433 Teams

OPHTHALMOLOGY

10

Neuro-ophthalmology

Color index:

432 Team – **Important** – **433 Notes** – Not important

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Part 1: Pupillary Disorders

Anatomy:

- Pupil construct to **light and near stimuli**
- Pupil is related to autonomic nervous system

Sympathetic pathway:

- Originate from **hypothalamus and go through superior cervical ganglia**

- **Dilator pupillae muscle:** Supplied by **Sympathetic fibers** and lead to **Dilation of pupil**
- If there is a cut through sympathetic pathway patient will develop signs of **Horner syndrome**

Parasympathetic pathway:

1. Originate from **Pretectal nucleus at midbrain and stimulate both Eddinger-westphal nucleus**
2. **Divided into superior and inferior division**
3. **inferior division** go to **ciliary ganglia** (parasympathetic ganglia) and finally reach to muscle

- **Sphincter pupillae muscle:** Supplied by **parasympathetic fibers** of **Oculomotor nerve** and lead to **constriction of pupil**

Examination of the pupil:

1- Best conducted in **dim light room** using a bright light
2- The patient should be relaxed and **fixing on a distant object.**
3- The size, shape and position of each pupil should be noted in light and dark condition.
4- Check light reflex:
- **Direct pupil reflex:** When focus the light on one eye, **that eye** will constrict
- **Consensual pupil reflex:** When you focus the light in one eye, **the other eye** will constrict

5- Looking for a relative **afferent pupillary defect (RAPD)**
Do swinging light reflex (Marcus gunn reflex), both eyes should be **always constrict** when you focus the light **if Dilated** when you focus the light, this is **+RAPD and means there optic nerve damage**

How to know which one is abnormal? Look to the corneal light reflex. The eye should constrict due to focusing of light. So, the left is abnormal

(This condition called Anisocoria)

Causes of Dilation of pupil:

1. Previous ocular surgery
2. Ocular trauma
3. Use of medications like cycloplegics e.g. atropine, cyclopentolate
4. Third nerve palsy
5. **Tonic pupil (Adie's pupil):**
    - **History:** female with **unilateral dilation of pupil**, which does not respond to light and only very fine movement of pupil
    - **How to know if it's tonic pupil or not?** I'll give patient **1% pilocarpine** (sympathomimtic) **if constrict that means it's tonic**

Causes of Constriction of pupil:

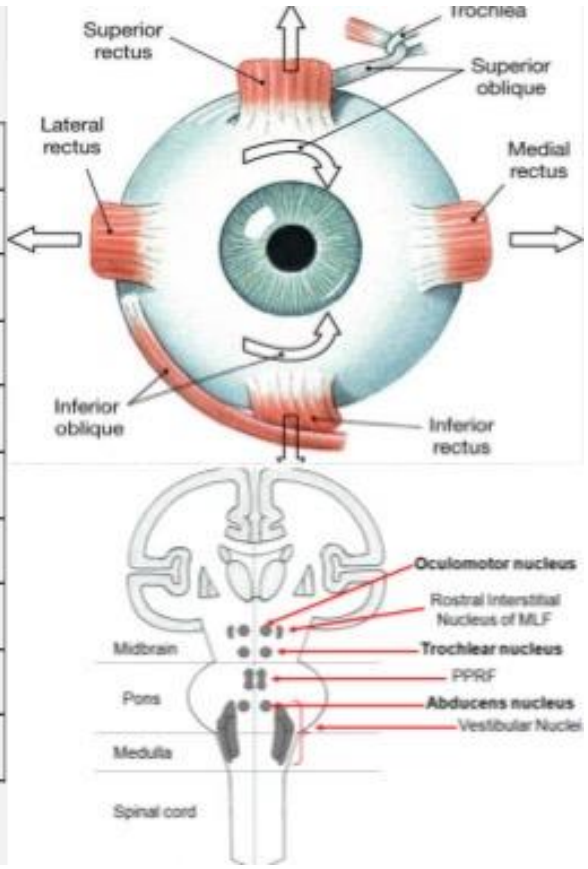
1. Previous ocular surgery
2. Ocular trauma or inflammation
3. Use of medication e.g. pilocarpine
4. **Horner syndrome:**
    - **Cause:** interruption of sympathetic pathway **(Carotid dissection, carotid aneurysm and tumor)**
    - **Signs:** at the side that affected you will see **miosis – anhydrosis – ptosis – enophthalmous**
        - **Enophthalmous:** due to paralysis of levator palpebrae muscle
        - **Ptosis:** due to paralysis of muller's muscle

Part 2: Neuromotility disorders

Anatomy:

Anatomy and physiology:

Innervation of extraocular muscles	Primary action
Cranial nerve III	
Superior rectus	Elevation (maximal on lateral gaze)
Inferior rectus	Depression (maximal on lateral gaze)
Medial rectus	Adduction
Inferior oblique	Excyclotorsion
Cranial nerve IV	
Superior oblique	Incyclotorsion
Cranial nerve VI	
Lateral rectus	Abduction



- Oculomotor and trochlear nerves exit at the of midbrain, while Abducent from pons

Third nerve palsy: (Patient will come with horizontal diplopia)

This patient have right 3rd nerve palsy. How did we know?
He can abduct his right eye only, which is lateral rectus muscle function

If you want to rule out 4th cranial nerve palsy along 3rd nerve palsy what will you do?
Ask the patient to look down, if the eye intorted the 4th cranial nerve is intact

What is the best investigation for PCA aneurysm?

Magnetic resonance angiography

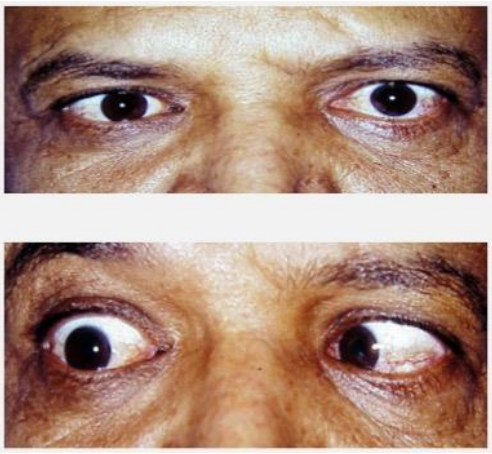
- **Medical 3rd nerve palsy:**

Isolate motor part damaged due to **Vascular diseases** such as **diabetic and hypertension.**

- **Surgical 3rd nerve palsy:**

Pressure on pupil constrictor fibers of CN III due to tumor or **Posterior communicating artery aneurysm (most common cause)** lead to **Unilateral dilated pupil.**

Sixth nerve palsy: (Patient will come with horizontal diplopia toward the side of lesion)



- **Horizontal diplopia (worse at distance)**
- **Esotropia**
- **Face turn in the direction of the paralyzed muscle**
- **Limited Abduction on the side of the lesion**

Causes:

- Intracranial tumors
- Trauma **(most common cause because it's long nerve)**
- Microvascular diseases **(mostly DM)**
- Increased intracranial pressure

Fourth nerve palsy: (Patient will come with Vertical diplopia Head tilt to the opposite shoulder)

Etiology:

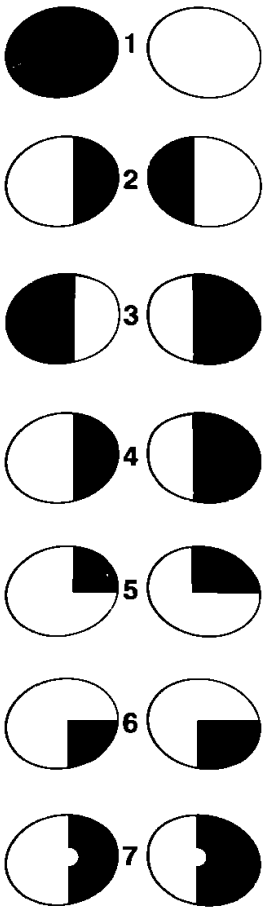
- Trauma
- Idiopathic
- Congenital

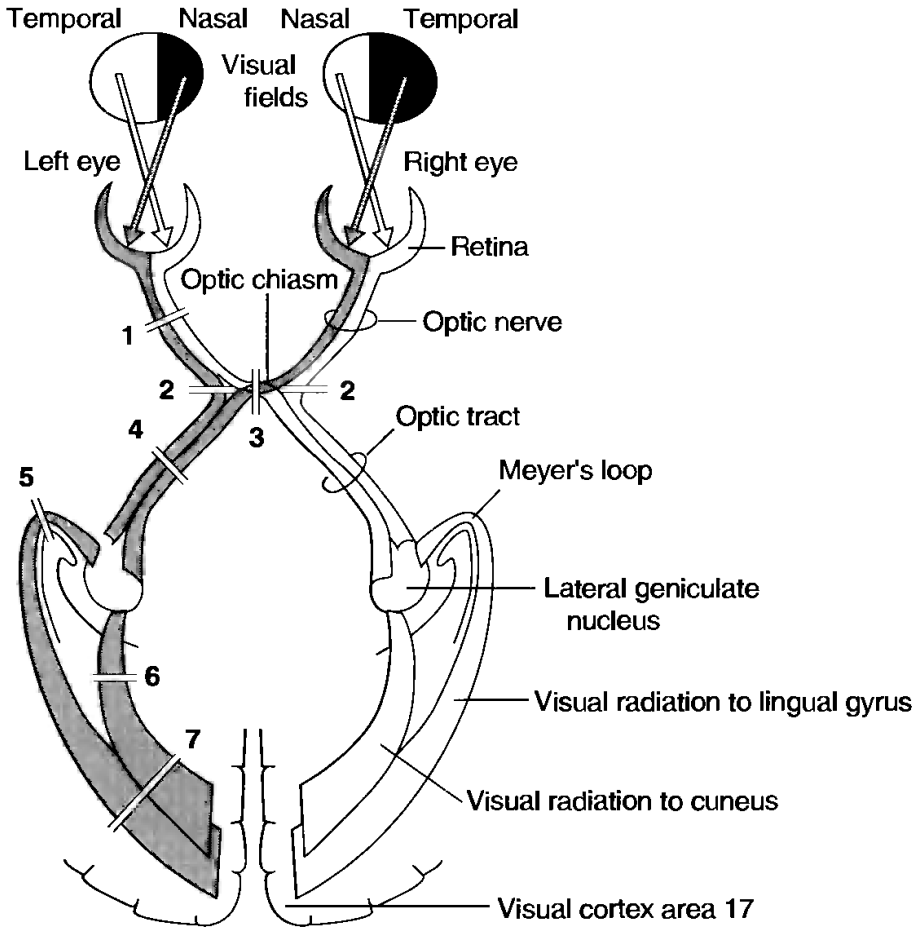
Part 3: Neuro-muscular disorders

Ocular myasthenia gravis:

- Chronic autoimmune disease affecting the **neuromuscular junction** in skeletal muscles.
- **History:** Patient is not able to stand from his bed at morning after sleeping due to muscle weakness Or he feel fatigue at the end of the day
- **Signs:** Ptosis (due exhaustion of muscle NOT due to paralysis) – Diplopia – fatigue – **pupil is normal**
- **Investigations:**
    1. **Tensilon test:** inhibits acetylcholinesterase and can transiently reverse signs of weakness due to OMG, such as ptosis and extra-ocular muscle paresis.
    2. Check for systemic weakness, difficulty in swallowing or breathing.
    3. **Assess orbicularis strength:** Ask the patient to close his eye strongly and open them
    4. **Blood test for: acetylcholine receptor antibodies**

Part 4: Visual pathway disorders





1- Left eye blindness due to Left optic nerve damage

2- Binasal hemianopia due to bilateral carotid artery aneurysm compressed optic chiasm

3- Bitemporal hemianopia due to pituitary tumor compressed optic chiasm

4- Right Homonymous hemianopia due to Left optic tract damage

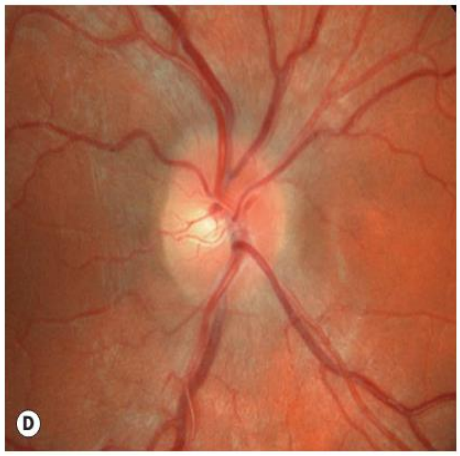
5- Right superior quadrantic hemianopia due to Left optic radiation at temporal lobe lesion (pie in the sky)

6- Right inferior quadrantic hemianopia due to Left optic radiation at parietal lesion (pie in the floor)

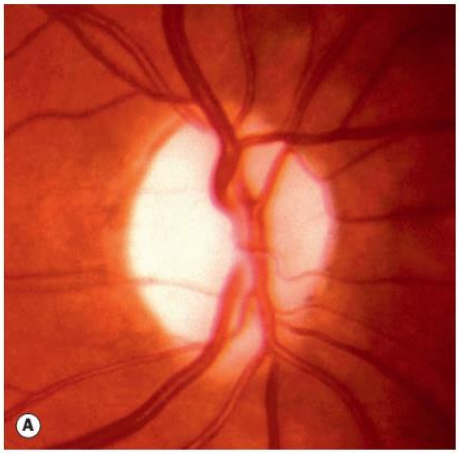
Optic neuropathy:

Signs:

- Most common cause of optic neuropathy is **glaucoma**
- Usually unilateral **(if bilateral this is papilledema)**
- Afferent pupillary defect
- Central visual loss
- Loss of color vision
- Optic disc edema
- Optic atrophy



Normal Optic disc



Pale disc (optic atrophy)

Disc edema

CASE1: Optic neuritis

- Inflammatory demyelinating condition associated with MS
- Most common type in **female young adults**
- **History:** Patient will come with sudden visual loss with ocular pain while moving the eye
  - **Why ocular pain happened?** Because **optic nerve sheath is attached to medial rectus muscle sheath**
- **Signs:** reduce visual acuity – Positive afferent pupillary defect – Optic disc edema – **scotoma visual field defect**
- **Treatment:** IV steroids my speed up the recovery process but does not influence the final outcome

CASE2: Ischemic optic neuropathy

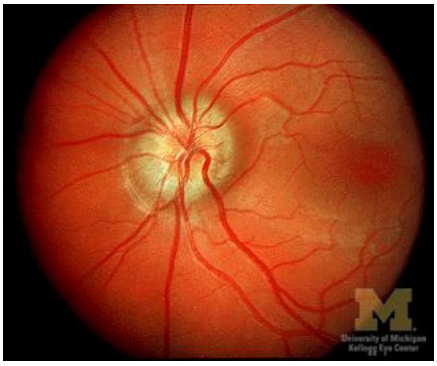
Non-arteritic ION:

- **History:** Old patient known to have DM and HTN come with sudden visual loss
- **Signs:** Optic disc edema and **Altitudinal visual field loss**

Arteritic ION: (giant cell arteritis)

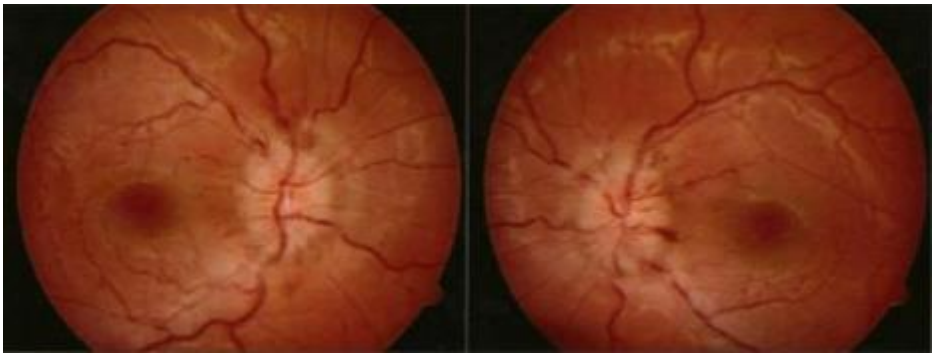
- **History:** 65yrs old comes with sudden visual loss **jaw claudication**, proximal myalgia and arthralgia, scalp tenderness, headache
- **Investigations: ESR, CRP and temporal artery biopsy (gold standard)**
- **Treatment:** IV steroid to save the other eye

CASE3: Congenital disk elevation



- **History:** Patient is have **hyperopia or drusen**
- **Signs:** Optic disc margins blurred and the cup is absent
- **B-scan ultrasound** can discover drusen (lipid collections)

CASE4: Papilledema



- **Bilateral swelling of the optic discs secondary to increased intracranial pressure**.
- **Signs:** Hyperemia of the disc - Tortuosity of the veins and capillaries - Blurring and elevation of disc margins - Per papillary flame shaped haemorrhages.
- **Causes:**
    - Intracranial mass
    - Sever systemic hypertension
    - **Idiopathic intracranial hypertension (pseudo-tumor cerebri): Female – Obesity - Tetracycline**

Done By:

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