

Eye quick final revision

By Fatima Haider

- * Hordoleum externum (stye) - occurs in anterior part of eyelid in glands of Zeis or lash follicle
- * Hordoleum internum - occurs in posterior part of eyelid in meibomian gland
- * Senile entropion and ectropion - affects only lower eyelid
- * Senile entropion - atrophy of lower lid retractors, tarsal plate and stretching of canthal tendon
- * Senile ectropion - laxity of medial and lateral canthal tendons and loss of tone of palpebral part of orbicularis muscle
- * Complete third nerve palsy - complete ptosis
- * Partial third nerve palsy - partial ptosis
- * Horner syndrome - partial ptosis
- * Myasthenia gravis - ptosis is variable, fatigable and becomes worse in the evening
- * ptosis + pupil dilatation - 3rd nerve palsy
- * Partial ptosis + ipsilateral miosis + anhidrosis - Horner syndrome
- * ptosis + diplopia - myasthenia gravis
- * Normal tear film breakup time = 15-20 seconds
- * Schirmer test - less than 10 mm without anesthesia or less than 6mm with anesthesia is considered abnormal
- * Lacrimation - increased tear production
- * Epiphora - decreased tear drainage
- * Conjunctival injection - hyperemia in conjunctivitis - much more towards the fornix and fades towards the limbus
- * Petechial hemorrhages - in viral conjunctivitis
- * large and diffuse hemorrhages - severe bacterial conjunctivitis
- * chemosis - conjunctival edema
- * In trachoma, follicles are more numerous on upper palpebral conjunctiva than on the lower, which is unlike any other condition
- * Viral conjunctivitis - follicular reaction on lower tarsal plate
- * Symblepharon - bulbar and palpebral conjunctiva form an abnormal adhesion to one another
- * Ankyloblepharon - adhesion of edges of upper eyelid with lower eyelid
- * corneal thickness - 0.5 to 0.54 mm
- * Corneal thickness is important for diagnosis of keratoconus, primary open angle glaucoma and refractive laser surgery
- * Fluorescein stain bed of corneal ulcer
- * Rose bengal stains margin of corneal ulcer
- * Dendritic ulcers with club shaped ends - HSV
- * Dendritic ends with no club shaped terminal ends - Herpes zoster - HHV 3
- * Catarrhal marginal ulcer - hypersensitivity reaction to staphylococcal exotoxins and cell wall proteins with deposition of antigen antibody complexes in peripheral cornea
- * Episcleritis - lesion moves with cotton tipped applicator over the deeper tissue
- * Scleritis - red nodule in nodular scleritis visible that cannot be moved over underlying tissue

- * Posterior capsular rupture is complication of cataract surgery bcz posterior capsule is weakest at posterior pole
- * Glaukomflecken in acute angle closure glaucoma - metaplasia of cuboidal cells into myofibroblasts (cuboidal cells in central zone of lens epithelium)
- * Central nucleus of lens - oldest cells
- * periphery of cortex - youngest cells
- * Intumescent cataract - lens get excessively hydrated and swollen. Anterior chamber become shallow
- * Shallow anterior chamber - pupillary block risk of phacomorphic glaucoma
- * Congenital rubella is most frequent cause of congenital cataract
- * Elschnig's pearls are caused by proliferation of lens epithelium on posterior capsule

- * pars plicata - secrete aqueous humor
- * pars plana - posterior segment of eye is entered through pars plana incision 3 - 4 mm behind the limbus
- * Blind spot - normal blind spot is 15 degree temporal to fixation and measures 6 degree wide and 8 degree high
- * Central field - portion of visual field within 30 degree of fixation
- * Bjerrum's area - Central field within 25 degree of fixation
- * Arcuate nerve fibers - most sensitive to glaucomatous change
- * Macular fibers - most resistant to damage (preservation of central vision till end)
- * Tonometry - measurement of IOP
- * Ectopia lentis - displacement or malposition of eye's crystalline lens from its normal position
- * Gonioscopy - evaluation of anterior chamber angle
- * Fundoscopy - examination of fundus for evaluation of optic nerve head changes
- * Perimetry - evaluation of visual field defects
- Lens proteins in anterior chamber may form pseudohypopyon
- * Phacomorphic glaucoma - when swollen cataractous lens push against the back of the iris and cause pupillary block, iris bombe and angle block
- * Phacolytic glaucoma - soluble lens proteins leak from intact anterior capsule in Hypermaturation cataract
- * Phacoanaphylactic glaucoma - inflammatory reaction to lens proteins after traumatic capsular rupture or post operative retention of lens material
- * Pupillary Block Glaucoma - dislocated lens that gets incarcerated in pupil
- * Pseudoexfoliative glaucoma - A systemic condition in which a whitish dandruff like material is deposited over anterior segment of eye and other organs such as skin, heart, lungs, kidneys, meninges
- * Hematogenic (blood induced) glaucoma - associated with hyphema or vitreous hemorrhage
- * Red cell glaucoma - fresh hyphema; trabecular meshwork block by RBCs
- * Hemolytic glaucoma - obstruction caused by macrophages
- * Ghost cell glaucoma - ghost cells (spherical khaki colored cells) from vitreous hemorrhage enter into anterior chamber and cause TBM obstruction

