Glare : Inability to drive at night. Causes : MNC Repay GST. • Myotonic Dystrophy. • Neurofibromatosis 2. • Complicated cataract, • Radiation (X-rays). • Galactosemia. • Steroids (m/c). • Trauma (Blunt). Note : Steroids cause (GTCS) • Glaucoma d/t topical administration. • Cataract d/t systemic administration.
4. Anterior subcapsular cataract	Causes : "AACG" • Atopic dermatitis. • Amiodarone. • Chlorpromazine. • Gold deposits. • AACG : Acute angle close glaucoma → Glaukomflecken.

----- Active space -----

Surgeries for Cataract

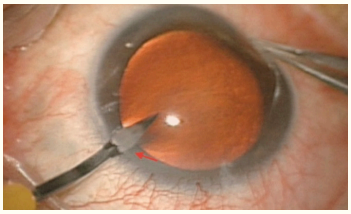
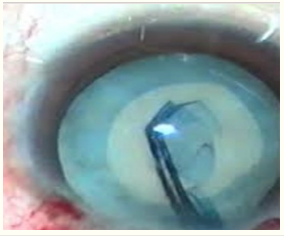
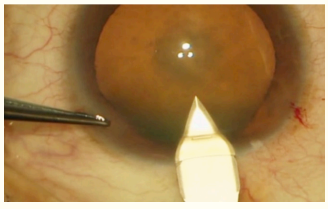
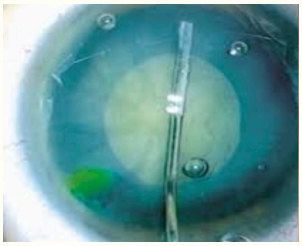
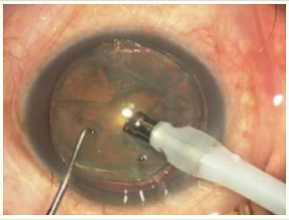
00:44:25

ECCE (Extracapsular cataract extraction) :

Types of ECCE	Site of incision	Size of incision
Conventional	Limbus	8–10 mm
Small incision cataract surgery (SICS)	Sclera (Sclero-corneal tunnel)	6 mm
Phacoemulsification	Cornea	2.2–3.2 mm

MOA of phacoemulsification :

Piezoelectric crystal vibrates → Mechanical to-and-fro motion.

Steps of Phacoemulsification :		
SL.No	Steps	Image
1.	Side port incision : Using MVR/15° blade.	
2.	Continuous curvilinear capsulorrhexis (CCC) : After Trypan blue staining; Using utrata forceps/bent 26G needle.	
3.	Main incision : Using 2.2/2.8/3.2 mm Keratome.	
4.	Hydrodissection : To separate capsule from cortical fibres. Optional step : Hydrodelineation of nucleus.	
5.	Nuclear fragmentation : Using phaco probe f/b irrigation & aspiration.	

6.	Intra ocular lens (IOL) implantation : In empty capsular bag.	

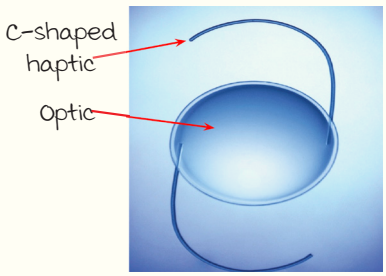
Active space

Femtosecond (10^{-15}) Laser Assisted Cataract Surgery (FLACS) :

- Uses Nd Glass laser causing photodisruption.
- Used for capsulorrhexis and nuclear fragmentation steps.

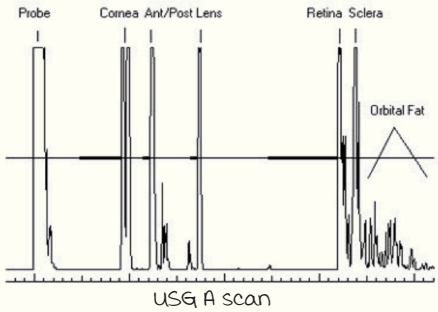
Intra-ocular lens

Types of IOL :

Posterior chamber IOL (PCIOL)	Anterior chamber IOL (ACIOL)
Implanted in capsular bag. 	Implanted in anterior chamber d/t damage to capsular bag. 

Calculation of IOL Power "Biometry" :

1. Keratometry : Corneal curvature measurement.
2. USG A Scan : Axial length (AL) of eye (Normal : 24mm).
3. Formulae :
   - SRK-T
   - Hoffer Q : If AL < 22 mm
   - Holladay : If AL > 24.5 mm
   - Haigis-L : Post refractive surgery cases.



USG A scan

Complications of cataract surgery :

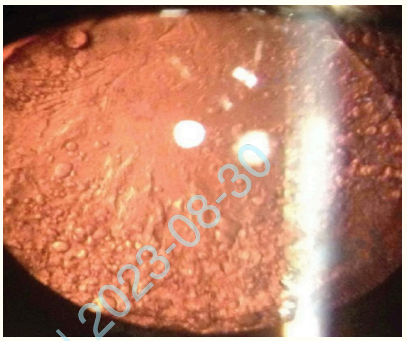
Operative Complications :

- Posterior capsular rupture → Vitreous loss (most serious).
- Uveitis-glaucoma-hyphema (UGH) syndrome d/t iris chaffing by ACIOL.
- Expulsive choroidal hemorrhage : Bleeding from choroidal artery.
- Damage to superior rectus while passing bridle suture (During SICS/ECCE).
- Descemet membrane detachment :
  Rx → Descemetopexy (Reattachment by injecting air bubble or gas in AC).

----- Active space -----

Post-operative Complications :

- Posterior capsular opacification (PCO)/Elschnig pearls (m/c).
  Rx : Nd YAG laser posterior capsulotomy.
- Retinal detachment.
- Irvin Gass syndrome (After 6-10 weeks) : Cystoid macular edema + Bullous Keratopathy + Vitreous touch.
- Displacement of IOL :
  a. Sunset syndrome : Inferior subluxation.
  b. Sunrise syndrome : Superior subluxation.
  c. Lost lens syndrome : Complete dislocation.
- Toxic anterior segment syndrome (TASS).
- Flat/shallow AC d/t :
  a. Wound leak.
  b. Ciliary choroidal detachment.
  c. Pupillary block glaucoma.
  d. Malignant glaucoma.
- Endophthalmitis : most severe.



Posterior capsular opacification : Elschnig pearls

Endophthalmitis

01:01:55

Suppurative inflammation of all parts of the eye, except sclera.

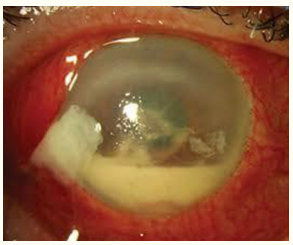
m/c causes :

- Acute post-op (<7 days) : Staphylococcus epidermidis (CONS).
- Late post-op (>6 weeks) : Propionibacterium acnes.
- Traumatic : Bacillus cereus.
- Endogenous : Klebsiella, Candida.

Note : Roth spots (Hemorrhage with clear/pale center) are seen in candida endophthalmitis & sickle cell disease.

C/F :

- Symptoms : Pain, red eye, loss of vision.
- Signs : Congestion, hazy cornea, hypopyon (Pus in AC).
- Vitritis : Yellowish/whitish exudates in vitreous.

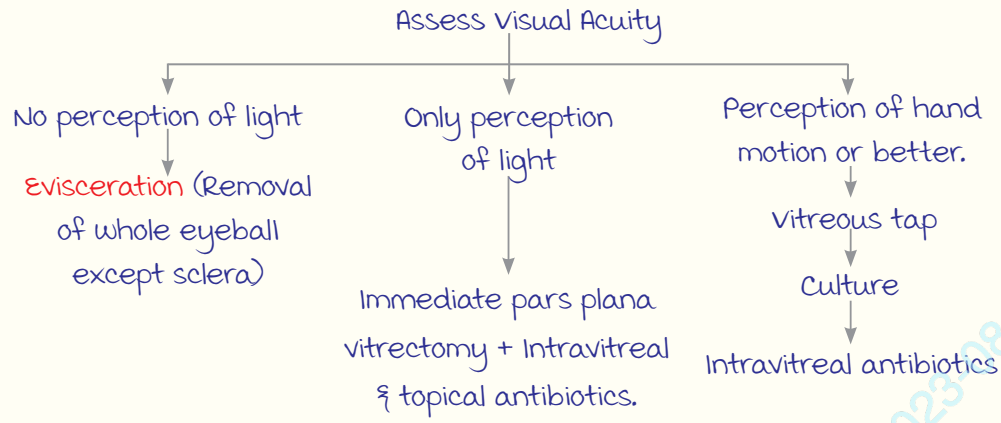


Endophthalmitis

Active space

Management :

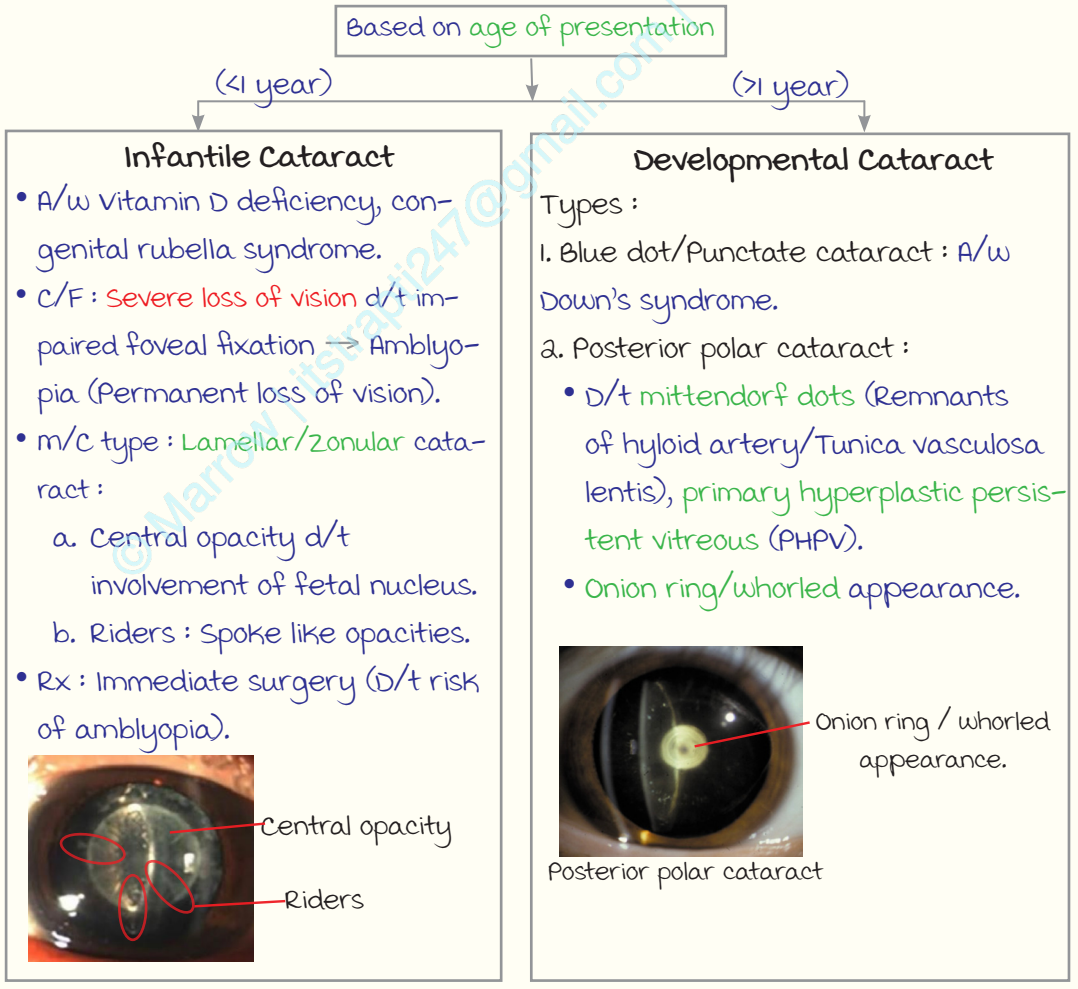
Depends on severity of loss of vision.



