Nervous System

Cranial Nerves Examination

I **OLFACTORY** • **Fiber:** Sensory • **Function:** Smell	Test each nostril separately with a familiar smells, such as coffee and vanilla. *Pungent"strong" substances such as ammonia should not be used
II **OPTIC** • **Fiber:** Sensory • **Function:** Vision	a) **Visual acuity:** • The patient wearing his/her glasses. • Using Snellen's chart[h] . • Each eye is tested separately, while a small card covers the other. • Requires the patient to be 6 meters from the chart. <u>A patient who is unable to read:</u> • Move closer (3m) • If still unable: move closer again (1m) • If still unable: ask Pt to count fingers • If still unable: detect moving of hand • If still unable: test for light perception with a torch. **b) Visual fields:** • Remove a patient's glasses and use a pin • Your head should be level with the patient's head. • Test each eye separately. • Hold the pin at arm's length. The pin should be brought into the visual field from the **four main directions**, towards the center of the field of vision. If the pin is difficult to see, Wiggle your fingers and ask the patient to say 'yes' when movement of the fingers is first seen. **c) Fundoscopy:** Use your right eye to look in the patient's right eye, and vice versa. This prevents contact between the noses of the patient and the examiner.Begin with the ophthalmoscope; look first at the cornea and iris, and then at the lens. Next note the color of the optic disc. Normally, it is a rich yellow color. Look especially for diabetic and hypertensive changes.

III

OCULOMOTOR

- **Fiber:** motor
- **Function:** all the ocular muscles except SO4 and LR6
- **Lesions:**

✓ Complete ptosis.
✓ Divergent strabismus (eye 'down and out")
✓ Dilated pupil that is unreactive to light.
✓ Unreactive to accommodation

The third nerve supplies all the ocular muscles except the superior oblique (fourth nerve) and the lateral rectus (sixth nerve) muscles

Assess by testing the pupils and movements of the eye.

❖ The pupils

Examine the pupils for size, shape, equality and regularity.Note if there is any ptosis.

1. **Light reflex**:Using a torch, shine the light from the side into one of the pupils. Inspect both pupils and repeat this procedure on the other eye.
   Direct response to light: the pupil into which the light is shone constricts
   Indirect response to light "consensual*":* the other pupil constricts because they share the same nucleus.

2. **Marcus Gunn[1] pupillary sign "*afferent pupillary defect*":**Move the torch in an arc from pupil to pupil; the affected pupil will dilate paradoxically after a short time when the torch is moved from the normal eye to the abnormal eye.

3. **Accommodation test:**Ask the patient to look into the distance and then to focus his eyes on an object such as a finger or pin, brought to a point about 30 centimeters in front of the nose. There is normally constriction of both pupils.

IV

TROCHLEAR

- **Fiber**: motor
- **Function**: supply superior oblique
- **Lesion:**

✓ Paralysis and weakness of downward and outward eye movement

VI

ABDUCENS

- **Fiber**: motor
- **Function**: supply Lateral Rectus.
- **Lesion:**
  - ✓ Failure of lateral movement
  - ✓ Convergent strabismus
  - ✓ Diplopia

❖ Eye movements

Assess **eye movement, diplopia and nystagmus."Dancing eye"**

1. **Eye movement:**

-Ask the patient to look laterally right and left, then up and down

-Following the finger without moving the head: test 6 point in H shape

-Move your finger in X shape to check for superior and inferior oblique muscle.

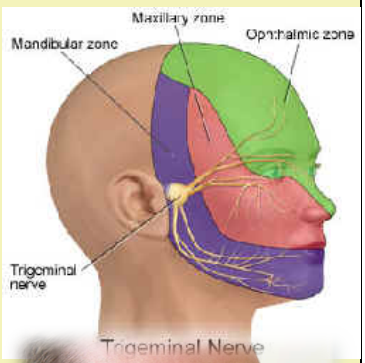
2. **Diplopia:**

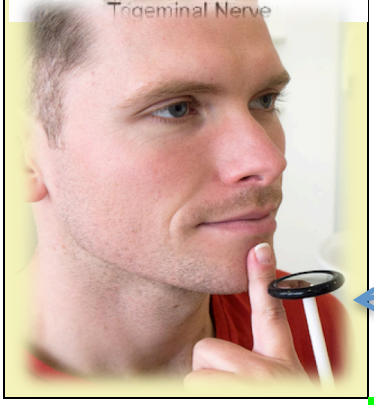
Ask the patient whether the two images lie side by side or one above the other. If they are side by side, only the lateral or medial recti can be responsible. If they lie one above the other, then either of the obliques or the superior or inferior recti may be involved.

V

TRIGEMINAL

- **Fiber:** Motor and sensory
- **Function:** Sensation over the face; muscles of mastication
- **Branches:**
  - V1 ophthalmic
  - V2 maxillary
  - V3 mandibular





Pain due to sinusitis, dental abscess and herpes zoster may be felt in a trigeminal nerve distribution *"trigeminal neuralgia "*. Muscle weakness of the trigeminal may lead the patient to complain of difficulty eating or talking

1. Corneal reflex: Lightly touch the cornea with a wisp of cotton brought to the eye from the side. Reflex blinking "shut and open the eyes quickly" of both eyes is a normal response.
   - *Afferent:* ophthalmic division of 5th nerve
   - *Efferent:* from facial nerve innervation.

2. Test facial sensation:in the three divisions of the nerve, comparing each side with the other.

- With the patient's eyes closed, use a new piece of cotton wool to test light touch in the same way. Instruct the patient to say 'yes' each time the touch is felt
- Use sharp end of pin for pain sensation, apply the pin lightly to the skin and ask to say yes each time he felt it.

3. Examine the motor division:

- First inspect for any wasting of the temporal and masseter muscles.
- Ask the patient to clench the teeth, then palpate for contraction of the masseter above the mandible.
- Ask the patient to bite forcefully onto a wooden tongue depressor with the molar teeth, and then try to withdraw it. Normal strength will prevent this.
- Ask patient to open his mouth while you attempt to force it shut. A unilateral motor lesion causes the jaw to deviate towards the weak (affected) side.
- Jaw jerk or masseter reflex: ask the patient to open his mouth, place your finger on the tip of the jaw and tap it lightly with a tendon hammer. Normally, there is a slight closure of the mouth or no reaction at all.

VII

FACIAL

- **Fiber:**Motor+ Sensory
- **Function:**

✓ Muscles of facial expression
✓ Stapedius muscle
✓ Taste sensation from Anterior two-thirds of tongue

(1) **Frontalis muscle**

(2) **Buccinators**

(3) **Orbicularis oculi**

❖ Start Examination with Inspection:if there is any

- Difficulty with speaking and keeping liquids in the mouth.
- Facial asymmetry
- Dryness of the eyes or the mouth
- Smoothing of the wrinkled forehead and the nasolabial fold.
- Inability to close the eye
- Upward rotation of the eyeball on trying to close the affected eye "Bell's Phenomenon"(comes with Bell's Palsy)
- Paralysis of the stapedius muscle can cause *hyperacusis*or intolerance of loud sounds (changes in hearing)
- Impairment of taste on the anterior 2/3 of the tongue.

❖ Test the muscle power:

1. **Frontalis muscle:**Ask the patient to look up so as to wrinkle the forehead
2. **Buccinators**: Ask the patient to puff out the cheeks
3. **Orbicularis oculi**:Ask the patient to close his eyes tightly then try to force open each eye.
4. **Orbicularis oris" kissing muscle":**Ask the patient to smile and compare the nasolabial groove.
5. Examining for taste on the anterior two-thirds of the tongue is not usually required. Ask the patient to protrude the tongue: (sweet, sour, saline and bitter) are placed one at a time on each side of the tongue. The patient indicates the taste by pointing to a card with the various tastes listed on it.

Bell's Palsy:common, acute, isolated facial nerve paralysis believed to be due to **Viral**

often Herpes Simplex) infection that result in swelling of the nerve within the facial canal in

the petrous temporal bone. It is more common

in **Diabetics patients and pregnant**

VIII

ACOUSTIC

(vestibulecochlear)

Test hearing:
Useful Video

- **Fiber**: Sensory
- **Function:** Balance and hearing

- **Causes of deafness:**
  - ✓ Tumor
  - ✓ Trauma
  - ✓ Acoustic neuroma
  - ✓ Exposure to noise
  - ✓ Degeneration
  - ✓ Toxicity
  - ✓ Infection

❖ History:

- Loss of hearing noticed by the patient or by his relatives.
- Unilateral hearing loss is more likely to be due to a nerve lesion.
- Ask if it is gradual or sudden onset
- Ask whether there is a family history of deafness and whether the patient has had exposure to loud noise

❖ Examination:

- If the patient is wearing a hearing aid remove it.
- Look for scars behind the ears.
- Pull on the pinna gently and Feel for nodes
- Inspect the patient's external auditory meatus by otoscope. The normal eardrum (tympanic membrane) is grey and concave.
- Look for wax or other obstructions, and inspect the eardrum for inflammation or perforation

A) Stand behind the patient, cover the ear not being tested with your hand and whisper some number (68,100), then ask him if he heard it or not.

B) **Rinne'stest:** Vibrating tuning fork is placed on the mastoid process, behindthe ear, and when the sound is no longer heardit is placed in line with the external meatus.

- Nerve deafness: Bone conduction is better than air conduction.
- Conductive deafness: both bone and air conductions are reduced.

C) **Weber's test:** tuning fork is positioned on the center of the forehead. "Normally the sound is heard here"

- Nerve deafness: sound heard better in the normal ear.
- Conductive deafness: sound louder in the abnormal ear

Test Vestibular function: patient complains of vertigo

A) **Hallpikez manoeuvre:** Explain the procedure to the patient. Have the patient sit up, then grasp his head between your hands and get him to lie back quickly and head turned to one side. With the eyes open. If the test is positive, after a short period vertigo and nystagmus towards the affected ear occur for several seconds.

IX

GLOSSOPHARYNGEAL

- **Fiber**: Motor sensory and secretory
- **Function:**
  - ✓ Sensation pharynx, ear, post. 1/3 tongue.
  - ✓ Secretory fibres to parotid.
  - ✓ Motor fibres to stylopharyngeus
- **Lesion**:
  - ✓ No definite symptoms
  - ✓ Difficulty in swallowing dry foods

1.Ask patient to open his mouth and inspect the palate with a torch.

2.Note any displacement of the uvula.

3.Then ask the patient to say 'Ah!'.Normally, the posterior edge of the soft palate rises symmetrically. Note that the soft palate is pulled to the normal side.

4.Gag reflex:

- By depressing the patient's tongue and Touch the back of the pharynx or palate on each side with a spatula.
- Normally, the reflex is contraction of the soft palate.
- The patient is asked if he felt the touch each time.
- Compare both sides
  - *Afferent:*Glossopharyngeal 9th "sensory"
  - *Efferent:Vagus* 10th "motor"

5.Ask the patient to speak to assess hoarseness (may occur with laryngeal nerve lesion), and then to cough

6. Ask patient to swallow a small amount of water and watch for regurgitation into the nose, or coughing.

7. Test taste on the posterior third of the tongue (9th nerve). Not necessary routinely

❖ *Glossopharyngeal neuralgia:*
Sudden shooting pains that radiate from one side of the throat to the ear.

X

VAGUS

Fiber: Motor&sensory
Function: Sensation of pharynx and larynx

Muscles of pharynx, larynx and palate

Lesion:"unilateral" Difficulty initiating the swallowing of solids and liquids. Hoarseness.

XI **ACCESSORY** • **Fiber:** Motor • **Function:** ✓ Trapezius and sternocleidomastoid muscles	❖ Trapezius muscles: • Ask the patient to shrug the shoulders. Feel the bulk of the muscles and attempt to push the shoulders down. • Compare the power on each side. ❖ Sternocleidomastoid: • Ask Patient to turn the head to the side against resistance. • Compare the power on each side
XII **HYPOGLOSSAL** • **Fiber:** Motor • **Function:** Muscle of the tongue	❖ History: Difficulty in swallowing and a sensation of choking if the tongue slips back into the throat. ❖ Examination: 1. Inspect the tongue at rest on the floor of the mouth. 2. Look for wasting and fasciculations (fine, irregular, non-rhythmical muscle contractions. 3. Ask the patient to stick out the tongue, which may deviate towards the weaker (affected) side.

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