



OPHTHALMOLOGY

medpgnotes

CONTENTS

DEVELOPMENT OF EYE	8
ANATOMY OF EYE	8
PHYSIOLOGY OF EYE.....	9
CLINICAL PRESENTATION AND METHODS IN OPHTHALMOLOGY	10
GENERAL FEATURES OF OPHTHALMIC METHODS	10
COLOURED HALOS	11
FLUORESCIN ANGIOGRAPHY	12
DIRECT OPHTHALMOSCOPY	12
INDIRECT OPHTHALMOSCOPY	12
LOSS OF VISION	12
OPTICS AND REFRACTION	13
GENERAL FEATURES OF OPTICS AND REFRACTION	13
GENERAL FEATURES OF REFRACTORY ERRORS	13
MYOPIA	14
HYPERMETROPIA	15
ASTIGMATISM	15
PRESBYOPIA	16
RETINOSCOPY	16
CONTACT LENSES	16
APHAKIA	17
INTRAOCULAR LENS	17
CONJUNCTIVA	18
GENERAL FEATURES OF CONJUNCTIVA	18
CONJUNCTIVAL XEROSIS	18
CHEMICAL CONJUNCTIVITIS	18
OPHTHALMIA NEONATORUM.....	19
PURULENT CONJUNCTIVITIS	19
MEMBRANOUS CONJUNCTIVITIS.....	19
ANGULAR CONJUNCTIVITIS.....	19
HEMORRHAGIC CONJUNCTIVITIS.....	19
PHYLCTENULAR CONJUNCTIVITIS	20
SPRING CATARRH.....	20

TRACHOMA	20
PTERYGIUM	21
CORNEA.....	22
GENERAL FEATURES OF CORNEA	22
CORNEAL ULCER.....	24
KERATITIS	24
BAND SHAPED KERATOPATHY	24
FUNGAL KERATITIS.....	24
HERPES KERATITIS.....	25
HERPES ZOSTER KERATITIS.....	25
ACANTHAMOEBA KERATITIS	25
CORNEAL DYSTROPHY.....	26
KERATOCONUS.....	26
SCLERA	26
UVEAL TRACT.....	27
GENERAL FEATURES OF UVEAL TRACT.....	27
FEATURES OF UVEITIS	28
MANAGEMENT OF UVEITIS.....	29
IRIDOCYCLITIS	29
CHOROIDITIS	29
CHORIORETINITIS.....	30
ENDOPHTHALMITIS.....	30
PANOPHTHALMITIS.....	30
PARS PLANITIS.....	30
PERSISTENT HYPERPLASTIC PRIMARY VITREOUS.....	30
VITREOUS HEMORRHAGE	31
PHTHISIS BULBI	31
NEOVASCULARISATION OF IRIS.....	31
IRIS CYST.....	31
MYDRIATIC AND CYCLOPLEGIC DRUGS.....	31
LENS	32
GENERAL FEATURES OF LENS.....	32
CAUSES OF CATARACT	33
FEATURES OF CATARACT	33

TYPES OF CATARACT	33
DIAGNOSIS OF CATARACT	35
TREATMENT OF CATARACT	35
ECCE	35
ICCE	36
SICS AND PHACOEMULSIFICATION	36
COMPLICATIONS OF CATARACT SURGERY.....	36
AFTER CATARACT	36
ECTOPIA LENTIS.....	37
GLAUCOMA.....	37
ANATOMY OF GLAUCOMA.....	37
PHYSIOLOGY OF GLAUCOMA	37
GENERAL FEATURES OF GLAUCOMA	38
CONGENITAL GLAUCOMA.....	39
FEATURES OF OPEN ANGLE GLAUCOMA	39
DIAGNOSIS OF OPEN ANGLE GLAUCOMA.....	40
TREATMENT OF OPEN ANGLE GLAUCOMA.....	40
FEATURES OF ANGLE CLOSURE GLAUCOMA	41
TREATMENT OF ANGLE CLOSURE GLAUCOMA.....	41
EPIDEMIC DROPSY	42
MALIGNANT GLAUCOMA.....	42
OPTIC NERVE.....	42
FEATURES OF OPTIC NERVE	42
FEATURES OF PAPPILLEDEMA.....	43
DIAGNOSIS OF PAPPILLEDEMA	43
OPTIC NERVE INJURY	44
FEATURES OF OPTIC NEURITIS	44
DIAGNOSIS OF OPTIC NEURITIS	44
LEBER'S OPTIC ATROPHY.....	44
WOLFRAM SYNDROME	45
LAMINA CRIBROSA.....	45
NEUROOPHTHALMOLOGY	45
GENERAL FEATURES OF NEUROOPHTHALMOLOGY.....	45
CORNEAL REFLEX	46

