

Glaucoma

Guidelines for Clinical Case Presentations

Anoop Thomas, Mythri HM, Mallipatna C Ashwin, Shamin Jacob

HISTORY:

- Diminished Vision
- Pain
 - Time of Day
 - Prone Position
 - Relieved by sleep
 - Emotional Factor
 - Associated Redness
- Watering
- Nausea and Vomiting
- Coloured Haloes
- Early Onset, Frequent change of glasses

Relevant History

- Trauma
- Intraocular Surgery (including previous surgeries for glaucoma)
- Use of topical medication
- Bronchial Asthma: contraindication for Beta-blockers
- Any cause for steroid use – note type and duration
- Thyroid Eye Disease
- Diabetes and Hypertension

Family history of glaucoma

Medical History

Personal History

EXAMINATION:

- General Physical Examination
- Skin: naevi, neurofibromatosis (or any phakomatosis)
- Skeletal: Facial and Dental
- CVS: PDA associated with Rubella
- CNS: phakomatosis
- RS: bronchial asthma, steroid use, beta-blocker contraindication

Ocular Examination

- Head posture
- Ocular Posture
- Visual Acuity
 - Best corrected vision for distance and near
 - Colour
 - Confrontation
- Lids and Adnexa
 - Hyperpigmentation
 - Port-wine stain
- Conjunctiva
 - Follicles
 - Adrenochrome pigmentation
 - Presence of Bleb (cicatrical or filtering)

- Cornea
 - Size, Shape, CCC
 - Corneal Edema
 - Healed opacities: longstanding edema
 - Vascularisation
 - Pigments: Kruckenberg spindle
 - Keratic Precipitates
- Anterior Chamber: Gonioscopic examination presented later
 - Depth (central and peripheral)
 - Irido-corneal touch
 - Cells and Flare
- Iris
 - Pattern, NVI, Atrophy, polycoria, Ectropion uveae, Pseudoexfoliation, Heterochromia, Lisch nodules, Peripheral Iridectomy (Patent vs. Non-patent)
 - Synechiae: peripheral anterior and posterior
- Pupil: Direct and consensual
- Lens
 - Glaucomflecken, pseudoexfoliation, Vossius' ring, lens subluxation
- Retrolental cells
- Fundus examination:
 - Distant direct ophthalmoscopy
 - Direct ophthalmoscopy (media, disc)
 - Disc
 - Size
 - Shape
 - Margins
 - C/D ratio (Horizontal and Vertical)
 - Cup: depth, lamellar dot sign
 - Neuro-retinal rim (colour and thinning, capillary count)
 - Vessles on the disc: tortuosity, nasal shift, bayoneting, bleeds)
 - Peripapillary defects
 - NFL defects
 - Retinal vessels, fundus periphery and macula - look for the possibility of neovascularisation
- Intraocular pressure
- Gonioscopy (draw a diagram if possible)
 - visible angle structures
 - iris configuration (occludable angle)
 - peripheral anterior synichiae
 - neovascularisation
 - Other findings:
 - Pigmentation, Sampolesi's line, Loch Ness monster, Lister's morning mist
- Fields
- Automated perimetry if possible

van Herick's Grading:

1. PAC < ¼ CT
2. PAC = ¼ CT
3. PAC = ½ to ¾ CT
4. PAC > 1 CT (normal depth)

Scheie's:

0. Wide open:
 - Ciliary body visualised
1. Open angle with which at least scleral spur can be visualised
2. Only trabeculum can be identified
3. Only Schwalbe's line can be identified
4. Closed:
 - Irido-corneal contact.

Shaffer's:

- A. Grade 4: (35 to 45 degrees)
- B. Grade 3: (25 to 35 degrees)
- C. Grade 2: (10 to 25 degrees)
- D. Grade 1: (0 to 10 degrees)
- Grade 0: (0 degrees)

Spaeth's:

Based on three factors:

- Angular width of angle recess (10 to 50 degrees)
- Configuration of peripheral iris (S, R, Q)
- Apparent insertion of iris root (A to E)

Corneal Infection

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HISTORY:

Presenting Complaints:

- Pain
- Redness
- Lacrimation

Details:

Pain

- Onset, Distribution, Character, Aggravating and Relieving Factors

Redness

- Associated Photophobia

Lacrimation

Associated History

- Coloured Haloes
- Dimness of Vision
- Lid Edema and Blepharospasm
- Foreign Body Sensation

Relevant History:

- Trauma
- Contact Lens Wear
- Cataract or Intraocular Surgery
- Topical Medication – specifically Steroids and Local Anaesthetic
- Alcoholism, Malnutrition, Immunosuppression
- Herpetic Skin Lesions
- Diabetes, Hypertension
- Similar Episodes in the Past
- Oral Medications

Family History

EXAMINATION:

General Physical Examination:

- Anaemia
- Nutritional Deficiency

Ocular Examination:

- Eyelid:
 - Lid closure, Apposition, Punctum
 - Margins, Trichiasis, Ectropion, Entropion
 - Meibomitis, Blepharitis
 - Marginal Tear Meniscus
 - ROPLAS
- Conjunctiva
 - Congestion
 - Limbal papillae
 - Upper Tarsal Conjunctiva:
(Foreign Body, Concretions, Follicles, Papillae, Scarring, Ulceration)

