

Lecture

Neurological Examination - I

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Examination

1. **Your position:** in the Right side
2. ✓ **Introduce yourself/Permission**
3. **Insure privacy**
4. ✓ **Expose the patient**
5. **Centralize the patient in the bed:** (Comfortable for the patient)
6. **Describe the position of the patient:** (Decubitus, Setting, Semisetting, Supine, Leaning forward, Squatting)
7. **General appearance:** looks ill/ well, dyspneic , cachectic, comfortable/ uncomfortable, cooperative/non cooperative.
 - **Body built:** (average , under wt. , over wt. , obese , morbid obesity) (**BMI**)
 - **Skin color:** cyanosis , pallor , jaundice.
 - **Describe associations & surrounds:** canula , I.V. fluid , O2 mask , urine catheter, NGT, ect.

Examination

1. **General examination:** ⁽¹⁾consciousness level, ⁽²⁾general look, ⁽³⁾physical appearance, ⁽⁴⁾pulse, blood pressure, O₂ saturation, temperature, R.R.,, vital signs.
2. **Examination of other systems:** ENT, Eyes, Neck, Respiratory system, Cardiovascular system, Gastrointestinal system, Skin & musculoskeletal system
3. **Neurological examination.**
 - * Different between
 - Meningitis: inflammation in meningeal layer with normal WBC
 - Meningeism: * irritation in meningeal layer without inflammation. * normal WBC

Neurological Examination



Neurological Examination

① I. Mental Status

a. State of consciousness:

- Glasgow coma scale (① Eye opening, ② Verbal response, ③ Motor response)
- Grading of coma. 15/□

Glasgow Coma Scale (GCS)

Category	Response	Points
E ye opening	Spontaneously	4
	To speech	3
	To pain	2
	None	1
V erbal response	Oriented	5
	Disoriented, confused conversation, able to answer questions	4
	Inappropriate responses (words)	3
	Incomprehensible speech (sound)	2
	None	1
M otor response	يسمع للأوامر... Obeying commands	6
	يحدد مكان الألم.. Localizes to pain	5
	يسحب يده منه.. Withdraws from pain	4
	Abnormal (spastic) flexion, (decortication)	3
	Extensor (rigid) response, (decerebration)	2
	None	1

(GCS minimum = 3: maximum = 15)

Classification of Coma

Grade	Consciousness	External stimulus
I. Lethargy or drowsiness	<u>Disturbed</u>	Response to verbal and painful stimuli (but not vigorous nor continuous)
II. Stupor	Disturbed	Response to verbal and painful stimuli (vigorous)
III. Semi-coma	Lost	No response to verbal stimuli with preserved response to painful stimuli
IV. Coma	Lost	No response to both verbal & painful stimuli

b. **Orientation:** for ¹⁾time, ²⁾place and ³⁾persons.

c. **Memory:**

- For recent events (lost = anterograde amnesia).
- For remote event (lost = retrograde amnesia).
- For certain period of time (lost = circumscribed amnesia).

d. Intelligence:

Assessed by Intelligent Quotient "IQ" test.

The patient is considered of average intelligence when he & the doctor "understand" each other.

e. Mood: Abnormalities include:

- Depression, euphoria, emotional liability.
- Apathy (indifference).

f. Behavior & perception.

Mentally of Normal Patient

The patient fully conscious, well oriented for time, place & persons, with normal behavior, mood & memory, cooperative & of average intelligence.

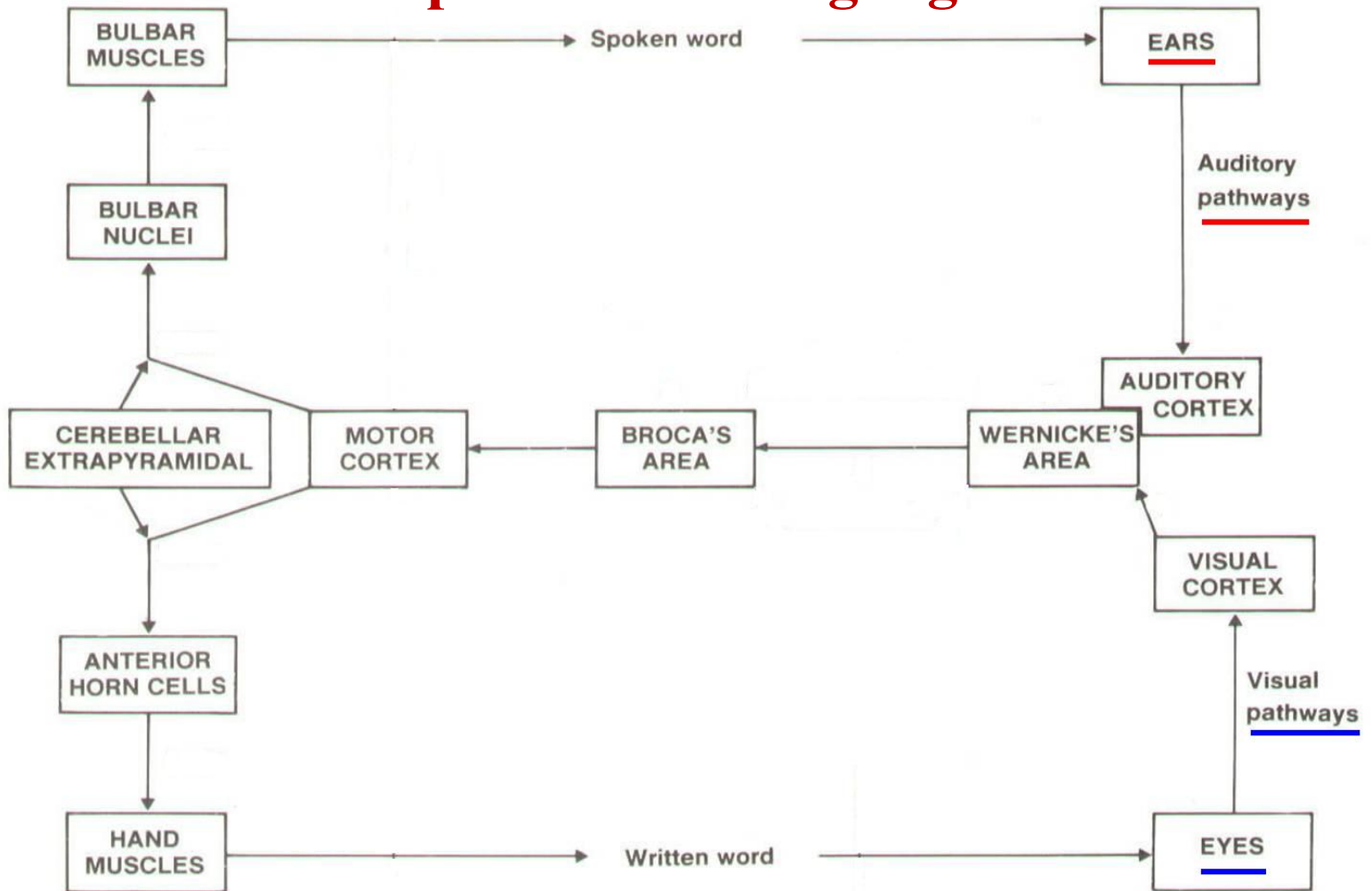
II. Speech Examination

The process of speech involves two stages:

I- Speech formulation. ①

II. Speech articulation. ②

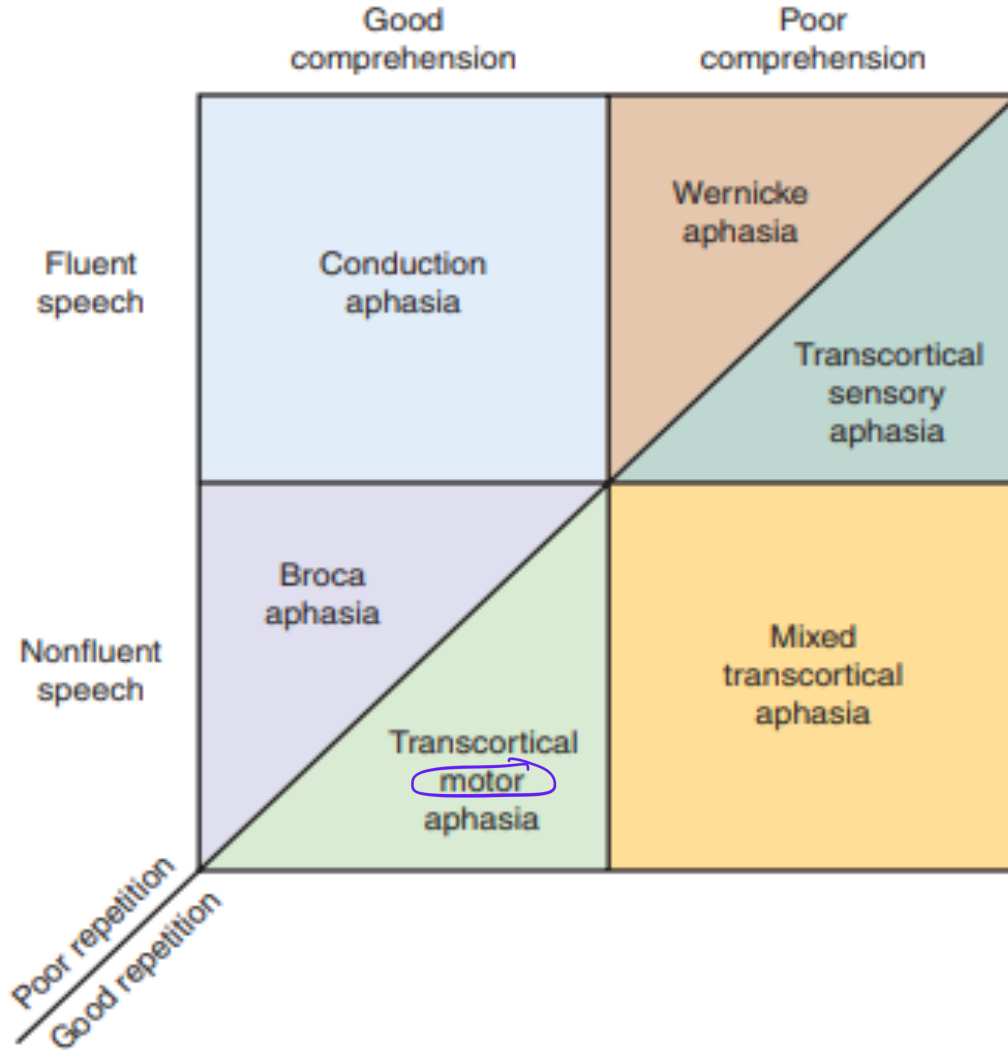
Speech and Language



Types of Speech Disturbances

1. **Aphasia:** inability to speech formulation in the absence of sense organs lesion or mental defect.
2. **Dysarthria:** difficulty in articulation with normal formulation (i.e. normal speech center).

Types of Aphasia



Types of Aphasia

1. **Broca's** (Verbal, motor, expressive or nonfluent) aphasia:

- The patient can not express his ideas in spoken word but the patient understand what ever told him.
not fluent / poor repetition.
good comprehension.
- Characterized by good comprehension, nonfluent speech and poor repetition.
- Lesion in Broca's area or Brodmann 44 & 45 in the inferior frontal gyrus of dominant hemisphere.

2. Wernicke's (sensory, perceptive or fluent) aphasia:

- The patient ^{fluent + good repetition} hears but does ^{poor comprehension} not understand sound.
- Characterized by poor comprehension, fluent speech, poor repetition.

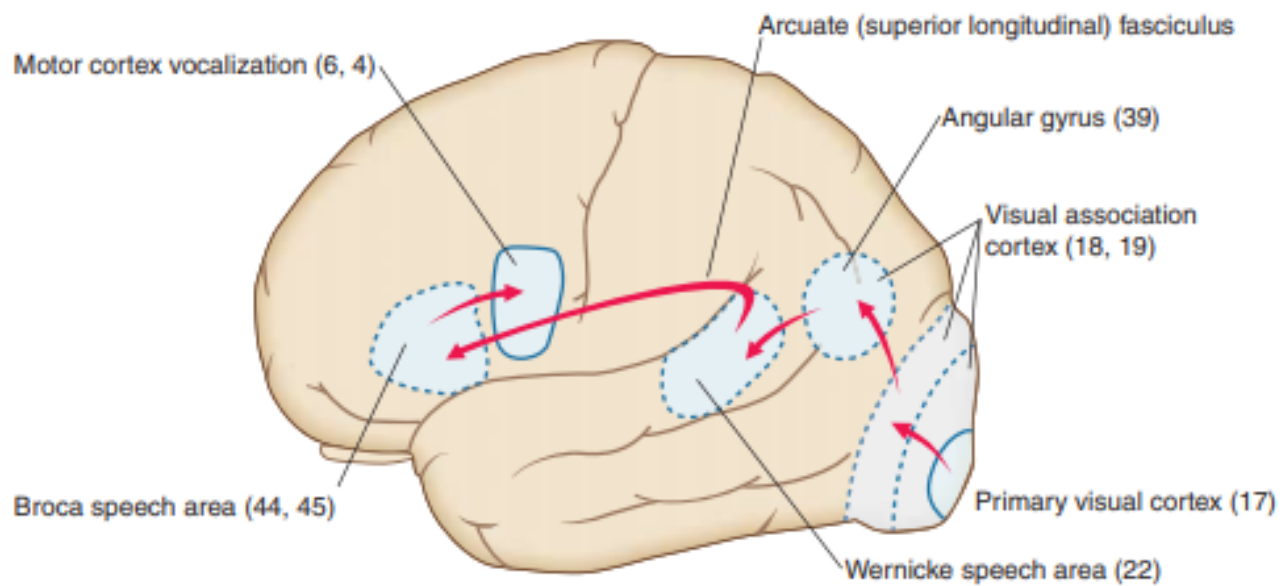
Results from a lesion in the superior temporal gyrus “posterior part” of dominant hemisphere (Brodmann 22 or Wernicke's center).

3. Conduction aphasia:

- Characterized by good comprehension, fluent speech and poor repetition, due to damage of the arcuate fasciculus.
- The arcuate fasciculus interconnects Broca's area with Wernicke's area.

4. Global aphasia:

- Combines all the symptoms of Broca's and Wernicke aphasias.



5. Transcortical motor aphasia:

- Characterized by good comprehension, nonfluent speech and good repetition.

6. Transcortical mixed aphasia:

- Characterized by poor comprehension, nonfluent speech and good repetition.

7. Transcortical sensory aphasia:

- Characterized by poor comprehension, fluent speech and and good repetition.

2. Dysarthria

Definition: difficulty in articulation with normal formulation (i.e. normal speech center)

It might be due to:

1. Bilateral pyramidal lesion (pseudobulbar palsy).
2. Lower motor neuron lesion of cranial nerves concerned with speech:
LMNL
 - a. Nuclear: True bulbar palsy.
 - b. Nerves: Lesion in 5, 7, 9, 10, 11, 12 cranial nerves.
 - c. Neuromuscular: Myasthenia.
 - d. Muscles: myopathy.
3. Multiple sclerosis. ✓
4. Cerebellar lesions. ✓
5. Parkinson's disease and parkinsonian syndromes.

Other Types of Speech Disorders

1.

Aphonia (dysphonia): phonation is lost but articulation is preserved, hence the patient talks in a whisper.

Causes of Dysphonia:

- a. **Organic causes:** due to disease of the larynx or the nerve supply of vocal cord (recurrent larynx nerve lesion), bulbar syndrome.
- b. **Functional cause:** conversion disorder.

2. **Palilalia:** repetition of the last sentence or words of the patient's own speech. It occurs in extrapyramidal lesions.

3. **Echolalia:** repetition of the last sentence or words that the patient hears. It occurs in severe dementia.

2.

Mutism: absence of any attempt at oral communication (in bilateral frontal lobe or third ventricle lesion).

5. **Anomic (nominal, amnesic) aphasia:** difficulty naming familial object or persons.

III. Examination of Meningeal Irritation Signs

a. **Neck rigidity (stiffness):** Passive flexion of neck leads to neck rigidity.

b. **Positive Lasegue's sign "Straight leg raise test":** Raise the leg of supine patient by flexion of the hip (while the knee is extended). Normally if can be raised to 90° without discomfort. Here it is painful and limited.

c. **Positive Kernig's sign:** Passive flexion of the hip at 90° and flexion of the knee in a supine patient. Trial to extend slowly is limited and painful.

d. **Positive Brudzinski's sign:**

- ① **Neck Brudzinski's sign (upper Brudzinski's sign):** Passive flexion of neck leads to flexion of both knees and hips.
- ② **Leg Brudzinski's sign (lower Brudzinski's sign):** Passive flexion of one hip and extension the knee leads to flexion of the other hip

* Examination Neck Rigidity :-

→ Patient supine → occipital to sternum → Complete flexion to neck

→ if patient make in examination neck Rigidity → **flexion to knee + hip**
upper / neck Brudzinski sign.
 why? to ↓ Pain.

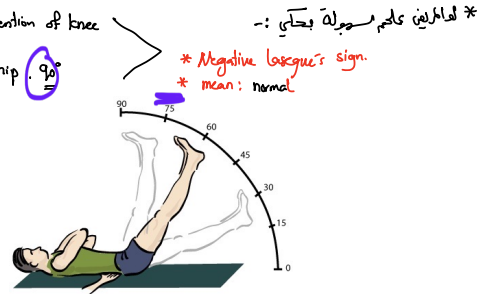
→ normal: relax + easy to make flexion.
 In neck Rigidity
 → abnormal: Resistant from Patient and hard to make complete flexion.
 ↓
due to pain

* straight leg raise test (Lasegue's sign)

→ Supine position → extension knee + hip then → ① maintenance Extension of knee with.
 ② Flexion to hip. 90°

→ Patient have numb/painful + resistant when flexion the hip in 45°
Positive Lasegue's sign in 45°

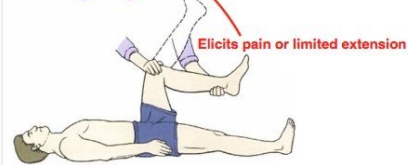
→ More severe presentation of disease → hip is rigid



* Kernig's sign :-

→ Supine patient → Passively make flexion hip + knee 90° then → Complete extension to knee.
 → If positive ⇒ Painful + limiting extension to knee.

Kernig Sign

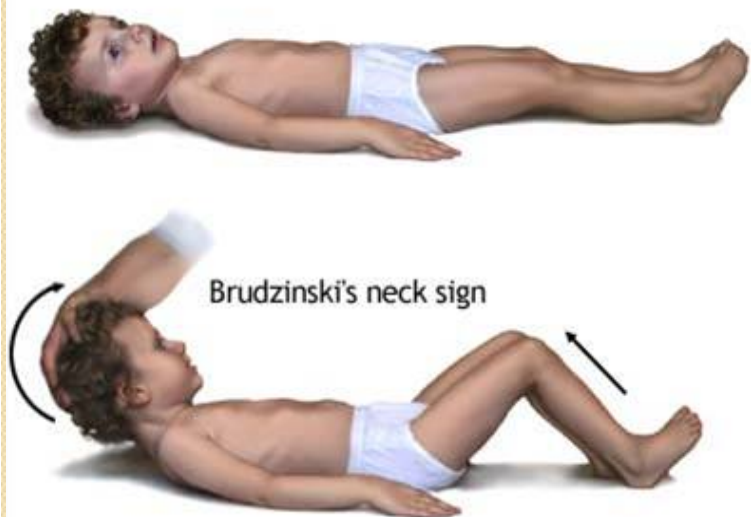
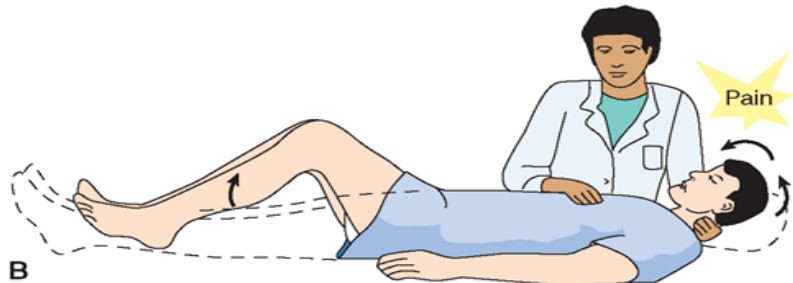


- 1 Knee is flexed to 90 degrees
- 2 Hip is flexed to 90 degrees
- 3 Extension of the knee is painful or limited in extension

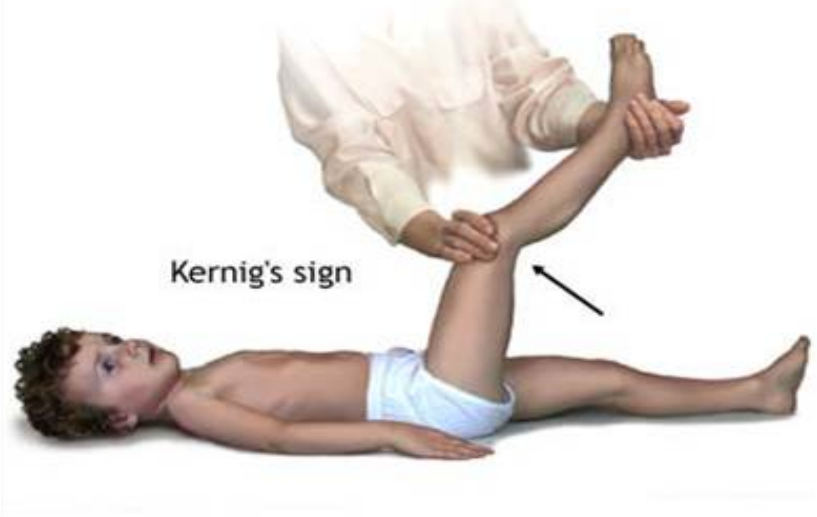
Brudzinski Sign



- 1 Passive flexion of neck



Brudzinski's neck sign



Kernig's sign

IV. Cranial Nerves Examination

· 12 - the 12th cranial ←

1. Olfactory Nerve Examination

Test substance should be:

• Familiar. → عيني متا حتى يحد عليه

• Non irritant. → irritation عت ناما يحل
to the trigeminal nerve

• Test each nostril alone.

• ← لازم يمش بكون عتقه مع الو

• Eyes should be closed.

??????????



لحظ النظر الصحيح انما العين مفتوحة للدم ← close eyes

Lesion of the Smell Pathway

1. ^{كيسي} Unilateral hyposmia or anosmia. ^{→ focal damage of olfactory bulb ⇒ tumors...}
2. Bilateral hyposmia or anosmia.
3. Parosmia (Smell hallucination)
4. Cacosmia (bad smell in chronic sinusitis)
5. Olfactory agnosia → ^{عدم التعرف بين الذوايح}

* Olfactory bulb tumor : meningioma ↔ focal damage to olfactory bulb or olfactory tract.

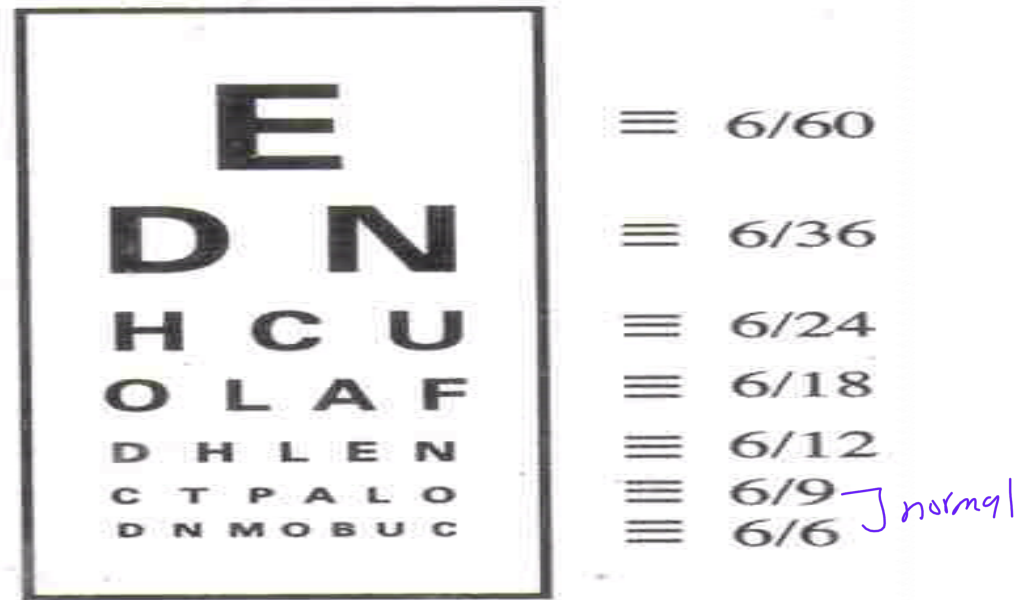
* Bilateral anosmia ⇒ Flu. Benign..

2. Optic Nerve Examination

a. Visual Acuity Examination

بِحُجَّةِ النَّظَرِ

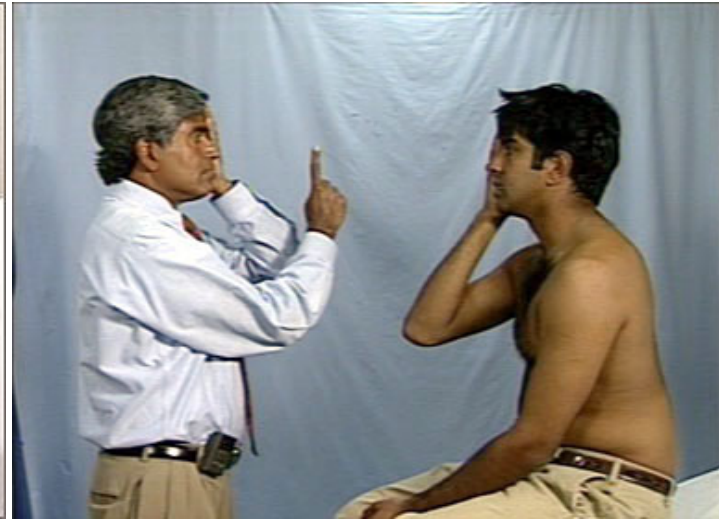
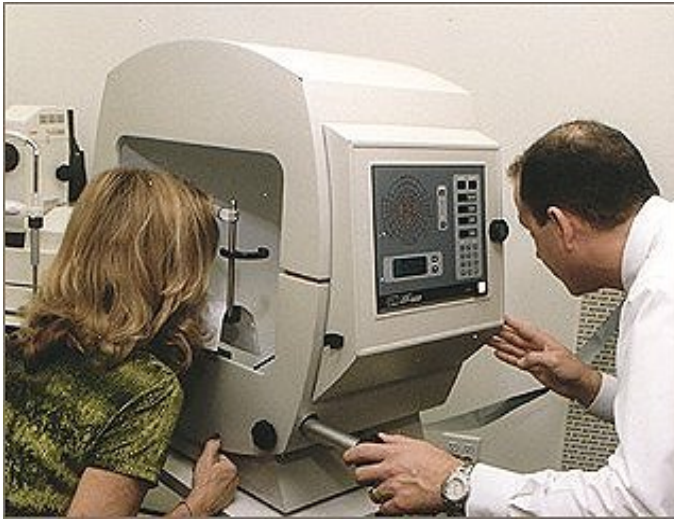
Acuity of vision: with a Snellen chart. The normal acuity is 6/6 to 6/9 in each eye.



Snellen's test types

b. Visual Field Examination

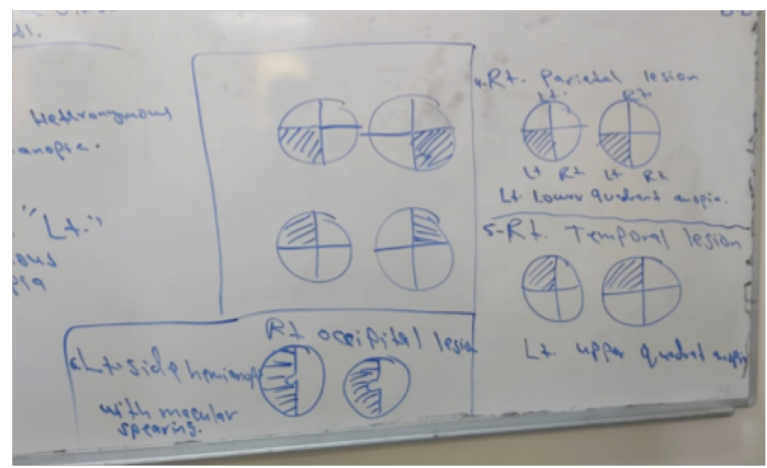
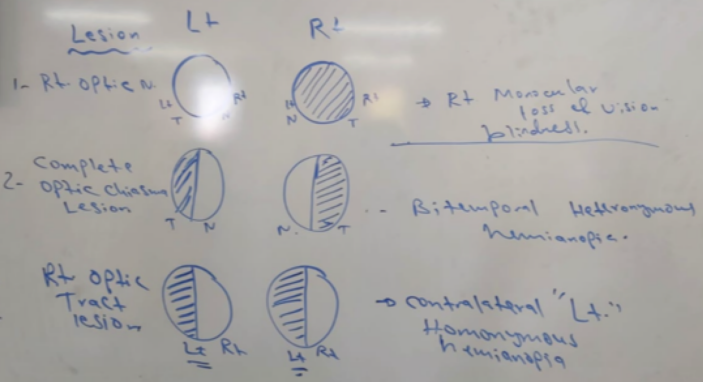
Checked by **confrontation**, if abnormal recorded with Goldman screen "**Perimeter**".



تخطيط المجال الإبصار - **Perimeter**

Confrontation Test

* Optic chiasma lesion → Bitemporal hemianopia.



Optic T. lesion → associated with impaired light R.

L.C.B. → intact light R.

I. Capsule → intact Light R.

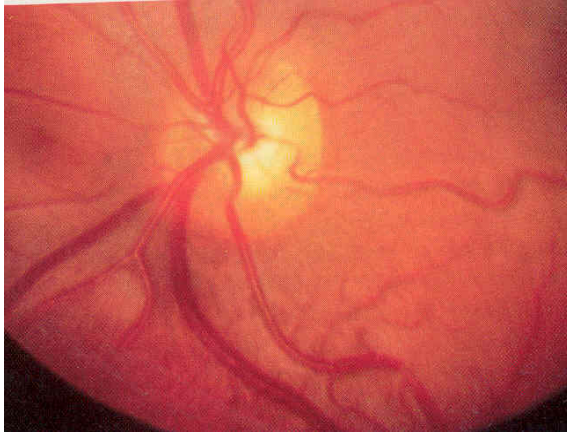
associated with contralateral hemiparesis, homihypoesthesia, VII & XII, LMNL.

3- I. Capsule, L.C.B.

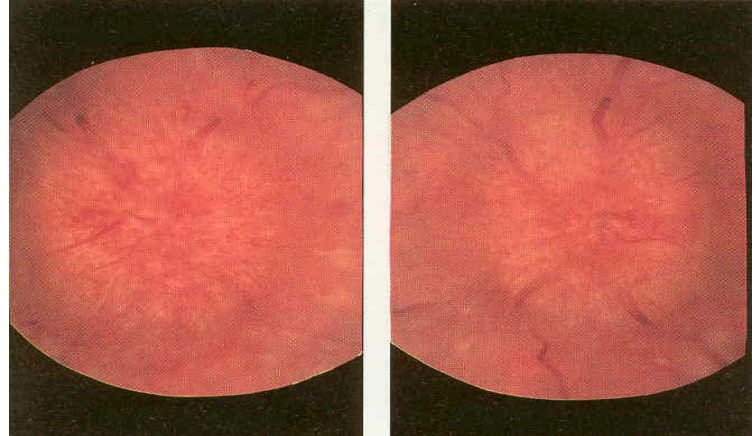
Optic Tract lesion

Lt Rt

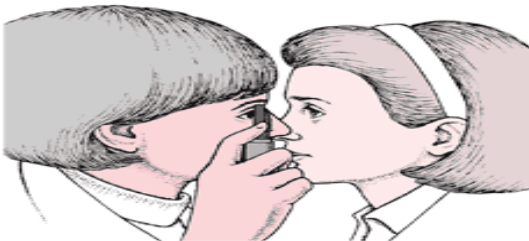
c. Fundus Examination (Ophthalmoscopy)



Normal optic nerve disc



Papilledema *due to increase intracranial pressure.*



Ophthalmoscopic Examination



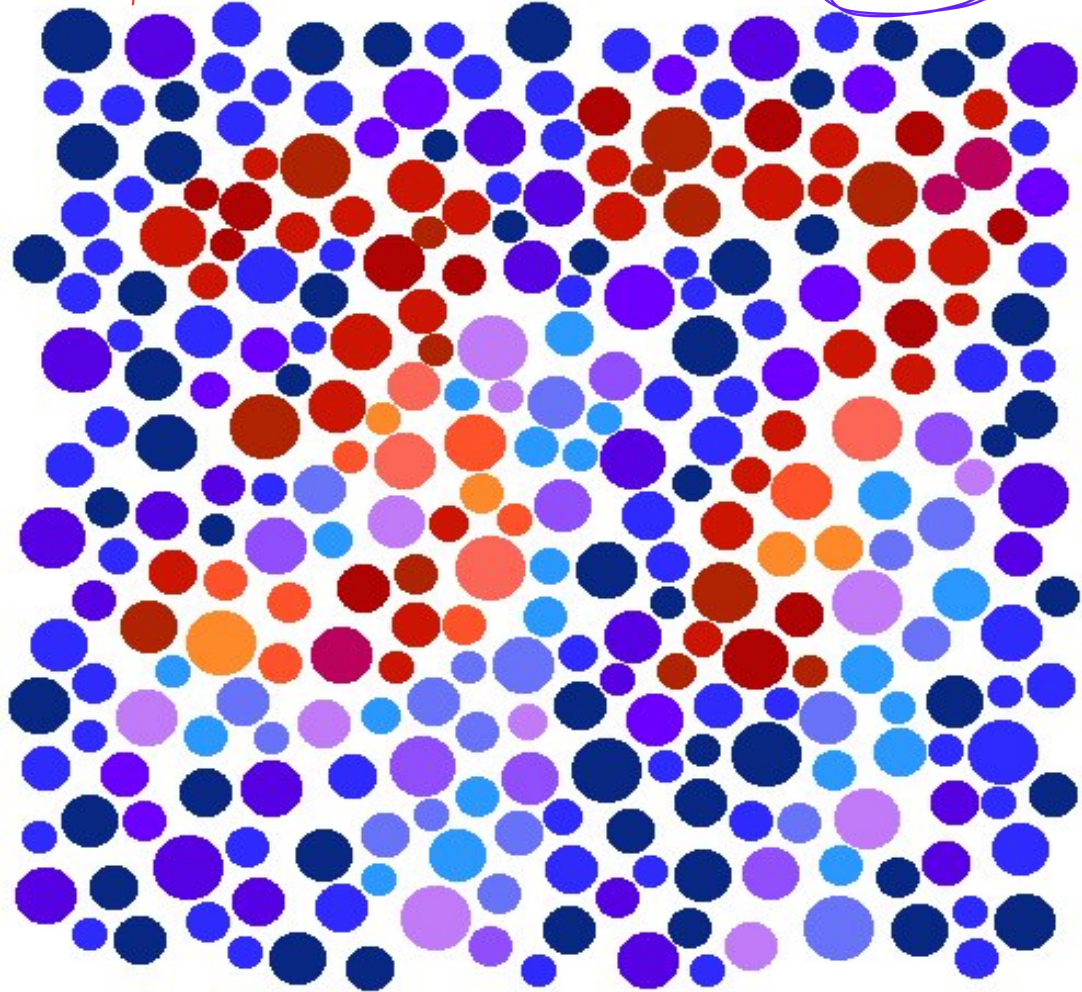
مكتوب 37 بالون الأحمر

d. Color Examination

loss of color vision

⇔ optic neuritis

* مرض عصب



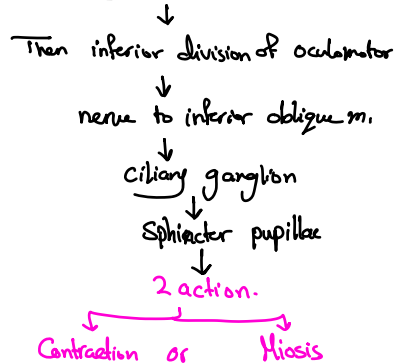
* With Optic nerve must examination

Light Reflex.

* afferent / optic nerve

* efferent / oculomotor nerve.

* nucleus / Edinger Westphal nuclei by Pretectal nuclei in both side



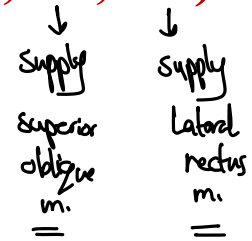
* Optic nerve response to afferent back of light reflex

* Direct light reflex → eye, now size, iris, is
Miosis size, iris,

* indirect light reflex → left eye is light Miosis, eye, size, iris, is

↳ due to // Edinger Westphal nuclei supply from 2 nerves (both side)

3, 4, 6. The Ocular Nerves (III, IV, VI) Examination



دائماً تبدأ فيها مع فحص motor nerves

A. Inspection

1. Pupils:

to light reflex.

* Anisocoria → Asymmetry of pupil size. Normal pupil is RRR (Regular, Round, Reactive to light and accommodation), Miosis, Mydriasis.

unilateral
Bilateral

2. Ptosis:

سقوط الجفون

- Complete. 3rd nerve palsy (oculomotor nerve lesion).
- Partial. horner syndrom.

3. Squint:

- طالعة لرا
- راخلة لجا

Divergent

Convergent

لأن lateral rectus يتجه لرا
Oculomotor n. lesion → defect in Medial rectus
abducent n. palsy due to defect in lateral rectus.
له مشكل في قارة تنحرف لرا
Medial rectus يتجه لجا.

B. Examine for extraocular movements:

H-shape

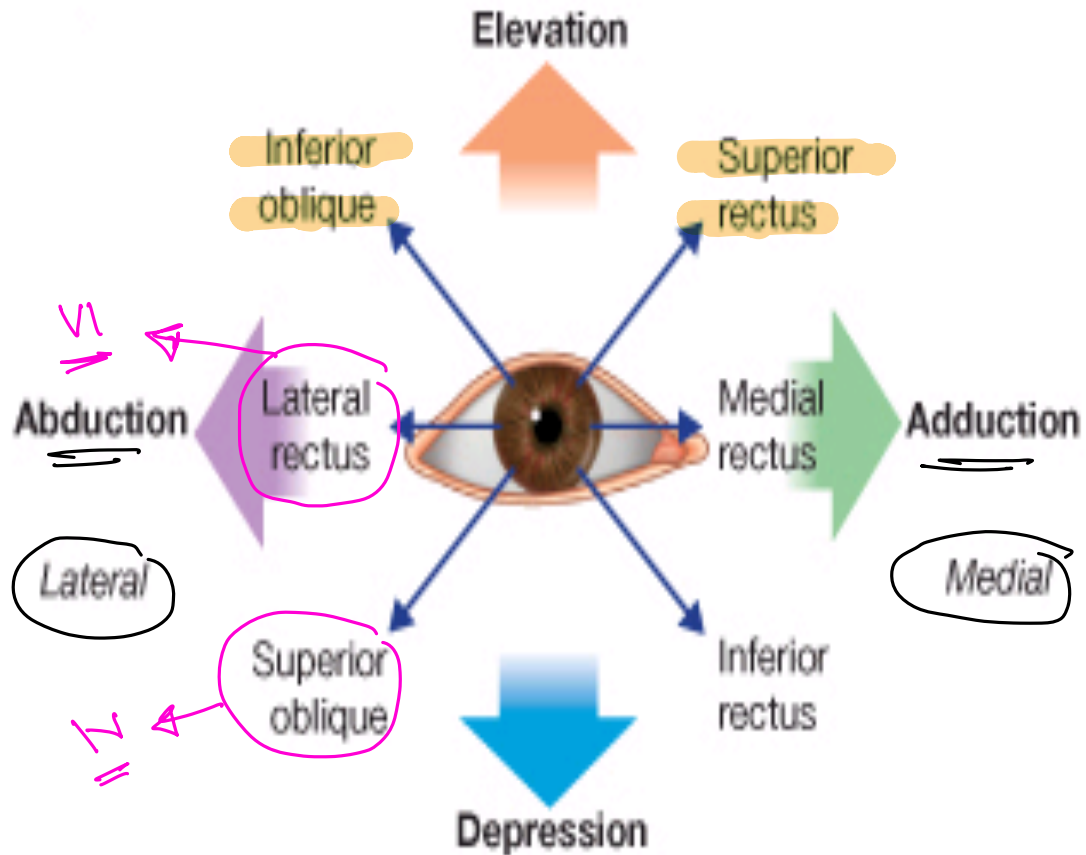
1. **Test for abducent nerve** (lateral rectus muscle): by looking lateral (external).
2. **Test for trochlear nerve** (superior oblique muscle): by looking by looking downward and lateral.
3. **Test for oculomotor nerve** by looking in all other direction.

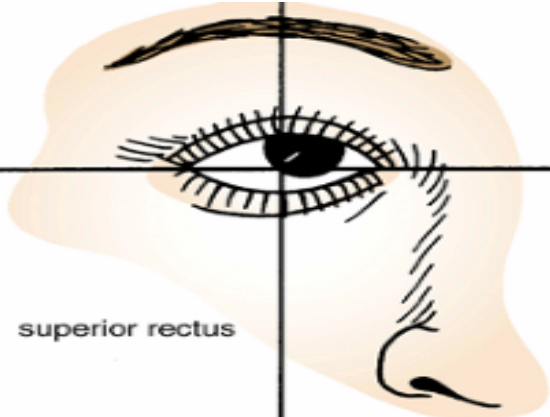
C. Nystagmus.

D. Light Reflex.

E. Accommodation Reflex.

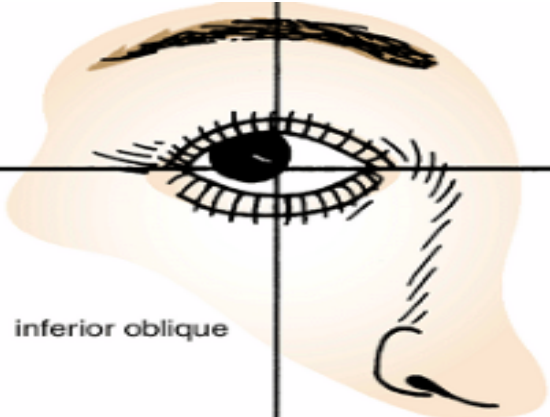
* **ferlia nerve**:- contraction of both medial recti muscle...
→ in central group...





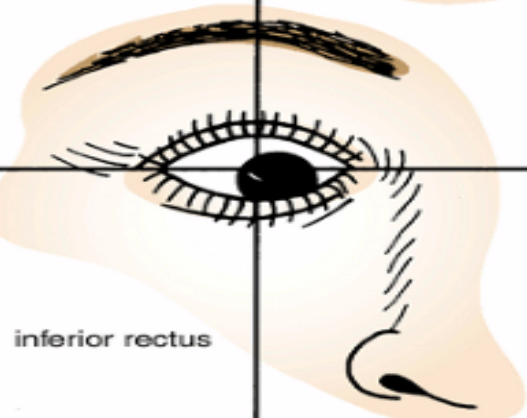
superior rectus

This diagram shows a lateral view of a human head with the right eye looking straight ahead. A horizontal line passes through the center of the eye. The superior rectus muscle is highlighted with a thick black line, indicating its contraction to move the eye upwards.



inferior oblique

This diagram shows a lateral view of a human head with the right eye looking straight ahead. A horizontal line passes through the center of the eye. The inferior oblique muscle is highlighted with a thick black line, indicating its contraction to move the eye downwards and laterally.



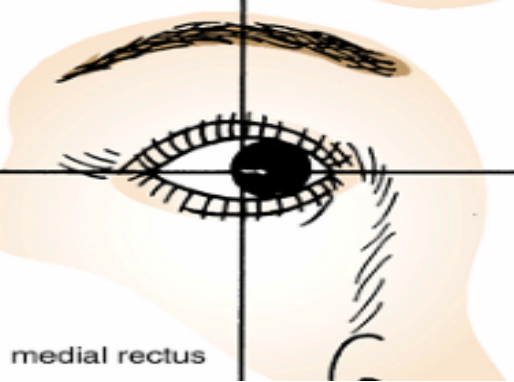
inferior rectus

This diagram shows a lateral view of a human head with the right eye looking straight ahead. A horizontal line passes through the center of the eye. The inferior rectus muscle is highlighted with a thick black line, indicating its contraction to move the eye downwards.



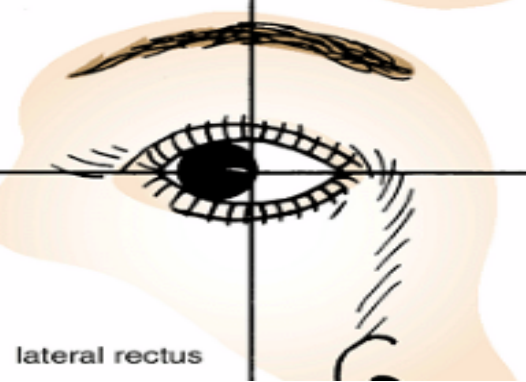
superior oblique

This diagram shows a lateral view of a human head with the right eye looking straight ahead. A horizontal line passes through the center of the eye. The superior oblique muscle is highlighted with a thick black line, indicating its contraction to move the eye downwards and medially.



medial rectus

This diagram shows a lateral view of a human head with the right eye looking straight ahead. A horizontal line passes through the center of the eye. The medial rectus muscle is highlighted with a thick black line, indicating its contraction to move the eye medially (towards the nose).



lateral rectus

This diagram shows a lateral view of a human head with the right eye looking straight ahead. A horizontal line passes through the center of the eye. The lateral rectus muscle is highlighted with a thick black line, indicating its contraction to move the eye laterally (away from the nose).

Cranial nerve palsy

Exam findings – evidence of incomitance

Right 3rd nerve palsy

Divergent
+ ptosis

*No adduction-

* mydriasis...

Direction of gaze



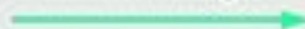
Smaller angle of horizontal squint

Primary position



Right eye turns downwards and outwards

Direction of gaze



Unable to adduct right eye
Larger angle of squint
Double vision further apart

Right 4th nerve palsy

Double vision → لا يرى
يطالع في الأرض مثلًا صراط
الرج



No obvious squint



Right eye turns upwards and outwards



Right eye elevates more as it moves medially
Double vision further apart

Right 6th nerve palsy

* lateral rectus in left normal

* Medial rectus in left normal

unable to make abduction in Rt eye.



Unable to adduct right eye
Larger angle of squint
Double vision further apart



Right eye turns medially



Able to adduct right eye
No obvious squint

Light Reflex

- ✓ **Direct Light Reflex:** Light in one eye leads to constriction (miosis) of the same eye
- ✓ **Indirect Light Reflex :** Light in one eye leads to constriction (miosis) of the opposite eye



Accommodation and Convergence Reflex

Patient is asked to follow your finger from a far point to a near one:

- Convergence (contraction of both medial recti muscle).
- Miosis (contraction of constrictor pupillae muscle).



Lesion of the Oculomotor Nerve

- **Ptosis:** paresis of the levator palpebrae superioris muscle.
- **Squint:** divergent paralytic.
- **Diplopia:** occurs only on elevation of eye lid.
- **Mydriasis:** dilated fixed pupil. (Parasympathetic effect)
- **Loss of light and accommodation reflexes.**

Causes of the oculomotor nerve lesion:

The first symptom is mydriasis.

- ① Aneurysm of the posterior communicating artery.
 (compress to the root of ocul. M. N.)
- ② Infarction of the third cranial nerve: HTN, DM.
 (first symptom: squint - ptosis, intact pupils, neuropathy)
- ③ Midbrain tumor, infarction or hemorrhage: Weber syndrome.
 (Brain stroke)
- ④ Cavernous sinus thrombosis.
 (Complete painful ophthalmoplegia. (3, 4, 6 lesion))

Mydriasis → Compression.

hemioplegia ١١ Brain stem ١١ ١١

كيف بي انزل اذا سبب oculomotor lesion
Q: A neuregism or ischemic or DM →

→ look to pupil
→ Mydriasis → Compression
→ reactive pupil → DM neuropathy.

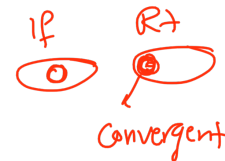


Lesion of the Trochlear Nerve

1. Diplopia on looking down and medial. ^[lateral / out]
2. Limitation of movement during examination for eye movement down and laterally.

Lesion of the Abducent Nerve

1. Diplopia on looking out wards. ^{lateral rectus M. 11 axis 4/8}
 2. Limitation during examination of eye movement in the outward direction. ^{abduct the eye laterally.}
- ③ Convergent paralytic squint.



لو بطلع على الـ left * left abducent nerve defect

abduction to the eye laterally. حن قارة تحن



لو بطلع على الـ right * Rt abducent n. defect

لا يـ الـ الـ الـ الـ الـ direction حان الـ الـ الـ الـ الـ

5. Trigeminal Nerve Examination

Sensory part: test for pain and touch sensation. Compare

➤ both sides of face, inner and outer part, each division of trigeminal nerve. Examination of terminal branches of the trigeminal nerve

↳ ophthalmic & maxillary
mandibular

➤ **Superficial Reflexes:** palatal and corneal “conjunctival” reflexes.

➤ **Deep reflex:** jaw reflex (see reflexes examination).

why?
due to see if have
unilateral fascial
hyposthesia

* Corneal reflex :-

- * A.F.F / ophthalmic branch of Trigeminal.
- * E.F.F / Facial.

* Palatal reflex :-

- * A.F.F / Maxillary + IX Glossopharyngeal.
- * E.F.F / X Vagus + XI Accessory.

* Jaw reflex :- (deep reflex)

- * A.F.F / Mandibular
- * E.F.F / Mandibular.

*Jaw reflex.



*Corneal reflex





Motor part:

(inspection)



Observe the skin over the temporal and masseter

muscles: asymmetry suggests muscle atrophy.



Ask the patient to clench his or her jaws: Palpate the masseter and temporal muscles for asymmetry of volume and for tone.

•

Observe for deviation of the tip of the mandible as the jaws are opened: Deviation is to the weak side.

•

Ask the patient to move the jaw from side to side against the resistance of your palm: The paralyzed side will not move laterally.

Lesions of Trigeminal Nerve

1. Sensory affection:

a. Trigeminal neuralgia.

Primary → > 40 y
Secondary → in young.

b. Loss of sensation over the face.

2. Motor affection: weakness of the mastication muscles and the jaw is deviated to side of lesion.



* Herpes Zoster → lesion in where site of herpes Zoster.
 = Cervical SC lesion ← upper limb ; G1/G2 ←
 Trigeminal lesion ← Trigeminal ←

7. Facial Nerve Examination

Trigeminal mainly motor.

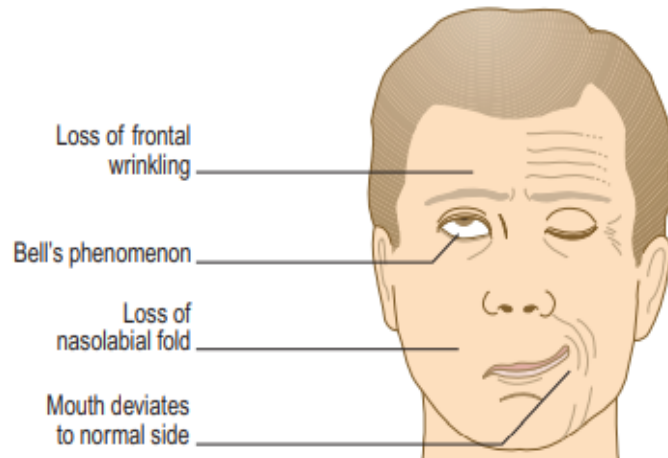
➤ **Motor part:** muscle of expression of the face.

Observe patient as he talk and smiles, watching for:

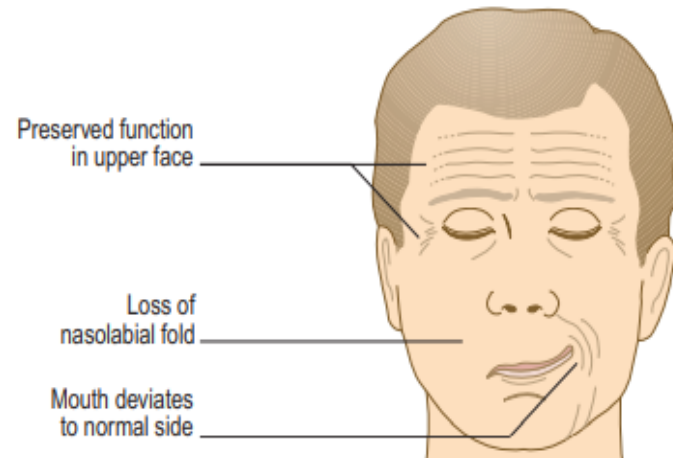
- * Eye closure. Bell's phenomena may be seen.
- * Absent nasolabial fold and dropping (asymmetrical) of mouth angle.

Patient then instructed to:

- Wrinkle forehead by looking upwards.
 - Close eyes while examiner attempts to open them (orbicularis oculi muscle).
 - Purse lips while examiner presses cheeks (buccinator muscle)
 - Show teeth (orbicularis oris muscle).
- **Sensory part “chorda tympani”:** examine of taste over anterior 2/3 of tongue (applying a drop of sweat or salty substance over each side of the tongue separately).
- **Reflexes:** corneal and conjunctival reflexes.



* Right-sided lower motor neurone lesion



* Right-sided upper motor neurone lesion

A**B****C**

Bell's phenomenon

* left lower motor neuron
lesion



8. Vestibulo-cochlear Nerve Examination

a. Examination of the Cochlear Component of VIII Nerve

- **Test by whispering numbers into one ear.**
- **Audiometry.**
- **Weber's test:** place tuning fork in middle of the head. Normally vibration are heard in the middle of the head.
- **Rinne's test:** using the vibration tuning fork compare air conduction (in front of ear) with bone conduction (on mastoid process).

	Weber's Test	Rinne's Test
Normal	Vibration are heard in the <u>middle</u> of the head	Air conduction is better than bone conduction
Conductive deafness	Vibration are heard in <u>affected ear</u>	Bone is better than air
Nerve deafness	Vibration are heard in <u>normal ear</u>	Both air and bone are diminished

Weber test



Normal

Conductive loss, same ear
or
Sensorineural loss, opposite ear

Rinne test

Air conduction (AC)

Bone conduction (BC)

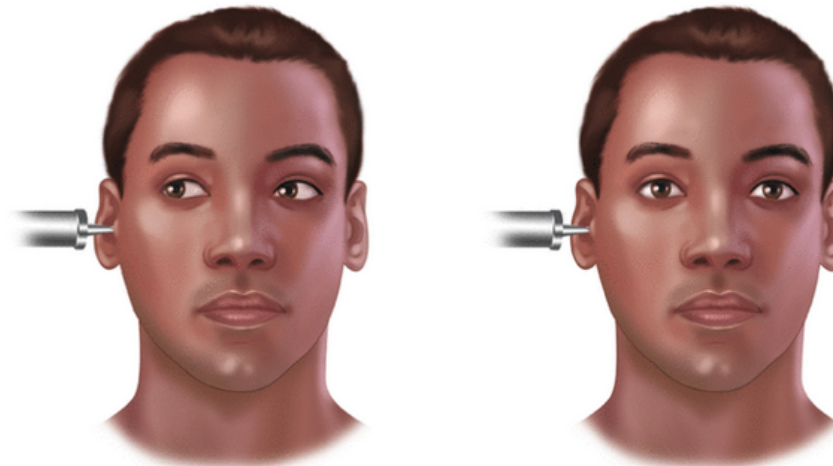
AC > BC = Normal

BC > AC = Conductive loss

b. Examination of the Vestibular Component of VIII Nerve

- **Oculovestibular reflex (caloric testing):** nystagmus towards the irrigated ear is seen when ice-cold water is run into the external auditory meatus . This indicates an intact vestibular nerve and brainstem. The test is used in the diagnosis of brainstem death.

- **Nystagmus**



Lesion of the Vestibulo-Cochlear Nerve

A. Lesion of the Cochlear Division:

1. Tinnitus in irritative lesion.
2. Deafness in destructive lesion.

B. Lesion of the Vestibular Division:

3. Vertigo.
4. Spontaneous nystagmus.
5. Ipsilateral incoordination.

9, 10. Examination of the Glossopharyngeal, Vagus and Cranial Accessory Nerves

➤ **Examine the uvula:**

- By inspection normally central
- Ask the patient to say “Ah”. In paralysis it is deviated to opposite side of lesion

➤ **Palatal reflex:** “**afferent-** V₂ & IX nerves, **efferent-** X nerve”
stimulation of soft palate leads to its elevation

➤ **Pharyngeal reflex :** “**afferent-** IX nerve, **efferent-** X nerve”
stimulation of posterior pharyngeal wall leads to local contraction and gag reflex

➤ **Isolated X nerve lesion** occur in cases of thyroid gland surgery

➤ Speech examination.

➤ Swallowing examination.



* lesion in Rt side → uvula اَلْأُفْلَاجَة

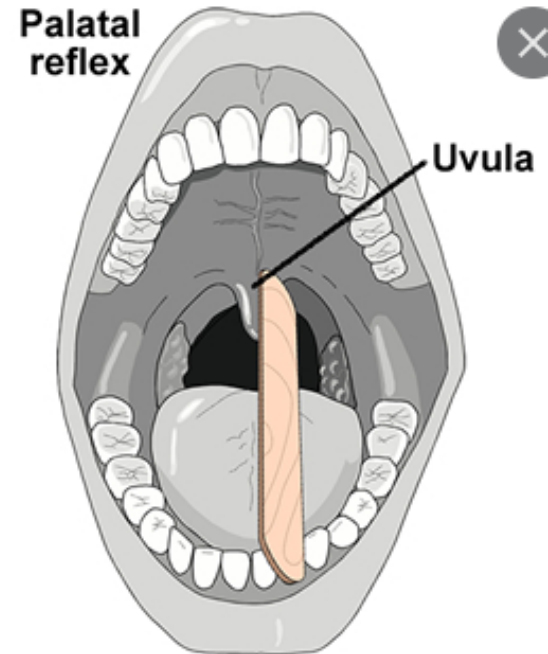


↓
normal

Examination of the Uvula



Pharyngeal Reflex



Palatal Reflex

Lesion of the Glossopharyngeal Nerve

1. Loss of taste and general sensation from the posterior 1/3 of the tongue.
2. Loss of sensation in the pharynx
3. Ipsilateral loss of pharyngeal reflex .
4. Some pharyngeal weakness (dysphagia).

Lesion of the Vagus & Cranial Accessory Nerves

1. Palatal paralysis:

- a. Nasal tone of speech.
- b. Drop of palatal arch on paralyzed side and shift uvula to opposite side. oropharyngeal dysphagia → neurogenic default swallowing liquid
- c. Fluid regurge.
- d. Loss of palatal reflexes.

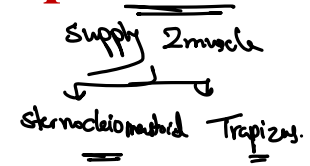
2. Pharyngeal paralysis:

- a. Neurogenic Dysphagia.
- b. Loss of pharyngeal reflex.

3. Laryngeal paralysis: hoarseness of the voice.

Others: tachycardia and constipation.

11. Lesion and Examination of the Spinal Accessory Nerve



Lesion:

- Ipsilateral paralysis of sternocleidomastoid muscle (rotation of the head and neck to the same side)
- Ipsilateral paralysis of trapezius muscle (inability to shoulder shrugging)

Examination:

- **Sternocleidomastoid muscle:** ask the patient to turn his chin against resistance
- **Trapezius muscle:** elevation (shrug) of shoulders against resistance



* Rt sternocleidomastoid m.



* Trapezius m.

12. Hypoglossal Nerve Examination

➤ Inspection tongue for

- Deviation

- Wasting

- Fasciculation

- Abnormal movement: in chorea

- Dimpling on tapping: in myotonia → Contraction with delay
relaxation

- **Others** : ulcers (Behcet's disease), red glazed (in vitamin deficiency)

➤ **Power of muscles**: ask the patient to push the inner side of cheek by his tongue

* Dimpling on tapping (Myotonic).
↑



Lesion of the Hypoglossal Nerve

UMNL:

- **Unilateral lesion:** deviation of the tongue to opposite side of lesion (corticospinal lesion): in cerebral stroke or tumor

- **Bilateral lesion:** inability to protrude tongue, in pseudobulbar syndrome

LMNL: in bulbar syndrome, syringobulbia, medullary stroke

- **Unilateral lesion:** deviation of the tongue to same side of lesion (hypoglossal nucleus or nerve)

- **Bilateral lesion:** inability to protrude tongue

- In both LMNL presented muscle wasting and fasciculation