Systemic antibiotics are not used, unless endogenous/candidal infections are present.

Congenital Cataract

01:08:25



----- Active space -----

Other conditions

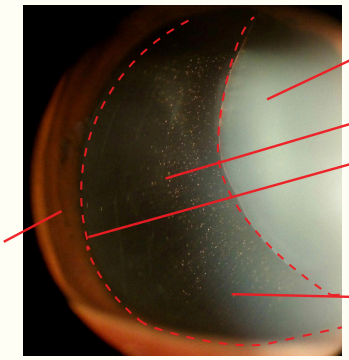
01:12:25

Ectopia lentis

C/F :

- Symptom : Mono ocular diplopia.
- Sign : Golden crescent seen in pupillary area.

Causes : Blunt Trauma (m/c).

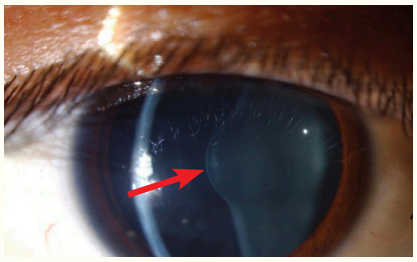


Dislocated lens

Syndromes	Lens dislocation
Marfan's syndrome	Supero-temporal dislocation
Homocystinuria	Infero-nasal dislocation
Weill Marchesani syndrome	Anterior/Forward dislocation

Lenticonus

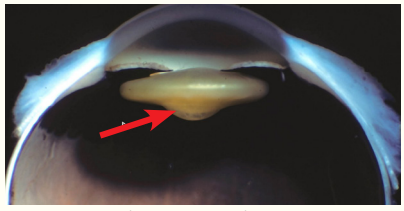
Congenital anomaly of the shape of lens.


Anterior Lenticonus

Anterior lenticonus :

Causes : "SAW"

- Spina bifida.
- Alport syndrome.
- Waardenburg syndrome.


Posterior Lenticonus

Posterior lenticonus :

Cause : Lowe syndrome.

OPHTHALMOLOGY REVISION 5

----- Active space -----

Tests for vision

00:00:20

Tests for far vision :

1. Snellen's chart :

- Top most line : Can be read from 60 m.
- Bottom most line : Can be read from 6 m.
- Distance of tests : 6m/ 20 feet.

Snellen's chart

Best possible vision : 6/5 > 6/6 > 6/9 --- 6/60 > 5/60 > --- 1/60.

Least recordable vision : 1/60.

< 1/60 → Finger counting > Hand movements > Check for perception of light (PL).

Principle of Snellen's chart : Each optotype (Letter) subtends an angle of 5' of arc at nodal point of eye when viewed from its respective distance.

2. Log chart/Bailey Love chart :

- Each row has 5 letters.
- Vision expressed in logarithm values.

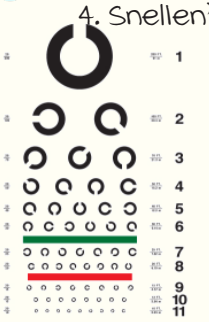
For illiterates :

3. Landolt C ring :

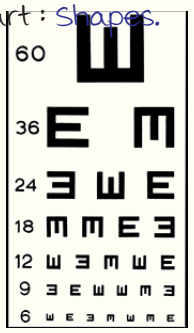
Side of the openings of the rings.

4. Snellen's E chart : Shapes.

Log chart



Landolt C ring



Snellen's E chart

Tests done in infants/very young children :

1. Optokinetic test :

- OKN drum : Based on size or number of strips the child can see with movements.
- Catford drum : Based on the size of the dots.


OKN drum


Catford drum

----- Active space -----

2. Preferential looking test :
- Infants prefer to look at striped pattern.
- Test based on thickness of patterns.


Teller acuity cards


Keeler gratings

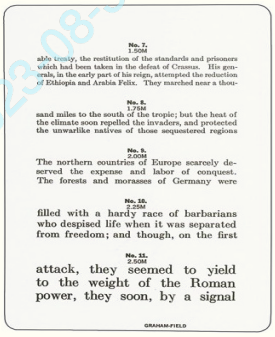
Preferential looking test

3. Cardiff acuity test : Different shapes & patterns (used for preschool children).


Cardiff acuity test

Tests for near Vision :

Used specifically in people > 40 years old.



Snellen's near chart

1. Jaeger's chart & 2. Snellen's near chart (Preferred) :
- Jaeger's chart uses J1, J2.
- Snellen's near chart → N6 to N36 (Commonly used).
- Testing distance : 25–35 cm.

Tests for contrast sensitivity :
- Cataract & old age : Loss of contrast sensitivity ↓ before vision loss.
- Tests (CRAP BF) :

  Cambridge test. Bailey-Love contrast chart.

  Regan chart. FACT chart.

  Arden's grating.

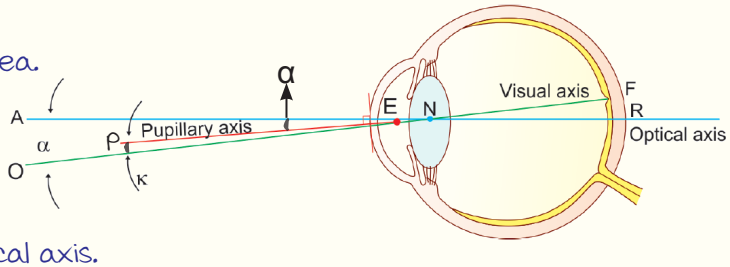
  Pelli robson chart (m/c used in India).

Pelli robson chart

Optics

00:09:50

Visual axis bisects the fovea.



Axes :
- ANR : Optical/anatomical axis.
- OENF : Visual axis.
- PE : Pupillary axis (Centre of pupil).
- Angle **k** : Angle between visual & pupillary axis.
- Angle **α** : Angle between optical & visual axis.

↓ Angle **k** → : Diagnosis of squint.

Active space

Gullstrand's schematic eye :

Cornea		Lens	
Anterior surface	Posterior surface	Anterior surface	Posterior surface
+ 48.83 D (max power)	− 5.88 D (D/t divergence)	+ 16 D to + 19 D	
+43 D to 44 D			

Purkinje images :

Shine light → 4 reflection images :

1st : Anterior surface of cornea.

2nd : Posterior surface of cornea.

3rd : Anterior surface of lens.

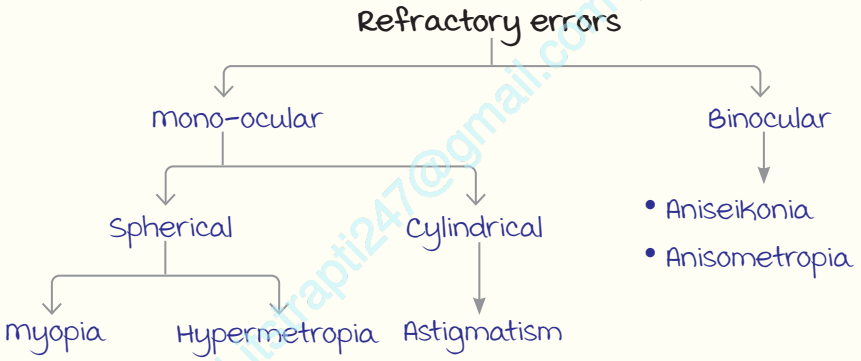
4th : Posterior surface of lens (Inverted).

Listing's reduced eye :

Power of total eyes : 58.6 D.

Depends on :

- Radius of curvature.
- Difference between refractive index & axial length.



Myopia vs hypermetropia :

	Myopia	Hypermetropia
Power of eye	↑ (Axial length ↑ : Seen in Buphthalmos)	↓
Image formed	In front of retina	Behind retina
Curvature (Cornea)	↑ (Seen in Keratoconus)	↓
Refractive index of lens	↑ (Index myopia : Nuclear cataract)	↓
Position of lens	Anterior (Seen in Weill-Marchesani syndrome)	Posterior
Rx (Glasses)	Minus (Diverging lens) → Concave lens	Plus glasses (Converging lens) → Convex lens

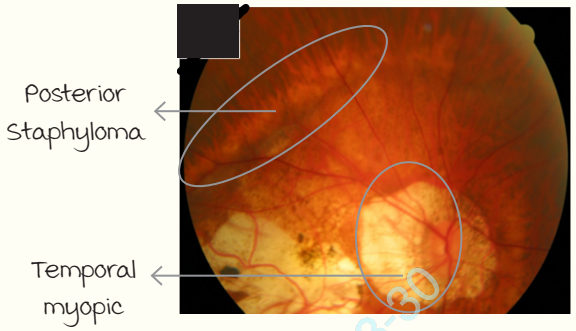
----- Active space -----

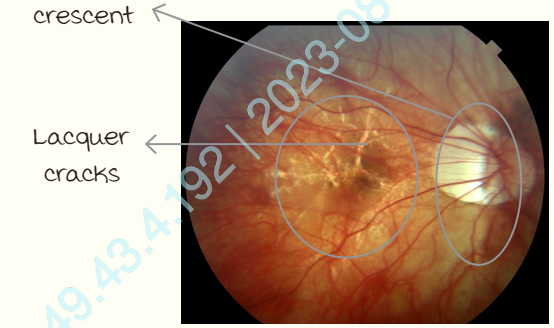
m/c type of myopia : Axial myopia.

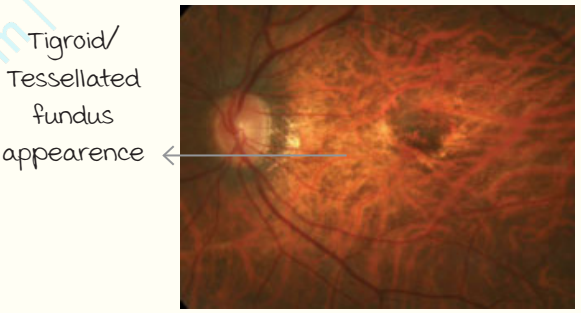
Fundus signs of pathological myopia :

Pathological/degenerative myopia → Axial length > 26 mm or myopia > 6D.

- Temporal myopic crescent.
- Foster fuch spots : Areas of sub retinal hemmorhage.
- Posterior staphyloma.
- Lacquer cracks.
- Tigroid fundus.







Rx of myopia :

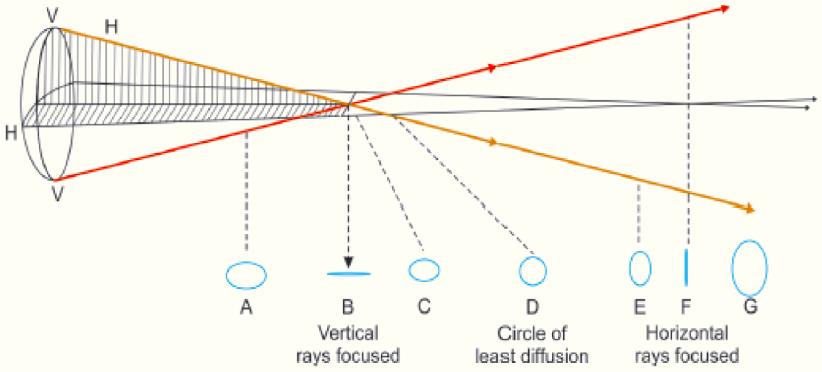
Concave lens/contact lens.

Surgery :

1. Radial Keratotomy : Peripheral cuts → Flatten the cornea → ↓ Curvature.
2. LASIK (Laser Assisted Insitu Keratomileusis) : ArF/Excimer laser → Photoablation → Flatten the cornea.
3. SMILE (Small Incision Lenticule Extraction) : Nd (Neodymium) glass laser → Piece of cornea cut → ↓ thickness → Flatten the cornea.
4. ICL (Implantable Collamer lenses) : Implanted in sulcus (Between lens & iris).

INTACS : Intra Corneal Stromal ring.