- * Aphakic Glaucoma - more common in intracapsular cataract extraction than extracapsular cataract extraction; mechanical block due to remained lens matter or vitreous in anterior chamber angle
- * Malignant or ciliary block glaucoma - occur after glaucoma or cataract surgery
- * True congenital glaucoma - IOP is elevated at birth
- * Primary infantile glaucoma - IOP elevation occurs within 3 years of age
- * Juvenile glaucoma (secondary glaucoma) - IOP elevation between 3 - 6 years of age
- * Primary infantile glaucoma - enlargement of corneal diameter
- * Axial myopia is due to enlargement of eyeball
- * In trabeculectomy, the scleral flap is repositioned and sutured with 10/0 nylon suture
- * Principle function of uvea is to provide nutrition to eye
- * Endophthalmitis is purulent inflammation of intraocular fluids (vitreous and aqueous) usually due to infection
- * Syphilis - granulomatous uveitis
- * Secondary syphilis - non granulomatous uveitis
- * Diabetes and HTN cause pupil sparing 3rd nerve palsy
- * RAPD (Relative Afferent Pupillary Defect) - Marcus Gunn pupil
- * TAPD (Total Afferent Pupillary Defect) - Amaurotic pupil
- * RAPD is always unilateral phenomenon
- * Bilateral symmetrical optic nerve or retinal lesion does not cause RAPD
- * ptosis + miosis = horner
- ptosis + mydriasis = cn3/oculomotor palsy

Anterior Uveitis classification

- * Iritis - involves iris only
- * Cyclitis - involves ciliary body (particularly pars plicata)
- * Iridocyclitis - involves both iris and ciliary body

- * myopia - light rays focus in front of retina
- * hypermetropia - light rays focus behind the retina
- * 1 mm Axial length decrease = 3D of hypermetropia
- * 1 mm change in radius of curvature = 6D of hypermetropia
- * Atropine, tropicamide - Mydriatics
- * Pilocarpine - miotic
- * Cyclopentolate, Atropine - cycloplegic
- * Latent hypermetropia - +1 D - corrected by normal physiological tone of ciliary body
- * Facultative hypermetropia - corrected by effort of accommodation
- * Presbyopia - occurs due to decrease in accommodation power of crystalline lens
- * spasm of accommodation - miotic drugs

- * For myopia - concave (-) lens
- * For Hypermetropia - convex (+) lens (converging lens)
- * Presbyopia - convex lens
- * Anisometropia - two eyes have unequal refractive power
- * Diplopia - difference of more than 4 Diopters between 2 eyes (8% difference in 2 retinal images)
- * Yoke muscles - A pair of muscles (one from each eye) which moves the two eyes in same direction of gaze
- * Esophoria - more common in hypermetropes
- * Exophoria - more common in myopes
- * Hypermetropia - associated with convergent squint
- * Myopia - associated with divergent squint
- * Astigmatism - associated with convergent squint
- * Recession surgery in squint - to weaken the strong muscle
- * Resection surgery in squint - to strengthen the weak muscle
- * Normal AC/A ratio is 3:1
- * Low AC/A ratio - eyes do not converge sufficiently
- * High AC/A Ratio - eyes converge more than normal for a given amount of accommodation
- * The gold standard of measuring refractive errors is retinoscope
- * Presbyopic patient + nuclear sclerosis = index myopia (second sight)
- * with movement - hyperopia
- * against movement - myopia
- * off axis movement - astigmatism
- * scissors movement - keratoconus
- * Retrobulbar space (central space) - enclosed by extraocular muscle
- * Tumors in Retrobulbar space cause Axial proptosis
- * Tumors in peripheral orbital space (between periosteum and extraocular muscles) cause non axial proptosis
- * In orbital cellulitis, pus collect in subperiosteal space
- * In cataract surgery, anesthetic agent given in subtenon space
- * MC Malignant tumor in children - Rhabdomyosarcoma
- * MC orbital tumor in children - Capillary hemangioma
- * MC benign tumor in adults - capillary hemangioma
- * CT - gold standard for midface and orbital trauma
- * Hyphema is blood in anterior chamber of eye caused by disruption of blood vessels in ciliary body or iris
- * Microhyphema - RBCs only visible with slit lamp examination
- * Total or full hyphema - entire anterior chamber is filled with blood
- * Open globe injury is full thickness perforation or laceration of ocular globe
- * Blow out fracture - a fracture of orbital floor (most common) or orbital wall without a fracture of orbital rim
- * madarosis - loss of eyelashes
- * poliosis - discoloration of eyelashes
- * Ishihara test - color vision test

- * deuteranopia - green color blindness
- * protanopia - red color blindness
- * Angle closure glaucoma - Gonioscopy - gold standard test
- * Tonometry - to determine IOP
- * Red reflex - an eye test that assess light reflection of ocular fundus, which normally has red color
- * Fundoscopy - visualise retina, optic disc, choroid, blood vessels
- * Mydriatic drops are contraindicated in patients with narrow angle glaucoma bcz they can induce acute angle closure glaucoma
- * Fluorescein angiography - an imaging procedure in which Fluorescein is injected intravenously to highlight retinal vessels, which are then photographed
- * hyperfluorescence - Neovascularization, leakage of retinal vessels
- * hypofluorescence - vessel occlusion
- * OCT - A non invasive imaging technique used to examine retina, mainly for diagnosis of macular and optic disc anomalies
- * Indications: monitoring diabetes and HTN progression, suspected retinopathy due to inflammation, evaluation of optic nerve
- * Electroretinogram (ERG) - to measure electrical activity generated by retina in response to light stimuli
- * Indications - monitoring diabetes and HTN progression, retained intraocular foreign bodies, retinal disorders
- * Maddox rod test - phoria for distance
- * maddox wing - phoria for near

Blepharophemosis syndrome (BEPS or TEPS)

- * Blepharophemosis (eyelid narrowing)
- * epicanthus inversus (skin fold at inner corner of eye)
- * ptosis
- * short palpebral fissure
- * telecanthus (increase distance between medial canthi)

Tear film

- * mucus layer - conjunctiva
- * aqueous layer - lacrimal gland
- * lipid layer - meibomian gland

Accessory lacrimal glands in Conjunctiva

- * Glands of Krause - 42 in upper fornix, 6 - 8 in lower fornix
- * Glands of Wolfring - 2 to 5 in number in upper border of tarsus and lower border of inferior tarsus

Mucus glands in Conjunctiva

- * Goblet cells
- * Glands of Henle - in palpebral conjunctiva
- * Glands of Manz - found at limbus

Follicular conjunctivitis

- * viral infection - adenovirus, HSV, picornavirus
- * chlamydial (trachoma)
- * Epinephrine

Papillary

- * Allergic (vernal, atopic)
- * Autoimmune
- * Chronic irritation
- * Chronic blepharitis
- * Atropine

Grading of Trachoma

(FISTO)

- * TF - Trachoma follicles with 5 or more on superior tarsus
- * TI - Trachomatous inflammation diffusely involving tarsal conjunctiva
- * TS - Trachomatous conjunctival scarring
- * TT - Trachomatous trichiasis
- * CO - Corneal opacity over the pupil sufficient to blur iris details

Vernal keratoconjunctivitis

- * large papillae with cobblestone appearance
- * giant papillae
- * ropy secretion
- * ptosis
- * limbal form - gelatinous papillae, trantus dots

Pterygium stages

- * Stage 1 - extends less than 2 mm over the cornea, usually asymptomatic
- * Stage 2 - extends up to 4mm of the cornea, can disrupt pre corneal tear film and cause astigmatism
- * Stage 3 - extends more than 4mm and involves visual axis, causing mechanical obstruction of vision

Descemet membrane

- * basement membrane of endothelium
- * terminates at periphery as prominent line called Schwalbe's line
- * only fungi penetrate Descemet membrane
- * Desmetocele - remain intact in corneal ulcer and herniate due to raised IOP

Hypopyon

- * collection of pus cells in the anterior chamber
- * sterile pus bcz it is free of organisms and contain polymorphonuclear leukocytes enmeshed in a network of fibrin

Complications of corneal ulcer

- * Toxic iridocyclitis (anterior uveitis)
- * Secondary glaucoma
- * Desmetocele
- * Perforation of corneal ulcer
- * Corneal scarring (corneal opacity)

Types of Corneal opacity

- * Nebula - involving Bowman membrane and superficial stroma
- * Macula - 1/3rd of stroma
- * Leucoma - involving more than half of stroma

Herpes zoster ophthalmicus

- * HHV 3
- * involvement of ophthalmic division of trigeminal nerve

Scleritis

- * immune mediated vasculitis that inflames and destroy the sclera
- * inflammatory necrotizing - most severe
- * diffuse non necrotizing - most common
- * Surgically induced necrotizing scleritis (SINS) - Trabeculectomy and pterygium can cause SINS due to use of Mitomycin C

Most common cause of Lymphadenopathy associated with conjunctivitis is

- * viral infection
- * chlamydial infection

- * severe bacterial conjunctivitis (esp gonococcal)
- * Parinaud oculoglandular syndrome

Leucocoria in children

4R, 3C, PT

- * Retinoblastoma
- * Retinopathy of prematurity
- * Retinal detachment
- * Retinal dysplasia, retinal hamartoma
- * Congenital cataract
- * coloboma choroid
- * Coat's disease
- * PHPV - Persistent hyperplastic primary vitreous
- * Toxocara endophthalmitis

Hyperature senile cataract

- * Morgagnian Hyperature cataract - the whole cortex liquefies; small brownish nucleus may sink to the bottom of lens
- * Sclerotic Hyperature cataract - cortex become disintegrated and is transformed into a pultaceous mass; shrunken and inspissated lens; thickened anterior capsule
- * Lens subluxation into vitreous cavity or anterior chamber

Refractive power of cornea

- * anterior convex surface = +48 diopters
- * Posterior concave surface = -5 diopters
- * Average power of cornea = +43 diopters

Refractive power of lens = 16 - 17 diopters (18 - 20 D in jatoi)

Normal refractive power of eye = 59 Diopters

Classic triad of glaucoma

(at least 2 out of 3)

- * increased IOP (> 22 mmHg)
- * visual field defects
- * optic disc changes

Anterior chamber angle

STSC

- * Schwalbe's line
- * Trabecular meshwork
- * Scleral spur
- * Ciliary body

Normal field of vision

- * 50 superiorly
- * 60 nasally
- * 70 inferiorly
- * 90 temporally

Optic disc changes in glaucoma

- * Glaucomatous cupping
- * Nerve fiber layer defect
- * Neuroretinal rim - color changes from orange/pink to pallor and decrease in width gradually due to nerve fiber damage and is totally lost in advanced stages
- * Cup disc ratio increase - ratio greater than 0.7 in one eye or a difference of 0.2 between 2 eyes
- * Nasalization of blood vessels
- * Splinter hemorrhage - spindle shaped hemorrhages
- * Peripupillary atrophy - usually in POAG

POAG

- * beta blockers - first line drugs
- * prostaglandin analogues - DOC
- * alpha 2 agonists (apraclonidine, brimonidine) - decrease aqueous secretion
- * carbonic anhydrase inhibitors - decrease aqueous humor secretion
- * miotics (pilocarpine, physostigmine) - increase aqueous outflow by causing miosis

POAG Risk factors

- * hereditary
- * Old age

- * Myopes (near sightedness)
- * Diabetics
- * Contraceptive pill
- * CRVO
- * Retinitis pigmentosa
- * Steroids > 6 weeks

Neovascular glaucoma - Neovascularization of iris and anterior chamber angle

Causes

- * Ischemic CRVO (MCC)
- * Diabetic retinopathy
- * BRVO
- * ocular Ischemic syndrome
- * Eale's disease
- * Chronic intraocular inflammation
- * Intraocular tumors

Neovascular glaucoma clinical features

- * pain
- * neo vessels on pupillary margin, iris anterior surface and anterior chamber angle
- * increased IOP
- * Anterior chamber - flare/cells, hyphema, ciliary congestion

Slit lamp diagnosis keleye

- * Scan A and kerametry is done for IOL power calculation
- * Scan B .is done for posterior segment evaluation in mature and hypermature cataract
- * Simple torch for iris shadow is done for immature and mature cataract..

Da tol end k ku after diagnosis of cataract from slit lamp

Corneal diameter

- * At birth - 10 mm
- * 12 mm before 1 year is suspicious
- * 13 mm before 1 year is diagnostic of primary infantile glaucoma

- * 14 mm is typical of advanced stage

Anatomic classification of uveitis

- * Anterior - Anterior chamber - anterior part (pars plicata) of ciliary body
- * Intermediate - vitreous
- * Posterior - retina or choroid
- * Pan uveitis - All

Anterior Uveitis classification

- * Iritis - involves iris only
- * Cyclitis - involves ciliary body (particularly pars plicata)
- * Iridocyclitis - involves both iris and ciliary body

UGH syndrome

- * uveitis
- * Glaucoma
- * Hyphema/ Hypopyon

- * Synechiae - apposition of iris and lens or cornea
- * Anterior synechia - attachment of iris to cornea
- * Posterior Synechiae - attachment of iris to lens
- * Suprachoroidal space - potential space between Suprachoroidal lamina and sclera
- * Bruch's membrane - lies in contact with retinal pigment epithelium
- * Koeppe's nodules - situated at the pupillary border and may initiate posterior synechiae
- * Busacca's nodules - situated near collarette
- * Macula - located at posterior pole and corresponds to 15 degree of visual field
- * Fovea centralis - most sensitive area in centre of macula and represent 5 degree of visual field; it is avascular
- * Foveola - shining pit in the central floor of the Fovea; cones only; represent 1-2 degree of visual field
- * Foveolar avascular zone - foveola and some surrounding area
- * Central retinal artery - supplies sensory retina up to outer plexiform layer
- * Central retinal vein - drains into cavernous sinus directly or through superior ophthalmic vein
- * When hypertensive retinopathy shows bilateral disc edema (papilledema), the hypertension is called Malignant hypertension
- * Retinal detachment - separation of sensory retina from RPE

- * Rhegmatogenous retinal detachment - associated with retinal break (hole or tears); full thickness break in sensory retina
- * Tractional retinal detachment - pull on sensory retina by contracting vitreoretinal membrane
- * Exudative (serous) RD - damage to RPE, which allow the fluid from choriocapillaris to enter subretinal space
- * CRAO - irreversible damage to neural tissue occur after only 90 minutes
- * Rhegmatogenous RD - detached retina have convex shape
- * Tractional retinal detachment - detached retina have concave shape
- * Supratarsal steroid injection - vernal keratoconjunctivitis, atopic keratoconjunctivitis
- * Intravitreal and Suprachoroidal triamcinolone acetonide - acute anterior uveitis
- * Posterior subtenon steroid injection - intermediate uveitis
- * Intravitreal Anti VEGF - intermediate uveitis
- * Intravitreal and Suprachoroidal steroids - diabetic retinopathy
- * Subtenon steroid - Exudative retinal detachment
- * Optic chiasm lesion - bitemporal hemianopia
- * Left optic tract - represent right side of field of vision
- * Right optic tract represent left side of field of vision
- * Defective pupillary reflexes and optic atrophy seen only in lesions upto the lateral geniculate body
- * Optic nerve lesion - complete blindness in affected eye
- * Proximal part of optic nerve - junctional scotoma (contralateral superior quadrantanopia)
- * Optic chiasm - bitemporal hemianopia
- * Optic tract - homonymous hemianopia and contralateral hemianopic pupillary reaction (Wernicke pupil)
- * Lateral geniculate body - homonymous hemianopia with sparing of pupillary reflexes
- * Total optic radiation lesion - complete homonymous hemianopia

Behcet disease

- * aphthous oral ulcers
- * genital ulcers
- * uveitis
- * associated with HLA B51

Grade 2 Hypertensive Retinopathy

- * Salus sign - deflection of retinal veins as it crosses arterioles
- * Gunn sign - tapering of vein on either side of crossing
- * Bonnet sign - Banking of retinal vein distal to AV crossing

Optic nerve diseases

- * usually unilateral
- * RAPD
- * central visual loss
- * loss of color vision
- * optic disc edema

Oculomotor nerve supplies

- * All extraocular muscles except superior oblique and lateral rectus
- * Levator palpebrae superioris
- * Intraocular muscles - sphincter pupillae and ciliary muscle

Normal pupil size

- * in bright light = 2 - 4 mm
- * In dim light = 4 - 8 mm
- * Miotic (constricted) < 2mm
- * Mydriatic (dilated) > 5mm

Argyl Robertson pupil

- * miotic pupil that do not dilate in dim light
- * irregular
- * absent light reflex
- * present near reflex
- * light near dissociation
- * pupils neither constrict in bright light nor dilate in dim light
- * pupils are very difficult to dilate with Mydriatics
- * iris abnormality and trans illumination defect
- * lesion in dorsal aspect of Edinger Westfal nucleus

Light Near Dissociation

- * Adie's tonic pupil
- * Argyll Robertson pupil
- * Dorsal midbrain syndrome
- * Aberrant 3rd nerve regeneration

Adie's Tonic Pupil

- * parasympathetic denervation of pupil
- * tonically dilated pupil

- * poor or absent light reflex
- * near reflex is present
- * damage to parasympathetic ciliary ganglion
- * light near dissociation
- * Anisocoria - Adie tonic pupil is larger

Afferent Pupillary Defect

- * optic neuritis
- * Optic neuropathy
- * Optic nerve tumors
- * Ischemic retinal vein occlusion
- * CRAO
- * Retinal detachment
- * Unilateral advanced glaucoma

Investigations

- * Argyll Robertson pupil - Cocaine 4-10% - affected pupil does not dilate
- * Adie's tonic pupil - Pilocarpine 0.1% - constriction of pupil

Horner syndrome

- * ptosis
- * miosis
- * anhidrosis
- * Anisocoria - most marked in dim light
- * heterochromia
- * damage to sympathetic trunk in head and neck

Mydriasis

- * 3rd CN palsy
- * Adie's tonic pupil
- * Traumatic iridoplegia
- * Raised IOP
- * Brain injury

Miosis

- * Horner syndrome
- * Argyll Robertson pupil

- * Cluster headache variant of migraine
- * Inflammation e.g. Iritis
- * head injury

Astigmatism

- * Cylindrical lens - correct simple astigmatism
- * Spherocylindrical lens - correct compound and mixed astigmatism
- * Hard contact lens - may correct all 2-3 diopters of regular astigmatism
- * Lasek - correct upto 3 D
- * Lasik - correct upto 5 D

Astigmatism

- * Cylindrical lens - correct simple astigmatism
- * Spherocylindrical lens - correct compound and mixed astigmatism
- * Hard contact lens - may correct all 2-3 diopters of regular astigmatism
- * Lasek - correct upto 3 D
- * Lasik - correct upto 5 D

Paralysis of accommodation

- * cycloplegic drugs
- * diphtheria
- * diabetes
- * alcohol
- * third nerve palsy

Yoke muscles

- * medial rectus and lateral rectus
- * Superior rectus and inferior oblique
- * Inferior rectus and superior oblique

Pinhole test

- * Improvement of vision - refractive errors
- * no improvement - organic disease
- * deteriorates - macular pathology

Manifest squint (heterotropia)

- * No paralytic (comitant) squint - deviation remain same in all direction of gaze
- * Paralytic (non comitant) squint - deviation is irregular and varies in different direction of gaze

Streak Retinoscope

- * A patient with myopia will show "against motion" of light reflex in pupil
- * A patient with hypermetropia will show "with motion"

Abnormal Fundoscopic findings

- * blurred, swollen disc - papilledema
- * enlarged cup - open angle glaucoma
- * pale optic disc - optic atrophy
- * arteriolar narrowing (copper/silver wire appearance) - hypertensive retinopathy
- * hemorrhages (flame or dot blot) - hypertensive retinopathy, diabetic retinopathy
- * loss of venous pulsations - intracranial HTN, glaucoma
- * cherry red spot at Fovea - CRAO
- * pale discoloration of macula - macular degeneration

Radius of curvature in

- * hypermetropia - curvature of cornea or lens or both is flatter than normal
- * myopia - increase in curvature of cornea or lens