Ophthalmology in Rhinology (Basics)

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Objectives

– **Anatomy** of the orbit in relation to nose and PNS
– Basics of **Visual Acuity** examination
– Basics of **Color Vision** examination
– Basics of **Visual Field** examination
– Basics of **Intra Ocular Pressure** measurement
– Basics of **Extra Ocular** Muscles examination
– Basics of **Exophthalmos** measurement
Terminology

- *Lagophthalmos*: inability to close the eyes completely.
Terminology

– *Chemosis*: swelling (edema) of the conjunctiva.
Terminology

- *Ptosis*: drooping of upper eyelid.
Terminology

– **Proptosis**: Forward displacement of an organ, esp, eye (pushing of the globe).
– **Exophthalmos**: Protrusion of eyeballs in their sockets (uniform expansion of orbital contents).
Terminology

– Proptosis: Forward displacement of an organ, esp. eye (pushing of the globe).
– Exophthalmos: Protrusion of eyeballs in their sockets (uniform expansion of orbital contents).
Anatomy

– **Orbit:** a pyramid-shaped bony recess in the anterior part of the skull, lined by periosteum called the periorbital fascia

– **BONES CREATING THE ORBITAL MARGIN:**
  I. Frontal
  II. Zygomatic
  III. Maxilla
# Anatomy

## Walls of the Orbit

<table>
<thead>
<tr>
<th>Region</th>
<th>Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior</td>
<td>Frontal (orbital plate) Lesser wing of the sphenoid</td>
</tr>
<tr>
<td>Inferior</td>
<td>Maxilla Zygomatic Palatine (orbital process)</td>
</tr>
<tr>
<td>Medial</td>
<td>Ethmoid (lamina papyracea) Lacrimal Sphenoid Maxilla</td>
</tr>
<tr>
<td>Lateral</td>
<td>Zygomatic Greater wing of the sphenoid</td>
</tr>
</tbody>
</table>
Anatomy
Anatomy

Contents of orbit include:

- Eye—organ associated with vision
- Extrinsic muscles
- CN: II, III, IV, V1, VI
- Ciliary ganglion
- Ophthalmic artery and branches
- Superior and inferior ophthalmic veins
- Lacrimal apparatus
- Much fatty tissue
<table>
<thead>
<tr>
<th>Opening</th>
<th>Bony Boundaries</th>
<th>Structures Passing through Opening</th>
</tr>
</thead>
</table>
| Optic foramen                 | Lesser wing of the sphenoid      | Optic n.  
|                               | Greater wing of the sphenoid     | Ophthalmic a.  
|                               | Lesser wing of the sphenoid      |  
| Superior orbital fissure      | Greater wing of the sphenoid     | Lacrimal branch of the trigeminal n.’s ophthalmic division  
|                               | Lesser wing of the sphenoid      | Frontal branch of the trigeminal n.’s ophthalmic division  
|                               |                                 | Nasociliary branch of the trigeminal n.’s ophthalmic division  
|                               |                                 | Oculomotor n.  
|                               |                                 | Trochlear n.  
|                               |                                 | Abducens n.  
|                               |                                 | Superior ophthalmic v.  
|                               |                                 | Inferior ophthalmic v.  
| Inferior orbital fissure      | Greater wing of the sphenoid     | Infraorbital n. and vessels  
|                               | Maxilla                          | Zygomatic n.  
|                               |                                 | Branch of inferior ophthalmic v. that connects to the pterygoid plexus  
| Supraorbital foramen          | FrONTAL                         | Supraorbital n. and vessels  
|                               |                                 | Supratrochlear n. and vessels  
| Infraorbital groove and canal | Maxilla                          | Infraorbital n. and vessels  
| Zygomatic foramen (1 or 2 openings) | Zygomatic                    | Branches of the zygomatic  
| Nasolacrimal canal            | Lacrimal                         | Nasolacrimal duct  
| Anterior ethmoidal foramen    | Ethmoid                          | Anterior ethmoidal n. and vessels  
| Posterior ethmoidal foramen   | Ethmoid                          | Posterior ethmoidal n. and vessels  