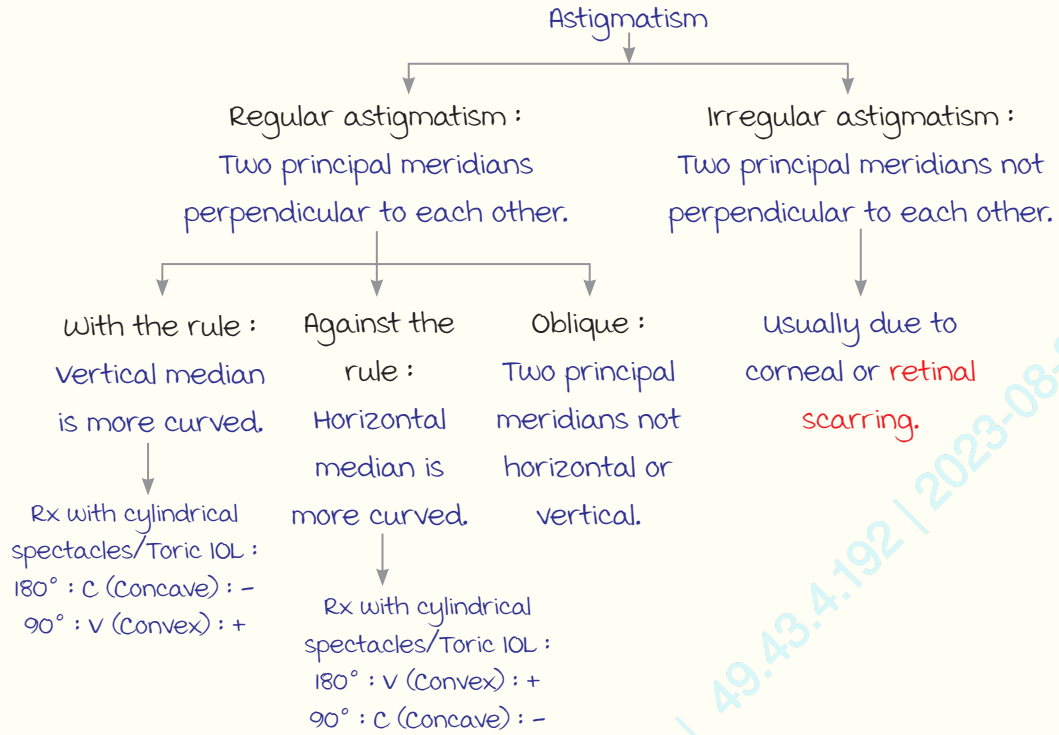
Astigmatism (Cylindrical refractory error) :



Configuration of light rays occuring from astigmatic surface : Sturm's conoid.

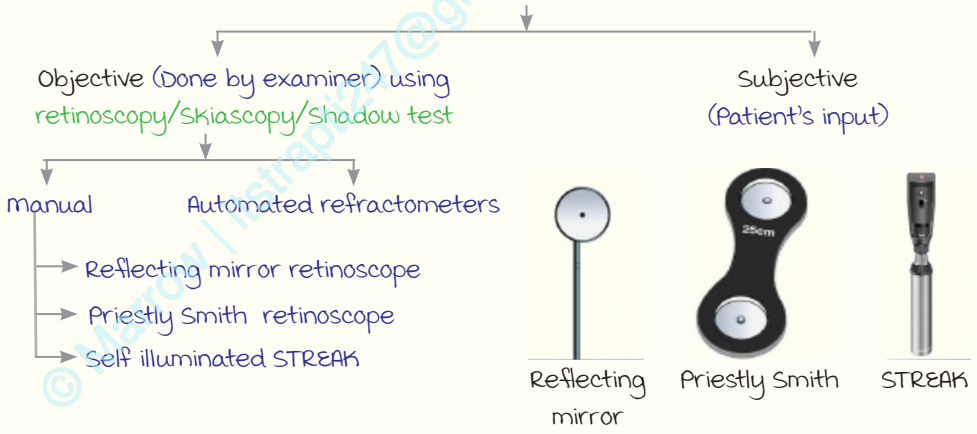
Power different in both horizontal axis & vertical axis.

Active space



Refraction :

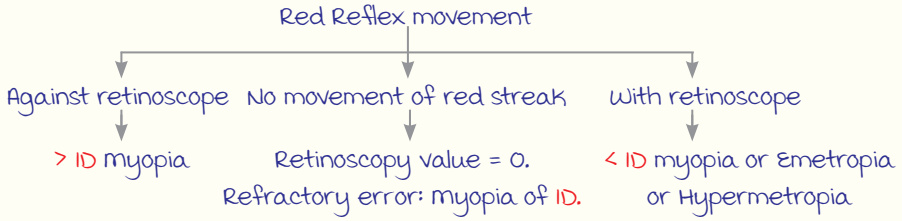
Procedure of determining & correcting refractive errors.



Retinoscopy (Objective refraction) :

Distance of examination for retinoscopy : 1 m.

Comparing movement of retinoscope with red streak.



----- Active space -----

Correction factors :

1. Distance of examination : C_1 = 1/d.
2. Tonus allowance of cycloplegic drug (Especially in children to avoid accomodation) : C_a
   - Atropine : 1
   - Cyclopentolate : 0.75
   - Homatropine : 0.50
   - Tropicamide : No tonus allowance.

Corrected retinoscopy findings (RF) = RF – C_1 – C_a.

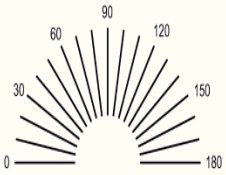
Prescription = Sphere (S)/Cylindrical (X–S) at axis of S.

Trial & error method

Jackson's cross cylinder test

Subjective refraction :

1. Trial & error method.
2. Refinement of cylinder :
   - Jackson's cross cylinder test with – 0.5 D sphere/ + 1.0 D cylinder.
   - Astigmatic fan test.
3. Refinement of Sphere :
   a. Duochrome test (2 colors) :
      - Green better : Residual hypermetropia.
      - Red better : Residual myopia.
   b. Pinhole test (1 mm) :
      - VA improves : Residual refractory error.
      - VA reduces : Macular diseases.



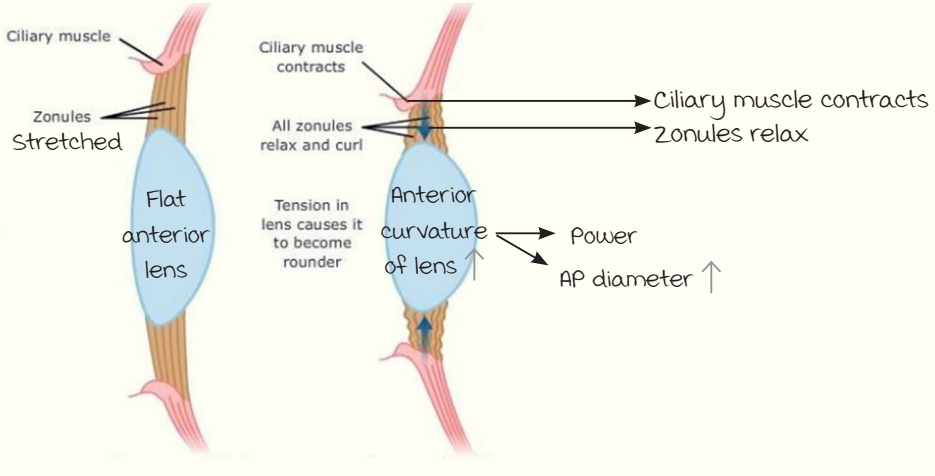
Astigmatic fan test

Duochrome test

Pinhole test

Accomodation :

Used for near vision (↑ power of eye).



Far vision Near vision

Active space

Anomalies of accomodation :

1. Presbyopia :
   - Physiological change (> 40 yrs age).
   - Difficulty in near work (Insufficiency of accomodation).
   - Rx : Convex spectacles.
     - Age 40 → 1 D (Every 5 years, the power by ↑ 0.5 D).
     - Maximum accomodative power : +3 D.
2. Spasm of accomodation : Permanent accomodation → Permanent near vision → Far vision lost → Mimics myopia → Pseudo myopia.

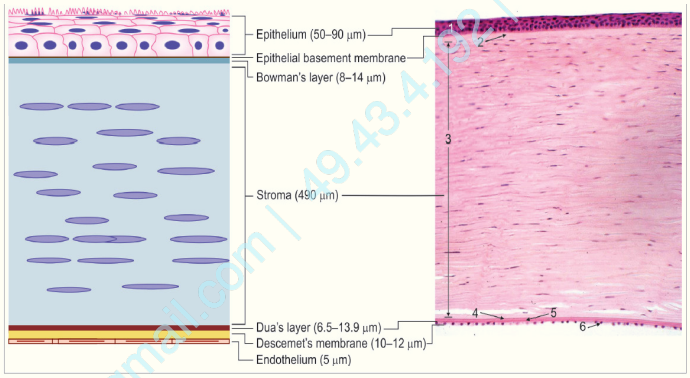
Cornea

00:54:06

Layers of cornea :

6 Layers :

1. Epithelium.
2. Bowman's layer.
3. Stroma.
4. Dua's layer.
5. Descemet's membrane.
6. Endothelium.



1. Epithelium :

Non-keratinized stratified squamous epithelium.

- Basal cells : Columnar → Mitosis → Regeneration of corneal epithelium.
- Superficial cells : Squamous cells with microvilli (Help in the adhesion of tear film).

2. Bowman's layer : Acellular layer → Cannot regenerate, heals by scar formation → Corneal opacity.

Types of corneal opacities :

	Pupillary margin	Iris details	Depth of involvement
Nebular	Visible	Visible	Bowman's and superficial stroma (maximum visual discomfort) by irregular astigmatism.
Macular	Visible	Not seen	≤ 1/2 stroma
Leucoma	Not seen	Not seen	≥ 1/2 stroma (Densest → maximum visual loss).

----- Active space -----

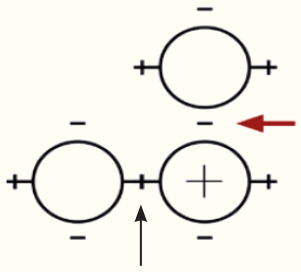
3. Stroma :
   - Thickest layer.
   - m/c collagen type : Type I.
   - Corneal transparency by glycosaminoglycans (Keratan sulfate).
4. Dua's layer : Strongest corneal layer.
5. Descemet's membrane :
   - Corneal regeneration.
   - Schwalbe's line : Peripheral termination of Descement's membrane.
6. Endothelium :
   - Functions : Corneal metabolism & corneal transparency (Tight junctions).
   - Corneal endothelial cell count : Done by specular microscopy (N =2400–3000).
     - > 500 to < 2400 : Corneal compensation by polymegathism and polymorphism.
     - < 500 : Corneal decompensation.

Special Investigations

01:00:38

Pachymetry :
Measurement of corneal thickness (N : 0.5–0.6 mm).

Keratometry :
Measurement of corneal curvature.
Corneal curvature is directly proportional to its power.

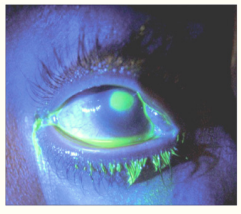

Keratometric mires

Topography :
Examination of corneal surface with placido disc.

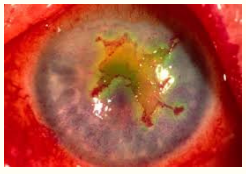

Placido disc

Stains of cornea :

Fluorescein staining :
- Dye : Orange color, Fluorescence : Green color.
- Stains areas of broken corneal epithelium (Base of corneal ulcer).
- Can be used in Goldman's applantation tonometry, fundus fluorescein angiography (FFA), diagnosis of dry eye.

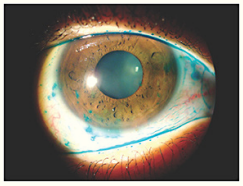


Rose Bengal stain :
- Stain is pink in color.
- Stains necrotic devitalized tissue (margins of ulcer).