PUPILLARY REFLEX	46
AFFERENT PUPILLARY DEFECT	46
ADIE'S PUPIL.....	46
ARGYLL ROBERTSON PUPIL.....	47
HORNER'S SYNDROME	47
VISUAL PATHWAY	47
COLOUR VISION	48
AMBLYOPIA	49
CORTICAL BLINDNESS	49
FUNCTIONAL VISUAL LOSS.....	49
INTERNUCLEAR OPHTHALMOPLEGIA.....	50
RETINA	50
GENERAL FEATURES OF RETINA.....	50
HYPERTENSIVE RETINOPATHY	52
FEATURES OF DIABETIC RETINOPATHY.....	52
MANAGEMENT OF DIABETIC RETINOPATHY.....	53
RETINOPATHY OF PREMATURITY.....	54
CHERRY RED SPOT.....	54
CRAO	54
CRVO	55
EALE'S DISEASE	55
AMAUROSIS FUGAX	55
CENTRAL SEROUS RETINOPATHY.....	56
RETINITIS PIGMENTOSA.....	56
FEATURES OF RETINAL DETACHMENT	56
MANAGEMENT OF RETINAL DETACHMENT.....	57
RETINAL DYSTROPHY	58
PHOTOPHTHALMIA	58
PHOTORETINITIS	58
CMV RETINITIS	59
COAT'S DISEASE	59
CHOROIDAL NEOVASCULARISATION	59
ANGIOID STREAK.....	59
STRABISMUS AND NYSTAGMUS	60

GENERAL FEATURES OF STRABISMUS AND NYSTAGMUS.....	60
OCCULOMOTOR NERVE PALSY	61
TROCHLEAR NERVE PALSY.....	61
ABDUSCENT NERVE PALSY	61
NYSTAGMUS	62
STRABISMUS	62
DUANE RETRACTION SYNDROME	63
OPHTHALMOPLEGIC MIGRAINE	63
TUMOURS OF EYE	63
GENERAL FEATURES OF TUMOURS OF EYE.....	63
PROPTOSIS	64
CAUSES OF RETINOBLASTOMA	65
FEATURES OF RETINOBLASTOMA	65
CLASSIFICATION OF RETINOBLASTOMA.....	66
DIAGNOSIS OF RETINOBLASTOMA.....	66
TREATMENT OF RETINOBLASTOMA.....	66
MELANOMA	66
THYROID OPTHALMOPATHY.....	67
ANATOMY OF CAVERNOUS SINUS.....	67
CAVERNOUS HEMANGIOMA.....	68
CAVERNOUS SINUS THROMBOSIS	69
OPTIC NERVE GLIOMA	69
DISEASES OF LID.....	70
GENERAL FEATURES OF DISEASES OF LID	70
CHALAZION	70
PTOSIS	70
SYMBLEPHERON.....	71
TUMOURS OF LID.....	71
DISEASES OF LACRIMAL APPARATUS	71
GENERAL FEATURES OF DISEASE OF LACRIMAL APPARATUS	71
KERATOCONJUNCTIVITIS SICCA	72
EPIPHORA.....	72
DACROCYSTITIS	72
NASOLACRIMAL DUCT OBSTRUCTION	72

OCULAR INJURIES.....	72
GENERAL FEATURES OF OCULAR INJURIES	72
BLOW OUT FRACTURE	73
SYMPATHETIC OPHTHALMITIS.....	74
INTRAOCULAR FOREIGN BODY	74
TRAUMA TO LENS	75
COMMUNITY OPHTHALMOLOGY.....	75
OCULAR MORBIDITY AND MORTALITY	75
TRACHOMA	76
VITAMIN A DEFICIENCY	76
CRITERIA FOR DETERMINING XEROPHTHALMIA.....	77
VISION 2020 AND NPCB	77



KEY TO THIS DOCUMENT

Text in normal font – Must read point.
Asked in any previous medical entrance
examinations

Text in bold font – Point from Harrison's
text book of internal medicine 18th
edition

Text in italic font – Can be read if
you are thorough with above two.

DEVELOPMENT OF EYE

Surface ectoderm gives rise to	Lens, corneal epithelium, conjunctival epithelium, lacrimal gland epithelium
Retina is an outgrowth of	Diencephalon
Corneal endothelium is derived from	Neural ectoderm
NOT derived from neuroectoderm	Ciliary muscle
NOT derived from mesoderm	Pupillary muscles
Ciliary muscle is derived from	Neural crest
<i>Factors associated with ocular angiogenesis</i>	<i>Fibroblast growth factor, VEGF, TGF beta</i>
<i>Cloquet canal or hyaloid canal runs between</i>	<i>Lens and optic disc</i>

ANATOMY OF EYE

<i>Frankfurt plane</i>	<i>Orbitomeatal plane</i>
<i>Length of eyeball</i>	<i>24 mm</i>
Anteroposterior stability of eyeball is NOT provided by	Suspensory ligament of eye ball
Lockwood ligament is found in	Orbit
<i>Suspensory ligament of lockwood</i>	<i>Thickened part of Tenon's capsule</i>
<i>Weigert ligament</i>	<i>Hyalocapsular ligament</i>
Semicircular fold of skin covering medial canthus of eye	Epicanthus
Newborn eye	Hypermetropic 2D, Apart from macular area, retina is fully differentiated. Orbit is more divergent than adult, Optic nerve is myelinated only upto lamina cribrosa
Macula lies at a distance of	3 mm from temporal margin of disc
Nodal point of eye lies in	Posterior part of crystalline lens
Lamina cribrosa is a modification of	Sclera
Posterior chamber of Eyeball is	Posterior to Iris
Telecanthus	Widened root of nose with normal interpupillary distance
Medial wall of orbit is formed	Body of sphenoid, Frontal process of maxilla, Ethmoid, Lacrimal bone
Floor or inferior wall of orbit is NOT formed by	Ethmoid
Superior rectus is innervated by	Oculomotor nerve
Superior oblique is supplied by	Trochlear nerve
Inferior oblique supplied by	3 rd nerve
Dilator papillae is supplied by	Post ganglionic sympathetic fibres from cervical sympathetic chain
<i>Ocular muscle having bilateral innervations</i>	<i>Levator palpebrae superioris</i>
Intortors of eye	Superior rectus, Superior oblique
Downward and lateral gaze is action of	Superior oblique
Actions of Superior oblique	Intorsion, Abduction, Depression
Function of superior oblique muscle	Depression with inward rotation
Horner's muscle	Muller's muscle of orbicularis oculi

<i>Müller muscle</i>	<i>Attached to upper margin of superior tarsus</i>
<i>Müller muscle is supplied by</i>	<i>Sympathetic fibers</i>
Muscle inserted farthest from Limbus	Superior rectus
Nerve arising from apex of orbit	Superior rectus, Inferior rectus, Medial rectus
Inferior rectus	Insertion 6.5 cm behind limbus, Attached to lower part of common tendinous ring
Ocular muscle NOT arising from apex of orbit	Inferior oblique
<i>Vein of versalius</i>	<i>Inferior ophthalmic vein</i>
3 rd nerve	Carries parasympathetic nerve, Cause miosis, Enters orbit through superior orbital fissure
Eye deviated laterally and slightly downward. Upward gaze is impaired and medial rotation is not possible.	Occulomotor nerve
NOT true about occulomotor nerve	Enters orbit through inferior orbital fissure
Trochlear	Longest intracranial course, Supplies contralateral superior oblique muscle, Only cranial nerve emerging from dorsal aspect of brain stem, Enters orbit through superior orbital fissure outside annulus of Zinn
Optic nerve	5 cm long, Closely related to ophthalmic artery, Covered with pia, arachnoid and duramater. Originates in retinal ganglion cells
Hasner's valve is seen in	Nasolacrimal Duct
<i>Optic canal</i>	<i>Situated between 2 roots of lesser wing of sphenoid</i>

PHYSIOLOGY OF EYE

<i>Potential difference between anterior and posterior part of eye</i>	<i>12 mV</i>
<i>Cells of eye first affected in radiation</i>	<i>Equatorial</i>
Rods are absent in eyes of	Hen
Critical period of development of fixation reflex	2-4 months of age
<i>Visual acuity in term infant</i>	<i>20/130</i>
Visual acuity reaches adult acuity by	7 years
Major function of Major intrinsic protein 26	Transport of water in lens
Initiation of visual impulse	Photoisomerisation and hydrolysis of visual purple
During dark phase of visual cycle, which form of vitamin A combines with opsin to make rhodopsin	11 cis retinaldehyde
Immediate reaction after Light in Visual cycle	11-cis retinol to all trans retinol
Increased visual acuity in eye is due to function of	Bipolar cells
Appreciation of color is by	Cones
Colors best appreciated by central cones of our foveomacular area	Red and green
True stereopsis is perceived due to	Binasal disparity
<i>Normal stereo activity is</i>	<i>40 seconds of arc</i>
Pain sensitive structure in eye	Ciliary body, Iris, Choroid
Oculocephalic reflex intactness of	Brain stem
Final common pathway for horizontal gaze	Abducent nucleus

In normal human eye, peripheral field of vision is usually least	Superior
Peripheral field of vision in human eye is least in	Upward direction
Yoke muscle of Right Superior rectus	Left Inferior Oblique
Antagonistic muscle to superior rectus	Inferior rectus
Components of near reflex	Miosis, Convergence, Increased anterior curvature of lens
NOT true about near reflex	Anterior displacement of lens
Delayed dark adaptation	Retinitis pigmentosa, Vitamin A deficiency, Central choroiditis
<i>Focussing of eye is controlled exclusively by</i>	<i>Parasympathetic innervations of ciliary body</i>
<i>Features of accommodation</i>	<i>Far point of distant vision on emmetropic eye is at infinity, static refraction refers to dioptric power of resting eye, dynamic refraction refers to dioptric power of accommodating eye, range of accommodation is the distance between far point and near point</i>
<i>Visual accommodation is characterized by</i>	<i>Constriction of ciliary muscle and sphincter pupillae, constriction of pupil, change in anterior surface of lens curvature</i>
<i>Associated with accommodation reflex</i>	<i>Accessory ciliary ganglion</i>
<i>Pathway NOT involved in accommodation reflex</i>	<i>Optic nerve, pretectal, ciliary ganglion</i>
NOT seen in Accommodation reflex	Mydriasis of Pupil

CLINICAL PRESENTATION AND METHODS IN OPHTHALMOLOGY

GENERAL FEATURES OF OPHTHALMIC METHODS

Ocular emergency	Angle closure glaucoma, Retinal detachment, Central retinal artery occlusion
Keratometry measures	Corneal curvature
Gonioscopy measures	Angle of anterior chamber
Not to be done in a dilated eye	Gonioscopy
Angle of anterior chamber is measured by	Gonioscope
Tonography helps you to determine	Facility of outflow of aqueous
Intraocular pressure is maintained by	Tonometer
Variable area tonometry	Mackey marg tonometer
<i>Surface area in applanation tonometry</i>	<i>3.06 mm</i>
<i>Weights used in indentation tonometer of Schiotz</i>	<i>5.5 g, 7.5 g, 10 g</i>
<i>Quantification of break down of blood aqueous barrier</i>	<i>Laser flare cell photometry</i>

Campimetry is used to measure	Field charting
Corneal thickness is measured by	Pachymeter
Amsler grid is used in	Detecting maculopathy
Visual testing in child	Visual evoked potential, Teller's acuity card test
<i>Type of visual acuity used clinically in Snellen chart</i>	<i>Minimum resolvable</i>
Miniature scale version of Snellen chart is called	Rosenbaum card
Inverted purkinje image is seen on	Posterior surface of lens
<i>Synotophore is used for examination of</i>	<i>Binocular vision</i>
<i>Jackson's cross cylinder is a</i>	<i>Spherocylindrical lens</i>
<i>Jackson's cross cylinder</i>	<i>Used to check axis and power of cylinder subjectively, blur the image when placed before an emmetropic eye</i>
<i>Tyndall effect is seen in</i>	<i>Biomicroscopy</i>
ERG is measured by placing electrode over	Cornea
<i>ERG represents</i>	<i>Summation response of retina</i>
<i>ERG detects</i>	<i>Changes in resting potential of eye induced by flash of light</i>
<i>ERG waves from</i>	<i>Rods and cones</i>
<i>ERG</i>	<i>A wave(-) from rods and cones, B wave(+) from bipolar cells and muller fibres, C wave(+) from pigment epithelium</i>
<i>ERG</i>	<i>Rods and cones are normal or not</i>
<i>EOG</i>	<i>For pigment epithelial function</i>
<i>Arden index</i>	<i>EOG</i>
NOT a macular function test	ERG
<i>Color of slit lamp used to visualize vitreous best</i>	<i>Green</i>
Peribulbar injection given in	Periorbital space
Low vision aids not useful in	Optic neuritis
ETDRS	Early treatment for diabetic retinopathy study

COLOURED HALOS

Coloured halos	Mucopurulent conjunctivitis, Angle closure Glaucoma, Phacomorphic glaucoma, Pigmentary glaucoma, Glaucoma of epidemic dropsy, Acute anterior uveitis, Corneal edema, Cataract
Coloured halos in angle closure glaucoma is due to	Corneal edema
Glaucoma in which coloured halos are NOT seen	Steroid induced glaucoma (Open angle glaucoma)
Coloured halos NOT seen in	Acute anterior Uveitis, Accomodation
Fincham test differentiates	Coloured halos due to immature cataract and due to acute congestive glaucoma
In fincham test, coloured halos broke into segments in	Immature cataract

FLUORESCEIN ANGIOGRAPHY

Fluorescent dye for ophthalmic diagnosis is injected in	Hepatic vein
Fluorescein dye injected in	Antecubital vein
Fluorescein angiography do NOT detect lesions in	Lens, Cornea (avascular)
Indocyanin green angiography is most useful in detecting	Occult choroid neovascularisation
Cerebral angiography dye injected in	Femoral artery

DIRECT OPHTHALMOSCOPY

Magnification in direct ophthalmoscopy	15 times
Distance in direct ophthalmoscopy	22 cm (25 cm)
Image in direct ophthalmoscopy	Virtual erect
Area of retina visualized by direct ophthalmoscopy	2 disc diameter
<i>NOT true about direct ophthalmoscopy</i>	<i>Better than indirect ophthalmoscopy in detecting diabetic maculopathy</i>
<i>NOT true about direct ophthalmoscopy</i>	<i>Large field of vision</i>

INDIRECT OPHTHALMOSCOPY

Periphery of retina visualized by	Indirect ophthalmoscopy, Goldmann three mirror contact lens
Indirect ophthalmoscopy detects	Ora serrata, retinal periphery, examination of vitreous base
Investigation for Floating opacities and decreased vision in high myopic.	Indirect ophthalmoscopy
Image seen by indirect ophthalmoscopy	Real inverted
Magnification in indirect ophthalmoscopy depends on	Power of lens used, Refractive power of patient
Magnification of indirect ophthalmoscopy	Only 4-5 times
<i>Advantage of indirect ophthalmoscopy</i>	<i>Binocular vision</i>
NOT true about indirect ophthalmoscopy	Magnification is 15 – 20 times
<i>NOT true about indirect ophthalmoscopy</i>	<i>Opacities in media visualized</i>

LOSS OF VISION

Sudden painful loss of vision	Acute congestive glaucoma, Anterior uveitis, Endophthalmitis
<i>Sudden painful loss of vision</i>	<i>Papillitis, CRVO, optic neuritis</i>
Sudden painless loss of vision	CRAO, CRVO, Retinal detachment, Vitreous hemorrhage, optic neuritis
Gradual painless loss of vision	Cataract, dry type ARMD, diabetic retinopathy, retinitis pigmentosa, optic atrophy
16 year old girl evaluated for recurrent abdominal pain presented with sudden onset of loss of vision on both	Malingering

eyes. On examination extraocular movements normal	
Most serious danger to vision	Fracture to Optic foramen
<i>Oculodigital syndrome</i>	<i>Constant rubbing of eyes by child (Leber's congenital amaurosis)</i>

OPTICS AND REFRACTION

GENERAL FEATURES OF OPTICS AND REFRACTION

Power of reduced eye	+58D
Length of eyeball	24 mm
Maximum refractive index	Centre of lens
Greatest Refractory Power	Anterior Surface of Cornea
<i>Refraction of anterior surface of cornea is maximum because</i>	<i>Smaller curvature, greater difference between refractory indices of air and cornea, avascular transparent tissue</i>
Refractive power of eye depends mainly on	Lens, cornea, axial length of eye
Refractory index of cornea	1.33
Most important factor determining convergence of lens on retina	Curvature of cornea, Refractive index of cornea
<i>Maximum refractory index</i>	<i>Centre of lens</i>
Cornea	Power is 43D, Majority of refraction occurs at air tear interface, With the rule astigmatism is present because vertical meridian more steep than horizontal meridian
<i>Visual axis and optic axis</i>	<i>Alpha angle</i>
<i>Visual axis and pupillary axis</i>	<i>Kappa angle</i>
If the axial length of eye is changed by 1 mm, then the power changes by	3 D
Swinging flash test for	Pupil (Marcus Gunn pupil)
Bailey Love chart is used to test	Visual acuity
Visual acuity is the measure of	Form sense
Malingering is detected by	Visual acuity testing
Objective method to assess visual acuity in malingering patients	Detecting Ocular kinetics
Combination of Flint and Crown glass lens produce	Achromatic Lens

GENERAL FEATURES OF REFRACTORY ERRORS

<i>Asthenopia is related to</i>	<i>Vision</i>
Anisokonia	Difference in size of image formed by 2 eyes
Difference in size of image formed by two eyes	Aniseikonia
<i>Aniseikonia is corrected by</i>	<i>Contact lens</i>
30 year old, 6/5 vision in each eye, unaided, his cycloplegic retinoscopy is +1D sphere at 1 metre distance. His complaints are blurring of new sprint at 30	Accommodative inertia