- Cornea
 - Size, Shape
 - Corneal Lustre
 - Transparency
 - Opacity
 - Corneal Edema
 - Vascularisation, Pannus
 - Corneal Nerves
 - Epithelial Defect
 - SPK, Filaments, Abrasions
 - Pigments / KP's
 - Corneal Sensation
- Look for Contact Lens
- Anterior Chamber
- Iris: synechiae
- Pupil: direct and consensual
- Lens
- Fundus

Systematic slit lamp examination of the cornea:

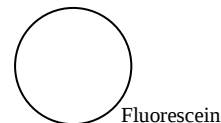
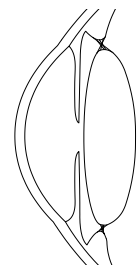
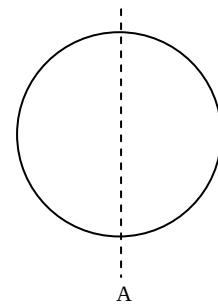
- *Diffuse*:
General survey and location of abnormality
- *Oscillating*:
General survey and location of abnormality
- *Sclerotic scatter*:
Pattern of abnormality
- *Optical section*:
Depth of opacity
- *Parallelepiped*:
Surface details
- *Proximal illumination*:
Internal details
- *Retroillumination*:
Optical quality of the cornea
- *Specular reflection*:
Surface irregularities and endothelial mosaic
- *Colour filters*:
Green – enhance vessels and pigments
- *Staining*:
Fluorescein (cobalt blue filter) and Rose Bengal

Description of ulcer:

- Site
- Size
- Shape
- Surface
- Edge
- Margin
- Surrounding tissue

CORNEAL DIAGRAM:

1. Basic outline
 - a. Draw circle (30mm diameter)
 - b. Add pupil (as a landmark) (in brown)
 - c. Indicate location of cross-section (dotted line)
 - d. Draw free hand of cross-section
2. Pattern of Pathology
 - a. Outline of opacity (blue) – use sclerotic scatter and broad tangential illumination
 - b. Draw a line to indicate the epithelium in the cross-section
3. Detail of Pathology
 - a. Refine the findings (scar, degeneration, infiltrate, oedema)
 - b. Add labels
 - c. Draw the findings in the appropriate levels in the cross-section.
4. Other corneal findings (vessels, pigments, posterior deposits)
5. AC and Lens in the cross-section
6. Vital staining (use a separate sketch if required)
7. Measurements to be written



COLOUR CODING:

Black	Scar, Degeneration Suture Contact Lens	Red	Blood, Rose Bengal Superficial Vessel Stromal Vessel Ghost Vessel (dashes)
Blue	Edema Decemet's Fold (wavy lines) Epithelial Oedema (small circles)	Green	Fluorescein, Lens, Vitreous
Brown	Pigment, Iris	Yellow or Orange	Infiltrate, Hypopyon, Keratic Precipitates

Optic Nerve Disease

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TYPES OF CASES:

- Optic Neuritis
- Anterior Ischaemic Optic Neuropathy
- Papilloedema
- Optic Atrophy

HISTORY:

Presenting Complaints:

- Loss of vision

Details:

Loss of Vision

- Onset
- Progression
- Diurnal variation
- Transient visual obscuration (Amaurosis Fugax)
- Colour desaturation
- Night blindness
- Uttoff's: worsening after exercise or a hot bath
- Pulfrich's: difficulty in depth perception
- Associated with pain / redness / photophobia, etc.
(Pain on ocular movement)

Diplopia

- Unilateral or Bilateral
- Vertical or Horizontal
- Worsening or Stationary
- Maximum in which field of gaze

CNS History

- Headache, Nausea, Vomiting (also: Neck rigidity)
- Loss of consciousness, Convulsions
- Focal Neurological Defects or TIA (Hemiparesis, Hemi-anaesthesia)
- Aphasia, Visual Hallucinations
- Ataxia, Dysarthria, Dysphagia

Past History

- Diabetes Mellitus, Hypertension, Ischaemic Heart Disease, Rheumatic Heart Disease
- Tuberculosis
- Ear Infections and Discharge
- Drug Intake
 - Papilloedema: Vitamin A, Tetracycline, Steroids, OCP's, Nalidixic Acid
 - Optic Atrophy: Ethambutol, Quinine, Amiodarone, Tamoxifen, Cisplatin, Cyclosporin, Chloramphenicol, INH
 - NA-AION: Antihypertensive medication (especially taken at night)
 - Anti-Glaucoma Medication (ask for glaucoma history if present)
- Malignancies: Weight loss, Neck surgeries, Radiation therapy
- Trauma to Orbit (TON)
- Jaw claudication, tenderness over temple (A-AION)

Personal History

- Alcohol, Tobacco smoking
- IV Drug abuse

Examination:

- General Physical Examination
- Systemic Examination
- CNS Examination:
HMF, Cranial Nerves, Sensory, Motor – gait, power, reflexes, coordination