Active space

Lissamine green stain :

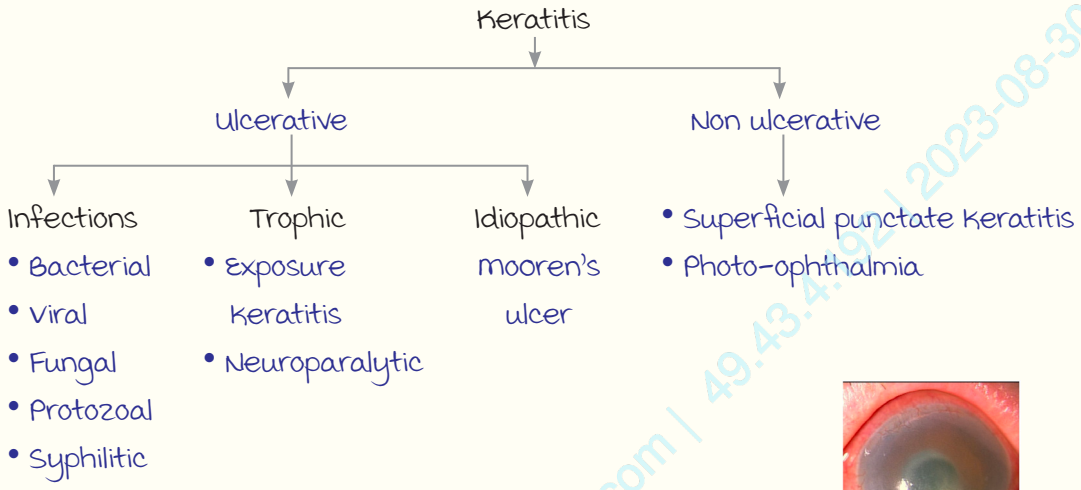


- Similar to Rose Bengal stain, stains conjunctiva also.
- Used to diagnose dry eye (Conjunctival xerosis).
- Safer and less toxic than Rose Bengal stain.

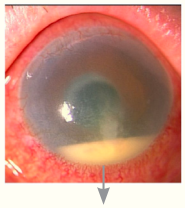
Corneal Ulcers

01:05:45

Loss of epithelium (Abrasion) + Infiltration of underlying stoma :



Bacterial corneal ulcers :



Hypopyon corneal ulcer

m/c cause in India : Pneumococcus.

Clinical features :

- Hypopyon (mobile, sterile) corneal ulcer + Ulcus serpens.
- Wreath pattern ulcer (By Nocardia, in traumatic cases).

Wreath pattern ulcer

Organisms that can penetrate intact cornea (High Level CNS) :

- Haemophilus aegyptius.
- Listeria.
- Corynebacterium diphtheriae.
- Neisseria gonorrhoea, Neisseria meningitidis (m/c cause).
- Shigella.

Management of bacterial corneal ulcer (SSS) :

1. Scrape the base of ulcer.
2. Send for Gram staining & culture.
3. Start fortified topical antibiotics + Supportive therapy (Atropine).

Steroids are contraindicated.

----- Active space -----

Fungal Corneal Ulcer :

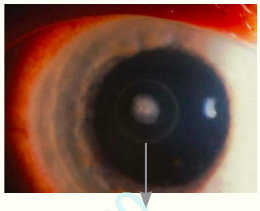
m/c cause : Aspergillus (Filamentous fungi with septate hyphae).

H/o trauma with vegetative material.

Symptoms : Almost absent.

Signs :

1. Feathery margins of ulcer.
2. Wessely immune ring.
3. Satellite lesions.
4. Hypopyon (thick, immobile asterile pus).

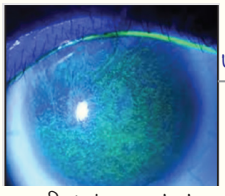


Wessely immune ring

DOC : 5% Natamycin eyedrops.

Herpetic Keratitis :

Etiology : Herpes simplex virus.

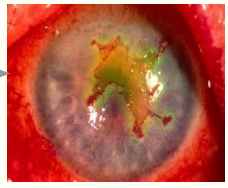


Superficial punctate keratitis

Untreated →

Dendritic ulcer

Untreated →



Geographic ulcer

Epithelial lesions.

Rx :

- 3 % Acyclovir eye ointment (5 times a day).
- Steroids are contraindicated.

Other lesions by HSV Keratitis :

- Necrotising stromal keratitis.
- Disciform keratitis/Endothelitis (Type 4 HSR).

} Rx : Topical steroids + Oral acyclovir

- Metaherpetic keratitis : D/t 5th cranial nerve palsy → Corneal anaesthesia → Neurotrophic ulcer.
- Neuroparalytic keratitis : D/t 7th cranial nerve palsy → No blinking (Lagophthalmos) → Exposure keratitis.

Acanthamoeba Keratitis :

Cause : Contact lens in contact with dirty water/swimming pool.

Symptoms : Severe pain out of proportion to the signs.

Signs :

- Ring shaped abscess.
- Radial keratoneuritis.

Culture : Non-nutrient agar enriched with E. coli.

Rx : Polyhexamethylene biguanide (PHMB) 0.02 % or Chlorhexidine 0.02 %.

Active space

Corneal Dystrophies

01:18:13

- Opacifying disorders.
- Non-inflammatory lesions.
- Progressive.
- Usually bilateral.
- Autosomal dominant disorder.
- Age : 1st to 2nd decade.

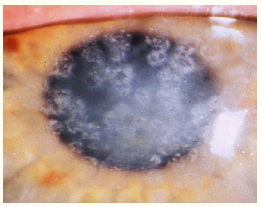
Epithelial corneal dystrophies (CML) :

Cogan's epithelial basement membrane dystrophy.
Meesmann epithelial dystrophy.
Lisch epithelial dystrophy

} m/c corneal dystrophy. Non progressive, d/t keratin gene mutation. AD/X-linked dominant.

Stromal corneal dystrophies :

Lattice corneal dystrophy	Seen in 70-90 years of age. Amyloid deposits (Congo Red stain).
Granular corneal dystrophy	Hyaline deposit (Masson Trichome stain). Hyaline + Amyloid deposit.
Macular dystrophy	Autosomal recessive. Least common.



Granular corneal opacities

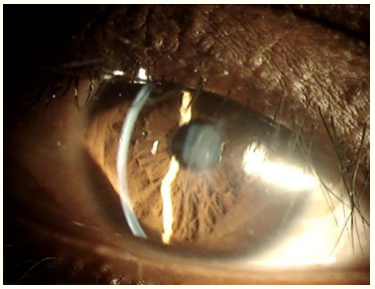
Keratoconus

01:20:05

Cone shaped cornea.

Signs of Keratoconus :

1. Munson's sign (v shaped indentation of lower eyelid)

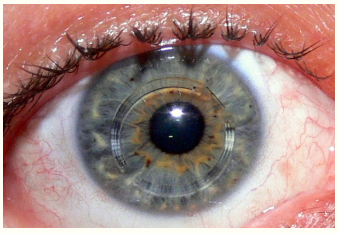


2. Rizzuti's sign (Arrow head of light over the nasal portion of limbus

3. Irregular astigmatism.
4. Vogt's striae.
5. Fleischer's ring
6. Oil droplet reflex on ophthalmoscopy
7. Scissoring reflex on retinoscopy

----- Active space -----

IOC : Corneal topography.

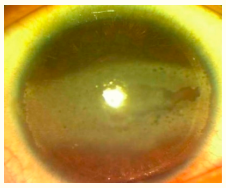

INTACS

Rx :

- INTACS : Intracorneal stromal ring segments → Flattening of cornea.
- Rigid contact lens.
- Keratoplasty (Corneal transplantation).
- Corneal collagen cross-linking by riboflavin and UV A radiation (m/c done).

Band Shaped Keratopathy

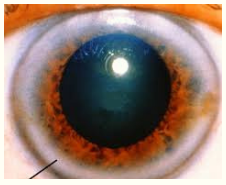
01:23:13



Whitish deposition of calcium in Bowman's layer of cornea.
Treatment : Chelation with EDTA.

Arcus Senilis

01:23:42



Perilimbal opaque ring.
D/t deposition of lipids.
Lucid interval of Vogt : A clear zone of cornea between arcus & periphery of the ring.

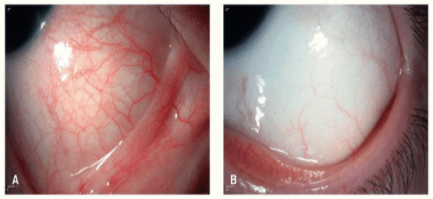
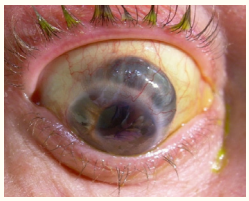
Sclera

01:24:26

Episcleritis vs Scleritis :

	Episcleritis	Scleritis
Inflammation	Superficial vessels	Deep vessels
Hue	Reddish	Violaceous
Pain	Minimal pain	Deep seated, severe
Phenylephrine	Blanching	No blanching
Cause	Idiopathic	A/w systemic conditions (Rheumatoid arthritis)

----- Active space -----

	Episcleritis	Scleritis
	 Congestion ↓ after the usage of phenylephrine/adrenaline eyedrops d/t vasoconstriction.	 (Scleromalacia perforans) : Necrotizing scleritis with no inflammation and pain. Seen commonly in RA.

----- Active space -----

OPHTHALMOLOGY REVISION 6

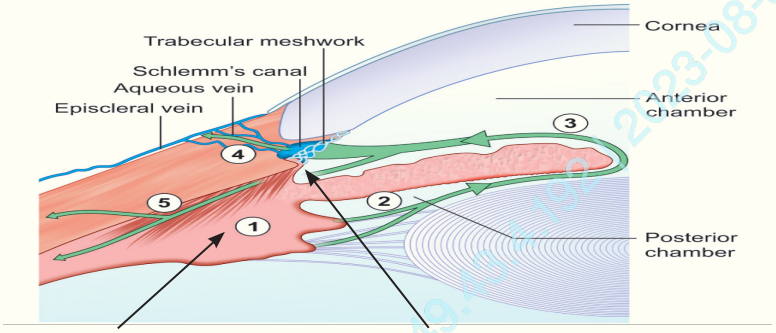
Glaucoma

00:00:15

Optic disc changes are characteristic & progressive.

Visual field changes : Irreversible.

Risk factor : IOP (Intraocular pressure) → may or may not be raised.



Types of outflow :

1. Trabecular outflow (90%) : IOP dependent.
2. Uveoscleral outflow (10%) : IOP independent. (Occurs in supraciliary space).

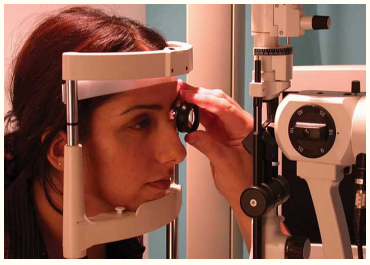
Types of Glaucoma :

	Angle closure glaucoma (ACG)	Open angle glaucoma (OAG)
Pathogenesis	Iris is pushed forward → Angle gets closed.	Blockage of trabecular meshwork.
AC Depth	Small.	Large.

Investigations in glaucoma

00:00:15

1. **Optic disc examination done using :**
   - Direct ophthalmoscope.
   - Slit lamp biomicroscopy along with +90 D convex lens.
   - Confocal Scanning Laser Tomography.
   - Spectral Domain OCT.



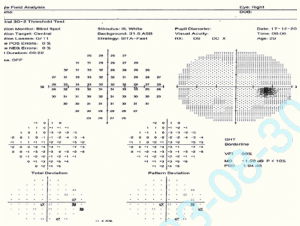
Optic disc examination.

Active space

2. **Perimetry :** Visual field examination.

- Shape : Horizontally oval with an infero-nasal notch.
- 2D plot of 3D visual field : Isoptre.
- Visual field : Maximum (temporal) & minimum (superior).
- Distance between fovea & blind spot : 2DD (3mm).
- Types of perimetry :
  a. Kinetic : Goldmann perimeter.
  b. Static (done clinically) : Humphrey field analyzer (HFA), Octopus, Dicon.

HFA



Visual field result of HFA

3. **Tonometry :** IOP measurement.

- Indentation tonometry :
  1. Schiotz tonometer.
  2. Rebound tonometer : Choice in self measurement.
- Non contact tonometry : Choice of screening in camps.
- Applanation tonometry : Works on Imbert Fick Law (Pressure = Force/Area applanated).

Rebound tonometer

Schiotz tonometer

Applanation tonometers :

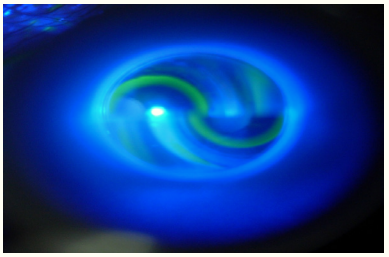
a. Goldmann's (gold standard) :
- Blue light illumination used.
- Fluorescein dye staining done.
- Slit lamp : Applanation tonometry rings (AT rings).