Anatomy
Main anatomical barriers of spreading the infections into the orbit:

1. *Lamina Papyracea:*

   - **Paper-thin bony plate** separate ethmoid cells from orbit.
   - Contains several **perforations** through which valveless blood vessels and nerves travel.
Main anatomical barriers of spreading the infections into the orbit:

2. Periorbita:

- **Periosteum** of the internal orbit and covers the bony orbital walls from the anterior aperture of the orbital cavity back to the cone enveloping the optic canal.
- Only **soft tissue barrier** between the sinuses and the orbital contents.
Anatomy

Main anatomical barriers of spreading the infections into the orbit:

3. Orbital septum:

- **Reflection of the periorbita** at the margins of the orbit and attaches into the upper and lower eyelids at the levator aponeurosis superiorly and the tarsal plate inferiorly.
- Lacks lymphatic channels and forms a **barrier** limiting infections from passing directly through eyelids into orbit.
- Forms a **boundary** between pre and post-septal infections.
Anatomy

Orbital septum
Anatomy

Important anatomical spaces related to the orbit:

1. Sub-periosteal space:
   - Potential space lying between the orbital bones and the periorbita.
   - Can be filled with blood after orbital fracture or with abscesses when associated with a paranasal sinusitis.
Anatomy

Important anatomical spaces related to the orbit:

2. Extra-conal space:
   - Potential space lying within the *periorbital* but *outside* the intermuscular septum.
   - **Contains:**
     1. Extra-conal fat.
     2. Superior oblique muscle and trochlea
     3. Trochlear nerve (CN IV)
     4. Lacrimal gland
     5. Lacrimal and frontal branches of Ophthalmic nerve (V1)
Important anatomical spaces related to the orbit:

3. Intra-conal (Retro-bulbar) space:
   - Potential space lying within the **periorbital** but **inside** the intermuscular septum.
   - **Contains:**
     1. Intra-conal fat
     2. Optic nerve (CN II)
     3. Oculomotor nerve (CN III)
     4. Abducens nerve (CN VI)
     5. Nasociliary branch of Ophthalmic nerve (V1)
     6. Ophthalmic artery
Anatomy
Anatomy

- Anterior compartment
- Bony orbit
- Retrobulbar space
  - Extraconal
  - Intraconal
- Optic nerve

Diagram showing:
- Levator palpebrae m.
- Superior rectus m.
- Inferior rectus m.
- Inferior oblique m.
- Optic nerve-sheath complex
- Globe
- Extraconal space
Anatomy

Eye:

- a *spherical globe* with a diameter of approximately 2.5 cm that lies in the orbit’s *anterior portion*
- Surrounded by a thin capsule called the *fascia bulbi (Tenon’s capsule)* which provides support and allow for movements
Anatomy

Eye:
- Composed of 3 coats: Sclera, Uveal tract, Retina
- Divided into an anterior and a posterior segment
## Anatomy

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
<th>Actions</th>
<th>Nerve</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levator palpebrae superioris</td>
<td>Roof of the orbit</td>
<td>Skin of the upper eyelid</td>
<td>Raises the upper eyelid</td>
<td>Superior division of the oculomotor</td>
<td>Opposed by the palpebral part of the orbicularis oculi m. There are smooth muscle fibers which insert into the superior tarsal plate which are innervated by sympathetic fibers. Lesions of the sympathetics will lead to a ptosis, or drooping of the upper eyelid.</td>
</tr>
</tbody>
</table>
### EXTRINSIC MUSCLES OF THE EYE