Ocular Examination

- Head posture
- Ocular posture
- Facial Assymetry
- Visual Acuity
 - Distance and Near (with best correction and/or pinhole)
 - Colour Vision
 - Confrontation Fields
- Lids and Adnexa
- Conjunctiva
- Cornea
- Anterior Chamber
- Iris
- Pupils
 - Size
 - Round? Regular?
 - Reacting briskly to direct and consensual reflex
(Check for near reflex if pupil is not reacting well to light)
 - Relative Afferent Pupillary Defect
- Lens
- Fundus
 - Distant Direct Ophthalmoscopy
 - Disc
 - Size, Shape
 - Margins
 - C/D ratio (Horizontal and Vertical)
 - Cup: depth, lamellar dot sign
 - Neuro-retinal rim (colour and thinning, capillary count)
 - Vessles on the disc: tortuosity, nasal shift, bayoneting, bleeds
 - Spontaneous Venous Pulsations
 - Peripapillary defects
 - NFL defects (check with green filter – aka. red-free filter)
 - Retinal vessels, fundus periphery and macula
 - Look for causes of consecutive optic atrophy
- Retinoscopy (if indicated)
- Intraocular pressure
- Extraocular movements
 - Ductions
 - Versions
 - Convergence

Orbital Mass and Proptosis

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HISTORY:

Presenting Complaints:

- Proptosis
- Pain
- Loss of Vision
- Diplopia

Details:

Proptosis (“Prominent eyeball”)

- Duration and age of onset
- Unilateral or bilateral
- Onset: Insidious or Sudden
- Progression or Stationary or Regression
- Constant or Intermittent
- Variation of proptosis: Postural variation or Cough or Strain
- Aggravating or Relieving factors
- Associated “swishing sound” (carotid-cavernous sinus fistula)

Pain

- Duration and relation to the onset of proptosis
- Site
- Radiation
- Character
- Aggravating and relieving factors
- Relation to eye movement

Vision loss

- Duration and relation to the onset of proptosis
- Onset: Insidious or Sudden
- Progression: Rapid or Slow
- Gaze evoked amaurosis

Diplopia

- Duration and relation to the onset of proptosis
- Monocular or Binocular
- Horizontal or Vertical
- Variability
- Maximum field of diplopia

Other Relevant History

- Ptosis
- Lid retraction and edema
- Redness, watering and photophobia (especially with exposure keratopathy)
- Infraorbital tingling or numbness
- Swelling anywhere else on the body
- Trauma
- CNS: Headache, nausea vomiting, convulsions, ataxia
- Focal sepsis:
 - “Boil” on the eye lid or face
 - Dacryocystitis: Swelling near medial canthus, discharge, matting of lashes
 - Sinusitis: Headache (frontal), nasal stuffiness or discharge, fever
 - Dental sepsis: Tooth pain
 - Ear: Discharge, tinnitus or hearing loss

Inflammatory or neoplastic lesions present with an **acute onset**. Benign lesions usually have a **chronic onset**.

Exophthalmos occurs in 30% of the patients suffering from an orbital tumor. However, pain, diplopia, swelling, tearing and blurred vision are much more common presenting complaints. Since most optic nerve gliomas occur in the first two decades of life, loss of vision in children with or without optic atrophy suggests optic nerve glioma, particularly if some degree of exophthalmos exists. In a child, the presence of a retrobulbar mass with ecchymosis of the lids and subconjunctival hemorrhage associated with exophthalmos suggests a malignant tumor, particularly medulloblastoma.

Past History:

- Diabetes or hypertension
- Medical history
- Ocular history
- Previous surgeries
(Mastectomy, Thyroid, Nasal, Trauma)

Mucormycosis should be considered in a **diabetic patient** suffering from a rapidly advancing exophthalmos with loss of vision and impaired motility.

Personal History:

- Weight loss

Family History

Systemic Review:

- CVS
- RS
- GIT
- Renal
- Musculoskeletal

EXAMINATION:

General Physical Examination

- General physical appearance
- Vitals: Pulse, BP, Respiratory Rate
- Pallor, Icterus, Cyanosis, Edema
- Lymph nodes
- Thyroid
- Skin: Naevi, Café-au-lait, Port wine stain

Order of Relative Frequency of Causes of Exophthalmos:

- Thyroid Disease
- Inflammation
- Orbital Tumors
- Vascular Disorder
- Orbital Anomaly

Systemic Examination

- Ear, Nose and Throat
- CNS
- CVS
- RS
- Abdomen: specifically look for an abdominal mass and organomegaly
- Musculoskeletal

OCULAR EXAMINATION

Overview

Simple Inspection is the first step in any physical diagnosis. The most intense rubor (redness) occurs with orbital cellulitis. Orbital and lid inflammation and minimal exophthalmos may occur after trauma to a dermoid tumor that has caused extrusion of its contents. Inflammation can also accompany rapidly growing tumors such as rhabdomyosarcoma in children.

Most orbital tumors, particularly those which are benign, occur in the upper two quadrants and displace the eye downward (eccentric displacement as opposed to an axial displacement of the globe). If the eye is displaced upward, consider lymphoma or carcinoma extending from the maxillary sinus. Lateral displacement occurs with mucocele or malignant tumors from the ethmoid sinuses. Posterior orbital tumors cause more exophthalmos than displacement. An exception is the hemangioma of infancy which tends to wrap around the eye rather than displace it.

Since most of the benign tumors are located anteriorly, palpation by the small finger will frequently uncover a mass. These include lacrimal gland, dermoid cyst, hemangioma and lymphoma.