Goldmann's tonometer.

b. Perkin's Tonometry : Hand held instrument (choice in children/ OT/ Anesthesized patients).

c. Mackay marg : Choice in irregular edematous cornea.

d. Pascal tonometer : Choice in post LASIK cases. (As thin cornea → False low IOP).



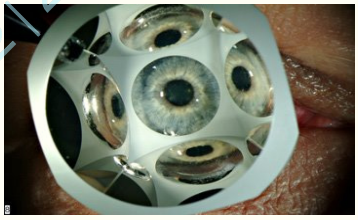
AT rings.

4. **Examination of angle of anterior chamber :**

- Van Herick's Method (slit lamp) : measures ratio of peripheral anterior chamber depth (PACD) to corneal thickness (CT)
  a. PACD = CT : Angle is open.
  b. PACD < 1/4th of CT : Angle is closed.

----- Active space -----

- Oblique flashlight test : Torch light is flashed from temporal side.
  a. Nasal side illuminates : Angle is open.
  b. Nasal side shows eclipse sign : Angle is closed.
- Gonioscopy : Best method.
  Types of gonioscopy :
  a. Direct : Koeppe, Swan-Jacob (used in infants, OT etc).
  b. Indirect : Zeiss 4 mirror, Goldmann's 4 mirror.
  Principle : To overcome total internal reflection.
  Contraindicated in a dilated pupil.
  Structures seen in angle :
  Cant : Ciliary body band (Posterior most).
  See : Scleral spur.
  This : Trabecular meshwork.
  Stuff : Schwalbe's line (Anterior most).
- Ultrasonic Biomicroscopy (UBM)
- Anterior Segment optical coherence tomography (ASOCT).


Zeiss 4 mirror gonioscope

Primary open angle glaucoma

00:23:18

Chronic simple glaucoma.
Age >50 years.

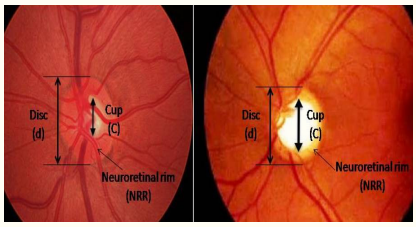
Symptoms :

- Headache.
- Delayed dark adaptation.
- Frequent changes in presbyopic spectacles.

Note : Genes involved in POAG.
- WDR 36
- Optineurin
- MYOC

Signs :

- IOP >21 or difference b/w two eyes >5mm.



Loss of NRR + Vertical cupping

Optic disc signs :
a. Loss of Neuroretinal rim (NRR) : inferior.
b. Vertical cupping (Cup Disc (CD) ratio >0.5).
c. Bayonetting sign : Double angulation of blood vessel.
d. Laminar dot sign.


Bayonetting sign.

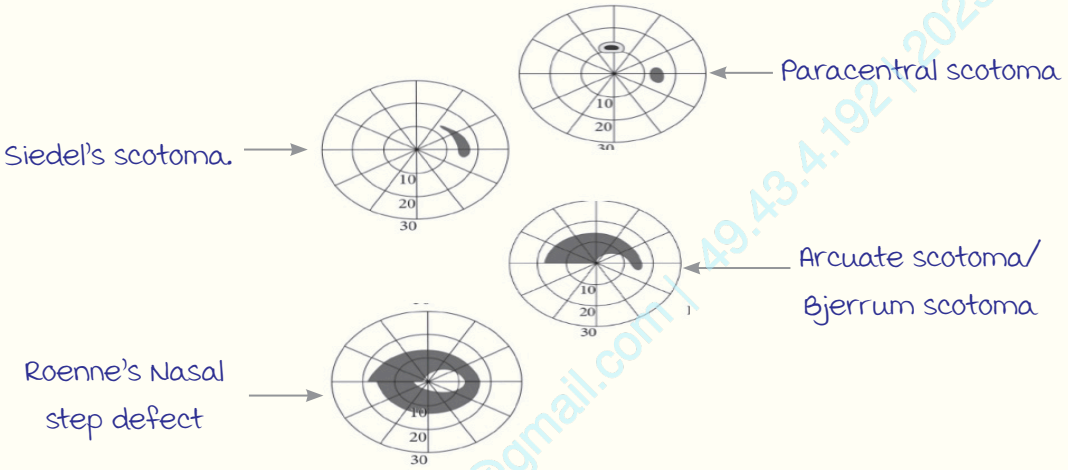
e. Peripapillary Atrophy :

i. Alpha zone (specific for glaucoma).

ii. Beta zone : Aka temporal myopic crescent.

Visual field changes :

- Isoptre contraction loss → Peripheral visual field loss → Baring of blind spot loss → Paracentral scotoma → Siedel's scotoma (comma shaped) → Bjerrum/ Arcuate scotoma → Ring/ double arcuate scotoma Roennne's central or peripheral nasal step → Central visual loss → Temporal vision loss.



Visual field changes

Management :

Conservative (mainly topical).

PGF2 alpha analogues (DOC)	Beta Blockers	Alpha Agonists	Carbonic Anhydrase Inhibitors
Latanoprost (↑ uveoscleral outflow).	Timolol (↓ aqueous secretion).	Apraclonidine (↓ aqueous secretion + ↑ trabecular outflow). Brimonidine (only ↓ aqueous secretion).	Acetazolamide (only Oral).
Side effects : 1. Hyper pigmentation. 2. Hypertrichosis. 3. Cystoid Macular Edema (CME). 4. Uveitis.	Side effects : 1. Corneal Anaesthesia. 2. NLD blockage. 3. Blepharo Conjunctivitis.	Side effects of Apraclonidine : 1. Eyelid retraction. 2. Mydriasis. 3. Follicular conjunctivitis. Side effects of Brimonidine (crosses BBB) : 1. Drowsiness. 2. Depression. 3. Apnea.	-

----- Active space -----

Surgical Treatment :

- Laser Trabeculoplasty : Argon laser or frequency doubled Nd Yag laser.
  Work by Photo coagulation.
  TOC for prophylaxis.
- Trabeculectomy.
- Non penetrating surgeries : Viscocanalostomy/ sclerectomy.
- SETON surgery (implantation of drainage device) : Resistant glaucoma.
- MIGS : istent (smaller drainage devices).

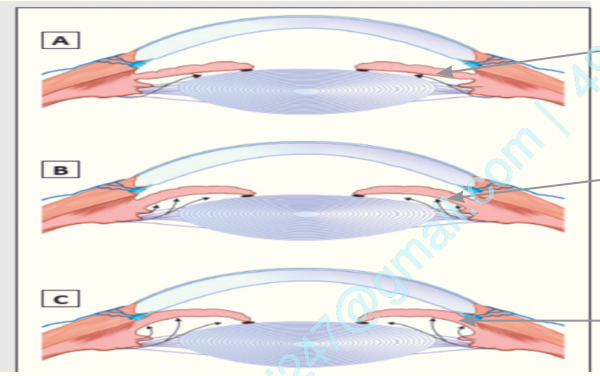
Primary angle closure glaucoma

00:34:33

Acute presentation.

Seen in young adults.

Cause :



Pupillary block.

Iris bombe : (convex iris).

Iridotrabeculocorneal contact

Symptoms :

- Extreme headache.
- Distorted vision (hazy cornea).
- Painful red eye.
- Vomiting.
- Halos (corneal edema → Prismatic dispersion of lights).

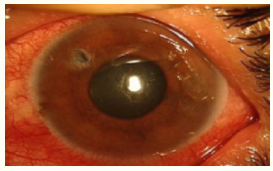
Signs :

1. Eclipse sign : Shadow over nasal iris.
2. Vogt's triad.
   i. Iris atrophy.
   ii. Cataract : Glaukomflecken (anterior subscapular cataract).
   iii. Pupil : Fixed, mid-dilated & vertical (d/t posterior synechiae).
3. Digital tonometry : Rock hard eye.

Active space

Rx :

- DOC : IV mannitol > Pilocarpine.
- TOC : Laser Iridotomy (between 11'o clock to 1'o clock).



Laser iridotomy

Congenital glaucoma

00:40:27

Type of open angle glaucoma.

Onset : <3 years of age.

Signs : Haab stria, buphthalmos, hazy cornea (earliest sign).

Haab's striae

Buphthalmos

Blue sclera.

Enlarged eyeball

(corneal diameter > 13 mm).

Rx :

- TOC : Trabeculectomy + Trabeculotomy.
- No hazy cornea : Goniotomy.

Secondary glaucoma

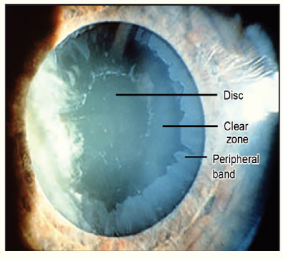
00:42:16

Secondary glaucoma

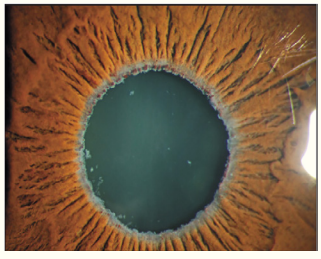
- Pseudoexfoliation glaucoma
- Lens induced glaucoma
- Pigmentary glaucoma

Pseudoexfoliation glaucoma

- m/c cause of 2° OAG.
- more common in : myopic, males (young).
- Signs : a. Target sign.
  b. Fnocks (makes mydriasis difficult).



Target sign



Fnocks

----- Active space -----

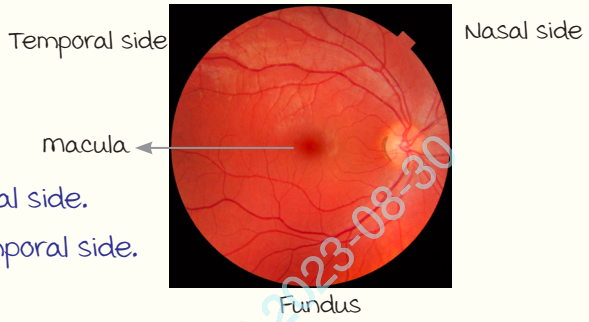
OPHTHALMOLOGY REVISION 7

Retina

00:00:14

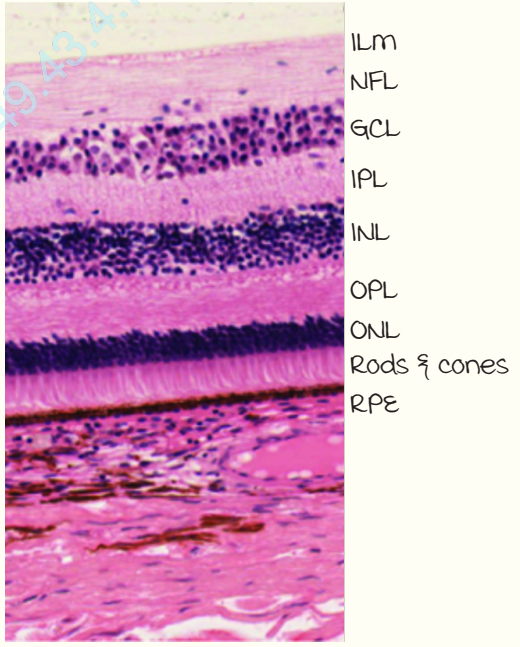
Landmarks :

1. Optic disc.
2. Optic cup at center.
3. Blood vessels are straight at nasal side.
4. Blood vessels form an arc at temporal side.
5. Macula/fovea : Avascular.



Histology :

1. Internal limiting membrane : Innermost.
2. Nerve fiber layer (optic nerve).
3. Ganglion cell layer (GCL) : more nuclei are found (3rd order neuron).
4. Inner plexiform layer (IPL) : To form a synapse between GCL & INL.
5. Inner nuclear layer (INL) : Bipolar cells (2nd order neuron).
6. Outer plexiform layer (OPL).
7. Outer nuclear layer (ONL).
8. External limiting membrane.
9. Rods and Cones (1st order neuron).
10. Retinal Pigment Epithelium (RPE) : Outermost layer.