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
<th>Actions on Eye</th>
<th>Nerve</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superior rectus</td>
<td>Common tendinous ring on sphenoid</td>
<td>Superior sclera</td>
<td>Elevation, Adduction, Intorsion</td>
<td>Superior division of the oculomotor</td>
<td>A check ligament attaches it to the levator palpebrae superioris m. to help elevate the upper eyelid</td>
</tr>
<tr>
<td>Inferior rectus</td>
<td></td>
<td>Inferior sclera</td>
<td>Depression, Adduction, Extorsion</td>
<td>Inferior division of the oculomotor</td>
<td>A check ligament attaches it to the inferior tarsal plate to help depress the lower eyelid</td>
</tr>
<tr>
<td>Medial rectus</td>
<td></td>
<td>Medial sclera</td>
<td>Adduction</td>
<td>Abducens</td>
<td>The most medial of the extraocular muscles</td>
</tr>
<tr>
<td>Lateral rectus</td>
<td></td>
<td>Lateral sclera</td>
<td>Abduction</td>
<td>Abducens</td>
<td>Impaired in abducens n. palsy</td>
</tr>
<tr>
<td>Superior oblique</td>
<td>Body of the sphenoid</td>
<td>Superior portion of the posterolateral sclera</td>
<td>Depression, Abduction, Intorsion</td>
<td>Trochlear</td>
<td>Tendon passes through the trochlea, a fibrocartilaginous pulley</td>
</tr>
<tr>
<td>Inferior oblique</td>
<td>Maxilla (lateral to the lacrimal groove)</td>
<td>Inferior portion of the posterolateral sclera</td>
<td>Elevation, Abduction, Extorsion</td>
<td>Inferior division of the oculomotor</td>
<td>Only extraocular muscle that attaches to the maxilla</td>
</tr>
</tbody>
</table>
Anatomy

Muscle attachments and nerves and vessels entering orbit

Superior orbital fissure
Lacrimal n. (V̂₁)  
Frontal n. (V̂₁)  
Trochlear n. (IV)  
Superior ophthalmic v.  
Lateral rectus m.  
Superior branch of oculomotor n. (III)  
Inferior orbital fissure  
Abducens n. (VI)  

In optic canal
Optic n. (II)  
Ophthalmic a.  
Inferior rectus m.  

Levator palpebrae superioris m.  
Superior oblique m.  
Superior rectus m.  
Medial rectus m.
Anatomy

Superior oblique
Superior rectus
Trochlear nerve
Oculomotor nerve
Lateral rectus
Inferior rectus
Abducens nerve
Inferior oblique
Medial rectus
Anatomy

Figure 13-7 In conjugate eye movement the "H" motion test provides a vehicle to assess the integrity of individual eye muscles. The patient is asked to follow the physician’s finger as it moves horizontally and then up and down at each end of the "H". The physician performs the movement while observing one eye, and then repeats it while observing the other eye. The muscle in each eye whose action is being tested and the nerve that drives it are indicated at each position.

Muscle names: Superior Rectus (SR), Inferior Rectus (IR), Medial Rectus (MR), Lateral Rectus (LR), Superior Oblique (SO), Inferior Oblique (IO).
Vision Assessment

- Always test visual acuity **first**
- Test best corrected visual acuity (BCVA) whenever possible (i.e. corrective lenses)
- Test **each eye individually**, starting with the right eye, and covering the untested eye
- Assess **distance** and **near** vision
Visual Acuity

Visual acuity is the measurement of spatial resolution of the eye (function of RETINA).

Components:
1. Minimum VISIBLE VA
2. Minimum RESOLVABLE VA (ordinary VA)
3. Minimum DISCRIMINABLE (hyperacuity)
Visual Acuity

1. Minimum VISIBLE VA
   o Determines presence or absence of target
Visual Acuity

2. Minimum RESOLVABLE VA (ordinary VA)
   - Determines **presence of identifying/distinguishing** feature in visible target
Visual Acuity

2. Minimum RESOLVABLE VA (ordinary VA)
   - **Snellen VA:**
     - Measures minimum resolvable visual acuity
2. Minimum RESOLVABLE VA (ordinary VA)

- **Snellen VA:**
  - Letters are made of **different sizes** and designated by **distance** at which letter subtends 5 min of ARC, e.g. letters on 20/20 line subtend 5 min of ARC when viewed at 20 feet
  - Patient asked to recognize progressively **smaller** letters or forms
Visual Acuity

3. Minimum DISCRIMINABLE (hyperacuity)
   - Spatial distinctions can be made at lower than ordinary VA
   - Determines positions of 2 or more visible features relative to each other
Visual Acuity – Distance

Snellen Fraction =

testing **distance** (usually 20 feet or 6 metres) smallest line patient can read on the chart / **smallest line** patient can read on the chart

e.g. 20/40 = what the patient can see at 20 feet (numerator), a “normal” person can see at 40 feet (denominator)
Visual Acuity – Distance

Testing hierarchy for low vision:

Snellen acuity (20/x) → counting fingers at x distance (CF) → hand motion (HM) → light perception with projection (LP with projection) → light perception (LP) → no light perception (NLP)

Legal blindness is BCVA that is ≤20/200 in the better eye, or a limit to the binocular central field of vision <20 degrees
**Visual Acuity – Distance**

<table>
<thead>
<tr>
<th>Distance</th>
<th>Visual Acuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/800</td>
<td>CF10’ (Count Fingers at ten feet)</td>
</tr>
<tr>
<td>20/1000</td>
<td>CF 8’</td>
</tr>
<tr>
<td>20/1143</td>
<td>CF 7’</td>
</tr>
<tr>
<td>20/1333</td>
<td>CF 6’</td>
</tr>
<tr>
<td>20/1600</td>
<td>CF 5’</td>
</tr>
<tr>
<td>20/2000</td>
<td>CF 4’</td>
</tr>
<tr>
<td>20/2666</td>
<td>CF 3’</td>
</tr>
<tr>
<td>20/4000</td>
<td>CF 2’</td>
</tr>
<tr>
<td>20/8000</td>
<td>CF 1’</td>
</tr>
</tbody>
</table>
Optotypes for measuring visual acuity

✓ Optotype cards

Letter Cards

Snellen
Optotypes for measuring visual acuity

✓ Optotype Cards

Letter Cards

Bailey-Lovie
Optotypes for measuring visual acuity

✓ **Optotype Cards**

**Letter Cards**

**Optotype Projectors**
Optotypes for measuring visual acuity

✓ Optotype Cards

Number Cards

Optotype Projectors

1 2 4 6
3 7 1 5
4 8 1 2 5 3
5 1 3 6 2 7
6 3 2 1 4 8 9 3 7
Optotypes for measuring visual acuity

✓ Optotype Cards

One Character Optotype Cards

Landolt Rings
Optotypes for measuring visual acuity

✓ Optotype Cards

One Character Optotype Cards

Snellen “E”
Optotypes for measuring visual acuity

✓ Optotype Cards

Other Cards

Infant Visual Acuity
Visual Acuity – Near

- use pocket vision chart (Rosenbaum Pocket Vision Screener)
- record Jaeger (J) or Point number and testing distance (usually 30 cm)
  e.g. J2 @ 30 cm
- conversion to distance visual acuity possible (e.g. immobile patient, no distance chart available)
Visual Acuity

- Use pocket vision chart (Rosenbaum Pocket Vision Screener).
- Record Jaeger (J) or Point number and testing distance (usually 30 cm).
- Example: J 2 @ 30 cm.
- Conversion to distance visual acuity possible (e.g., immobile patient, no distance chart available).
Factors that affect Visual Acuity

✓ Refractive error
✓ Size of the pupil
✓ Illumination
✓ Time exposure of target
✓ Area of retina stimulated
✓ State of adaptation of the eye
✓ Eye movements
Good to Know ...

- OD = oculus dexter = right eye
- OS = oculus sinister = left eye
- OU = oculus uterque = both eyes
Color Vision

- Color vision is the ability to **perceive** and **differentiate** colors.
- It is the sensory response to stimulation of **cones (in retina)** by light of wavelength **400–700 nm**.
- The physiological basis is the **relative absorption** of different wavelengths by the three cones (cone outer segment visual pigments).
- Color itself can be described in terms of its **hue, saturation** and **brightness**.
- Very important for **optic nerve function**.
Color Vision - 2 Basic Theories

1- **Trichromatic theory** = selective wavelength absorption

❖ **Three** types of photolabile visual pigments:

➢ **Short wavelength**: Absorbed by “blue” cones
➢ **Middle wavelength**: Absorbed by “green” cones
➢ **Long wavelength**: Absorbed by “red” cones
Color Vision - 2 Basic Theories

2- **Opponent color theory** = stimulation and inhibition of different “receptive fields”

- **“Receptive fields”** of color sensitive cells have regions that **compare** intensity of:
  - Red vs green
  - Blue vs yellow
Color Vision – Description of Colors

- **Hue ("color")**: Refers to wavelength
- **Saturation**: Refers to depth of color, purity or richness of color
- **Brightness**: Refers to intensity or radiant flux
Color Vision – Tests

1. Quantitative (both sensitive and specific)
   I. Farnsworth-Munsell 100 hue test
   II. Nagel’s anomaloscope

2. Qualitative (more sensitive, but less specific)
   I. Farnsworth 15 panel
   II. Pseudoisochromatic color plate tests e.g: Ishihara Plates
Color Vision – Quantitative

Farnsworth Munsell 100 Hue Scoring System
Color Vision – Quantitative

- Based on matching hues/color
- Consists of 84 colored discs
- Discs arranged in sequence (increasing levels of hue)
- Test is then scored
- Difference in hues between adjacent tablets is 1–4 nm
- Accurate in classifying color deficiency
- Very sensitive
- Time consuming and tiring
Color Vision – Quantitative

Nagel’s anomaloscope

- Based on matching luminance or brightness
- Good for congenital red-green color defects
- Sensitive
Color Vision – Qualitative

1. Farnsworth 15 panel
Color Vision – Qualitative

- **More rapid** and convenient to use than 100 hue test
- 15 colored tablets
- Hues **more saturated** than 100 hue test
- Tablets arranged in sequence
- Errors plotted very quickly on a simple circular diagram to define nature of color deficiency
Color Vision – Qualitative

- **Not very sensitive**
- Useful in *judging practical* significance of color deficiency
- Desaturated versions available to recognize more subtle degrees of color deficiency. Discriminates well between congenital and acquired defects.
- Congenital defects: Very precise protan/deutan pattern.
- Acquired defects: Irregular pattern or errors, shows tritan errors very clearly.
Color Vision – Qualitative

2. Pseudoisochromatic color plate tests e.g.: Ishihara Plates

- Gross estimate of acquired color loss
- Quick, available, useful central visual dysfunction
- Test congenital red-green defects
Color Vision – Qualitative

1. Test in well-illuminated room
2. Held 75 cm from subject and perpendicular to line of sight
3. Literate patients use plates 1–17
   • Answer given within 3 seconds
4. Illiterate patients use plate 18–24
   • Lines traced with a brush within 10 seconds
5. Results:

- **13 plates correct**: Normal color vision
- **< 9 plates correct**: Deficient color vision
- **Only reads “12”**: Total color blindness
- **Reads first 7 plates (except “12”)** incorrectly and unable to read the rest: Red-green deficiency
- **Reads “26” as 6 and “42” as 2**: Protan defect
- **Reads “26” as 2 and “42” as 4**: Deutan defect
- **Unable to read all plates, including “12” (despite good VA)**: Suspect functional color blindness
The visual field (VF) is one of the functional components of vision. It is defined as the area that is perceived simultaneously by a fixating eye. Not 2- but 3-dimensional. “Island of vision in a sea of darkness” (Traquair’s definition)

**Limits:**
- 60° nasally, 50° superiorly, 90–110° temporally, 70° inferiorly
- Blind spot 15° temporal to fixation
Visual Field

- Test “visual fields by confrontation” (4 quadrants, each eye tested separately) for estimate of visual field loss
- Accurate, quantifiable assessment with automated visual field testing, **perimetry** (Humphrey or Goldmann) or Tangent Screen, done by ophthalmology
Visual Field – Uses

1. **Diagnosis of**
   I. Glaucoma
   II. Optic nerve diseases (optic neuritis, anterior ischemic optic neuropathy, toxic neuropathy)
   III. Unexplained visual loss
   IV. Malingering patients

2. **Follow-up of**
   I. Glaucoma
   II. Tumors (pituitary adenoma)
Aqueous Humor and Intraocular Pressure

❖ The aqueous humor is the fluid in the anterior (AC) and posterior chamber (PC).
❖ Produced from ciliary body and outflow trabecular meshwork/pressure dependent flow (90%) (others like retinal and iris veins)
❖ Three functions
  I. Maintains volume and IOP
  II. Nutrition for avascular ocular tissue: Posterior cornea, trabecular meshwork, lens and anterior vitreous
  III. Optical Role
Aqueous Humor and Intraocular Pressure

❖ Properties

- Clear fluid
- Composition:
  - No cells and less than 1% of proteins compared to plasma
  - Same sodium and chloride, slightly lower potassium and 30% lower bicarbonate than plasma
  - Thirty times higher ascorbate than plasma
Aqueous Humor and Intraocular Pressure

❖ **Properties**

- Volume in AC and PC = 0.30 ml
  
  0.25 ml in AC
  
  0.05 ml in PC

- Rate of secretion = 3 ul/min (therefore takes 100 min to completely reform AC and PC!)
IOP Variation

1. Long term variations
   • Age:
     • Increase with age
   • Blood pressure:
     • Increase with BP but not linearly
   • Body weight:
     • Increase with increase in body mass
   • Climate:
     • Increase in winter
IOP Variation

2. Short term fluctuations
   - CVP changes
     - Change in body position and valsalva maneuver
   - Diurnal variation:
     - Increase in morning
     - Normal variation = 4 mmHg (>10 mmHg in glaucoma)
     - Correlates with increase in endogenous cortisol and catecholamines
     - Accentuated in POAG
   - Eye movement
     - Clinically important in restrictive ophthalmopathy (e.g. thyroid eye disease, pseudotumor)
   - Exercise:
     - Decrease in IOP
     - Correlated to metabolic acidosis and changes in extracellular fluid volume and osmolality
3. **Pharmacological effects**

- **Miotics**
  - Generally decreases IOP
  - Effects:
    - Contraction of iris sphincter
    - Contraction of ciliary muscle pulls scleral spur, leading to change in trabecular meshwork and increase in outflow
  - Direct parasympathomimetics (pilocarpine, carbachol) and indirect (phospholine iodide)

- **Mydriatics**
  - Generally increases IOP
  - Effects
    - Allows peripheral portion of anterior iris stroma to move forward towards inner aspect of uveoscleral meshwork, leading to decrease in trabecular outflow facility

- **Others**:
  - Beta adrenergic blockers (e.g. timolol)
  - Carbonic anhydrase inhibitors (e.g. diamox)
    - Affects membrane transport of bicarbonate and water across ciliary epithelium, thereby reducing production of aqueous and IOP
  - Hyperosmotic agents (e.g. mannitol, glycerol)
    - Elevates blood osmolality with resulting fluid shift out of the vitreous
  - Steroids (page 36)
Tonometry - measurement of the IOP

- Normal range is **10-21.5 mmHg** (average 15 mmHg)
- Types:
  1. **Applanation tonometry** (Goldman tonometer, Air puff tonometer)
  2. **Indentation tonometry** (Schiotz tonometer)
  3. **Combined applanation–indentation tonometry** (Mackay-Marg tonometer)
Applanation tonometry-
Determines force necessary to flatten a fixed area of cornea

1. **Goldman tonometer (gold standard)**: performed using the slit-lamp with special tip (prism)

2. **Air puff tonometer**: Non-contact, Pressurized air current directed against a fixed area of cornea, Not reliable in extremes
Indentation tonometry
Determines extent of indentation of cornea by fixed weight

- **Schiotz tonometer**: Plunger with known weight indents cornea (Weights of 5.5, 7.5 or 10 g)

  - **Method**:
    - Patient in **supine** position
    - Topical **anesthetic**
    - Tip of **plunger** allowed to rest on surface of eye forcing an indentation
    - **Depth** of indentation registered on scale in mm
    - IOP in mmHg read off from **conversion chart**
Combined applanation-indentation tonometry

- **Mackay-Marg tonometer:**
  - Contains a spring-mounted plunger and surface footplate
    - Plunger has 1.5 mm area that protrudes 10 μm through center of footplate
  - Initially plunger indents cornea (indentation)
  - End point occurs when plunger indents enough to be flushed with footplate (applanation)
Combined applanation-indentation tonometry

- For pressures from 6 to 24 mmHg, it measured an average of 1.7 mm higher than the Goldmann tonometer.
- Above 24 mmHg, the readings were similar.
Tonometry

Note: RIGHT EYE IOP always listed on top.

Note method used to measure IOP (Goldmann, Tonopen, airpuff).

Figure 10. Tonometry
Extra Ocular Muscles’ Examination

**Alignment**

- **Hirschberg corneal reflex test**
  - Examine in **primary position of gaze** (e.g. straight ahead) with patient focusing on distant object
  - **Shine light** into patient’s eyes from ~30 cm away
  - **Corneal light reflex** should be symmetric and at the same position on each cornea
Extra Ocular Muscles’ Examination

**Movement**

- Examine movement of eyeball through **six cardinal** positions of gaze
- Ask patient if **diplopia** is present in any position of gaze or observe for any restricted movement
Figure 13-7 In conjugate eye movement the "H" motion test provides a vehicle to assess the integrity of individual eye muscles. The patient is asked to follow the physician's finger as it moves horizontally and then up and down at each end of the "H". The physician performs the movement while observing one eye, and then repeats it while observing the other eye. The muscle in each eye whose action is being tested and the nerve that drives it are indicated at each position.

Muscle names: Superior Rectus (SR), Inferior Rectus (IR), Medial Rectus (MR), Lateral Rectus (LR), Superior Oblique (SO), Inferior Oblique (IO).
Exophthalmous measurement

1- History and PE including full local examination
2- Visual acuity
3- Pupil reaction (Marcus Gunn pupil → optic nerve compression)
4- Fundoscopy
5- EOM → restricted in thyroid ophthalmopathy, extensive tumour growths and neurological deficit
6- Labs
Exophthalmous measurement

7- Exophthalmometry

- *It measures protrusion of the* apex of cornea from the outer orbital margin (with the eyes looking straight ahead).
- Normal values vary between **10 and 21 mm** and are symmetrical in both eyes.
- A **difference** of more than **2 mm** between the two eyes is considered significant.
- The simplest instrument to measure proptosis is *Luedde’s exophthalmometer*
- *Hertel’s exophthalmometer* (is the most commonly used instrument)
- ✓ Its advantage is that it measures the two eyes simultaneously.
Luedde’s exophthalmometer  Hertel’s exophthalmometer
Conclusion

❖ It is very important for otorhinolaryngologist to know the basic anatomy and basic simple bed side investigations of ophthalmology related ENT diseases to deal with many conditions

❖ One of these is visual acuity to start with in initial assessment

❖ EOM, visual field, and color vision should be encountered with simple examinations

❖ Exophthalmos is very important sign to be diagnosed as it could be related to underlying conditions

❖ Always ask for help from your colleagues in ophthalmology to create safe and professional environment for the patients
References

- Oxford Medical Dictionary
- Manitoba Notes
- Riyadh et al notes
- Google images
Thank You ...