Suggested Order of Ocular Examination:

1. General Ocular Examination
2. Examination of Proptosis
3. Detailed Ocular Examination
(including fundus, refraction and intraocular pressure and ocular motility)

General Ocular Inspection

- Head Posture
- Ocular Posture
- Facial asymmetry

Examination of Proptosis

Inspection

- Unilateral or Bilateral
- Axial or Eccentric
- Visible pulsatility
- Change with Valsalva, cough or posture
- Lid position: Retraction or ptosis
- Lid fullness
- Skin over the lid
 - Inflammation
 - Pigmentation (Hyper or Hypo)
 - Ecchymosis
 - Venous dilatation

Watch for pseudoproptosis:

Lid retraction can occur without exophthalmos in thyroid disease. A small ptosis in the other eye may give the appearance that the other, normal, lid is retracted. The patient complains about the cosmetic appearance of the eye that bothers him the most when in reality the problem may be in the other eye.

Palpation

- Rise in temperature
- Tenderness
- Pulsatility
- Thrill
- Mass palpated
 - Size and shape
 - Discrete or ill-defined
 - Margins
 - Consistency
 - Compressibility
 - Ability to insinuate a finger between the mass and bony orbit
- Resistance to retropulsion of the globe
- Auscultation over the orbit

An arteriovenous fistula commonly causes **pulsating exophthalmos** in an adult. In children, pulsating exophthalmos is usually caused by neurofibromatosis with a dehiscence in the orbital roof. Subtle pulsations may be observed only when looking at the fundus with a direct ophthalmoscope or when performing applanation tonometry.

A **bruit** is better heard with the bell of a stethoscope.

Exophthalmometry

- Axial: from the lateral orbital rim to the tip of the cornea
 - Normal: 16 to 18 mm (Difference of 2mm)
 - Minimal: 20 to 23 mm (Difference of 3 to 4mm)
 - Moderate: 24 to 27 mm (Difference of 5 to 7mm)
 - Severe: More than 28 mm (Difference of more than 8mm)
- Vertical
- Horizontal

The measurements of a displaced globe may be expressed in absolute, comparative and relative terms.

Measuring Exophthalmos:

It is preferable to use the Hertel instrument as it provides better reproducibility. It measures the relationship between the lateral orbital rim and the anterior cornea surface. This instrument allows the examiner to reproduce the same pupillary distance from exam to exam. It also allows the examiner to keep the same parallax view for observation of the corneal surface by lining up two lines in its mirrors.

Most orbital tumors, particularly those which are benign, occur in the upper two quadrants and displace the eye downward. If the eye is displaced upward, consider lymphoma or carcinoma extending from the maxillary sinus. Lateral displacement occurs with mucocele or malignant tumors from the ethmoid sinuses. Posterior orbital tumors cause more exophthalmos than displacement. An exception is the hemangioma of infancy which tends to wrap around the eye rather than displace it.

Detailed Ocular Examination

- Visual Acuity
 - Acuity (Distance and Near)
 - Colour vision
 - Confrontation field of vision
- Eyelid (included with inspection of proptosis)
 - Palpebral fissure height
 - Lagophthalmos: Lid closure, blink rate
 - Eye lid sensation (include forehead and cheek)
 - Bells phenomenon
 - Special: Lid signs of thyroid ophthalmopathy
- Conjunctiva
 - Chemosis, Congestion, Haemorrhage
 - Conjunctival extension of orbital tumors (eg. Salmon patch)
- Cornea
 - Size, clarity
 - Keratic Precipitates
 - Staining
 - Sensation
- Anterior Chamber
 - Depth
 - Reaction (Cells and Flare)
- Iris
 - Colour, Pattern, Atrophy, Neovascularisation
- Pupil: afferent pupillary defect, tonic pupil (light near dissociation)
- Lens
- Fundus: Distant Direct, Direct and Indirect Ophthalmoscopy
 - Disc Oedema, Optic Atrophy
 - Posterior Pole Indentation, Choroidal Folds, Optociliary shunts
 - Tortuous vessels
- Refraction
- Ocular Motility: Ductions and Versions
- Intraocular Pressure
 - Straight ahead gaze
 - In Upgaze for Thyroid Ophthalmopathy

Visual acuity loss can occur with exophthalmos from any cause; however, a retrobulbar tumor, particularly in the muscle cone, is the first consideration in the case of slowly progressive exophthalmos associated with loss of acuity. If the acuity can be restored by plus lenses and if increasing hyperopia is suggested, a retrobulbar tumor that is causing a flattening of the posterior surface of the eye should be considered. This is not pathognomonic of a retrobulbar tumor, since it can be seen also in posterior scleritis or with mild subretinal edema from other causes displacing the retina anteriorly.

In cases of endocrine exophthalmos, loss of vision is usually minimal and is frequently variable, suggesting some problem with the corneal epithelium secondary to exposure or to disturbance in the tear film from dryness or decreased blinking. In some cases, when exophthalmos progression is rapid and accompanied by considerable chemosis and inflammation, the loss of vision can be profound and may be caused by optic nerve involvement.

Tumors that indent the posterior part of the globe, particularly in the muscle cone, can cause **horizontal striae in the macula**. The folds are seen not only with retrobulbar tumors, but may also be seen in association with ocular hypotony, intraocular tumors, scleritis, uveitis, after scleral surgery, and occasionally in thyroid disease.