Ganglion cell —Impulse→ Nerve fiber —Forms→ Optic nerve

Investigations :

1 & 2. Direct & indirect ophthalmoscopy : Examination of fundus.

	Direct ophthalmoscopy	Indirect ophthalmoscopy
External lens	Not required	Required (+20D convex Lens)
Distance	Close to patient' eye	At an arms length
Type of image	Virtual & erect	Real & inverted
Brightness	Not as bright	Bright

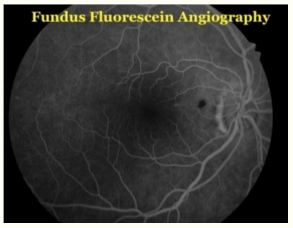
----- Active space -----

Hazy media	Not possible	Possible
Magnification (∝ 1/ area).	15x (Smaller area).	• 3x with +20D lens. • 5x with +14D lens (Larger area).
Area	• Posterior to equator. • Central Fundus. • Optic disc & macula. • Field of view : Smaller.	• Retina visualized anterior to equator. • Peripheral fundus. • Ora serrata. • Field of view : Larger – 45 degree with +20D lens.
		

3. Fundus Fluorescein Angiography (FFA) :

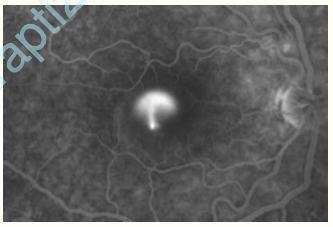
Used to diagnose :

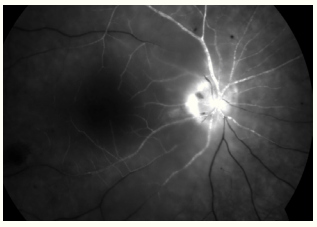
1. Vascular disorders (Leakage or blockage of dye).
2. Macular disorders (Maculae appears bright; Dye seen).



Normal FFA


Leakage of dye

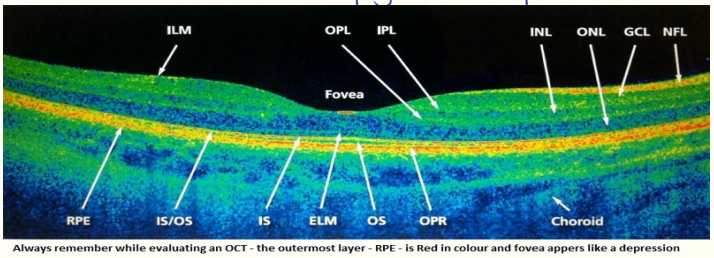

Macular disease


Vascular disease
(Block of blood vessel)

4. Indocyanin Green Angiography (ICGA) : Used to visualize collateral circulation.

5. Optical Coherence Tomography (OCT) :

- The outermost layer is red in colour (Retinal pigmented epithelium).
- Fovea appears like a depression.



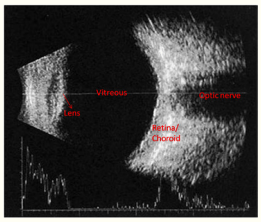
Always remember while evaluating an OCT - the outermost layer - RPE - is Red in colour and fovea appers like a depression

----- Active space -----

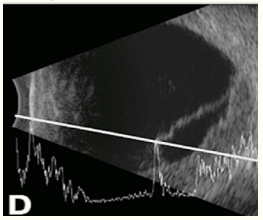
6. B-SCAN USG :

Done only when there are media opacities (lens or corneal opacities).

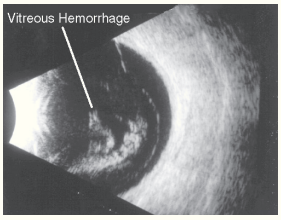
- Vitreous : Hyperechoic.
- Retina & choroid : Hypoechoic.



Normal B scan



Retinal detachment



Vitreous hemorrhage


Choroidal melanoma (Collar Stud/Mushroom appearance).

7. ElectroOculography (EOG) :

- Standing potential of the retina.
- Detects only outer retinal pathology as it generates from 2 layers only (photoreceptors & RPE).
- Measured by Arden's ratio (Normal : >1.85).

Vitreous hemorrhage :

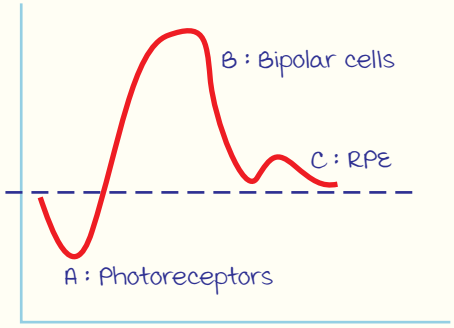
- MCC overall : Diabetic retinopathy.
- MCC in young adults : Blunt trauma.
- m/c recurrent cause : Eale's disease.

8. ElectroRetinography (ERG) :

- Action potential of the retina.
- Source : Pan retinal.

Graph of ERG :

- A wave : Photoreceptors.
- B wave : Bipolar cells.
- C wave : RPE.



Retinoblastoma : 00:12:40

- Non hereditary (60%) : Unilateral (m/c type).
- Hereditary (40%) : Non familial or Familial (7%).

m/c Inheritance : Autosomal dominant.

Gene : RB gene located on 13q14 chromosome.

m/c malignancy : PNET (Pinealoblastoma).

m/c secondary malignancy : Osteosarcoma.

Follows Knudsons's 2 hit hypothesis (Loss of heterozygosity).

Clinical features :

- m/c : Leukocoria (White pupillary reflex).
- 2nd m/c : Squint (Esotropia).


Leukocoria

----- Active space -----

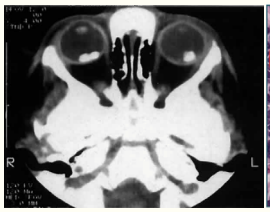
- 3rd m/c : Secondary glaucoma with buphthalmos.
- m/c route of spread : Direct and through the optic nerve.

Investigations :

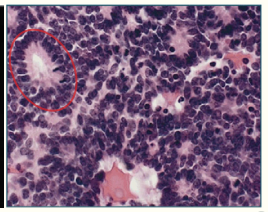
IOC : X Ray/CT scan (Calcified tumor).

Gold standard : Biopsy.

- Flexner Wintersteiner (FW) Rosettes.



Calcifications



FW Rosettes

Rx :

TOC : Enucleation.

Chemotherapy with Carboplatin, Etoposide & Vincristine.

Macular Disorders

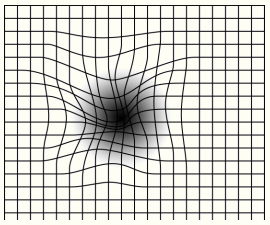
00:16:13

Tests :

Amsler's Grid : Wavy lines (Diagnostic of macular disorders).

Photo-Stress test : Differentiate macular from Optic nerve disease by Photo Stress Recovery Time (PSRT).

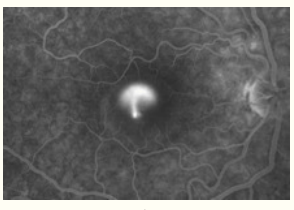
- Light is shown on retina.
- Delayed regeneration of cones → macular disorders.



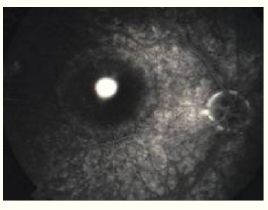
Wavy lines

Central Serous Retinopathy (CSR) :

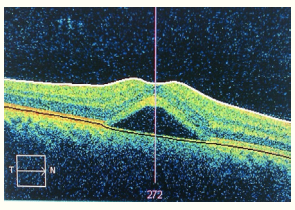
- Damage to RPE leads to fluid collection in sub retinal space.
- Risk factors :
  - Steroids.
  - Cushing's syndrome.
  - Type A personality.
  - Pregnancy.
- Treatment :
  - Laser Photocoagulation.
  - Verteporfin → PDT (Photodynamic therapy).
  - Steroids : Contraindicated.



Smoke stack sign



Ink blot appearance



Fluid in subretinal space (CSR)

----- Active space -----

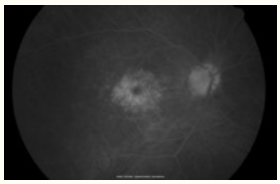
Cystoid macular edema :

Fluid in outer plexiform layer.

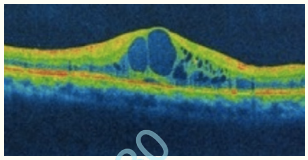
Risk factors (RUN for PRIDE) :

- Retinitis pigmentosa.
- Uveitis.
- Niacin/ Nicotine.
- PG analogues.
- RVO (Retinal vein occlusion).
- Irvin Gass syndrome.
- Diabetic retinopathy.
- Epinephrine in aphakia.

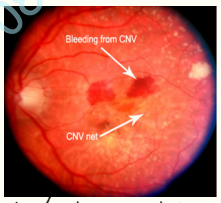
Rx : Steroids.



FFA : Flower petal appearance



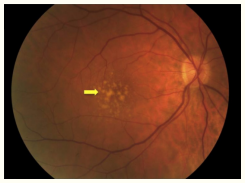
Cystoid macular edema



Late/advanced ARM

Age related macular degeneration

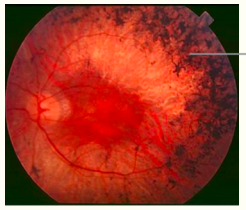
- Dry (Non-neovascular/ Non-exudative)
  - Early
  - Intermediate
    - Drusen (eosinophilic deposits) between retina & choroid.
      - Yellowish spots on macula
        - Rx : Antioxidants
  - Late
    - Geographic atrophy of RPE
- Wet (Neovascular/ Exudative)
  - Choroidal neovascularization
    - Hemorrhage
      - Rx : Anti VEGF drugs – Intravitreal injection. (Bevacizumab, Ranibizumab, Brolucizumab, Aflibercept).



Drusen

Retinitis Pigmentosa :

- Triad :
  1. Bony spicule pigmentation (Periphery).
  2. Waxy pale optic disc.
  3. Arteriolar attenuation.
- m/c fundal dystrophy.
- m/c inheritance mode : Autosomal recessive.
- Dystrophy : Rod – Cone dystrophy → Nyctalopia (Night blindness) + Peripheral loss of vision (Doughnut Scotoma/ Ring scotoma/ Tunnel vision).



Bony spicule pigmentation

Retinitis pigmentosa

----- Active space -----

- IOC : ERG not normal (A wave not generated).
- Rx : Not available.

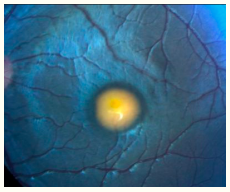
Best's macular dystrophy :

Inheritance : Autosomal dominant.

IOC : EOG (Ardens ratio is < 1.50).

Symptoms :

- Day blindness.
- Central scotoma.



Best's MD

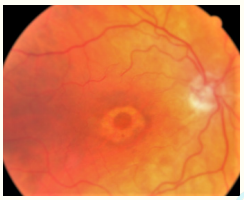
1. Vitelliform lesion (Fried egg).
2. Vitelliruptive lesion (Pseudo hypopyon).

Stargardt's disease :

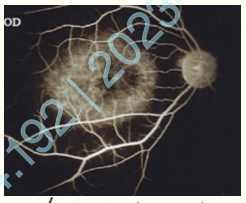
m/c hereditary juvenile macular dystrophy → Dystrophy of cones cells.

Symptoms :

- Day blindness/color blindness .
- Loss of central vision (central scotoma).



Bull's eye maculopathy



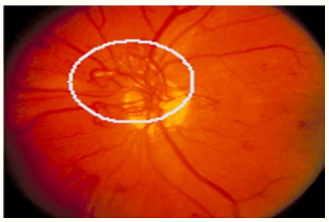
Dark/Silent choroid sign

Vascular Disorders

00:28:12

1. Diabetic retinopathy :

- Most important risk factor : Duration of diabetes.
- Screening for DR :
  - Type 1 : Done after 5 years.
  - Type 2 : Immediately upon diagnosis.

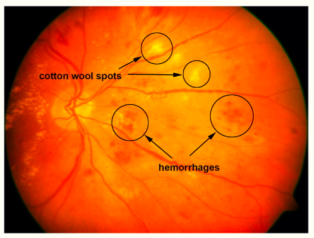


Neo vascularisation.

ETDRS (Early Treatment Diabetic Retinopathy Study)

Classification :

1. Proliferative DR : Neo vascularisation.
2. Non proliferative DR.
   - Earliest is micro aneurysm.
   - Hemorrhages : Flame shaped or dot & blot.
   - Exudates.
   - Cotton wool spots.



Cotton wool spots

Exudates

Rx of NPDR : Glycemic control.

Rx of PDR :

- Pan retinal photocoagulation (TOC) with argon laser.
- Anti VEGF drugs.

----- Active space -----

2. Hypertensive retinopathy :

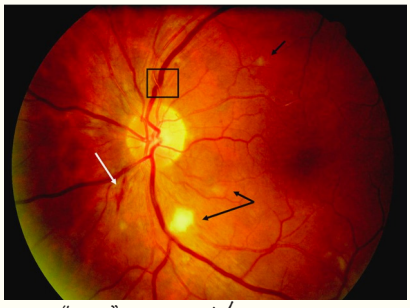
Keith Wagner Classification :

G1 – Arteriolar attenuation A:V ratio 1:3.

G2 – Salus sign.

G3 – Copper wiring of arterioles :

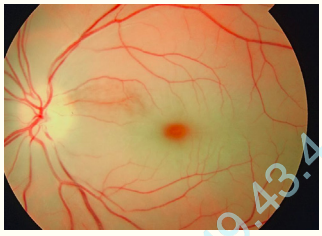
G4 – Papilledema and Silver wiring of arterioles.



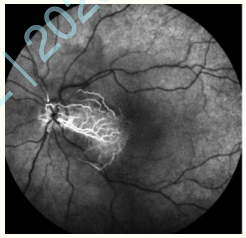
"Box" : Bonnet/Gunn sign.
"White arrow" : Flamed shaped hemorrhage.
"Black arrow" : Cotton wool spots.

3. Central retinal artery occlusion (CRAO) :

Red area d/t Cilioretinal artery supply

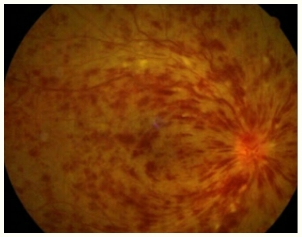


Cherry red spot + Pale fundus



FFA shows absence of dye. Central retinal artery occlusion.

- m/c cause is atherosclerosis.
- Fundus appearance : Pale + cattle trucking appearance.
- Emergency Rx :
  - Ocular massage (dislodge the emboli).
  - Decrease IOP by paracentesis / IV mannitol.
  - Vasodilation with sublingual Isosorbide nitrate.



Tomato splash fundus (CRVO)

4. Central Retinal Vein Occlusion (CRVO) :

	Non Ischemic stage	Ischemic stage
D/t	Stasis → Vasodilatation → Leakage of fluid	Damage to the vessel wall.
Signs	Macular edema	Severe flame shaped Hemorrhages → Tomato Ketchup/splash fundus. Rubeosis iridis : Neo vascularisation of Iris → 100 day Glaucoma (also seen in PDR).
Rx	Intra vitreal Triamcinolone	Pan retinal photocoagulation.

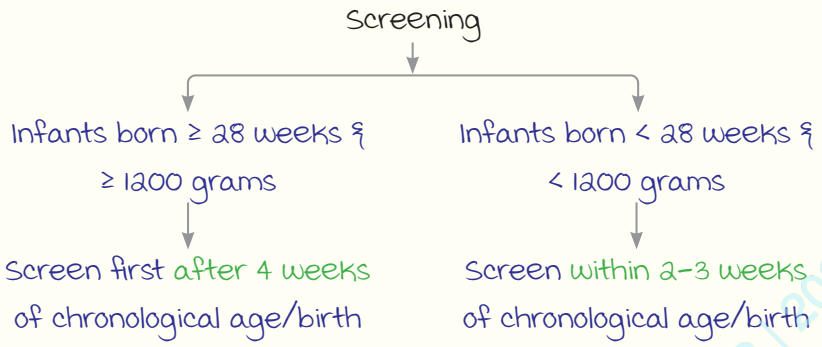
Retinopathy of Prematurity

00:38:35

Active space

Criteria for screening :

- Preterm infants born <34 weeks of gestational age.
- Birth weight < 1750 grams.
- Preterm infants 34–36 weeks of age with risk factors.



Rx : Laser photocoagulation of the entire avascular retina upto ora serrata (Diode-red laser : 810 nm wavelength is preferred) Or by lens-sparing pars plana vitrectomy (PPV) for Tractional RD.

Retinal Detachment

00:39:42

Rhegmatogenous RD	Tractional RD	Exudative RD
Syneresis (vitreous liquefaction) → Retinal breaks → Liquid vitreous seeps inside retina	D/t static vitreoretinal traction. No breaks.	Local & systemic causes → Leakage of fluid into subretinal spaces → RD. No breaks or traction.
Symptoms : • Photopsia. • Floaters. • Curtain falling in front of eyes. • Sudden & painless vision loss.	Symptoms : • Curtain falling in front of eyes. • Gradual & painless vision loss.	Symptoms : • Curtain falling in front of eyes. • Sudden & painless vision loss.
Clinical features : Convex surface.	Clinical features : • Concave surface. • Immobile retina.	Very mobile.
Other features : • Shafer's sign (Tobacco dust appearance). • Marcus Gunn pupil/ RAPD.	Other features : • Marcus Gunn pupil/ RAPD.	Other features : • Shifting fluid. • Marcus Gunn pupil/ RAPD.

----- Active space -----

OPHTHALMOLOGY REVISION 8

Eyelids

00:00:18

Anatomy :

The grey line divides the eyelid into 2 parts :

- **Anterior laminae :** Consists of skin (Thinnest skin in the body), subcutaneous tissue and muscles.
- **Posterior laminae :** Consists of tarsal plate (No cartilage, only fibrous tissue) and palpebral conjunctiva.

Muscles of the eyelid :

Muscle	Nerve Supply	Action, Clinical correlation
Levator palpebrae superioris	Oculomotor nerve	• Elevation of upper eyelid. • Ptosis.
Muller's muscle	Sympathetic nerve fibers	
Orbicularis oculi	Facial nerve	• Closure of eyelid. • Lagophthalmos.

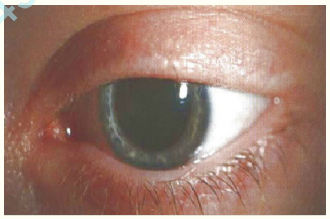
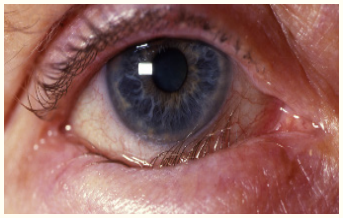
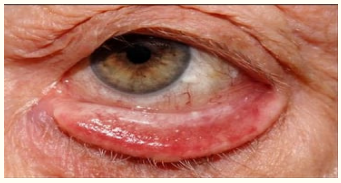
Glands of the eyelid :

Gland	Type
Meibomian glands	Modified sebaceous glands
Glands of Zeis	
Glands of Moll	Modified sweat glands

Eyelid pathology :

Eyelid pathology	Salient features	Image
Chalazion	• Lipogranulomatous inflammation of the meibomian gland. • C/F : Painless upper lid swelling away from the lid margin. • Rx : Incision and curettage/ intralesional triamcinolone 0.1 ml.	

----- Active space -----

Eyelid pathology	Salient features	Image
Stye (Hordeolum externum)	• Suppurative inflammation of the gland of Zeis. • Cause : S. aureus. • C/F : Diffuse painful swelling and pus points at the lid margin. • Rx : Hot compression.	
Trichiasis	• Inward turning of the eyelashes. • Rubbing on the cornea → Corneal opacity, if not treated. • Rx : Epilation, cryotherapy at the base of the lash.	
Distichiasis	Second row of eyelashes.	
Madarosis	Loss of eyelashes	
Entropion	Inward turning of the eyelid margin	
Ectropion	Outward turning of the eyelid margin	
Tylosis	Thickening of the eyelid margin.	
Ankyloblepharon	Fusion of upper and lower eyelid margins.	
Symblepharon	Fusion of bulbar and palpebral conjunctiva.	

----- Active space -----

Congenital ptosis :

Ptosis with absence of upper eyelid crease d/t levator palpebrae superioris malinsertion & lid lag.

Congenital ptosis

Treatment :

Treatment of congenital ptosis	
Mild ptosis and good levator function, also done in ptosis d/t Horner's syndrome.	Fasanella servat operation
Moderate ptosis and fair levator function (2-4 mm).	Levator resection surgery (Blaskowics/Everbusch)
Severe ptosis and poor levator function (>4mm).	Frontalis sling surgery
Surgery is done around 5 years of age.	

Synkinetic phenomenon :

Also known as Marcus Gunn jaw winking syndrome.

Cause : Synkinesis between trigeminal and oculomotor nerves.

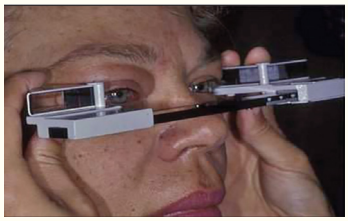
Proptosis

00:09:43

Protrusion > 21 mm from the lateral orbital rim.

Measured by :

- Leude's exophthalmometer.
- Hertel's exophthalmometer.



Hertel's exophthalmometer

Special features of various proptosis	Cause
Proptosis that increases on bending forward/with Valsalva manoeuvre	Orbital varices (U/L, bag of worms like consistency, phleboliths).
Proptosis exacerbated with upper respiratory tract infection	Orbital lymphangiomas.
Proptosis that ↑ on crying/straining	• Children : Capillary hemangioma. • Infants : Encephalocoele.
Pulsatile proptosis	Caroticocavernous fistula.

Caroticocavernous fistula :

Bilateral.

Cause : Trauma (75%).

M/C nerve involved : Abducens nerve.

IOC : Digital Subtraction Carotid Angiography (DSCA).

Active space

m/C causes of proptosis :

	Unilateral	Bilateral
Adults	Grave's disease	Grave's disease
Children	Orbital cellulitis	• Leukemia/AML (Chloroma). • Neuroblastoma.

	Cavernous sinus thrombosis	Orbital apex syndrome	Orbital cellulitis
Cranial nerves involved	III, IV, V_1, V_2 and VI.	II, III, IV, V_1, V_2 and VI.	II, III, IV and VI.
Laterality	Starts U/L, then becomes B/L.	U/L	U/L
Complete external ophthalmoplegia	+ 6th nerve earliest affected.	Concurrent (All 3 nerves involved together). +	
Corneal anesthesia	+	+	-
Loss of vision	-	+	+
Edema in mastoid region	+	-	-
Fever + headache	+	-	-
Systemic and ophthalmic findings	Systemic and ophthalmic findings occur together.	Ophthalmic > systemic	Systemic > Ophthalmic

most commons related to orbit :

m/C	Cause
m/C cystic orbital lesion	Ductal cyst of lacrimal gland.
m/C cystic orbital tumor	Epidermoid and dermoid.
m/C orbital neoplasm (Pediatric age)	
m/C orbital malignant tumor (Pediatric age)	Rhabdomyosarcoma.
m/C orbital and periorbital tumor in children	Capillary hemangioma.
m/C benign orbital tumor in adults	Cavernous hemangioma.
m/C malignant orbital tumor in adults	B cell non Hodgkin's lymphoma.
m/C intrinsic lacrimal gland lesion	Pleomorphic adenoma.

----- Active space -----

m/C	Cause
m/C orbital metastasis (Pediatric age)	Neuroblastoma.
m/C peripheral neural tumor of the orbit	Plexiform neurofibroma.
m/C primary source of orbital metastasis	• Breast > Lungs (most deaths). • Neuroblastoma : Pediatric age.

Conjunctiva

00:16:50

Histology :

Goblet cells :

- Present in the conjunctival epithelium.
- Secrete mucin, which forms the innermost layer of the tear film.

