NEURO-OPHTHALMOLOGY

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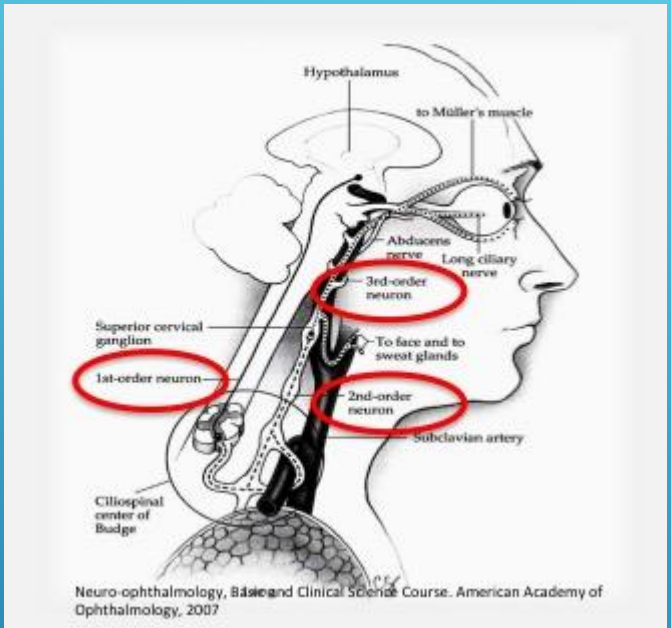
Neuro-ophthalmolgy deals with ocular problem caused by disorder of brain, optic nerve, Cranial Nerves and pupil pathway.

PART 1: PUPILLARY DISORDERS

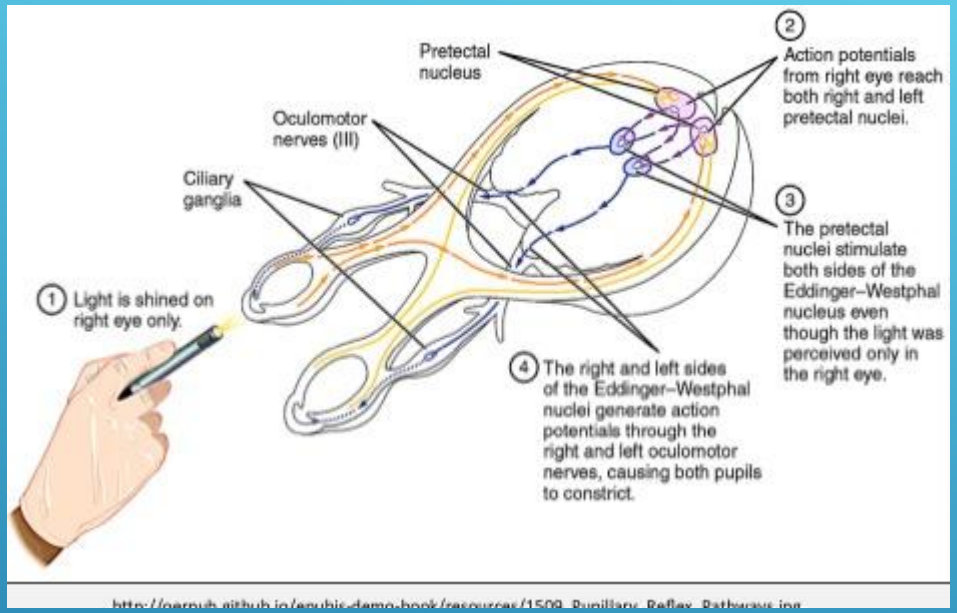
PUPILLARY DISORDERS

- Anatomy and physiology:
  - The pupil size is controlled by a balance between parasympathetic innervation to the sphincter muscles and sympathetic innervation of the dilator muscles of the iris.
  - Pupil construct to light and near stimuli.



- Sympathetic(adrenergic) pathway:
  - Pupillary dilation is mediated through three-neuron sympathetic(adrenergic) pathways that originate in the hypothalamus.

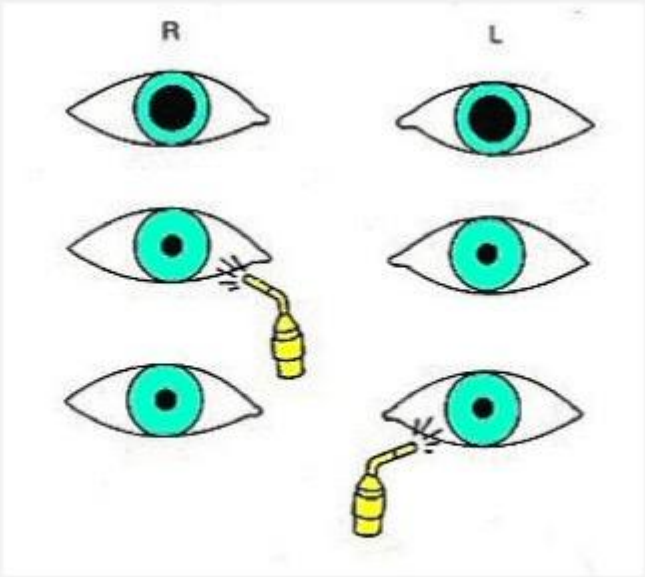
PUPILLARY DISORDERS



PUPILLARY DISORDERS: PARASYMPATHETIC(CHOLINERGIC) PATHWAY:

PUPILLARY DISORDERS

- Examination of the pupil:
  - Best conducted in dim light room using a bright light
  - The patient should be relaxed and fixing on a distant object.
  - The size, shape and position of each pupil should be noted in light and dark condition.
  - Check light reflex looking for a relative afferent pupillary defect(RAPD)



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PUPILLARY DISORDERS

PUPILLARY DISORDERS

WHICH PUPIL IS ABNORMAL?

PUPILLARY DISORDERS

- When the small pupil does not dilate as well as the large pupil in dim light, then the small pupil is abnormal.

- When the larger pupil does not constrict as well as the small pupil in response to a light stimulus, then the large pupil is abnormal

PUPILLARY DISORDERS

- **The large pupil is abnormal:**
  - Previous ocular surgery
  - Ocular trauma
  - Use of medications like cycloplegics e.g. atropine, cyclopentolate
  - Third nerve palsy
  - Tonic pupil (Adie's pupil)

PUPILLARY DISORDERS

- **Tonic pupil (Adie's pupil)**
  - Young women
  - Unilateral
  - Light reaction is diminished or absent
  - Installation of weak cholinergic agents (0. 1% pilocarpine) will cause constriction of the tonic pupil (denervation hypersensitivity)
  - Benign condition

PUPILLARY DISORDERS

- **The small pupil is abnormal:**
  - Previous ocular surgery
  - Ocular trauma or inflammation
  - Use of medication e.g. pilocarpine
  - Horner syndrome

PUPILLARY DISORDERS

- **The small pupil is abnormal:**

- *Horner syndrome:*

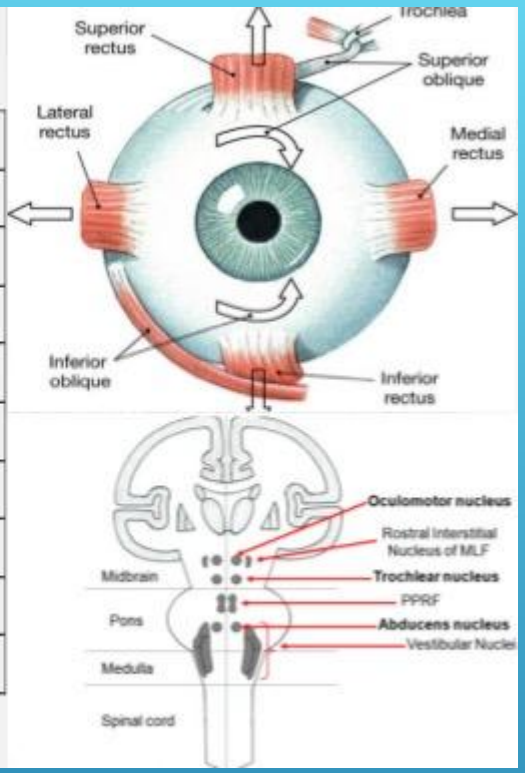
  - Small pupil, ptosis and anhydrosis
  - Caused by a lesion anywhere along the sympathetic pathway
  - Carotid dissection, carotid aneurysm and tumor can be associated with this syndrome

PUPILLARY DISORDERS

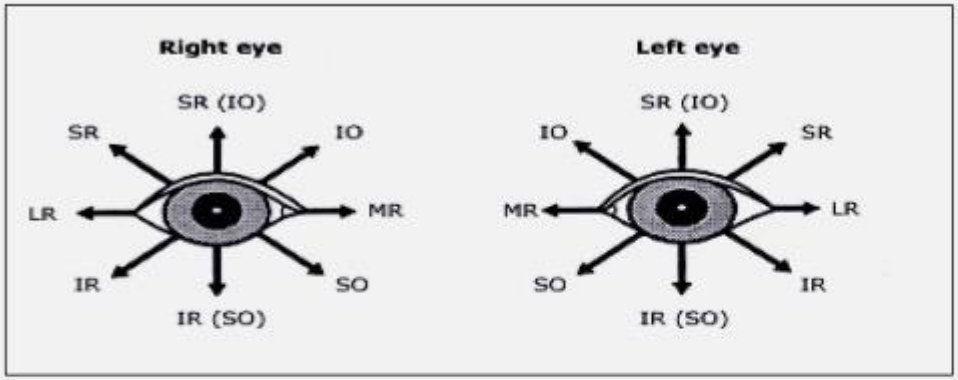
PART 2: NEUROMOTILITY DISORDERS

- 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



NEUROMOTILITY DISORDERS



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NEUROMOBLITY DISORDERS

NEUROMOTILITY DISORDERS

- Third cranial nerve (oculomotor) :
  - Begins as a nucleus in the midbrain that consists of several subnuclei that innervate the individual extraocular muscles, the eyelids, and the pupils.

NEUROMOTILITY DISORDERS

- Third cranial nerve (oculomotor)palsy:
  - 65 yrs old presented complaining of double vision

NEUROMOTILITY DISORDERS

NEUROMOTILITY DISORDERS

- Third cranial nerve (oculomotor)palsy :

Check for pupil involvement

NEUROMOTILITY DISORDERS

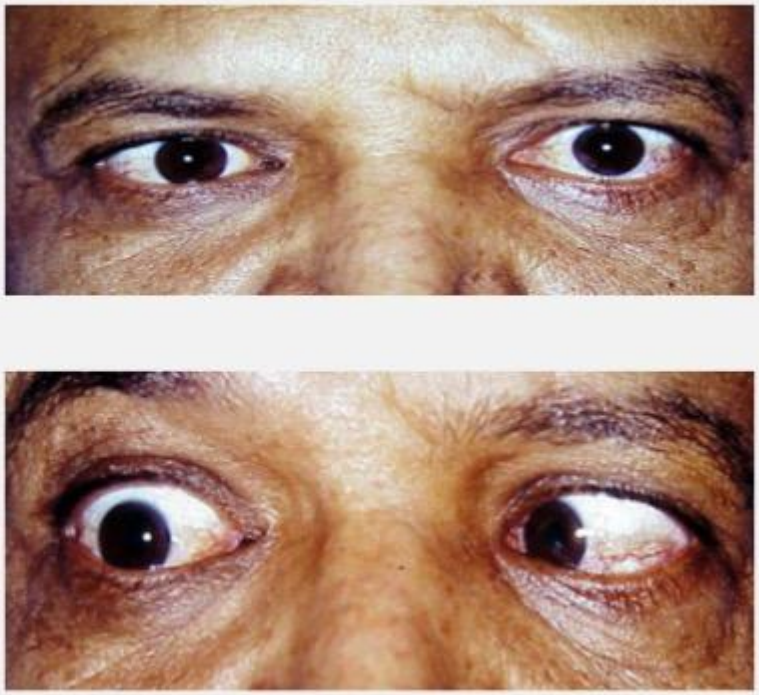
- **Third cranial nerve (oculomotor)palsy :**
  - *Etiology:*
    - intracranial aneurysm (posterior communicating artery)
    - micro-vascular ischemia (DM and HTN) – trauma
    - brain tumor

NEUROMOTILITY DISORDERS

- **Fourth cranial nerve (trochlear) palsy:**
- Vertical diplopia
- Head tilt to the opposite shoulder
- Etiology:
  - Trauma
  - Idiopathic
  - Congenital

NEUROMOTILITY DISORDERS

- Which muscle is affected?



NEUROMOTILITY DISORDERS

- **Sixth cranial nerve(abducens)palsy:**
  - Horizontal diplopia (worse at distance)
  - Esotropia
  - Face turn in the direction of the paralyzed muscle
  - Limited Abduction on the side of the lesion

NEUROMOTILITY DISORDERS

- **Sixth cranialnerve(abducens)palsy:**

causes :

- Intracranial tumors
- Trauma
- Microvascular diseases
- Increased intracranial pressure

PART 3: NEUROMUSCULAR DISORDER

NEUROMUSCULAR DISORDER

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- Ocular myasthenia gravis
  - Chronic autoimmune disease affecting the neuromuscular junction in skeletal muscles.
  - Ptosis
  - Diplopia
  - Fatigability and variability of clinical findings are characteristic
  - The pupil is not affected

NEUROMUSCULAR DISORDER

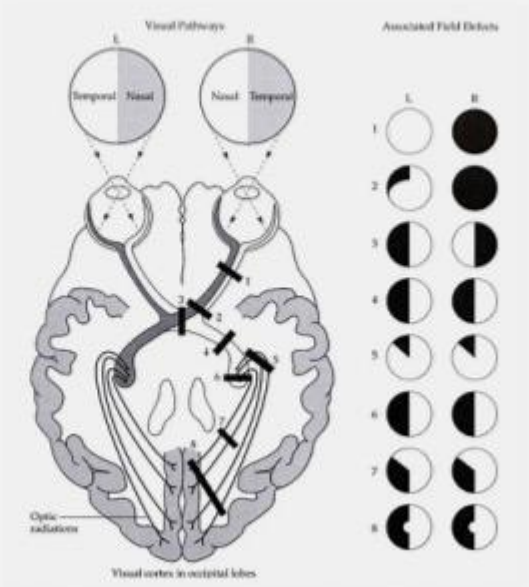
- Ocular myasthenia gravis
  - Check for systemic weakness, difficulty in swallowing or breathing.
  - Assess orbicularis strength
  - Blood test for acetylcholine receptor antibodies

NEUROMUSCULAR DISORDER

- Ocular myasthenia gravis (OMG):
  - Tensilon test: inhibits acetylcholinesterase and can transiently reverse signs of weakness due to OMG, such as ptosis and extra-ocular muscle paresis.

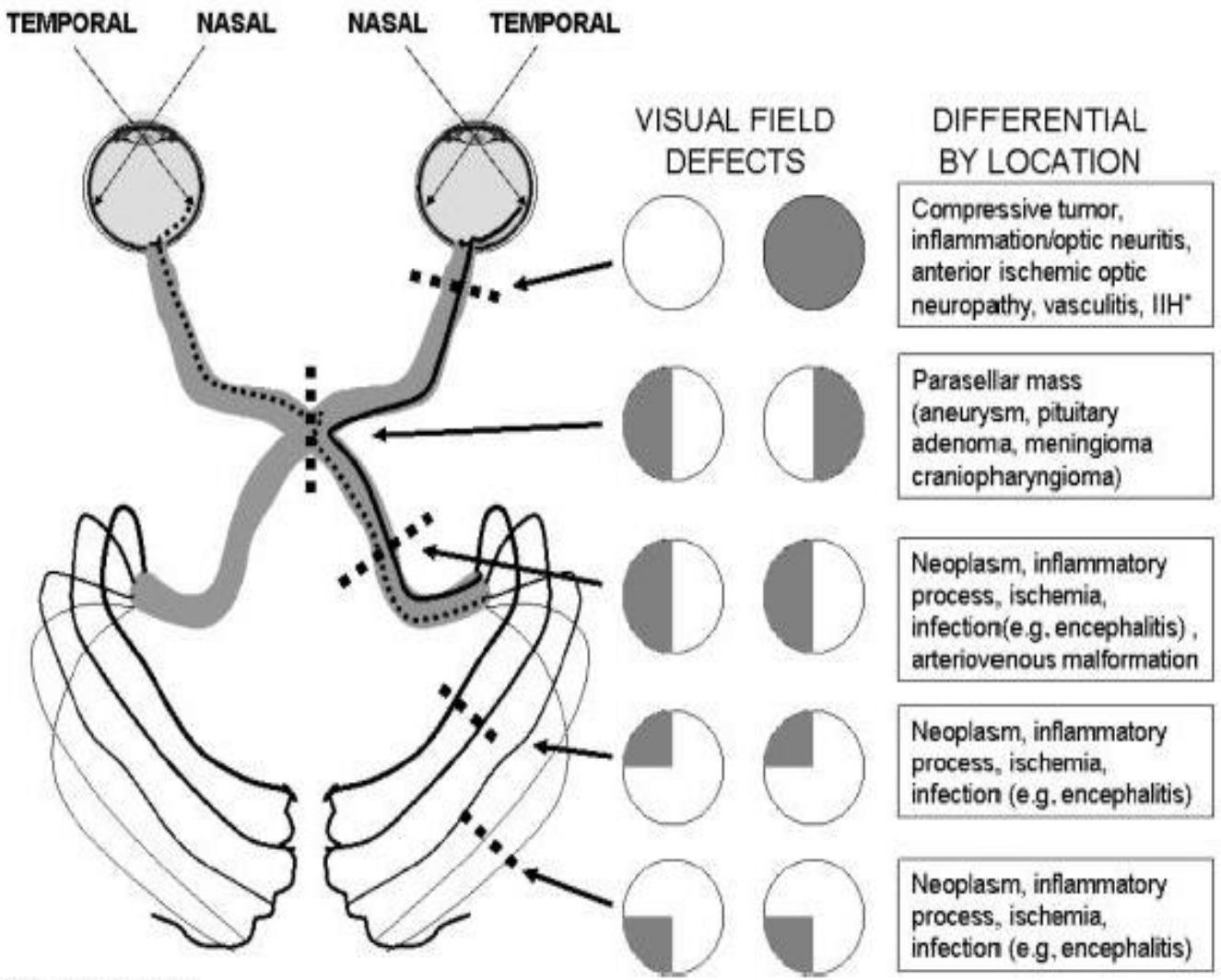
PART 4: VISUAL PATHWAY DISORDERS

- Lesions anywhere in the visual pathway will produce visual field defect



VISUAL PATHWAY DISORDERS

Figure 2. The Visual Field Defects Associated With The Various Possible Locations Of A Pathological Lesion



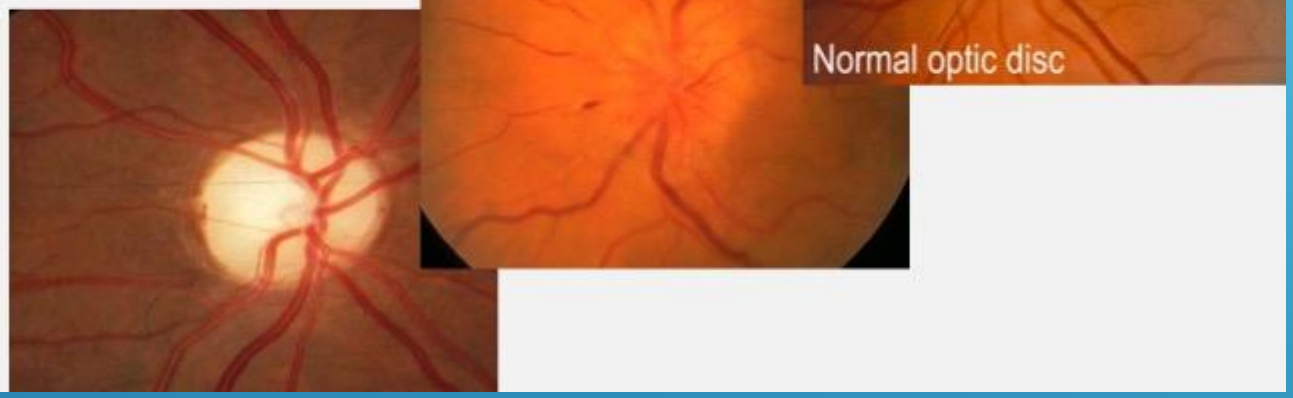
** IIH, idiopathic intracranial hypertension.*

- **Optic nerve disease:**
  - Usually unilateral
  - Afferent pupillary defect
  - Central visual loss
  - Loss of color vision
  - Optic disc edema
  - Optic atrophy

VISUAL PATHWAY DISORDERS

VISUAL PATHWAY DISORDERS

- **Optic nerve disease:**

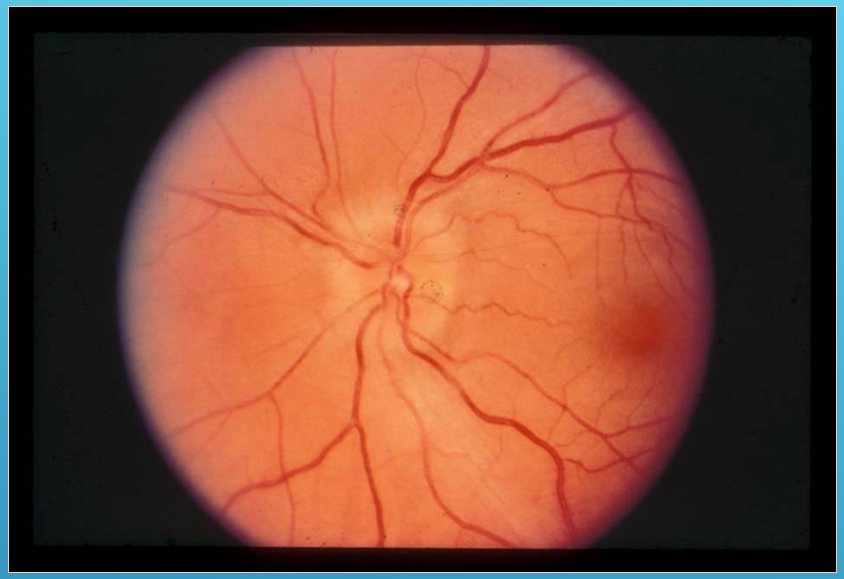


- **Optic nerve disease:**

- Optic neuritis :

  - Inflammatory demyelinating condition associated with MS
  - Most common type in young adults
  - The visual acuity is markedly reduced and an afferent pupillary defect is present.
  - Associated with pain on extra-ocular muscle movement in 90% of patients
  - Good recovery
  - IV steroids my speed up the recovery process but does not influence the final outcome

VISUAL PATHWAY DISORDERS



VISUAL PATHWAY DISORDERS

- Ischemic optic neuropathy (ION):
- *Non-arteritic ION:*
  - Patients usually have DM,HTN and other vascular risk factor.
  - Most common cause in older patients
  - Altitudinal visual field loss

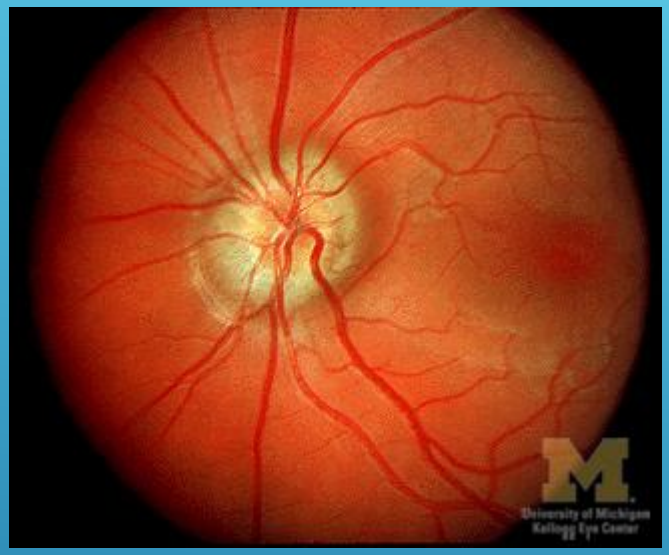
VISUAL PATHWAY DISORDERS

- Ischemic optic neuropathy (ION):
  - *Arteritic ION:*
    - >65yrs old
    - Associated with giant cell arteritis (GCA)
    - Check for jaw claudication, proximal myalgia and arthralgia, scalp tenderness, headache
    - Elevated erythrocyte sedimentation rate (ESR) and C- reactive protein (CRP)

- Ischemic optic neuropathy (ION):
- *Arteritic ION:*
  - Temporal artery biopsy is the gold standard for diagnosis.
  - Systemic steroids is given immediately if GCA is suspected.
  - Binocular involvement occurs in a third of cases, often within the first day.

VISUAL PATHWAY DISORDERS

VISUAL PATHWAY DISORDERS



- **Optic nerve disease:**
  - congenital disc elevation: <1%
    - optic disc margins blurred and the cup is absent but no edema or hrg can be observed.
    - may be associated with hyperopia or drusen.

- **Optic nerve disease:**

- Other causes of optic neuropathy:

  - Infection e.g viruses, TB, cryptococcus and syphilis
  - Systemic connective tissue disease e.g SLE
  - genetics : Leber's opticc neuropathy (through a mitochondrial DNA mutation)
  - Toxic and nutritional deficiencies
  - Trauma

VISUAL PATHWAY DISORDERS

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VISUAL PATHWAY DISORDERS

- Papilledema
  - Bilateral swelling of the optic discs secondary to increased intracranial pressure.

- Hyperemia of the disc.
- Tortuosity of the veins and capillaries.
- Blurring and elevation of disc margins.
- Per papillary flame shaped haemorrhages.

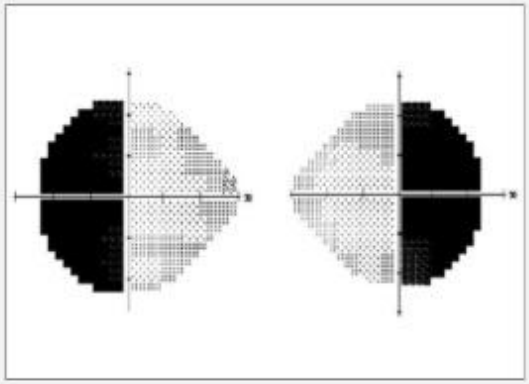
VISUAL PATHWAY DISORDERS

VISUAL PATHWAY DISORDERS

- Papilledema Causes:
  - Intracranial mass
  - Sever systemic hypertension
  - Idiopathic intracranial hypertension (pseudo-tumor cerebri)

- a patient presented with this visual field defect.

Which one of the following diagnosis is the most Likely?



a. Optic neuritis
b. tilted discs
c. pituitary tumor
d. 6th nerve palsy

MCQ

THANK YOU