Special Examination

- Diplopia Charting (if diplopia is present)
- Forced Duction Test (thyroid ophthalmopathy and sequelae of orbital trauma)

Evaluation of Motility

Orbital tumors and some endocrine disorders can cause exophthalmos without impairment of motility. Benign orbital masses frequently cause only minor limitation of local rotation, usually in the field of action where the mass is located. Although the two conditions usually occur together, in some cases of endocrine disease ophthalmoplegia may occur before frank exophthalmos appears. Forced duction tests are usually positive in endocrine disease. However, some limitation may be experienced - and the test is less than specific - if considerable orbital edema or inflammation from other causes exists. Endocrine ophthalmoplegia usually manifests as limitation of upgaze, from restriction of the inferior rectus and inferior oblique in the area of Lockwood's ligament.

Laboratory Studies

Such studies are usually of little value. If leukemia or multiple myeloma is suspected, a complete blood count is revealing. In cases of lymphoma an evaluation of the bone marrow is helpful. Thyroid studies are often disappointing because thyroid exophthalmos and ophthalmoplegia may occur when the thyroid appears to be functioning normally at least as indicated by blood tests.

Radiographic Studies

The best test for thyroid disease is a CT or MRI of the orbit. Either one will demonstrate large muscles even in the absence of diplopia. However, you must order coronal views or you will not get views of the vertical muscles except when you are lucky. This test is particularly useful in cases where there is minimal exophthalmos but loss of vision is the main problem. It will demonstrate the enlarged muscles around the optic nerve posteriorly. MRI is the better choice, however, for looking at other orbital soft tissue entities.

Ptosis

HISTORY:

Presenting Complaints:

- Drooping of Eye Lid

Details:

Ptosis

- Duration
- Onset
- Aggravating or relieving factors (eg. jaw winking)
- Diurnal variability, dysphagia, associated fatigue (Myasthenia Gravis)
- Associated diplopia (Myasthenia or Oculomotor nerve palsy)

Precipitating event

- Trauma
- Previous ocular surgery

Other Relevant History

- Family history
- Presence of other neurological problems
- History suggestive of a dry eye syndrome (for post operative complication)

EXAMINATION:

General physical examination

- Vitals: pulse rate and rhythm

Systemic Examination

- CNS
- Musculoskeletal system
- CVS: look for signs of a heart block
- RS, Abdomen

OCULAR EXAMINATION:

Inspection

- Head posture (chin elevation, face turn, head tilt)
- Ocular posture (orthophoric, hypotropia)
- Facial symmetry, hypoplasia of the nasal bridge, orbital rim, telecanthus, epicanthus inversus.
- Ptosis: Unilateral or Bilateral (symmetrical or asymmetrical)
- Eye lid examination (cursory) – scarring, mass lesion, dermatochalasis, thinning of eyelid, frontalis overacting, giant papillary conjunctivitis

Measurement of Ptosis

- Vertical fissure height (in pupillary line in primary position)
- Margin reflex distance
 - MRD1: Primary gaze – reflex to upper lid
 - MRD2: Primary gaze – reflex to lower lid
 - MRD3: Up gaze – reflex to upper lid
- Margin limbus distance (MLD): measured in up-gaze
- Presence of lid crease and margin-crease distance: measured in down-gaze
- Levator function (remember to negate the frontalis action)

Normal Values

Vertical Fissure Height

Males: 7 to 10mm

Females: 8 to 12mm

MRD1: 4 to 4.5mm

MRD2: 5mm

MRD3: 7mm

MLD: 9mm

Margin-crease: 8mm - males

10mm - females

Mild ptosis: 2mm

Moderate: 3mm

Severe: 4mm

Excellent Levator function: 15mm

Good: 12 to 14mm

Fair: 5 to 11mm

Poor: less than 4mm

Note the presence of

- Lid lag
- Lagophthalmos
- Bell's phenomenon and Orbicularis action (by tight lid closure)
- Marcus Gunn (Jaw winking) phenomenon
- Fatiguability and Cogan's lid twitch sign
- Signs suggestive of aberrant regeneration

Ocular Examination: (Slit Lamp Examination)

- Visual Acuity (Distance and near acuity, colour vision and confrontation fields)
- Eye lid
 - Lid apposition
 - Lid margin (blepharitis, meibomitis, ectropion)
 - Tear meniscus: height and presence of debris
- Conjunctiva (congestion and cicatrization)
- Cornea
 - Epithelial defect
 - Filamentary keratopathy
 - Corneal sensation (anticipating post operative complication)
- Iris (heterochromia: Horner's syndrome)
- Pupil
 - Size and symmetry (Horner's syndrome)
 - Efferent pupillary defect (Oculomotor nerve paralysis)
- Lens (cataract with myotonic dystrophy)
- Fundus examination: look for pigmentary retinopathy (Kearns Sayre – CPEO)
- Refraction: look for astigmatism (congenital ptosis)
- Extraocular movements (look for hypotropia)
- Intraocular pressure

Special tests

- Tear function tests (Schirmer's and Break-up time)

Paralytic Squint

TYPES OF CASES:

- Oculomotor Nerve Palsy
- Trochlear Nerve Palsy
- Abducent Nerve Palsy

HISTORY:

Presenting Complaints:

- Diplopia
- Pain
- Drooping of Eyelid

Details:

Diplopia (ptosis may conceal diplopia)

- Onset
- Unilateral or Bilateral
- Vertical or Horizontal
- Worsening or Stationary
- Diurnal Variation
- Maximum in which field of gaze

Pain

- Onset and relationship with diplopia
- Severity
- Localisation

Drooping of eye lid

- Onset
- Progression
- Diurnal Variation
- Association with fatigue

Visual Complaints

- s/o Cavernous Sinus Thrombosis: Redness, Proptosis

CNS History

- Headache, Nausea, Vomiting (also: Neck rigidity)
- Loss of consciousness, Convulsions
- Focal Neurological Defects or TIA (Hemiparesis, Hemi-anaesthesia)
- Aphasia, Visual Hallucinations
- Ataxia, Dysarthria, Dysphagia

Past History

- Diabetes Mellitus, Hypertension
- Ischaemic Heart Disease, Rheumatic Heart Disease
- Trauma (head injury or orbital trauma)
- Hearing Loss, Tinnitus, Ear Infection, Sinusitis, Epistaxis
- Malignancies: Weight loss, Neck surgeries, Radiation therapy
- Hyperthyroidism: Tremors, Palpitations, Insomnia
- Tuberculosis
- Child birth (Pituitary Apoplexy)

Personal History

- Alcohol, Tobacco smoking
- IV Drug abuse

Causes of Ophthalmoplegia

- Congenital
- Traumatic
- Neoplastic
- Demyelinating Disease
- Inflammatory
- Ischaemic
- Toxic
- Idiopathic

Painful Ophthalmoplegia:

- Intracranial Aneurysm
- Cavernous Sinus Thrombosis
- Orbital Apex Syndrome
- Tolosa Hunt Syndrome
- Orbital Cellulitis
- Pseudotumor of the Orbit

Mimics of cranial nerve palsies:

3rd Nerve and 4th Nerve:

- Thyroid Eye Disease
- Myasthenia Gravis

6th Nerve:

- Thyroid Eye Disease
- Myasthenia Gravis
- Medial Wall Blow-Out
- Orbital Myositis
- Convergence Spasm
- Eso-Duane's Syndrome
- Infantile Esotropia

Examination:

- General Physical Examination
- CNS Examination:
HMF, Cranial Nerves, Sensory, Motor – gait, power, reflexes, coordination

OCULAR EXAMINATION:

Head posture:

- Head tilt
- Chin elevation
- Face turn

Ocular Posture:

- General Ocular Inspection (Exo- or enophthalmos)
- Hirschberg's Test
- Cover/Uncover test
 - Tropia or Phoria
 - Concomitant or Incomitant (Primary and Secondary deviation)
 - Nystagmus: type, jerky or pendular, direction, null point
- Diplopia charting (Hess chart or Lees screen if possible)
- Park-Bielschowsky's 3-step test for vertical deviation
- Detect cyclo-deviation (Double Maddox)

Ocular Examination

- Visual Acuity (Best corrected for distance and near, Colour, Confrontation)
- Lids
 - Palpebral fissures (equal, ptosis)
- Anterior Segment Examination (aniridia, coloboma, heterochromia, cataract)
- Pupil: direct and consensual (comment on near reflex if reaction to light is poor)
- Fundus (Distant Direct Ophthalmoscopy, Direct and Indirect Ophthalmoscopy)
 - Disc
 - Size, Shape, Margins, C/D ratio (Horizontal and Vertical)
 - Neuro-retinal rim (colour and thinning, capillary count)
 - Spontaneous Venous Pulsations
 - Peripapillary defects, NFL defects
 - Retinal vessels, fundus periphery and macula
 - Remember:
 - Bruckner's Test
 - Fundus Torsion
 - Eccentric Fixation (Foveal, Parafoveal, Perifoveal)
- 4. Extraocular Movement
 - Duction, Versions, Convergence (watch for inhibitional palsy)
 - Saccadic Velocity
- 5. Refraction

Intraocular Pressure (Differential Tonometry for muscle restrictions)

Past Pointing:

This test indicates a recent onset. Elicited by asking the patient to point to an object with his finger while viewing it through the paretic eye. The patient will initially point further than the object.

* Important to look out for internuclear ophthalmoplegia and other gaze palsies

Diplopia Charting:

1. Maximum separation is in the direction in which the muscle acts the most
2. The image that appears farthest belongs to the deviating eye
3. The image is displaced in the direction of the paralysed muscle

Watch for Pseudoptosis!

Associated with hypotropia and can be mistaken for ptosis of 3rd CN Palsy.

Internal Ophthalmoplegia:

Isolated involvement of accommodation and pupillary reflex – occurs with botulism and diphtheria.