Lymphatic drainage :

In the eye, lymphatic drainage occurs only in the conjunctiva.

- Medial : Submandibular lymph nodes.
- Lateral : Preauricular lymph nodes.

Conjunctivitis :

Also known as eye flu.

C/F : Redness, painless, stickiness, irritation, foreign body sensation, watering.

Note : Loss of vision indicates corneal involvement.

Signs :

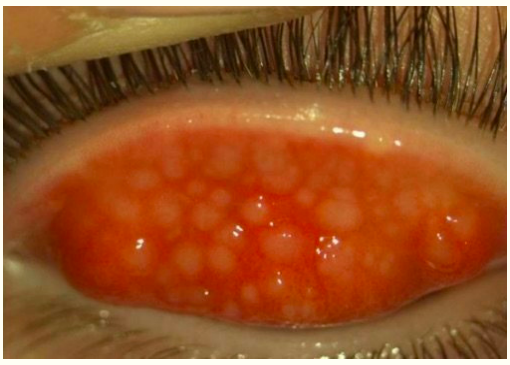
Discharge :

Watery : Allergy, viral infection.

Mucopurulent : Bacterial and chlamydial infections.

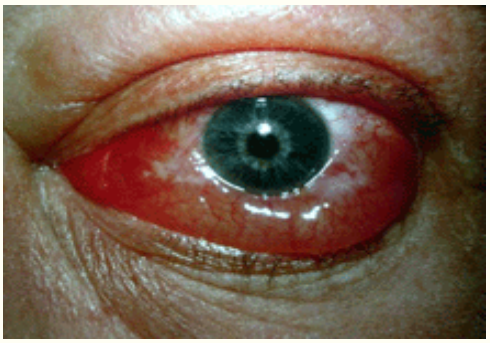
Sticking together of the eyelids in the morning and colored halos.

Papillae :
Hypertrophied vascular cores seen in bacterial infections and allergy.

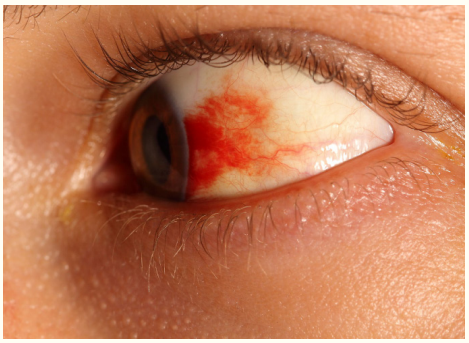


Follicles → Lymphoid aggregates :
Whitish/yellowish grey lesions. Seen in chlamydial and viral infections.

----- Active space -----



Chemosis :
Edema of the bulbar conjunctiva



Subconjunctival hemorrhage

Hyperemia : Redness/congestion.

Type of discharge	Inflammatory reaction	Etiology
Mucopurulent	Papillae	Bacteria
	Follicle	Chlamydial
Watery	Papillae	Allergic
	Follicle	Viral

Bacterial conjunctivitis :

Type	Salient features
Acute mucopurulent	m/c due to S. aureus.
Acute purulent conjunctivitis	Also known as hyperacute/blennorrhea. Cause : N. gonorrhoeae. C/F : • Overhanging eyelid. • Copious discharge. • Preauricular lymphadenopathy.
Acute membranous conjunctivitis	membrane bleeds on removal.
Acute pseudomembranous conjunctivitis	membrane does not bleed on removal.
Angular conjunctivitis	• Aka diplobacillary conjunctivitis (moraxella axenfield). • Affects lateral canthi. • Rx : Tetracycline ointment and zinc eye drops.

----- Active space -----

Chlamydial conjunctivitis :

00:24:00

Chlamydial conjunctivitis	Serovars
Adult inclusion conjunctivitis	D-K
Trachoma	A, B, Ba, C
Ophthalmia neonatorum	• D-K • Other causes.

Trachoma :

Trachoma	
Also known as	Egyptian ophthalmia.
Spread (FFF)	Finger, Fly, Fomite.
Clinical signs	• Sago grain follicles. • Papilla.
Diagnosis	Inclusion bodies : Cytoplasmic Halberstaedter Prowazeke bodies.
Treatment	SAFE strategy : • S : Surgery for inturned eyes. • A : Antibiotic (Azithromycin). • F : Facial cleanliness. • E : Environmental change.
DOC	Azithromycin 1 g single dose.
Blindness in trachoma	Due to corneal opacity.

Herbert's pits :
Seen at limbus.

Arlt's line :
Line of cicatrization.

Pannus :
Vascularization of cornea.

Ophthalmia neonatorum :

Conjunctivitis in neonate.

Onset (Hours after birth)	Cause
Within first 6 hours	Chemical (Silver nitrate) conjunctivitis.
24-48 hours (most severe)	N. gonorrhoeae.

----- Active space -----

Onset (Hours after birth)	Cause
2-5 days	Other bacteria (Gram +ve > gram -ve).
5-7 days	HSV-II.
> 1 week (most common)	Chlamydia trachomatis (D-K).

Prevention :

Crede's method (Not used now) since the drug for this method is silver nitrate.

Erythromycin eye ointment in the neonate's eye.

Viral Conjunctivitis :

00:27:37

Viral conjunctivitis	
Adenoviral	• Epidemic Keratoconjunctivitis. • Pharyngoconjunctival fever.
Acute hemorrhagic/Apollo conjunctivitis (m/c) : PACE	• Picornavirus. • Adenovirus type 11. • Coxsackie A24. • Enterovirus type 70.
HSV conjunctivitis	
Molluscum contagiosum conjunctivitis	

Allergic conjunctivitis :

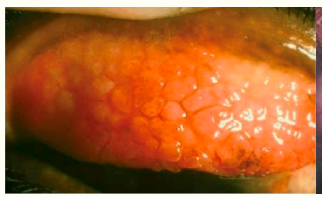
- Seasonal.
- Vernal Keratoconjunctivitis (Spring catarrh).
- Atopic Keratoconjunctivitis.
- Giant papillary conjunctivitis (mechanical irritation due to contact lens use, suture protrusion in the eye or ill-fitting prosthetic eye).
- Phlyctenular conjunctivitis.

Vernal Keratoconjunctivitis/Spring catarrh :

m/c in boys (5-15 years of age).

Hypersensitivity type 1 > 2.

Ropy discharge (maxwell-lyon sign).



Cobblestone papilla

Pseudogerontoxon

Horner Trantas dots :

Eosinophilic deposits at the limbus.

Treatment :

DOC : Olopatadine (Anti histamine + Mast cell stabilizer) + Topical steroids (Given in acute exacerbations/initial treatment).

----- Active space -----

Pterygium :

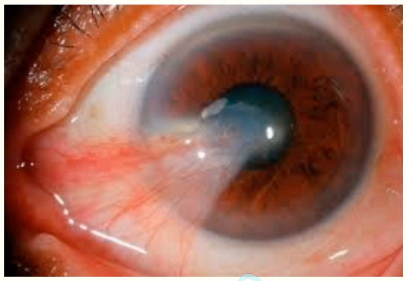
00:31:33

A triangular growth of conjunctiva over the cornea.

Causes :

- Limbal stem cell deficiency.
- Ultraviolet rays.
- Dust, heat.

Can cause visual defects by astigmatism and obstruction of visual axis.



Pterygium

Treatment :

- Excision.
- Mitomycin-C/autografting to prevent recurrence.

Uveitis

00:33:50

Inflammation of the uvea.

Anterior uveitis	Intermediate uveitis	Posterior uveitis	Pan uveitis
Iris + Pars plicata	Pars plana	Choroid + Retina	All parts involved
Iridocyclitis	Pars planitis	Choroiditis/ chorioretinitis/reti-nochoroiditis	Causes: • Sympathetic ophthalmitis. • Vogt Koyanagi Harada syndrome.

Sympathetic ophthalmitis :

Cause : Trauma.

Involves the non traumatic eye.

Prevention : Enucleation of the traumatic eye within 14 days.

Anterior uveitis :

Involvement of iris and pars plicata.

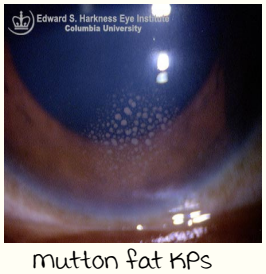
C/F : Pain, redness, loss of vision, lacrimation, photophobia.

Signs :

Keratic precipitates :

a. Mutton fat Keratic precipitates :

Deposits on the corneal endothelium, m/c seen inferiorly in Artl's triangle, in granulomatous uveitis.



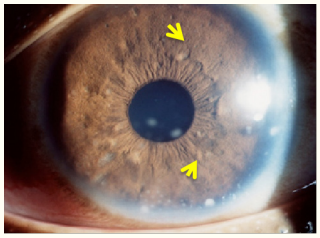
Mutton fat KPs

b. Fine granules : Non-granulomatous uveitis (Related to HLA B-27).

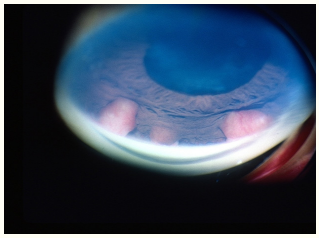
c. Stellate : HSV uveitis, Fuch's heterochromic iridocyclitis.

Iris Nodules :

Koeppe's nodules : Iris nodules seen at the pupillary margin.



Busacca nodules : Seen at the stromal surface.

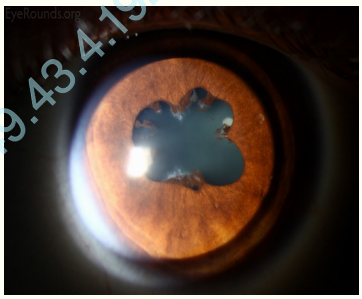


Berlin's nodules : Seen at the angle of anterior chamber/ periphery of iris.

Acute cases	Chronic cases
Miosis.	Posterior synechiae (Adhesion between pupillary margin and the lens), causes irregularly dilated pupil, known as festooned pupil.

Aqueous cells : Marker of disease activity.

Aqueous flare : Earliest sign of anterior uveitis (Tyndall effect/Brownian movement).



Festooned pupil

Occlusio pupillae :

Seen in severe uveitis, where a membrane covers the pupil.

It can lead to secondary angle closure glaucoma.

Treatment :

Topical steroids (Tapering should be done).

Atropine (mydriatic and cyclopegic).

Complications :

1. Band shaped keratopathy.
2. Complicated cataract.
3. Glaucoma :
   - Secondary angle closure glaucoma : Due to posterior synechiae formation.
   - Secondary open angle glaucoma :
     a. Due to trabeculitis.
     b. Latanoprost is contraindicated in this condition.
     c. DOC : α agonist/dipivefrine.
4. Pthisis bulbi.

----- Active space -----

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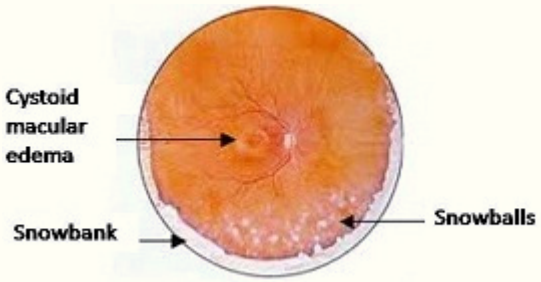
Intermediate Uveitis :

Inflammation of the pars plana.



Leakage of cells in vitreous → Appear white in colour (Snow balls) → Snowbanking of inflammatory deposits

m/c cause of loss of vision : Cystoid macular edema.

Treatment :

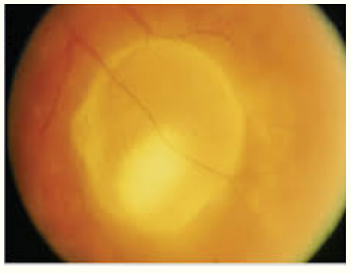
Periocular steroids given.

Steroid injection in the parabulbar/sub Tenon space
↓ No response
Systemic steroids
↓ No response
Immunomodulator therapy
↓ No response
Pars plana vitrectomy

Posterior uveitis :

m/c cause : Toxoplasma chorioretinitis.

Punched out scar



Headlight in fog appearance