Pupil Sparing 3rd Nerve Palsy:

Ischaemic mononeuropathy due to diabetes mellitus, hypertension, etc. (**Medical** 3rd Nerve Palsy)

Miosed Pupil in 3rd CN Palsy:

- Associated Horner's Syndrome
- Hutchinson's Pupil in Evolution

Stages of a Paralytic Squint:

1. **Paresis** of Muscle
2. **Overacting** ipsilateral antagonist
3. **Inhibitional Palsy:** Underacting antagonist of contralateral synergist
4. Long standing cases: Comitance (aka: **spread of comitance**)

Strabismus

HISTORY:

Presenting Complaints:

- Ocular Deviation (eso-, exo-, etc.)
- Diplopia

Details

Ocular deviation

- Onset: Congenital or Acquired - precipitating event)
- Duration
- Constant or intermittent
- Diurnal variation
- Precipitating event
 - Trauma
 - Ocular surgery (cataract surgery, scleral bucking)
 - Fever, convulsions, focal neurological deficits
 - Debilitating illness
- Associated eye strain, headache and watering
- Specific to Intermittent Exodeviation
 - Percentage of time strabismic: more than 50%
 - Present in attentive state
 - Lasting through a blink

Very often a pre-existing ocular deviation might get noticed after a **trivial traumatic event**, when the eye was “looked at” in detail.

Diplopia

- Monocular or Binocular
- Horizontal or Vertical
- Maximum in which position of gaze
- More for distance or near
- Does the condition interfere with school, work, play, etc.?
- Aggravating or relieving factors
- Associated vertigo or past pointing
- Abnormal head posture (could occur in absence of subjective diplopia)

Past History

- Spectacle use
 - Date of last prescription
 - Power of present glasses
 - Use of occlusion therapy previously
- Migraine
- Trauma
- Ocular surgery
- Fever, convulsions, focal neurological deficits
- Debilitating illness

Medical History

- Diabetes

Family history

Antenatal, Birth and Developmental history (in congenital strabismus)

- Maternal illness, medication, fever with rash during pregnancy
- Route of birth, forceps assisted delivery, low birthweight, perinatal anoxia
- Developmental milestones (motor and intellectual – schooling)

EXAMINATION:

General Physical Examination:

- Shape of head, facial asymmetry, dysmorphic features (cyclovertical paralyses and craniostenoses)
- Other deformities like extra digits

Systemic Examination:

- Pay special attention to CNS examination
- Details of some cranial nerves will be presented with ocular examination

OCULAR EXAMINATION:

Head posture:

- Head tilt
- Chin elevation
- Face turn

Ocular Posture:

- General Ocular Inspection (Exo- or enophthalmos)
- Hirschberg's Test
- Cover/Uncover test
 - Tropia or Phoria
 - Concomitant or Incomitant (Primary and Secondary deviation)
 - Nystagmus: type, jerky or pendular, direction, null point
 - Dissociated Vertical Deviation

For Concomitant Squint

- Alternate Cover Test
 - Free alternation
 - Dominant Eye (preference to fix with which eye)
- Krimsky's Test
 - Objective and subjective
- Prism Bar Cover Test
 - In 9 positions of gaze for distance, plus for near
 - A/V pattern
 - AC/A ratio (approximate)
 - Watch for variable deviations
- AC/A ratio
 - Heterophoria method
 - Lens gradient method
- Measurement of near point of accommodation and near point of convergence
 - RAF rule or equivalent
 - Base-In and Base-Out Fusional Reserve
- Detect cyclodeviation
 - Double Maddox

For Incomitant Squint

- Diplopia charting
- Hess chart or Lees screen
- Park-Beilschowsky's 3-step test for vertical deviation
- Detect cyclodeviation (Double Maddox)

Sensory Examination: retinal correspondence, suppression, stereopsis

- Bagolini's Striated Glasses
- Worth Four Dot Test
- Titmus fly or TNO test

Ocular Examination

- Visual Acuity (Best corrected for distance and near, Colour, Confrontation)
- Lids
 - Palpebral fissures (equal, ptosis)
 - Epicanthal folds
- Anterior Segment Examination (aniridia, coloboma, heterochromia, cataract)
- Pupil: direct and consensual
- Posterior Segment
 - Remember Bruckner's Test
 - Fundus Torsion
 - Eccentric Fixation (Foveal, Parafoveal, Perifoveal)
- Extraocular Movement
 - Duction
 - Versions
 - Look for superior oblique and inferior oblique over action: grading
 - Convergence
 - Forced Duction Test, Forced Generation Test
 - Differential Tonometry
 - Saccadic Velocity
- Refraction

Grading Oblique Over-Action:

1. 15° deviation from horizontal
2. 30° deviation
3. 60° deviation
4. 90° deviation

HISTORY:

Presenting Complaints:

- Pain
- Redness
- Photophobia
- Watering
- Floaters
- Blurred Vision

Details:

Pain

- Onset and Duration
- Type
- Site
- Radiation
- Aggravation and Relieving factors
- Constant and Remittent factors

Redness

- Localised
- Diffuse

Floaters

- Size
- Constancy
- Change in Pattern

Field defect

- Quadrant
- Variation with posture

Systemic History:

- Fever, chills, night sweats, poor appetite, fatigue, weight loss
- Skin: rashes, sores, white patches, loss of hair
- Musculoskeletal: joint pains, low back pain
- ENT: deafness, tinnitus, severe ear infections, painful/swollen earlobes, recurrent nose bleeds, sores in the nose and mouth
- CNS: headache, loss of consciousness, numbness, tingling, weakness, seizures
- RS: severe recurrent URTI, haemoptysis, cough, dyspnea
- CVS: chest pain
- GI: diarrhoea, bloody stools
- Genitourinary: genital sores, ulcers, discharge
- Personal history: miscarriages and abortions
- Pets at home (cats, cows and cattle)

Past history:

- Blood transfusions in the past
- History of trauma

EXAMINATION:

General Examination:

- Vitals: Pulse, BP, Respiratory Rate
- Pallor, Icterus, Cyanosis, Lymph nodes, Edema
- Skin
- Musculoskeletal

Systemic Examination:

- RS: inspection of chest, percussion, auscultation
- CVS: inspection, palpation (Apex Beat), auscultation
- Abdomen: organomegaly, abdominal mass, tenderness
- CNS: higher mental functions, cranial nerves, sensory (touch and pain), motor (gait, power, reflexes and co-ordination)

Ocular Examination:

- Head and Ocular posture
- Visual Acuity
 - distance
 - near – loss of accommodation is an important sign)
- Lids and Adnexa
 - pigmentation
 - vitiligo
- Conjunctiva
 - nodules
 - congestion
- Cornea
 - opacification
 - edema
 - vascularisation
 - band keratopathy
 - pigments
 - KP's: old vs. fresh, mutton fat, etc
- Anterior Chamber
 - Depth
 - Reaction (cells and flare)
 - Contents (hypopyon, hyphaema, etc)
- Iris
 - character
 - pattern
 - vascularisation
 - edema
 - transillumination
 - atrophy
- Pupil
 - Synichiae
 - Reaction
- Lens
 - Pigment
 - Clarity

Grading of cells (Neussenblatt)

(3mm x 1mm beam)

0 : No cells

Trace : 1 to 5 cells

1+ : 6 to 15 cells

2+ : 16 to 25 cells

3+ : 26 to 50 cells

4+ : more than 50 cells

Note: for trace and 1+ the exact number of cells visualised are recorded in brackets.

Grading of flare (Hogan's)

0 : Absent

1 : Very slight

2 : Moderate (iris and lens clear)

3 : Marked flare (iris and lens hazy)

4 : Intense flare (fibrinous)

- Retrolental area
 - Cells (vitritis)
 - Snowball opacities
- Fundus Examination
 - Distant Direct Ophthalmoscopy
 - Media
 - Disc: inflammation, glaucomatous cup
 - Vessels: sheathing, vascular occlusions
 - Background: retinitis, choroiditis, nodules, white dots, NVE
 - Macula: cystoid macular oedema

DIAGNOSIS:

- Onset: Acute, Chronic, Acute on chronic
- Type: Granulomatous, Non-granulomatous
- Laterality: Bilateral or Unilateral (Right or Left)
- Location: Anterior, Posterior, Pan-uveitis
- Complications: Cataract, Glaucoma, Rubeosis Iridis, CME
- Etiology: if known

Example:

“Acute non-granulomatous bilateral anterior uveitis with a complicated cataract, secondary to ...”

Retinal Detachment

Guidelines for Clinical Case Presentations

Anoop Thomas, Mythri HM, Mallipatna C Ashwin, Shamin Jacob

HISTORY:

Presenting Complaints:

- Decreased Vision
- Flashes of light
- Floaters

Details

Decreased vision

- Duration

Flashes of light

- Onset
- Duration
- Location: which quadrant

Floaters

- Onset: sudden increase, sudden cessation
- Number of floaters (estimate)
- Mobility
- Description: Cob web like, Ring like, Spot like

History to detect the cause

- Trauma
- Ocular Surgery (specifically cataract extraction and squint correction)
- High Myopia (wearing thick glasses)
- Diabetes (duration and history of medication – if insulin is being used for control)

History to rule out an exudative detachment

- Ocular disease such as uveitis (on treatment)
- Hypertension
- Pregnancy

EXAMINATION:

Ocular Examination:

- Head and Ocular Posture
- Visual Acuity
 - Distance and Near Acuity
 - Specifically mention projection of light
 - Colour Vision
- Slit Lamp Examination
 - Uveitis
 - Complicated Cataract
 - Tobacco dusting
 - Signs of Previous surgery: presence of sutures or a scleral buckle
- Relative Afferent Pupillary Defect
- Detailed Fundus Examination with Fundus Diagram (see next page)
- Intraocular Pressure (applanation tensions preferred)

FUNDUS EXAMINATION:

Distant Direct Ophthalmoscopy

- Media clarity
- Weiss Ring
- Posterior subcapsular cataract

Direct Ophthalmoscopy

- Optic Disc (size, shape, margin, cup-disc ratio, NRR, peri-papillary area)
- Vessels

Indirect Ophthalmoscopy (with a detailed retinal diagram)

- Extent of Detachment
- Bullous or Shallow
- Attached Retina: clock hours
- Macula On or Off
- Location and posterior extent of retinal breaks
- Peripheral retinal degenerations
 - Lattice degeneration
 - Snail track degeneration
 - Degenerative schisis
 - White without pressure
- Fresh or Old detachment (thinness of the retina, watermarks, intraretinal cysts)
- Location and extent of star folds or fibrotic bands
- Associated choroidal detachment
- Vitreous changes (haze and hemorrhage)

By convention, the description of the **location and extent** of a retinal pathology is usually in clock hours, not in degrees.

COLOUR CODE FOR RETINAL DRAWING: