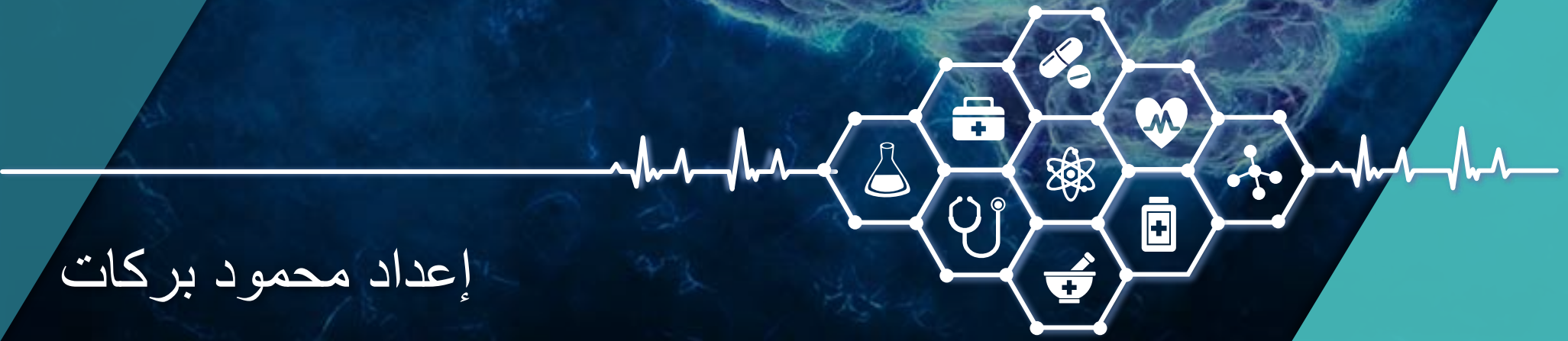
Neurology Detailed Dossier

2023 edition



إعداد محمود بركات

ملاحظات

- شامل لأسئلة السنوات حتى نهاية 2022
- شامل لأسئلة الفاينل 2018-2202 لأنه الدكتور مرات بيجيب منهم بالميني أوسكي
- مصادر الملف: كتاب "lecture notes"، كتاب "first aid"، موقع "Amboss"
- شامل للمواضيع الي بيجي عليها أسئلة في الميني وبعض المواضيع الي تشرح وما بنسأل عنها وليس كلها (ضروري ترجعوا تشوفوا السمينارات الي مش مكتوب عنها على الفاينل بيجي منها)
- الملف مرتب حسب المواضيع تحت كل موضوع فيه ملاحظات الدكاترة وأسئلة السنوات
- أسئلة السنوات المكررة تم جمعها بسؤال واحد ووضع عدد مرات تكرار السؤال في هامش أعلى الصفحة من جهة اليمين أو على يسار السؤال
- أي كتابة بصندوق يعتبر هامش للملاحظات
- معاني الألوان: المهم، ملاحظات أو إضافات أو أسئلة من عندي، معلومات إضافية
- الكلام الي بلغتكم فيه بدوسيه الأشعة قائم برضو على هذا الملف وأي الملفات ثانية اشتغلتها ويا ريت بس هبل

Last update: 24/6/2023

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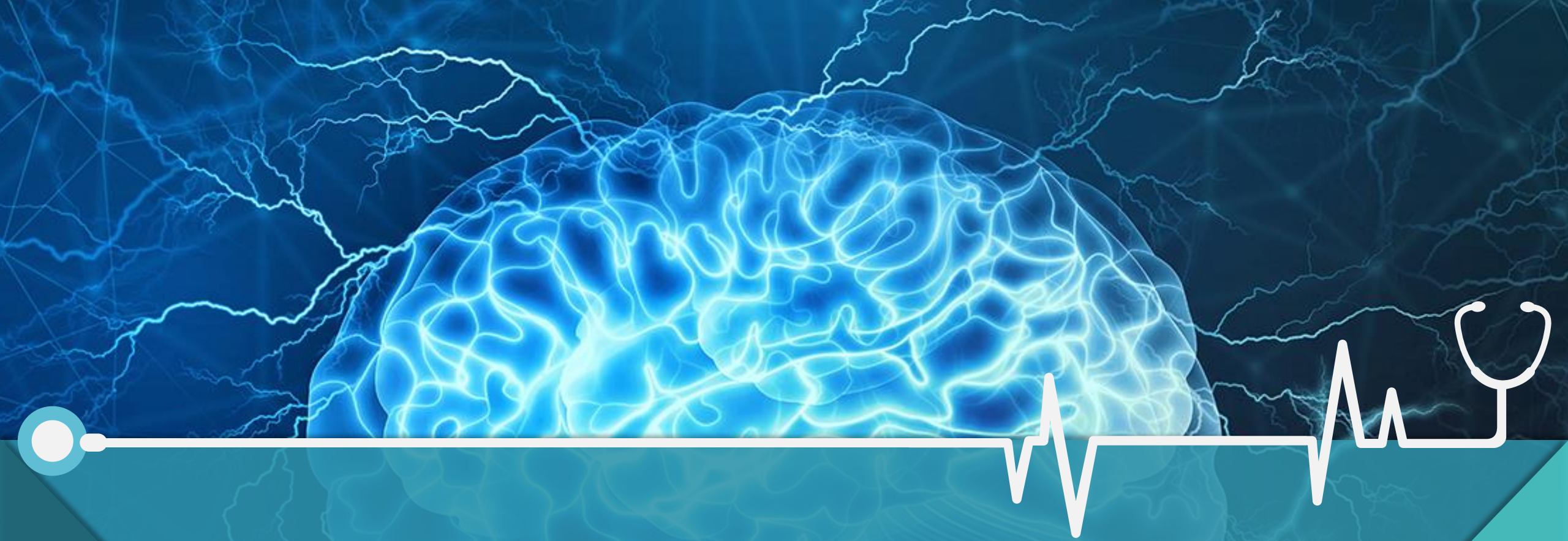
Neurological abnormalities



Consciousness abnormalities

Disturbance of consciousness

- Is a description of the mental status when there is limited or no responsiveness
- It is objectively measured by the Glasgow coma scale (discussed later in dossier)
- Causes include:
  - Syncope (a temporary loss of consciousness due to decreased cerebral blood flow)
  - Hypoxia, Hypercapnia
  - Drug induced (anesthesia, opioids overuse), Intoxication
  - Epilepsy, Stroke, Head injury
  - Hypoglycemia
  - Severe dehydration, Severe pain
  - Endocrine abnormalities (Addison disease, Hypothyroidism)
  - UTI in old age (could lead to Confusion and Psychosis)
  - Arrhythmias

شرح

Transient disturbance of consciousness

- Patients with transient episodes of altered consciousness constitute a common diagnostic problem in neurological outpatient practice.
- The main differential diagnosis is between epilepsy and syncope. (Compare)

سنوات (3)

Syncope	Epilepsy
10-15 seconds in duration	1-5 minutes in duration
Awakes from the event normally	Amnesia for 30 minutes after the event
Associated with prodromes (visual fields look black or grey)	Associated with auras
Usually due to a cause (Fatigue, Phobia)	Triggered by: Fatigue, Sleep deprivation, Flashing lights, Infections, Alcohol withdrawal, Cell phones.
The patient looks pale	The patient looks cyanosed
Rapid recovery	Slower recovery and the patient has fatigue, headache and numbness (Postictal phase)
Could be associated with abnormal movements	Associated with abnormal movements, Biting of the tongue, Foaming, and Urination.

MCQ – Syncope V.s. epilepsy

فاينل (2)

❖**Syncope is different from epilepsy in that:**

a. Syncope is not associated with any warning signs
b. Syncope is not associated with any involuntary movements
c. Syncope never occurs in sitting position
d. Syncope is usually associated with brief post ictal symptoms
e. Syncope has no complete loss of consciousness

فاينل (1)

❖**Syncope is different from epilepsy in that:**

a. Syncope is not associated with any warning signs
b. Syncope is not associated with any involuntary movements
c. Syncope never occurs in sitting position
d. Syncope is usually not associated with prolonged post ictal sleepiness
e. Syncope has no complete loss of consciousness

MCQ – Loss of consciousness

- A 17 years old female presented with attacks of loss of consciousness. Before each attack, she experiences blurring of vision for seconds then collapse for 10 -20 seconds with brief involuntary movements of the upper limbs. Patient regains consciousness and feels tired for few minutes before she returns to normal activity.

- **The patient is mostly suffering from:**

  a. Vasovagal syncope
  b. Epilepsy
  c. Vertigo
  d. Labyrinthitis
  e. Arrhythmias

MCQ – Loss of consciousness

➢A 60 years old male with known history of terminal prostate malignancy. He presented to the emergency room unconscious. On examination he has pinpoint pupils.

❖**After the airways, breathing, and circulation were restored, what would be the next step in management ?**

a. Flumazenil administration
b. Naloxone administration
c. Thiamine administration
d. Normal saline administration
e. Observation

✓Terminal prostate cancer ⟶ Bone metastasis and bone pain ⟶ Patient is likely to be prescribed opioid for pain ⟶ pinpoint pupil support the likelihood of opioid overdose

شرح

Dizziness and Vertigo

- **Dizziness** is lightheadedness without falling, therefore, all causes of syncope can cause dizziness

❖Causes of syncope

- Vasovagal syncope
- Syncope with palpitation or after exercise may suggest heart problems
- Brain ischemia
- Hypotensive drugs
- Diabetes

❖Causes of falls

- Trauma.
- Parkinsonism.
- Loss of consciousness.
- Strokes.
- MS.
- Cerebellar diseases.
- Spinal cord injury.

- **Vertigo** is illusion of movement of the body or the place around. It can be peripheral (the 8th nerve or the inner ear) or central (brainstem):

❖**Central Vertigo** can be caused by:

فاينل (2)

- Multiple sclerosis
- Strokes and TIAs
- Migraine

❖**Peripheral vertigo** can be caused by:

- Meniere's disease
- Benign paroxysmal positional vertigo (BPPV)
- Vestibular neuritis
- Labyrinthitis
- Trauma
- Gentamicin
- ✓ **Peripheral vertigo is associated with fatigable nystagmus**

فاينل (1)

شرح

Meniere’s disease V.s. BPPV

	Meniere’s disease	BPPV
Pathophysiology	excessive endolymph	otoliths in the endolymphatic fluid
Duration	Hours	Seconds
Symptoms	Unilateral hearing loss, Tinnitus, Aural fullness	No hearing loss, tinnitus, or aural fullness
Test for diagnosis	Pure tone audiometry	Dix-Hallpike maneuver
Treatment	low salt intake, diuretics	Epley maneuver

سنوات (1)
فاينل (1)

❖**In what disease do we find otoliths in the endolymphatic fluid ?**

- Benign paroxysmal positional vertigo

سنوات (1)

❖**The condition caused by excessive endolymph is called ?**

- Meniere’s disease

سنوات (8)

Dix-Hallpike maneuver

سنوات (5)

❖What is the name of this test ?

- Dix-Hallpike maneuver

سنوات (4)

❖What is this test used to diagnose ?

- Benign paroxysmal positional vertigo (BPPV) (positional vertigo)

سنوات (1)

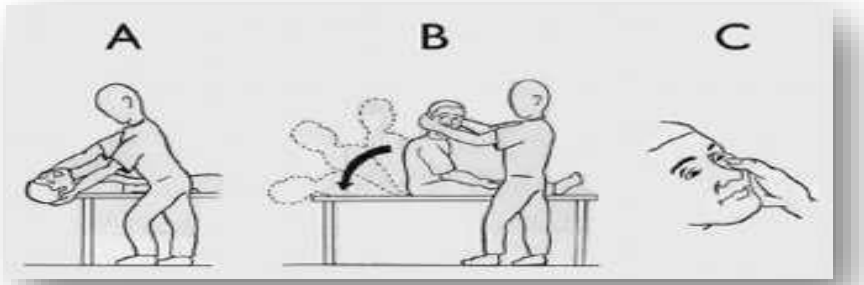
❖Describe a positive result of the test.

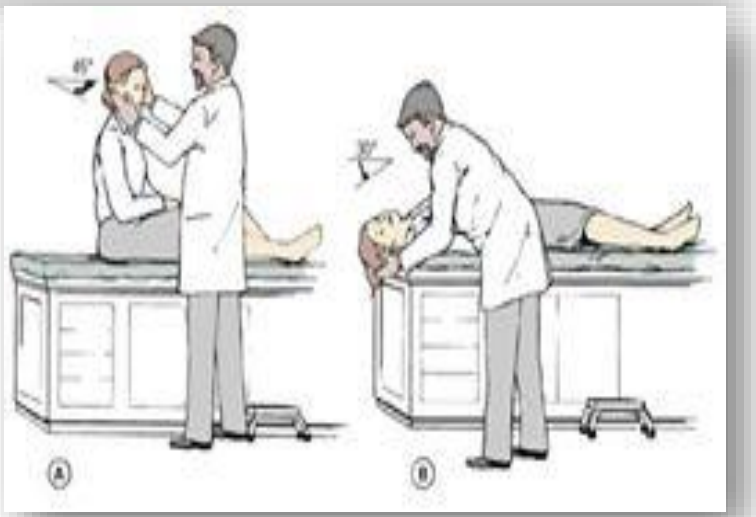
- It provokes a paroxysmal vertigo and nystagmus

سنوات (1)

❖This test used for ?

- to differentiate between central and peripheral causes of positional vertigo (benign paroxysmal positional vertigo)





MCQ

فاينل (2)

❖**Which is the key distinction between vestibular neuritis and labyrinthitis ?**

a. Direction of nystagmus
b. Sensation of rotation
c. Undulating ground
d. Hearing loss (labyrinthitis is the one associated with hearing loss)
e. Loss of balance

فاينل (2)

❖**Central vertigo can be associated with all of the following conditions except:**

a. Multiple sclerosis
b. Stroke
c. Brain tumor
d. Brain hemorrhage
e. Labyrinthitis

MCQ

سنوات (1)

❖**Which of the following is true ?**

a. BPPV lasts for hours
b. Central vertigo is associated with fatigable nystagmus
c. Vestibular neuritis have long duration
d. Gentamicin result in central vertigo
e. Meniere's disease is a type of central vertigo

سنوات (1)

❖**Which disease causes unilateral sensorineural hearing loss and tinnitus ?**

a. Meniere’s disease
b. Benign paroxysmal positional vertigo (BPPV)
c. Vestibular neuritis
d. Labyrinthitis
e. Multiple sclerosis

MCQ

سنوات (1)

❖If this test is positive, what does it mean ?

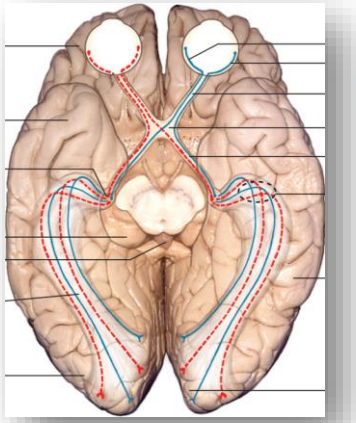
a. Excessive endolymph
b. Space-occupying lesion in the acoustic meatus
c. Otoliths in posterior semicircular canal
d. Otoliths in middle semicircular canal
e. Otoliths in Anterior semicircular canal

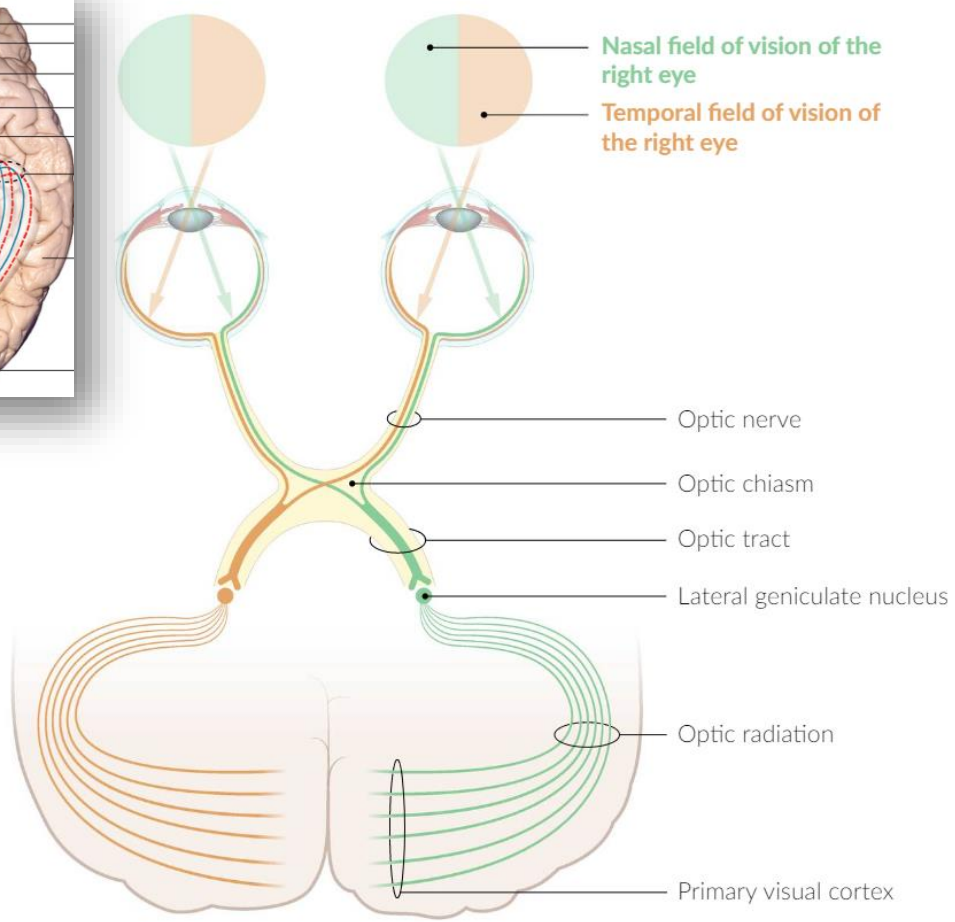
❖Select the incorrect choice

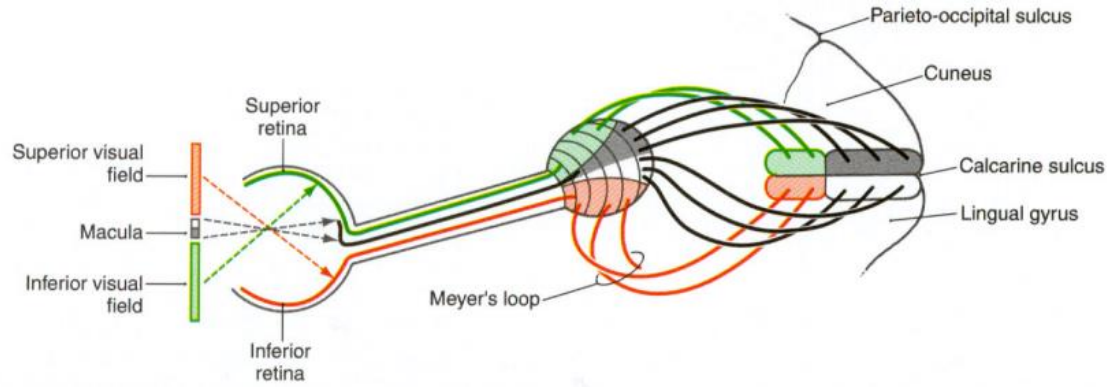
a. Central nystagmus is a non-fatigable nystagmus
b. Eply's maneuver is diagnostic for BPPV
c. Meniere's disease is a causes unilateral sensorineural hearing loss

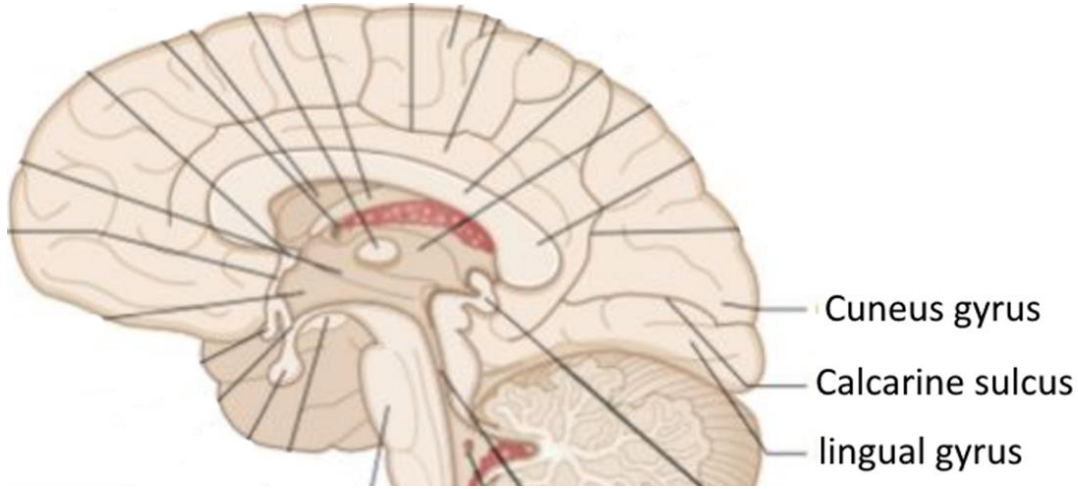
Visual abnormalities

Visual pathway (Transverse & Sagittal planes)

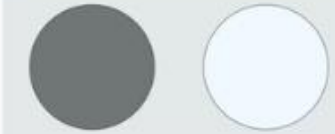
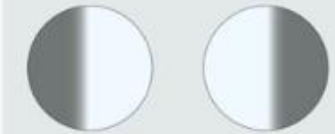


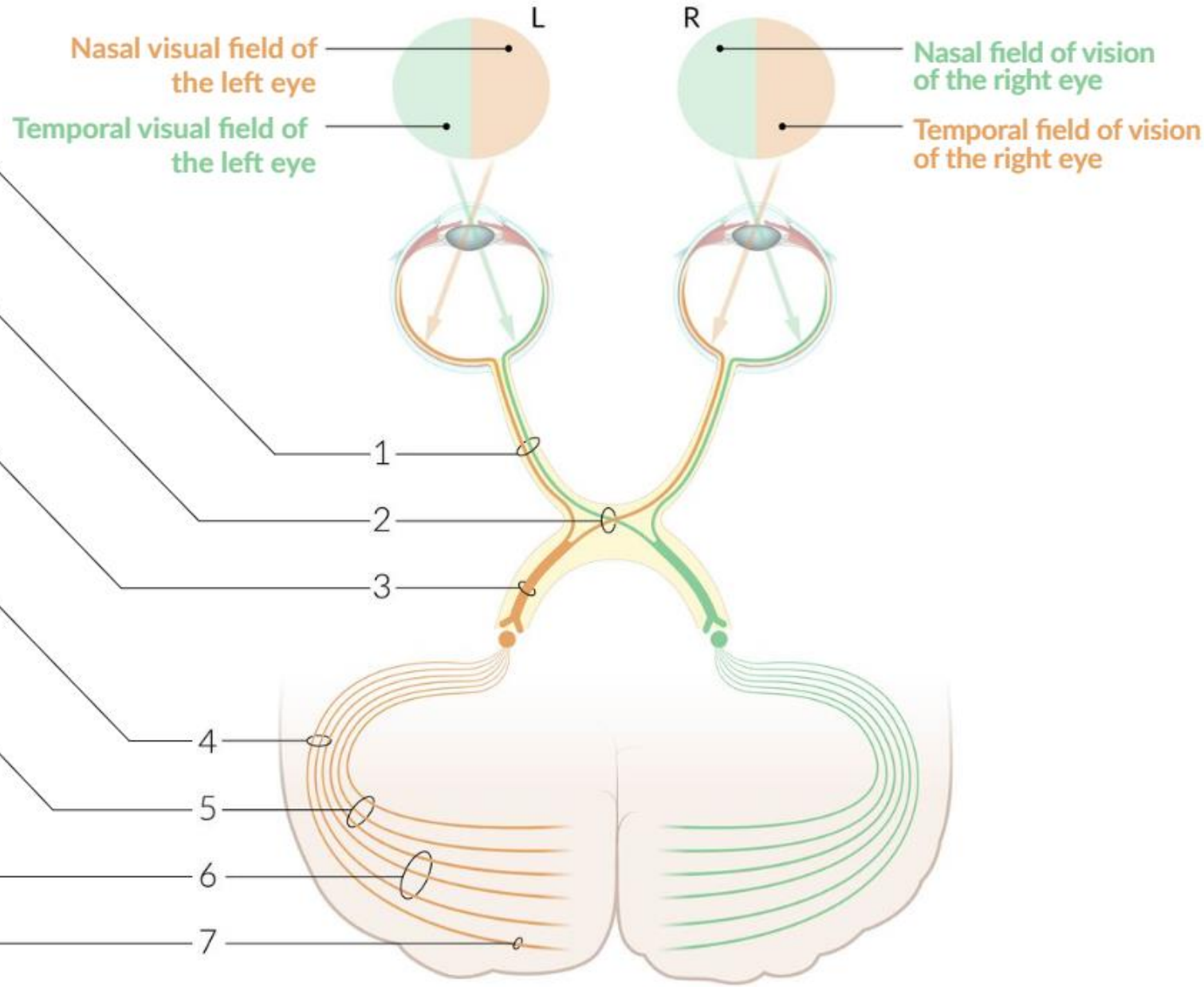






شرح

Site of lesion	Visual field defects
1 Left optic nerve	
2 Medial portion of the optic chiasma	
3 Left optic tract	
4 Lower bundle (Meyer's loop) of the left optic radiation	
5 Upper bundle of the left optic radiation	
6 Anterior portion of the calcarine sulcus and adjacent visual cortex	
7 Left occipital pole	



Terminology

- **Monocular**: Affecting one eye
- **Homonymous**: Affecting the same part of the visual field in each eye (Nasal field of an eye and temporal field of the other)
- **Heteronymous**: Affecting different parts of the visual field in each eye (Nasal or temporal field of both eyes)
- **Anopia**: A defect in the visual pathway
- **Hemianopia**: Anopia affecting half of the visual field of an eye
- **Quadrantanopia**: Anopia affecting a quarter of the visual field of an eye
- **Scotoma**: Central loss of vision (more common to be an ophthalmological problem rather than neurological)

Monocular anopia

- Complete blindness in affected eye with loss of both direct and consensual reflex
- Can be caused by
  - Optic atrophy
  - Acute optic neuritis
  - Trauma

Bitemporal hemianopia

- Vision is missing in the outer (temporal) half of both the right and left visual fields
- Associated with paralysis of pupillary reflex
- Caused by compression/lesion affecting the optic chiasm such as:
  - tumors e.g., pituitary adenomas and craniopharyngiomas.
  - aneurysms e.g., anterior communicating artery aneurysm.

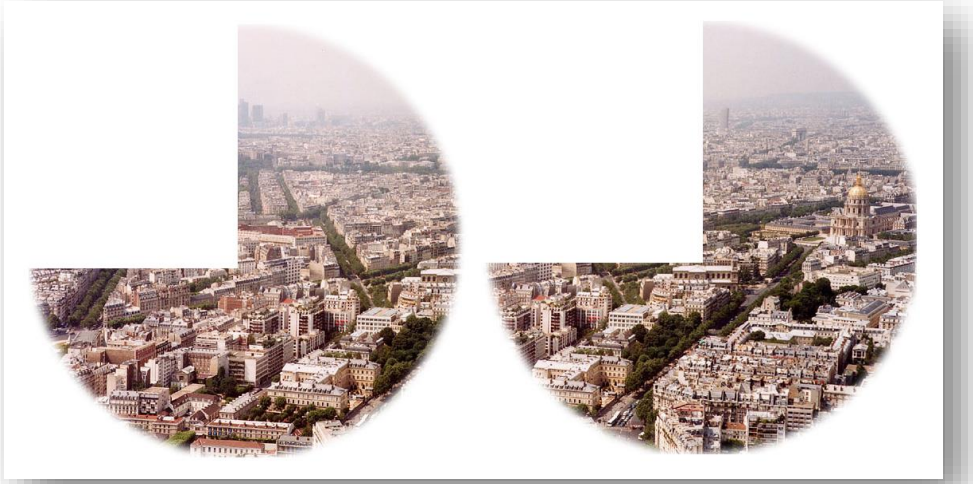
Homonymous hemianopia

- Can be congenital or caused by tumors, strokes(thalamus), traumas, infections or by aneurysms of superior cerebellar or posterior cerebral arteries
- If transient, it can constitute the aura phase of migraine
- If the lesion is in the optic tract, it will be associated with RAPD in the contralateral side and retrograde optic atrophy
- If the lesion is in the cerebral cortex, the hemianopsia will be congruous and macular sparing. Also, pupillary light reflex will be normal
- If the lesion is in optic radiation (complete), pupillary reflex will be intact

Quadrantanopia

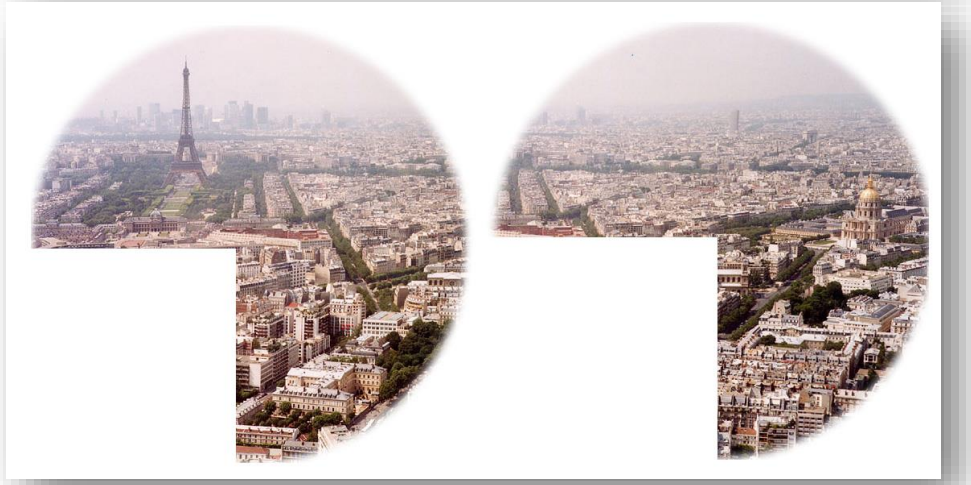
❖Superior quadrantanopia

- Described as “pie in the sky”
- Causes are strokes, tumors and traumas.
- Occurs when the lesion affects the temporal lobe (inferior fibers of the optic radiation, i.e., Meyer’s loop).
- Pupillary reflex is normal.



❖Inferior quadrantanopia

- Described as “pie in the floor”.
- Causes are also strokes, tumors and traumas.
- Occurs when the lesion affects the parietal lobe (superior fibers of the optic radiation, i.e., Baum’s loop)..
- Pupillary reflexes are also normal.



MCQ – Visual abnormalities

فاينل (1)

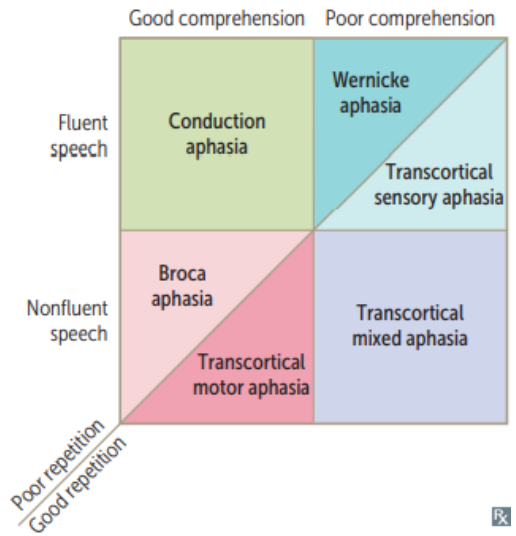
❖ Bitemporal hemianopia associated with lesion in ?

a. Central part of the optic chiasm
b. Lateral part of the optic chiasm
c. Optic nerve
d. Optic tract

Speech abnormalities

Aphasia (Defect in the cerebral cortex)

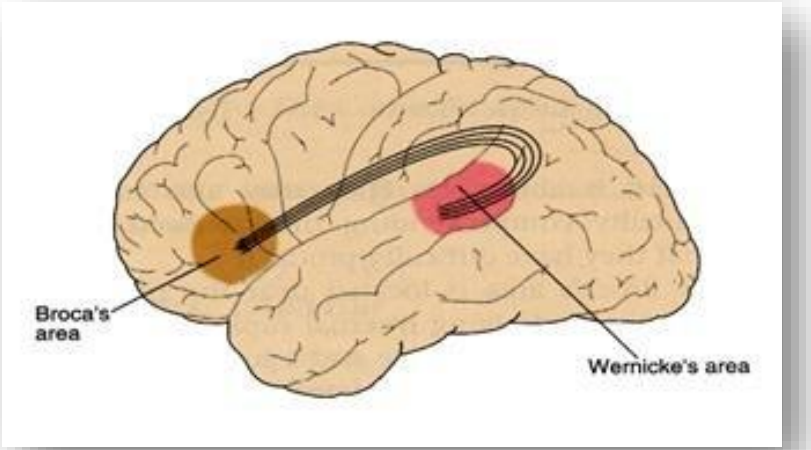
- **Aphasia**: higher-order language deficit (inability to understand / produce / use language appropriately); caused by pathology in dominant cerebral hemisphere (usually left)
- **Dysarthria**: motor inability to produce speech (movement deficit)



TYPE	COMMENTS
Broca (expressive)	Broca area in inferior frontal gyrus of frontal lobe. Patient appears frustrated, insight intact. Broca = Broken Boca (*boca* = mouth in Spanish).
Wernicke (receptive)	Wernicke area in superior temporal gyrus of temporal lobe. Patients do not have insight. Wernicke is a Word salad and makes no sense.
Conduction	Can be caused by damage to arCuate fasciculus.
Global	Broca and Wernicke areas affected.
Transcortical motor	Affects frontal lobe around Broca area, but Broca area is spared.
Transcortical sensory	Affects temporal lobe around Wernicke area, but Wernicke area is spared.
Transcortical mixed	Broca and Wernicke areas and arcuate fasciculus remain intact; surrounding watershed areas affected.

How to differentiate ?

- All kinds of aphasia results from a lesion in or near these 3 structures:
  - Broca's area, Wernicke's area, and arcuate fasciculus
- Any lesion to any of the three structures results in **impaired repetition**, while other lesions (transcortical) preserve repetition
- The letter B is before the letter W → B is in front of W → Broca is anterior to Wernicke (Broca is in the front in the frontal lobe)
- Broca = Broken words = **Non-fluent** (Any lesion in Broca's area or around it (transcortical motor) causes non-fluent speech)
- Wernicke = World salad = **Impaired comprehension** (Any lesion in Wernicke's area or around it (transcortical sensory) causes impaired comprehension)



شرح

Dysarthria (Defect in muscles of speech)

❖Which is impairment of articulation, as a result of disease of the muscles involved in speech or their innervation (including lower ('bulbar') cranial nerves, brainstem, cerebellum, basal ganglia and cerebral hemispheres).

Pseudobulbar palsy (UMN LESION)	Bulbar palsy (LMN LESION)
Spastic tongue	Flaccid tongue
Difficulty in pronunciation	Nasal speech (weak soft palate)
Brisk jaw jerk	Jaw jerk may be absent

سنوات (2)

❖**Which of the following is wrong about pseudobulbar palsy ?**

a. Absent jaw jerk
b. Spastic tongue
c. Difficulty in pronunciation

MCQ – Aphasias

سنوات (1)

❖ **Which of the following is wrongly paired ?**

a. Broca’s aphasia – Impaired grammar
b. Sensory aphasia – Preserved comprehension
c. Transcortical aphasia – Preserved repetition
d. Wernicke’s aphasia – Fluent speech

سنوات (2)

❖ **Patient with non fluent speech, Grammar errors**

a. Broca’s aphasia
b. Wernicke’s aphasia
c. Transcortical aphasia
d. Global aphasia
e. Conductive aphasia

MCQ – Aphasias

سنوات (4)

❖ **Patient with smooth talking, minimal paraphasic errors, impaired comprehension (and poor repetition)**

a. Broca's aphasia
b. Wernicke's aphasia
c. Transcortical aphasia
d. Global aphasia
e. Conductive aphasia

فاينل (1)

❖ **Patient with Conductive Aphasia, the artery responsible for that ?**

a. Anterior Cerebral artery
b. Posterior Cerebral artery
c. Superior middle Cerebral artery
d. Inferior middle Cerebral artery

MCQ

سنوات (1)

❖75 years old male came with acute stroke. He has right side weakness. He has spontaneous speech with occasional paraphrasic errors. He can understand and follow commands, but repetition is severely affected. Which of the following best explains his speech pattern?

a. Broca aphasia
b. Transcortical aphasia
c. Conduction aphasia
d. Wernicke aphasia
e. Global aphasia

فاينل (1)

❖Patient came after stroke. Cannot follow your commands, cannot repeat and has grammar mistakes. What is the lesion producing his symptoms?

a. Broca's area
b. Wernicke's area
c. Conductive lesion
d. Global aphasia

Simple rule
- Cannot follow = Wernicke's area
- Cannot repeat = Conductive lesion
- Grammar mistakes = Broca's area
  - All three = Global ☺

MCQ

- 75 years old male came with acute stroke. He has right side weakness. He has spontaneous speech with occasional paraphrasic errors. He cannot understand and follow commands, and repetition is affected.

- Which of the following best explains his speech pattern?

a. Broca aphasia
b. Transcortical aphasia
c. Conduction aphasia
d. Wernicke aphasia
e. Global aphasia

Aphasia

سنوات (1)

❖ **Mention 3 features of Broca's aphasia**:

- 1. Non fluent speech, 2. Reduced number of used words, 3. Grammar errors

❖ **Wernicke's aphasia**:

- Speech is fluent, but meaningless and contains incorrect words and new invented words

❖ **Conductive aphasia**:

- When the patient cannot repeat words

❖ **Global aphasia**:

- Poor comprehension and non fluent speech

Motor abnormalities

شرح

Motor symptoms 1

1. **Akathisia**: Restlessness and intense urge to move
   - Can be seen with neuroleptic use or as a side effect of Parkinson treatment
2. **Asterixis**: Extension of wrists causes “flapping” motion
   - Associated with hepatic encephalopathy, Wilson disease, and other metabolic derangements

سنوات (2)

3. **Athetosis**: Slow, snake-like, writhing movements; especially seen in the fingers.
   - Seen in Huntington disease

سنوات (2)

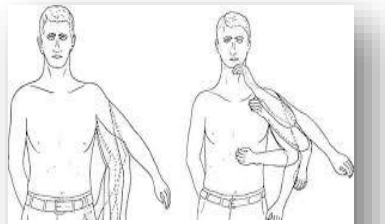
4. **Chorea**: Sudden, jerky, purposeless movements
   - Seen in Huntington disease and in acute rheumatic fever (Sydenham chorea)
5. **Ataxia**: loss of coordination
   - Seen in Cerebellar diseases.
6. **Restless legs syndrome**: Worse at rest/nighttime. Relieved by movement. Associated with iron deficiency, CKD

شرح

Motor symptoms 2

سنوات (2) **7. Dystonia**: Sustained, involuntary muscle contractions

- Usually primary but can be secondary to drugs (chlorpromazine)
- Examples: Writer's cramp, blepharospasm, torticollis.


Hemiballismus

سنوات (1) **8. Hemiballismus**: Sudden, wild flailing of one side of the body

- Contralateral subthalamic nucleus (eg, lacunar stroke) lesion

سنوات (3) **9. Myoclonus**: Sudden, brief, uncontrolled muscle contraction

- Sen in multiple sclerosis, Parkinson's, Alzheimer, encephalitis, epilepsy, disc prolapse

سنوات (1) **10. Tic disorder**: Repetitive, sudden semi-voluntary movement of a muscle or group of muscles, the patient can inhibit it but not for long time

11. Tourette syndrome: Multiple motor tics with at least one phonic tic that start during childhood

شرح

Motor symptoms 3

12. **Akinesia**: inability to initiate movement, in Parkinsonism
13. **Bradykinesia**: Reduced movement, in Parkinsonism and Hypothyroidism
14. **Cataplexy**: general or partial weakness of muscles in response to emotional stimulus (crying or laughing), in Narcolepsy
15. **Freezing phenomenon** in Parkinsonism
16. **Tremors**: Involuntary, brief, rhythmic, oscillating movement of the fingers or toes

سنوات (1) **A. Resting tremor**: Alleviated by intentional movement. Seen in Parkinson

سنوات (1) **B. Intention tremor**: Slow, zigzag motion when pointing/extending toward a target. Seen in Cerebellar disease

C. Physiological tremor: Multiple sclerosis, caffeine, alcohol, liver disease, hypoglycemia, Hyperthyroidism

D. Essential tremor: High-frequency tremor with sustained posture, worsened with movement or when anxious. Often familial

MCQ

فاينل (1)

❖Choose the FALSE combination:

a. Chorea: Dancing like movement
b. Athetosis : Writhing movement
c. Parkinson: rest tremor
d. Cerebellar Disease: contralateral action tremor
e. Myoclonus: involuntary sudden jerks

فاينل (3)

❖Choose the FALSE combination

a. Chorea: Dancing like movement
b. Athetosis : Writhing movement
c. Parkinson: rest tremor
d. Cerebellar Disease: ipsilateral action tremor
e. Myoclonus: semi-voluntary sudden jerks

MCQ

سنوات (3)

❖Choose the FALSE combination:

a. Athetosis is slow writhing movement
b. Tics are semivoluntary movement
c. Hemiballismus due to contralateral lesion in subthalamic nucleus
d. Cerebellar tremors frequency is the same through out the movement
e. Myoclonus sudden, brief, uncontrolled muscle contraction

سنوات (1)

❖Choose the FALSE combination:

a. Athetosis is slow writhing movement
b. Tics are semivoluntary movement
c. Hemiballismus due to contralateral lesion in subthalamic nucleus
d. Intention tremors frequency is the same through out the movement
e. Myoclonus sudden, brief, uncontrolled muscle contraction

MCQ

فاينل (2)

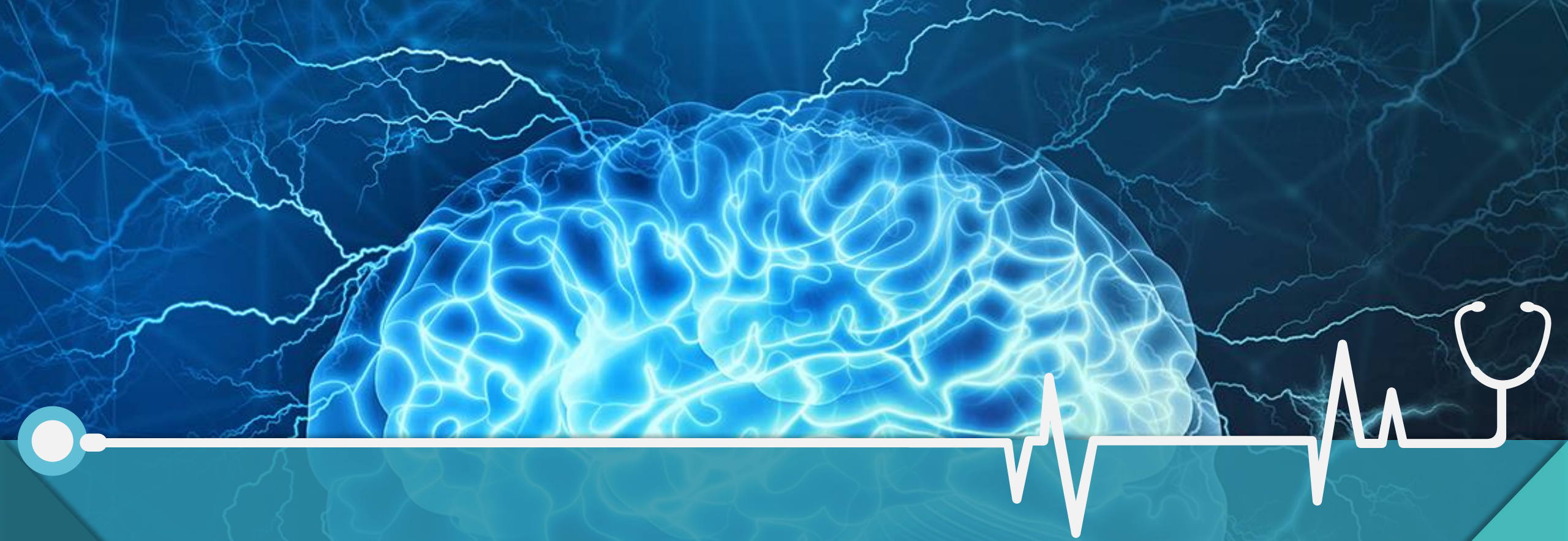
❖**Which of the following disorders is most likely to occur during action rather during rest ?**

a. Athetosis (occur both during action and at rest)
b. Chorea (primarily occur during action or voluntary movements)
c. Tics (occur both during action and rest, and are typically suppressible to some extent)
d. Parkinson tremor (occurs at rest and typically subsides during voluntary movement)
e. Stereotypies (occur in a variety of situations, including during rest, sustained postures, or specific activities)

فاينل (1)

❖**Which of the following disorders is semi voluntary movement ?**

a. Chorea
b. Athetosis
c. Tics



Common brain lesions

Brain lobes lesions

Frontal lobe lesion	Temporal lobe lesion	Parietal lobe lesion	Occipital lobe lesion
Personality and behavioural change including disinhibition	Memory impairment	Sensory impairment	Visual field defects
Loss of emotional responsiveness	Complex partial seizures	Dyslexia, dyscalculia, dysgraphia (speech abnormalities)	Visual agnosia
Cognitive impairment	Contralateral upper quadrantanopia	Contralateral lower quadrantanopia	Disturbance of visual perception
Expressive dysphasia	Receptive aphasia	Apraxia	Visual hallucinations
Urinary incontinence		Primitive reflexes reappear	
Primitive reflexes reappear			

MCQ

❖**The inability to write is called:**

a. Dyspraxia (Difficulties in planning and executing coordinated movements)
b. Dyslexia (Cannot read)
c. Dysgraphia
d. Dyscalculia (Cannot calculate)
e. Dysarthria (Articulation difficulties)

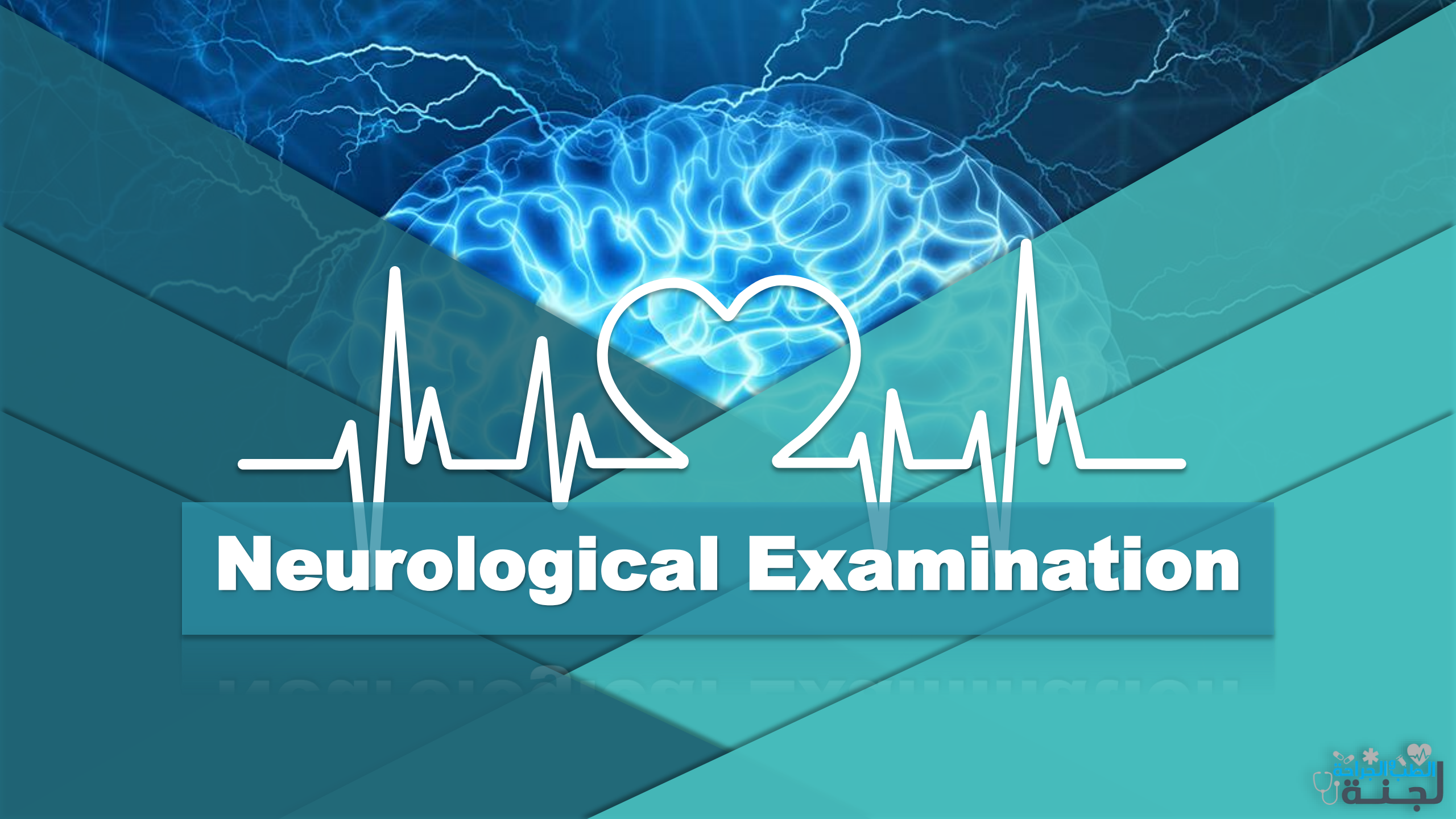
❖**Note**: A lesion in the Supramarginal gyrus in parietal lobe results in

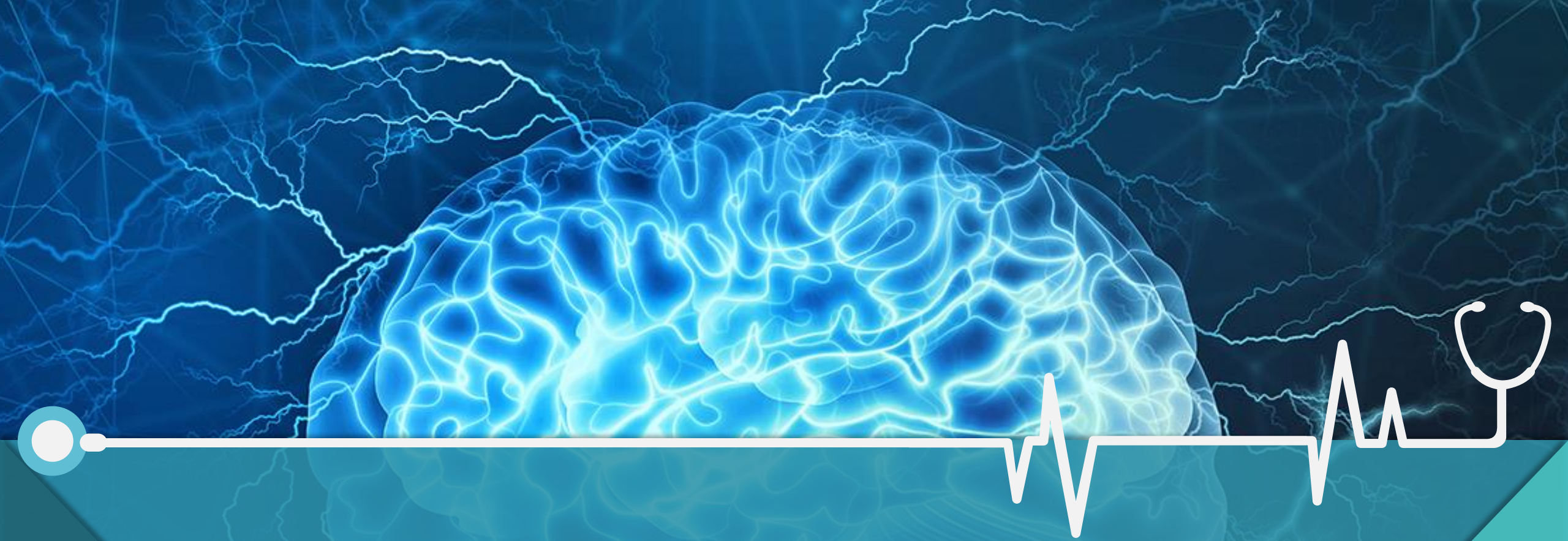
- **Dyslexia**: Cannot read
- **Dyscalculia**: Cannot calculate
- **Dysgraphia**: Cannot write

MCQ

❖**The patient Unable to perform new learned motor skills:**

a. Apraxia
b. Dyslexia (Cannot read)
c. Dysarthria (Speech disorder with articulation difficulties)
d. Dysgraphia (Cannot write)


Neurological Examination



Consciousness assessment

Disturbance of consciousness

- Is a description of the mental status when there is limited or no responsiveness
- It is objectively measured by the Glasgow coma scale
- Causes include:
  - Syncope (a temporary loss of consciousness due to decreased cerebral blood flow)
  - Hypoxia, Hypercapnia
  - Drug induced (anesthesia, opioids overuse), Intoxication
  - Epilepsy, Stroke, Head injury
  - Hypoglycemia
  - Severe dehydration, Severe pain
  - Endocrine abnormalities (Addison disease, Hypothyroidism)
  - UTI in old age (could lead to Confusion and Psychosis)
  - Arrhythmias

Explain the Glasgow Coma Scale

Response	Scale	Score
Eye Opening Response	Eyes open spontaneously	4 Points
	Eyes open to verbal command, speech, or shout	3 Points
	Eyes open to pain (not applied to face)	2 Points
	No eye opening	1 Point
Verbal Response	Oriented	5 Points
	Confused conversation, but able to answer questions	4 Points
	Inappropriate responses, words discernible	3 Points
	Incomprehensible sounds or speech	2 Points
	No verbal response	1 Point
Motor Response	Obeys commands for movement	6 Points
	Purposeful movement to painful stimulus	5 Points
	Withdraws from pain	4 Points
	Abnormal (spastic) flexion, decorticate posture	3 Points
	Extensor (rigid) response, decerebrate posture	2 Points
	No motor response	1 Point

Minor Brain Injury = 13-15 points; **Moderate Brain Injury** = 9-12 points; **Severe Brain Injury** = 3-8 points

What is the Glasgow coma scale for the following

سنوات (5)
- Eye open to verbal command, Incomprehensible sound, and Withdraws from pain.
  - GCS = 9

سنوات (1)
- Confused, open eyes to commands, moves withdraw from pain.
  - GCS = 11

سنوات (2)
- A patient in coma. You examined him and you found that he produced noises, he can localise pain and responds to verbal orders by only opening his eyes.
  - GCS = 10

سنوات (1)
- A patient in coma. You examined him and you found that he can say words, he can localize pain and responds to verbal orders by only opening his eyes.
  - GCS = 11

What is the Glasgow coma scale for the following

فاينل (2)

- a patient, who opens his eyes to pain, withdraw from pain and produce incomprehensible sounds
  - GCS = 8

فاينل (3)

- a patient, who cannot open his eyes to pain, withdraw from pain and produce incomprehensible sounds
  - GCS = 7

سنوات (1)

- Patient opens his eye spontaneously, produces incomprehensive sounds and withdraws to pain
  - GCS = 10

What is the Glasgow coma scale for the following

1. A patient fell while rock climbing. When you apply a deep sternal rub, he extends his arms and legs and shows no other response.
   - GCS = 4 (E=1, V=1, M=2)
2. The patient is pulseless and apneic.
   - GCS = 3 (E=1, V=1, M=1)
3. A 73-year-old patient looks at spontaneously you when you speak to her. When you ask her the date, she says "blue." You note left-sided weakness when she grips your fingers.
   - GCS = 13 (E=4, V=3, M=6)
4. A trauma patient moans, bends his arms towards his chest, and points his toes when your partner attempt to start an IV.
   - GCS = 6 (E=1, V=2, M=3)

What is the Glasgow coma scale for the following

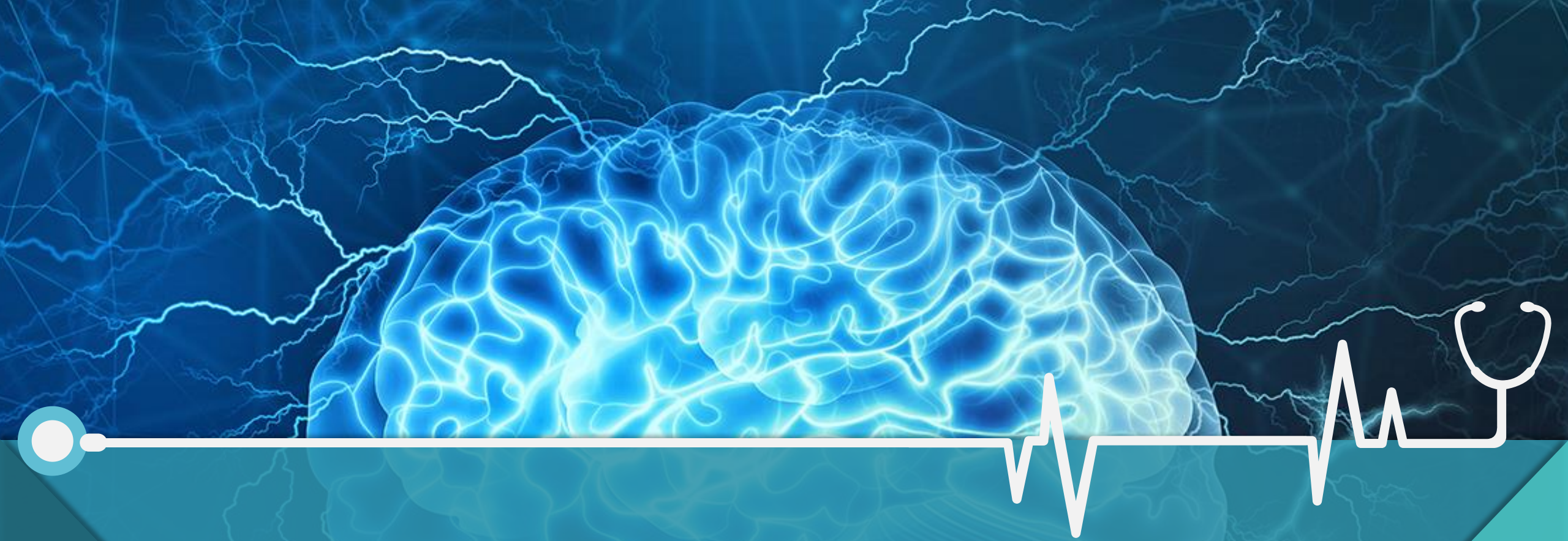
5. You are assessing a 20-year-old male suspected of overdosing. He is staring off into space, writhing, and babbling. When your partner starts an IV, he cries out incomprehensibly but does not pull away.
   - GCS = 7 (E=4, V=2, M=1)
6. You are transporting an altered mental status (high suspicion inebriated) patient. When you attempt to insert a nasal airway he opens his eyes, slaps your hand away, curses at you but unsure where he is, and sits up. When you stop, he lays down on the stretcher.
   - GCS = 11 (E=2, V=4, M=5)
7. The patient spontaneously looks around. When you speak to the patient, they can tell you who they are, where they are and why, and the date, and obey simple commands.
   - GCS = 15 (E=4, V=5, M=6)
8. A 75-year-old male rubs his chest and tells you it really hurts. He tells you he wants to go to the hospital, and you help him walk to the stretcher.
   - GCS = 15 (E=4, V=5, M=6)

What is the Glasgow coma scale for the following

9. A man is found on the ground outside a homeless shelter. When you give him a sternal rub, he opens his eyes, tells you to go away, and pushes your hand away.
   - GCS = 12 (E=2, V=5, M=5)
10. A possible overdose patient looks around with an unfocused gaze, mumbles when you ask him questions, and pulls away from a painful stimulus.
   - GCS = 10 (E=4, V=2, M=4)
11. An intoxicated patient initially appears unresponsive. When you start an IV, she wakes up and yells at you, then lays back down and closes her eyes.
   - GCS = 12 (E=2, V=5, M=5)
12. An adult moves their hand away when you apply pressure to the nail bed. The patient can make words but not form coherent sentences. They open their eyes to pain, but not to speech.
   - GCS = 9 (E=2, V=3, M=4)

What is the Glasgow coma scale for the following

13. The patient moves their hand towards the head when you apply pressure above the eyesocket. They are disoriented but able to form sentences. They open their eyes in response to speech.
    - GCS = 12 (E=3, V=4, M=5)
14. The patient extends their elbow when you put pressure on the nail bed. They can talk in sentences and are disorientated. They are unable to open their eyes.
    - GCS = 7 (E=1, V=4, M=2)
15. The patient opens their eyes when you say their name and speaks to you in words that make no sense. When you apply pressure on their nail bed, they move their arm away.
    - GCS = 10 (E=3, V=3, M=4)
16. The patient opens their eyes when they hear you shouting for help. They groan and make sounds which you cannot recognize as words. They do not respond to pain.
    - GCS = 6 (E=3, V=2, M=1)



Neurocognitive assessment

Mini mental status examination (MMSE)

Mini mental status examination (MMSE)

- It is a screening tool used to assess neurocognitive function and for follow up of patients
- MMSE is a 30-points screening tool

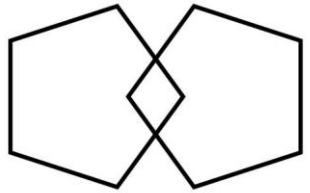
Tests 6 aspects:

- Orientation, Registration, Recall, Attention and calculation, Language, Visual construction

1. **Orientation**:
   - **Time** (year, season, month, date, time) (maximum score 5/5)
   - **Place** (country, town, district, hospital, ward/floor) (maximum score 5/5)
2. **Registration**: (maximum score 3/3)
   - The examiner names three unrelated objects clearly and slowly, then the instructor asks the patient to name all three of them. The patient's response is used for scoring.
   - The examiner repeats them until patient learns all of them, if possible.
3. **Recall**: (maximum score 3/3)
   - Asks the patient to name all three objects learned earlier

Mini mental status examination (MMSE)

4. **Attention and calculation**:
   - Count backward from 100 by sevens (100, 93, 86, 79, 72, 65, …)
   - **Alternative**: Spell WORLD backwards (D-L-R-O-W)
5. **Language**:
   - Show the patient two simple objects, and ask the patient to name them
   - "Repeat the phrase: 'No ifs, ands, or buts.'"
   - "Take the paper in your right hand, fold it in half, and put it on the floor."
   - "Please read this and do what it says."
   - "Make up and write a sentence about anything."
6. **Visual construction**:
   - Please copy this picture (intersected pentagons)



Mini mental status examination (MMSE)

- Score 24-30: no cognitive impairment
- Score < 24 suggests cognitive impairment
  - 18-23: Mild cognitive impairment
  - 00-17: Severe cognitive impairment

Mini mental status examination (MMSE)

Advantages of MMSE

- Could be administered without any additional equipment at patient's bed side or in the consulting room
- Requires little critical thinking interpretations
- Quick to administer
- Can be administered by a capable assistant
- Patient's relatives as well as Patients with mild neurocognitive disorder can very easily relate with the results of the findings

Disadvantages of MMSE

- Patients educational level may affect the validity of the test
- A patient with mild cognitive disorder may be missed by this test (physician should put into consideration the area of impairment instead of just looking at the scores)
- Patients new to a region may not geographic orientation aspect of the test
- False positives can lead to anxiety, labeling and stigma

سنوات (7)

MCQ

سنوات (4)

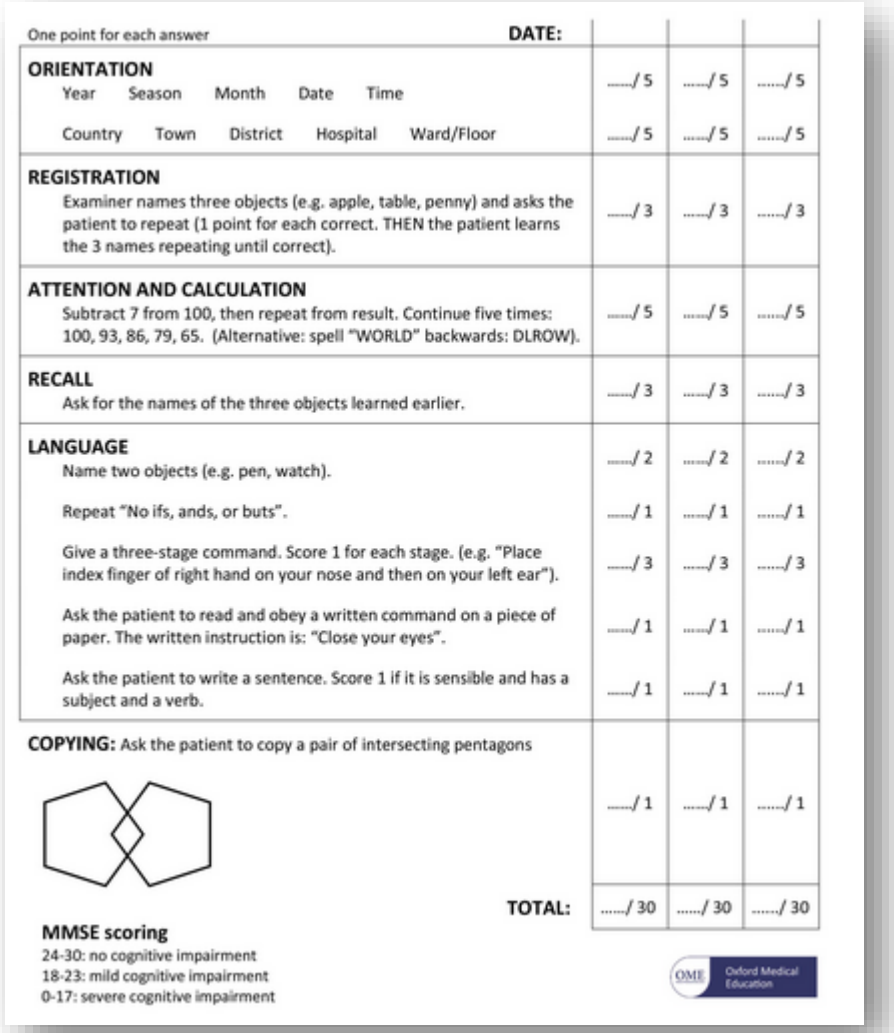
❖Which of the following is wrong about mini mental exam ?

A. MMSE is 30 points screening tool
B. used to diagnose dementia
C. 100-7 is to test recall
D. score of 23 risk for mild dementia

سنوات (3)

❖Which of the following is wrong about mini mental exam ?

A. MMSE is 30 points screening tool
B. used to diagnose dementia
C. 100-7 is to test calculation
D. score of 27 risk for mild dementia



One point for each answer	DATE:		
ORIENTATION Year Season Month Date Time	...../ 5	...../ 5	...../ 5
Country Town District Hospital Ward/Floor	...../ 5	...../ 5	...../ 5
REGISTRATION Examiner names three objects (e.g. apple, table, penny) and asks the patient to repeat (1 point for each correct. THEN the patient learns the 3 names repeating until correct).	...../ 3	...../ 3	...../ 3
ATTENTION AND CALCULATION Subtract 7 from 100, then repeat from result. Continue five times: 100, 93, 86, 79, 65. (Alternative: spell "WORLD" backwards: DLROW).	...../ 5	...../ 5	...../ 5
RECALL Ask for the names of the three objects learned earlier.	...../ 3	...../ 3	...../ 3
LANGUAGE Name two objects (e.g. pen, watch).	...../ 2	...../ 2	...../ 2
Repeat "No ifs, ands, or buts".	...../ 1	...../ 1	...../ 1
Give a three-stage command. Score 1 for each stage. (e.g. "Place index finger of right hand on your nose and then on your left ear").	...../ 3	...../ 3	...../ 3
Ask the patient to read and obey a written command on a piece of paper. The written instruction is: "Close your eyes".	...../ 1	...../ 1	...../ 1
Ask the patient to write a sentence. Score 1 if it is sensible and has a subject and a verb.	...../ 1	...../ 1	...../ 1
COPYING: Ask the patient to copy a pair of intersecting pentagons	...../ 1	...../ 1	...../ 1
TOTAL:	...../ 30	...../ 30	...../ 30

MMSE scoring
24-30: no cognitive impairment
18-23: mild cognitive impairment
0-17: severe cognitive impairment

OME Oxford Medical Education

فاينل (2)

Mini mental status examination (MMSE)

فاينل (1)

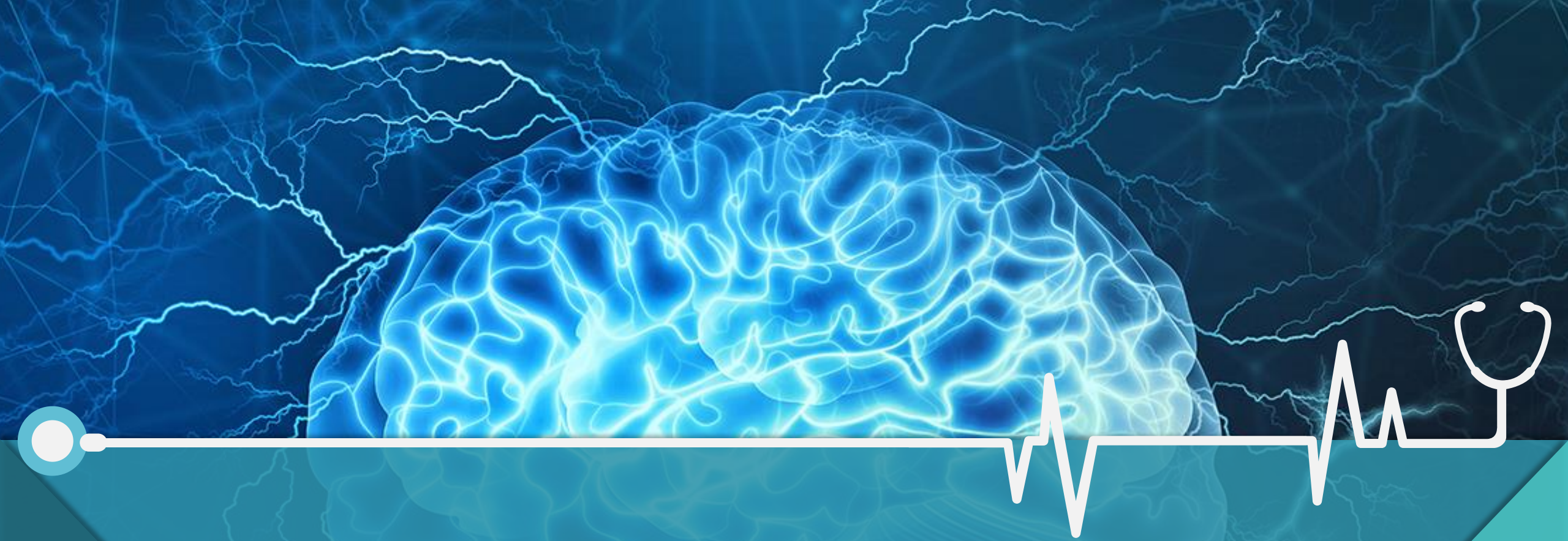
❖**Spelling WORLD backward in mental status examination most closely tests which of the following:**

a. Attention
b. Concentration
c. Memory
d. Abstraction
e. Executive function

فاينل (1)

❖**“Mention three objects” in mini mental examination most closely test which one the following:**

a. Attention
b. Concentration
c. Recall
d. Registration



Gait assessment

شرح

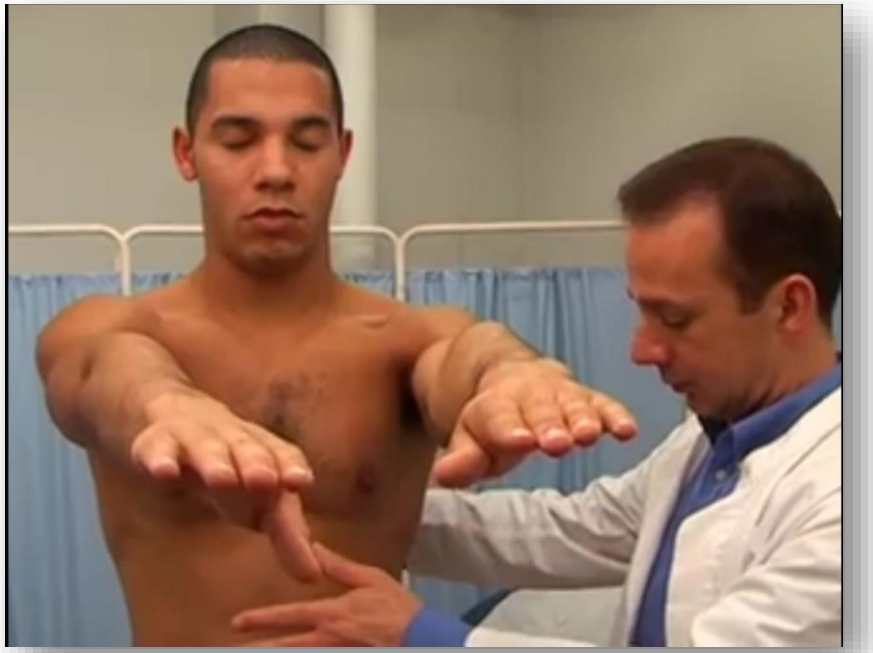
Gait abnormality examples

- **Paraplegic Gait (Scissoring):** due to spinal cord disease
- **Drunken Gait (Cerebellar ataxia)**: due to cerebellar disease
- **Shuffling Gait (Propulsive Gait)**: due to Parkinson's disease or Parkinsonism
- فاينل (1) **Steppage Gait (Drop foot or Neuropathic)**: due to weakness of foot and ankle dorsiflexion
- **Trendelenburg Gait (Hip drop)**: due to proximal muscle weakness (Pelvis tilting)
- **Waddling Gait (Duck Gait)**: due to bilateral weakness in the Gluteal muscles
- **Hemiplegic Gait (Spastic hemiparesis)**: due to Stroke or UMN lesion (Left sided lesion will manifest on the right side and vice versa)
- **Choreiform Gait (Dancing like)**: due to damage in the basal ganglia

Romberg's test

1. Position the patient with feet together and arms relaxed at their sides.
2. Eyes open: Have the patient stand still with eyes open for about 30 seconds.
3. Observe for any swaying or difficulty in maintaining balance.
4. Eyes closed: Instruct the patient to close their eyes while maintaining the same position.
5. Observe for increased instability or loss of balance.
6. Interpret the results based on observed stability or instability.
7. Ensure patient safety throughout the test.

- Stand behind the patient and be ready to catch them as they may fall
- Repeated falling of swaying indicates positive test (Sensory Ataxia)



سنوات (4)

Romberg's test

سنوات (1)

❖ **What is the name of this test ?**

- Romberg's test (sensory ataxia)

❖ **If this test was positive, what does it indicates ?**

- Sensory ataxia (impaired proprioception)

سنوات (2)

❖ **What are the causes of this condition ?**

1. Dorsal column lesion
2. Vit B12 deficiency
3. Tertiary syphilis (Tabes Dorsalis)
4. Diabetic neuropathy
5. Hypothyroidism

MCQ

❖**Which of the following <u>doesn't result</u> in a positive Romberg test ?**

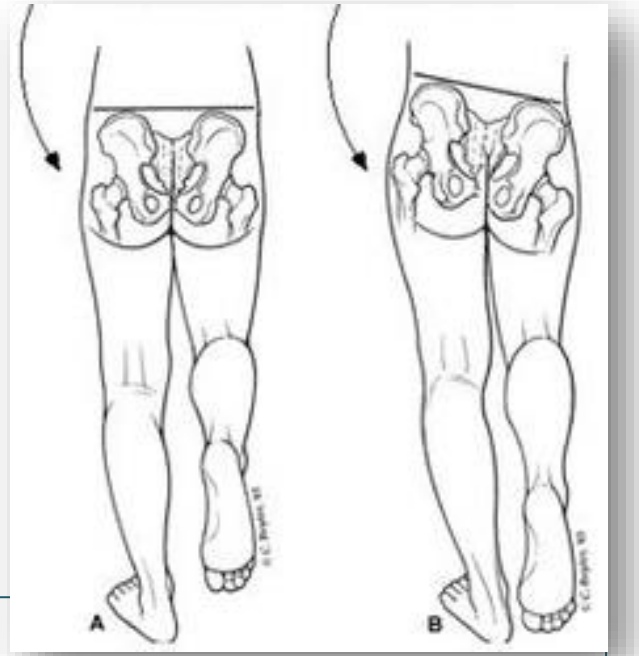
a. Dorsal column lesion
b. Vit B12 deficiency
c. Diabetic neuropathy
d. Impaired proprioception
e. Cerebellar disease

❖**Which of the following <u>result</u> in a positive Romberg test ?**

a. Dorsal column lesion
b. Vit B12 deficiency
c. Diabetic neuropathy
d. Impaired proprioception
e. All of the above

Trendelenburg’s test

- **What is the name of this test ?**
  - Trendelenburg's gait
- **If this test was positive, what does it indicates ?**
  - Proximal muscle weakness
- **Which is the abnormal one (A or B) ?**
  - B

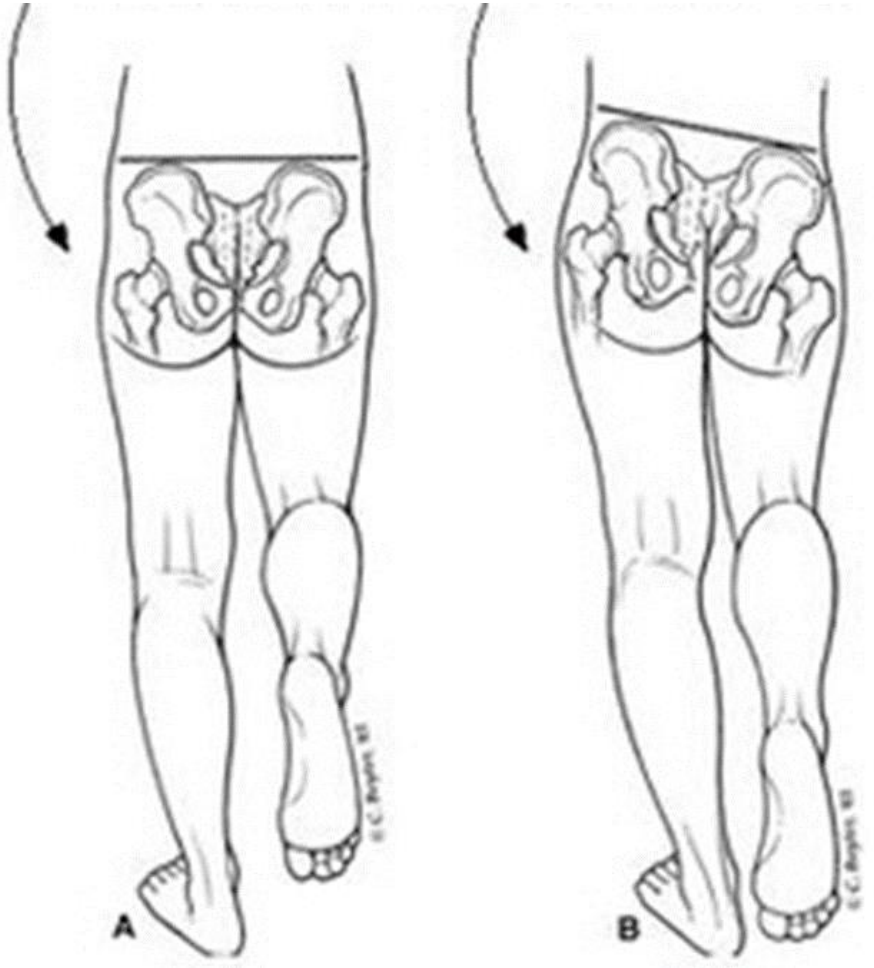


Trendelenburg’s test maneuver

- Position: Have the patient stand upright with both feet together.
- Observation: Stand behind the patient and visually observe their pelvic alignment and hip level.
- Instructions: Ask the patient to lift one leg off the ground, bending the knee.
- Assessment: Observe for any dropping or tilting of the pelvis on the unsupported side.
- Repeat: Repeat the test on the other leg.
- Interpretation: Significant dropping or tilting of the pelvis indicates weakness or dysfunction of the hip abductor muscles.

Which of the following is wrong

a. This is Trendelenburg's test
b. Due to proximal muscles weakness
c. Due to sciatic nerve palsy
d. Due to superior gluteal nerve palsy
e. Result from gluteus minimums injure



Tandem test

سنوات (6)

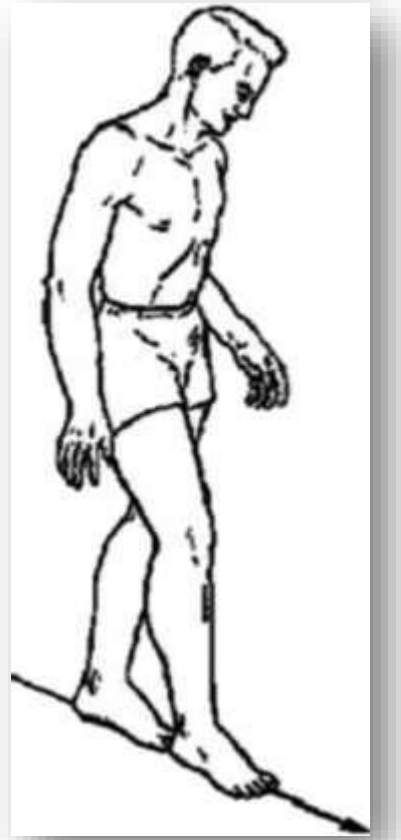
❖What is the name of this test ?

- Tandem walking test / Tandem gait / Heel to toe walking test

سنوات (2)

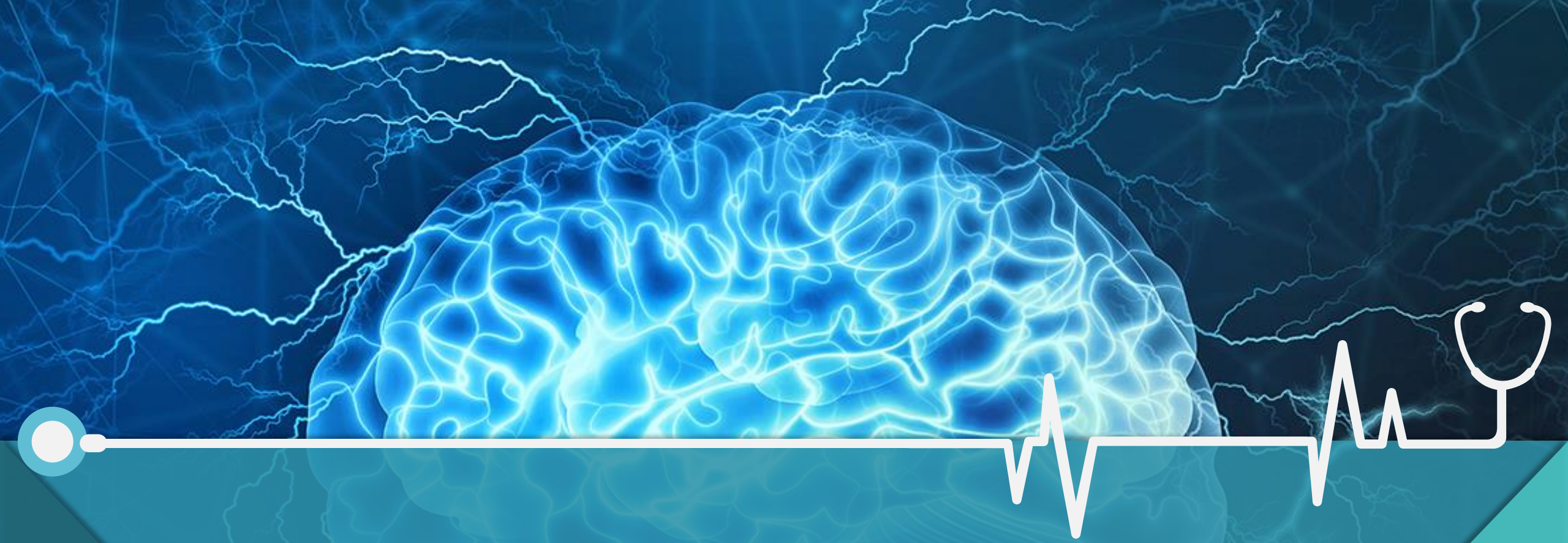
❖What does it detect ?

- Used as a neurological test of balance and coordination especially for **cerebellar lesion**



Tandem test maneuver:

- ❖ The patient walks Heel to Toe in a straight line
- ❖ Swaying while walking is sensitive but not specific for cerebellar disease



Cranial nerves

Ninja Nerd video
Cranial Nerves Exam

Geeky medics video
Cranial Nerves Exam

NERVE	CN	FUNCTION	TYPE	MNEMONIC
Olfactory	I	Smell (only CN without thalamic relay to cortex)	Sensory	Some
Optic	II	Sight	Sensory	Say
Oculomotor	III	Eye movement (SR, IR, MR, IO), pupillary constriction (sphincter pupillae), accommodation (ciliary muscle), eyelid opening (levator palpebrae)	Motor	Marry
Trochlear	IV	Eye movement (SO)	Motor	Money
Trigeminal	V	Mastication, facial sensation (ophthalmic, maxillary, mandibular divisions), somatosensation from anterior 2/3 of tongue, dampening of loud noises (tensor tympani)	Both	But
Abducens	VI	Eye movement (LR)	Motor	My
Facial	VII	Facial movement, eye closing (orbicularis oculi), auditory volume modulation (stapedius), taste from anterior 2/3 of tongue (chorda tympani), lacrimation, salivation (submandibular and sublingual glands are innervated by CN seven)	Both	Brother
Vestibulocochlear	VIII	Hearing, balance	Sensory	Says
Glossopharyngeal	IX	Taste and sensation from posterior 1/3 of tongue, swallowing, salivation (parotid gland), monitoring carotid body and sinus chemo- and baroreceptors, and elevation of pharynx/larynx (stylopharyngeus)	Both	Big
Vagus	X	Taste from supraglottic region, swallowing, soft palate elevation, midline uvula, talking, cough reflex, parasympathetics to thoracoabdominal viscera, monitoring aortic arch chemo- and baroreceptors	Both	Brains
Accessory	XI	Head turning, shoulder shrugging (SCM, trapezius)	Motor	Matter
Hypoglossal	XII	Tongue movement	Motor	Most

What are the test used to assess the following

1. **Optic (2nd) nerve**: Inspection, visual equity, visual field, color vision, direct papillary reflex, and fundoscopy
2. **Oculomotor (3rd) nerve**: extra ocular muscles movement except superior oblique and lateral rectus, Papillary consensual light reflex
3. **Tracheolar (4th) nerve**: superior oblique muscle movement
4. **Abducent (6th) nerve**: lateral rectus muscle movement
5. **Facial (7th) nerve**: inspection, facial expression, corneal reflex, eyelid closure
6. **Vestibulocochlear (8th) nerve**: Weber, Rinne, Fukuda test, Nystagmus testing

Cranial nerve reflexes

	Afferent limb	Efferent limb
Corneal	Ophthalmic nerve	Bilateral facial nerve
Lacrimation	Ophthalmic nerve	Facial nerve
Jaw jerk	Mandibular nerve	Mandibular nerve
Pupillary	Optic nerve	Oculomotor nerve
Gag	Glossopharyngeal nerve	Vagus nerve
Cough	Vagus nerve	Vagus nerve

Lower motor lesions in cranial nerves

Mnemonic: Remember the number 17

- 7 (Facial nerve) + 10 (Vagus nerve) = 17
  - Deviation to the opposite side of the lesion (Normal side).
- 5 (Trigeminal nerve) + 12 (Hypoglossal nerve) = 17
  - Deviation to the same side of the lesion.

Mnemonic: Lick your wound

- To remember that hypoglossal nerve palsy deviate the tongue to the same side

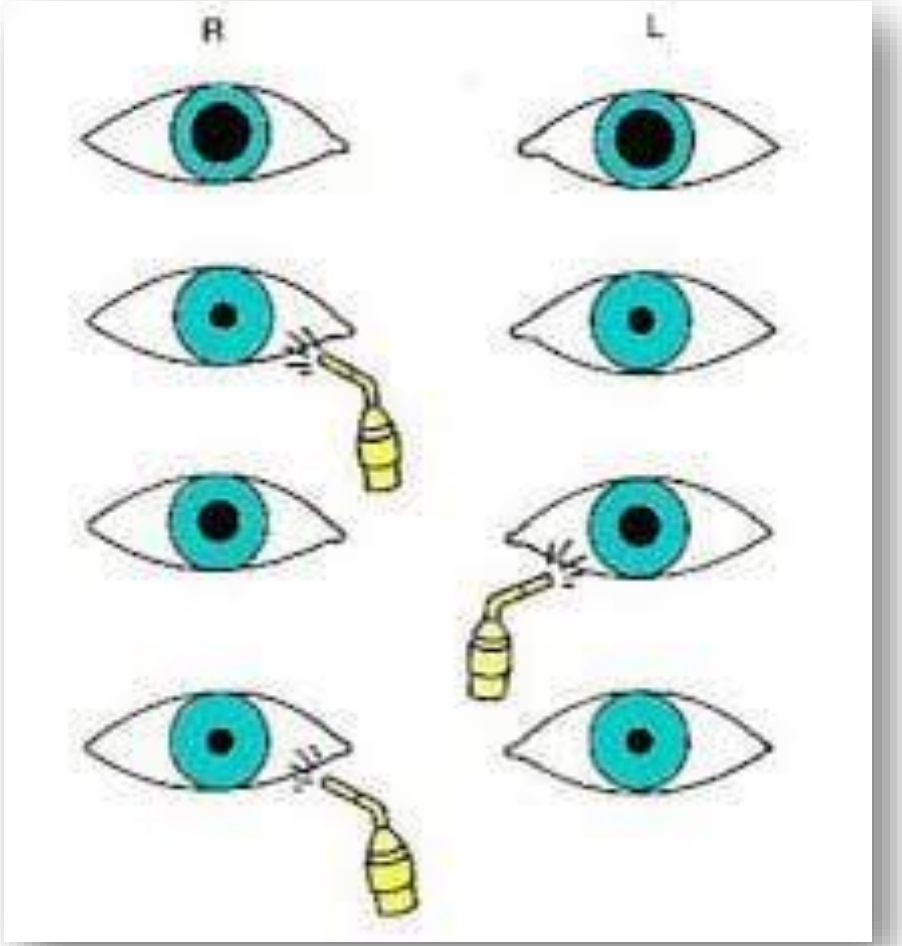
Optic (2nd) Nerve

Optic nerve assessment

1. **Inspection**: Eye redness, Ptosis, Alignment of the eyes, Pupil shape and size.
2. **Visual acuity (using Snellen chart)**:
   - Optic neuritis in MS: Early defect in visual acuity.
   - Papilledema: Late defect in visual acuity.
3. **Color vision (using Ishihara test)**:
   - Color vision is more sensitive for optic neuritis (presents as painful, blurred vision with Red Desaturation) than visual acuity.
4. **Visual field**:
   - Central visual field: Examine the Macula and the Blind spot (Compare the patient's blind spot with your blind spot, Blind spot increases in Optic neuritis and Papilledema).
   - Peripheral visual field.
   - Visual attention test to detect visual agnosia (Cortical function).
5. **Pupillary reflex**:
   - (Direct, Indirect (Consensual) reflex, also swinging light test to detect Relative afferent pupillary defect which occurs in optic neuritis).
6. **Fundoscopy**:
   - Detect Papilledema (Blurred optic disc margins) or Optic neuritis (could be Retrobulbar or Papillitis).

Pupillary light reflex

- **What is the name of this test ?**
  - Pupillary light reflex test
- **What is the affected nerve ?**
  - Left optic nerve
- **What is the afferent limb ?**
  - Optic nerve
- **What is the efferent limb ?**
  - Oculomotor nerve



What is a possible cause for this ?

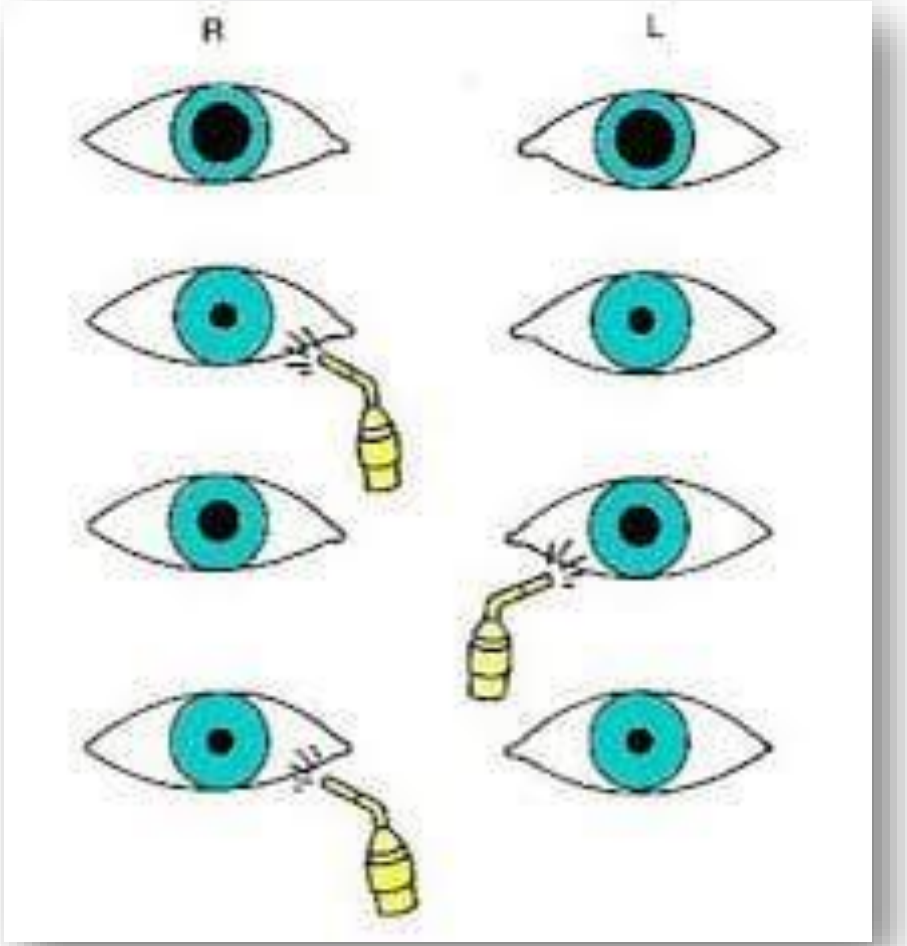
A.Right optic neuritis

B.Left optic neuritis

C.Right oculomotor palsy

D.Left oculomotor palsy

E.Horner’s syndrome



Extraocular muscles

The oculomotor (3rd), trochlear (4th), and abducens (6th) nerves

Oculomotor, Trochlear and Abducens nerves

❖**Oculomotor nerve supplies**:

1. Superior rectus: Elevation of the eyeball while Abducted
2. Inferior rectus: Depression of the eyeball while Abducted
3. Medial rectus: Adduction
4. Inferior Oblique: Extorsion (Elevation of the eyeball while adducted).
5. Ciliary body: Accommodation
6. Constrictor pupillae: Meiosis
7. Levator palpebrae superioris: Eyelid elevation , in CNIII palsy there will be complete Ptosis

❖**Trochlear nerve supplies**:

- Superior Oblique muscle: Intorsion (Depression of the eyeball while adducted)

❖**Abducens nerve supplies**:

- Lateral rectus muscle: Abduction

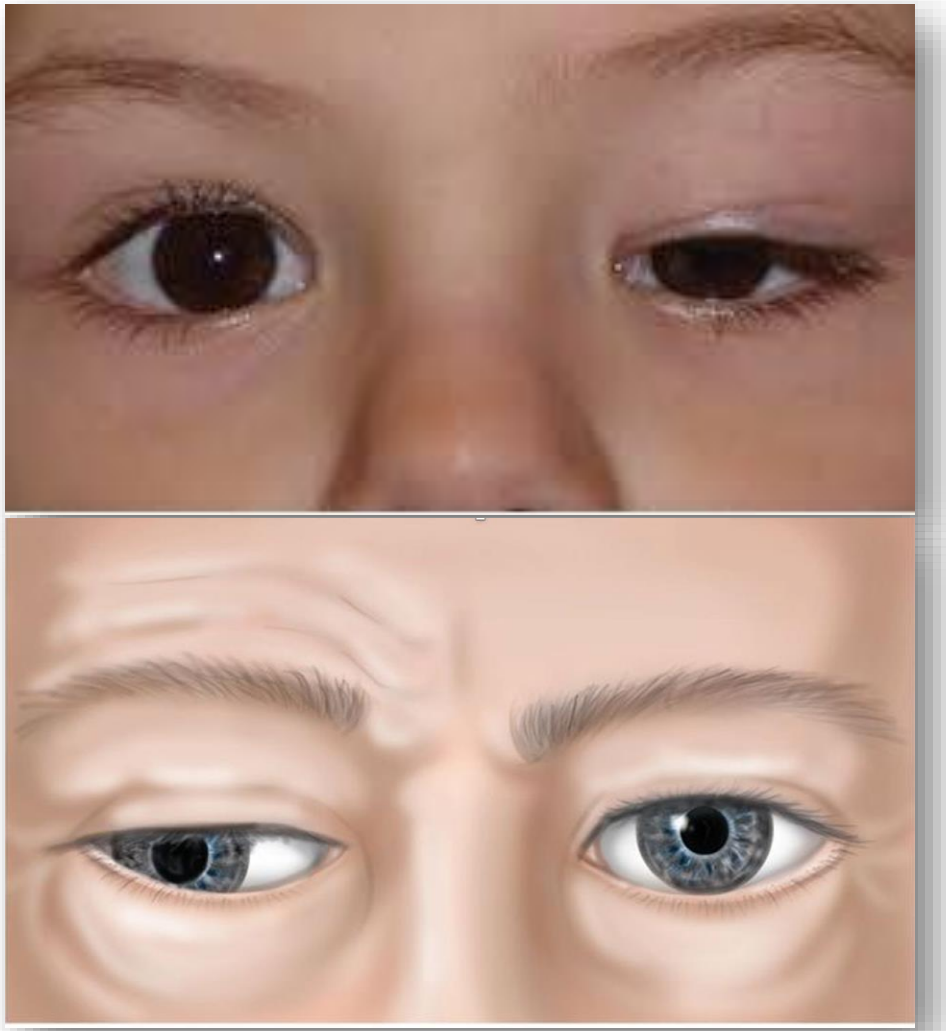
❖**Sympathetic nerves supplies**:

- Superior tarsal muscle (Muller’ muscle , slightly elevates the eyelid)
- Inferior tarsal muscle

3rd nerve

❖**Which of the following is wrong about this palsy ?**

a. Eye down due to superior rectus weakness
b. Eye out due to medial rectus weakness
c. Ptosis due to muller weakness
d. Mydriasis due to constrictor pupillae weakness
e. Decreased accommodation due to ciliary body weakness

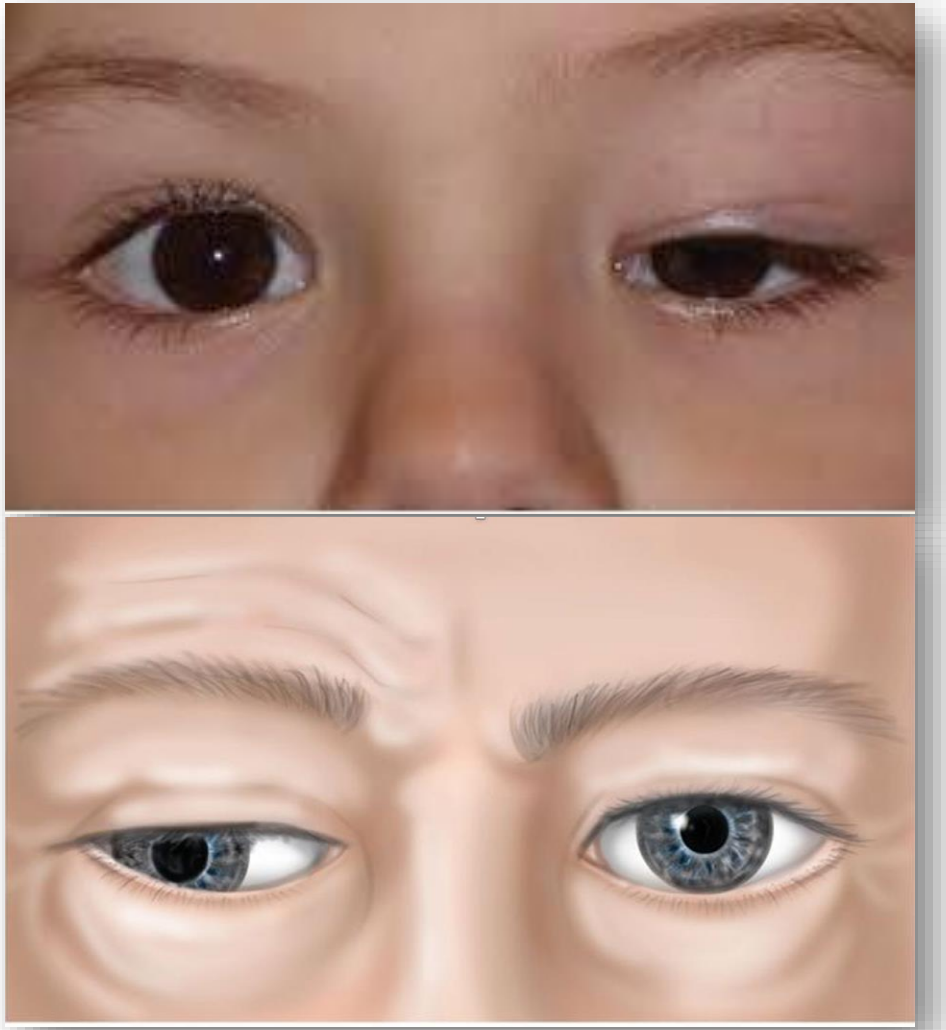


الأرشيف مكتوب فقط الإجابة باقي الخيارات من عندي

شرح

3rd nerve

- **Function**: (Things to exam) سنوات (1)
  - Moves the eye (Up, down, medially, and superior rotation)
  - Elevates eyelid
  - Pupillary constriction (Pupillary light reflex)
- **Nerve palsy**:
  - Eye down, out, pupil dilated, ptosis
  - **Medical 3rd palsy**: Non traumatic pupil-sparing oculomotor nerve palsy
  - **Surgical 3rd palsy**: pupil-affecting oculomotor nerve palsy



3rd nerve

❖To exclude oculomotor nerve lesion what do you examine and what are the abnormal findings

Structure examined	Abnormal finding
Extraocular muscles	Eye shifted down and out (due to unopposed action of SO and LR)
Sphincter pupillae	Mydriasis
Levator palpebrae superiors	Ptosis
Accommodation reflex	Absent accommodation reflex
Light reflex	Absent pupillary construction

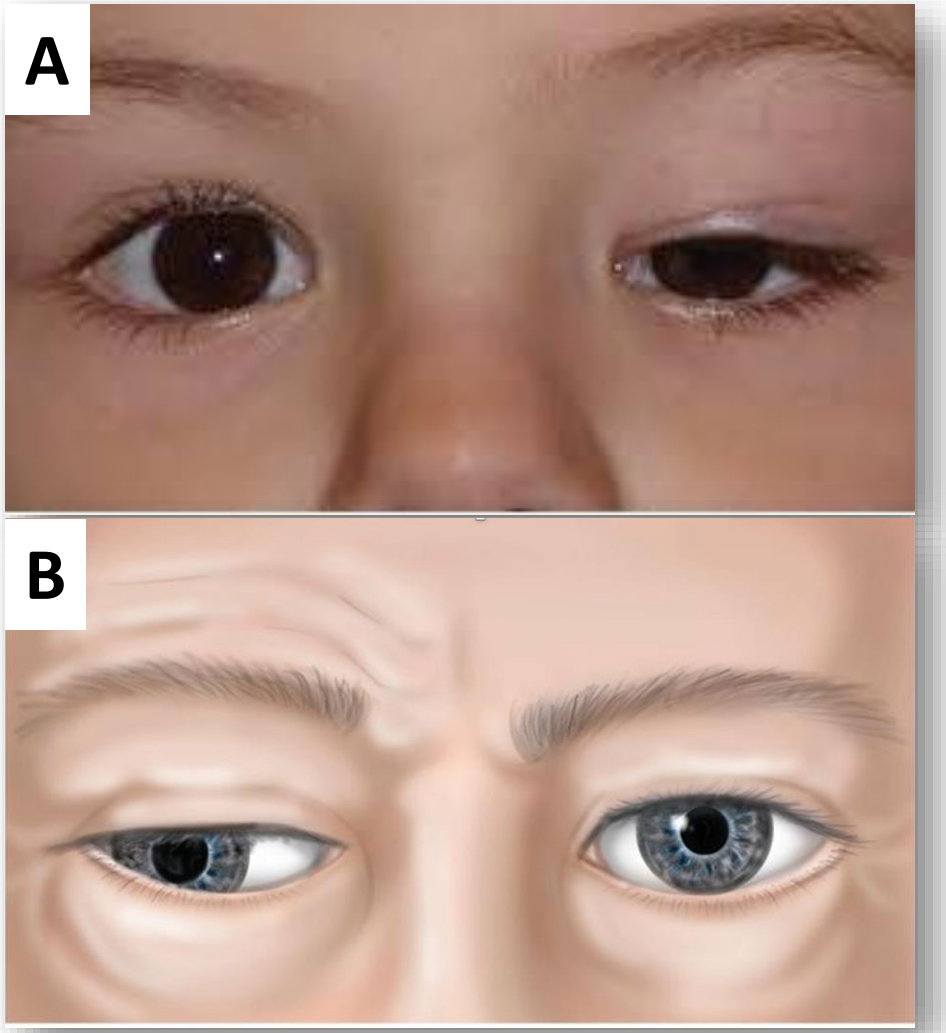
MCQ – 3rd nerve

سنوات (2)

- **What is this abnormality and where is the lesion in "A"?**
  - Ptosis, oculomotor nerve CN III

سنوات (1)

- **Patient presented with downward and outward pupils and intact pupillary reflex, as seen in "B" diagnosis:**
  a. medical 3rd nerve palsy
  b. surgical 3rd nerve palsy
  c. Horner's syndrome
  d. Trochlear nerve palsy
  e. Abducens nerve palsy



MCQ – 3rd nerve

فاينل (2)

❖ **A patient was found to have right relative afferent pupillary defect. Which of the following is true ?**

a. Right complete optic nerve injury
b. Right partial optic nerve injury
c. Right complete oculomotor nerve injury
d. Right partial oculomotor nerve injury
e. None of the above correctly describe the patient finding

فاينل (1)

❖ **3rd nerve examination may include all of the following except ?**

a. Ptosis assessment
b. Pupillary light reflex
c. Accommodation reflex
d. Corneal reflex
e. Eye movements examination

MCQ – 3rd nerve (continued)

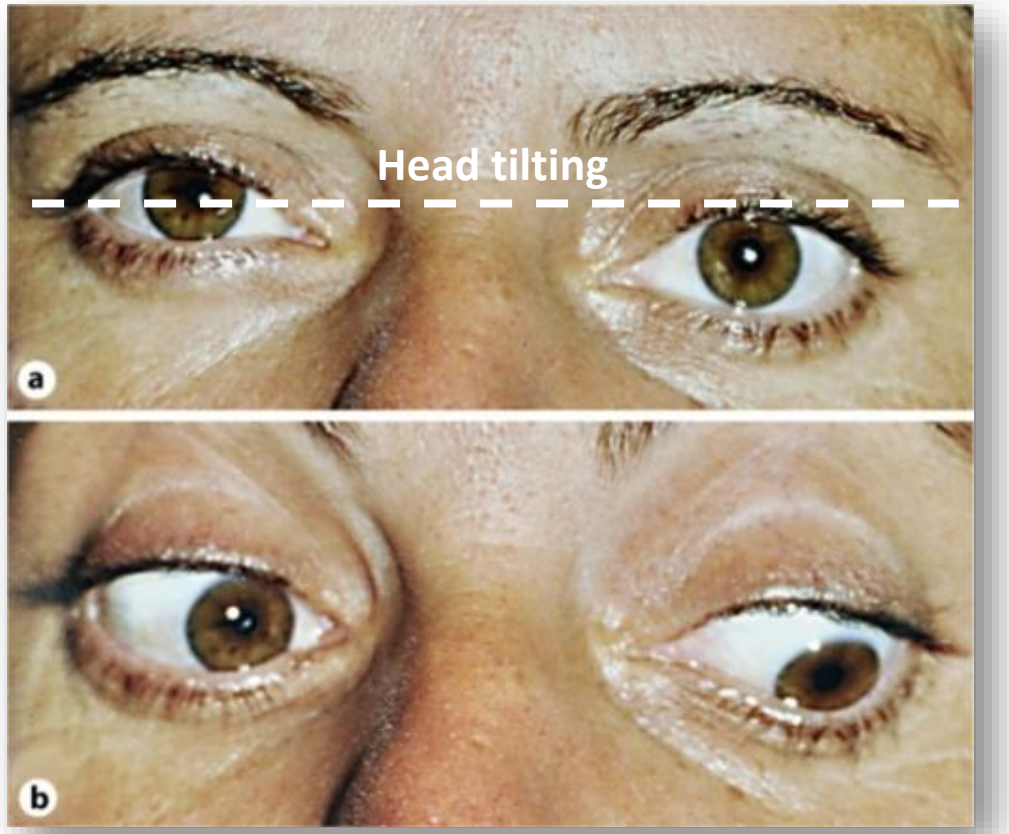
فاينل (3)

❖ **Medical third nerve palsy can be distinguished from surgical third palsy by ?**

a. Ptosis
b. The affected eye is down and out position
c. Preserved pupillary reflex
d. Dilated pupils
e. Presence of other chronic diseases

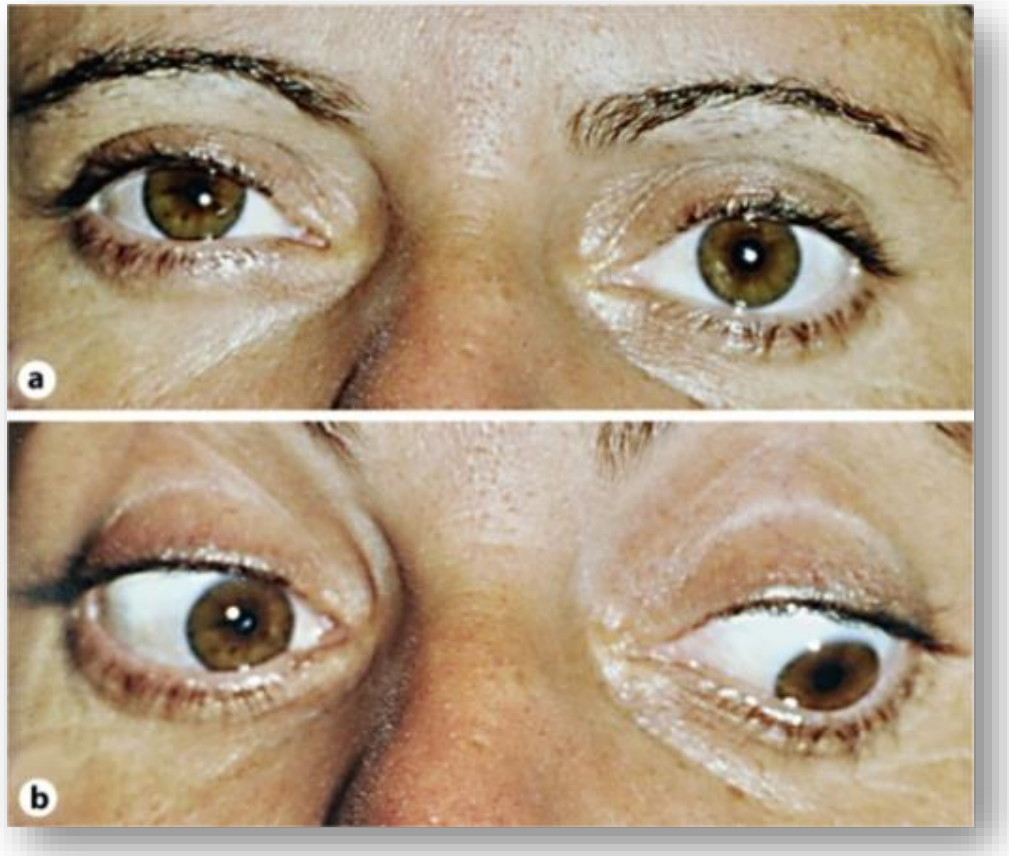
4th nerve

- Smallest cranial nerve
- Supplies the superior oblique muscle
- **Palsy symptoms**:
  - Diplopia
  - Eye tilted outward
  - Unable to look down/in (stairs, reading)
  - Head tilting away from affected side (to compensate)



4th nerve

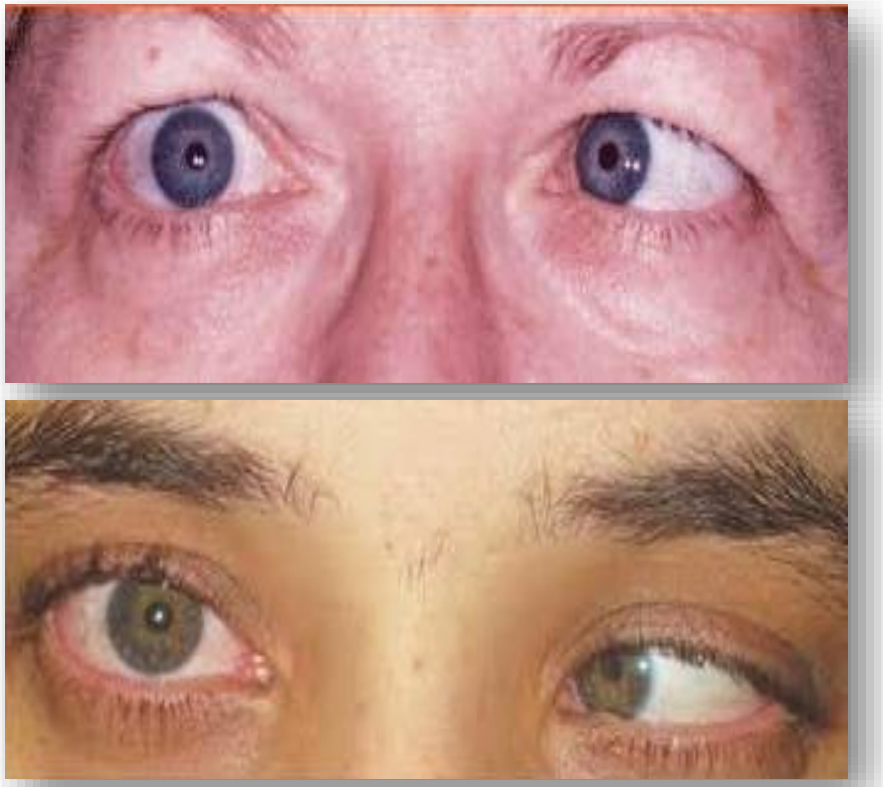
- **The right eye is abnormal, which nerve is affected?**
  - Right Trochlear nerve (CN IV)
- **Mention one cause of nerve lesion ?**
  - Acquired
    - Microvascular damage (diabetes, hypertension, arteriosclerosis)
    - Cavernous sinus thrombosis
    - Trauma
  - Congenital: fourth nerve palsy



6th nerve

- The patient was asked to look to the right

- **Which nerve is affected and on which side?**
  - Right abducent nerve
- **Which muscle or group of muscles are affected ?**
  - Right lateral rectus
- **Palsy symptoms**:
  - Diplopia
  - Can’t laterally move (look out) affected eye



6th nerve

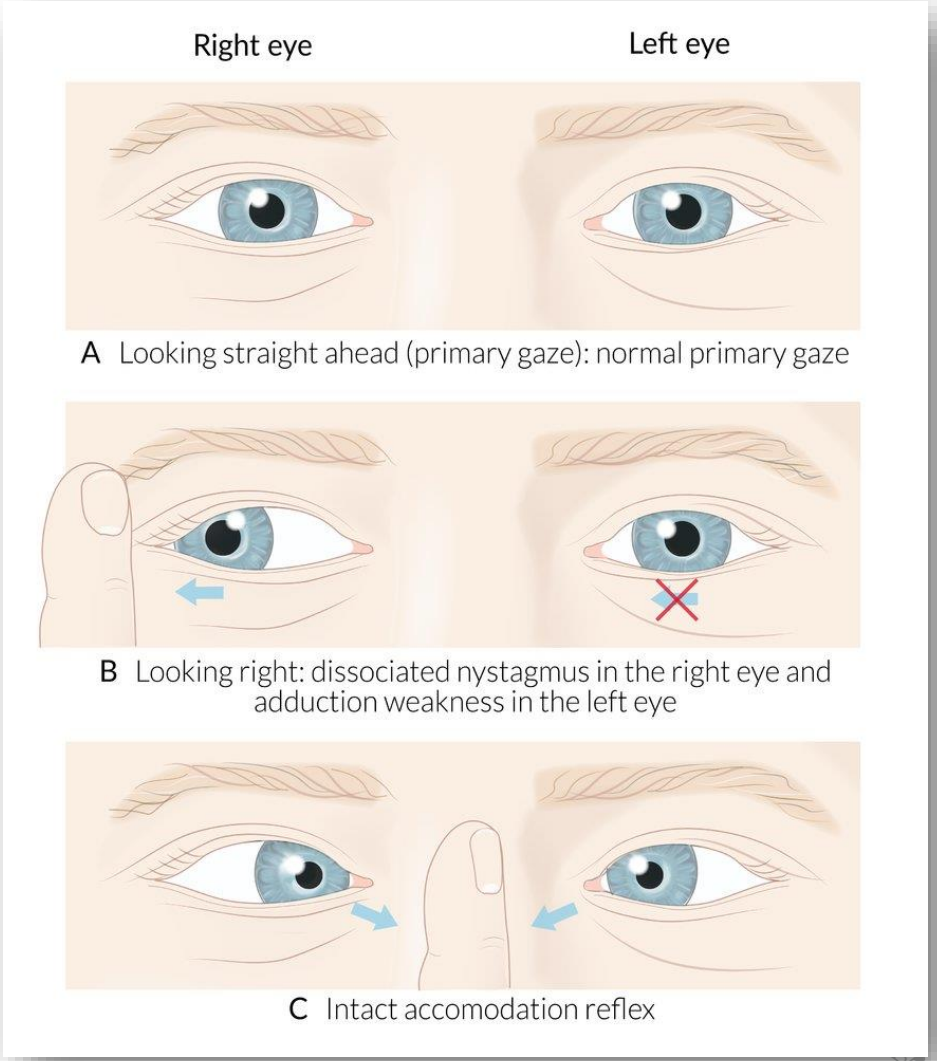
- The patient was asked to look to the right

❖This lesion can be in one of the following except ?

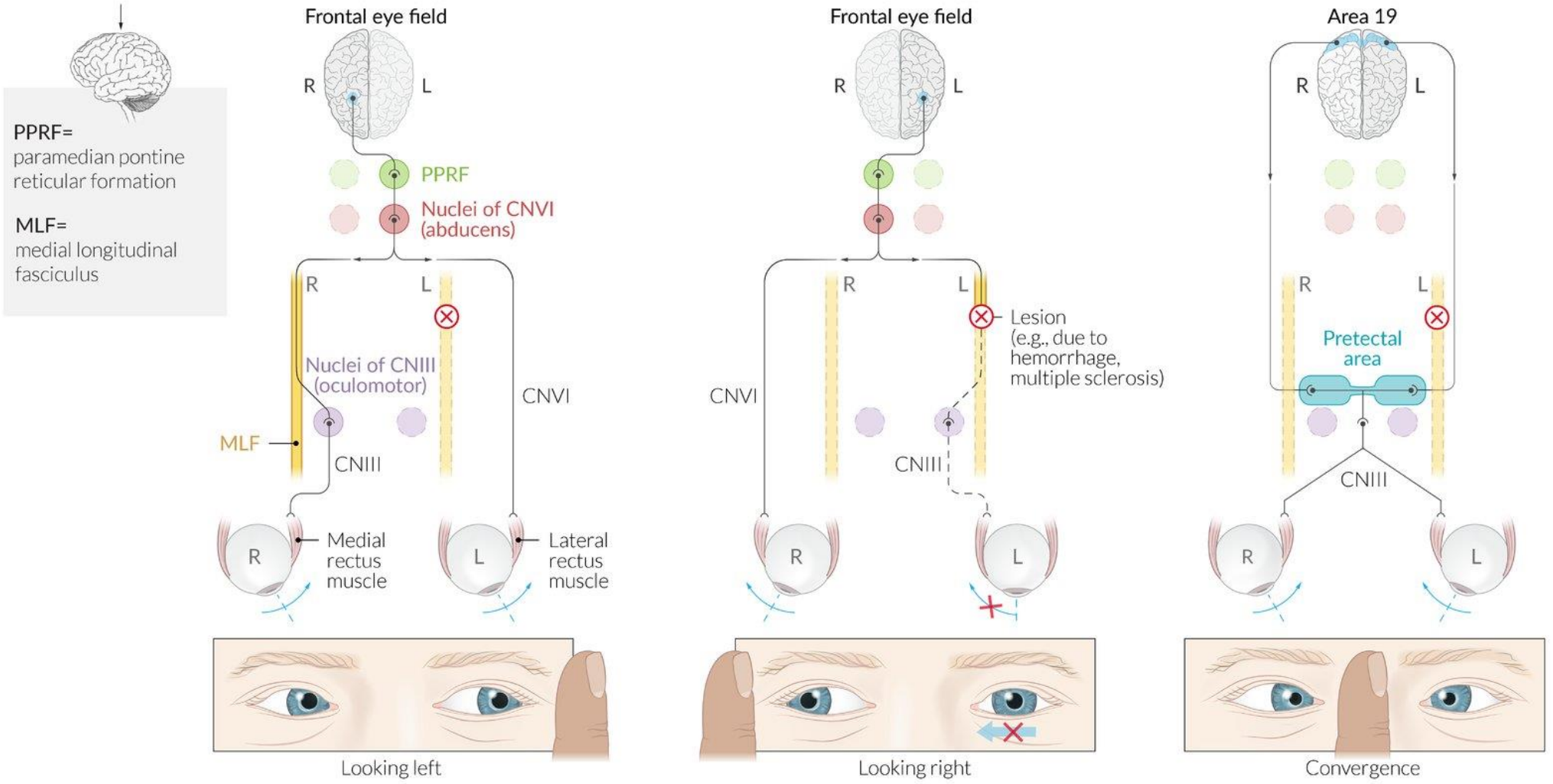
a. Right medial rectus
b. Left medial rectus
c. Myasthenia gravis
d. Space-occupying lesion
e. Increased ICP

Internuclear ophthalmoplegia

- **Definition**: Damage to the medial longitudinal fasciculus
- **Common etiology**: Multiple sclerosis (typically bilateral), hemorrhage
- **Clinical findings**:
  - Adduction limited in horizontal eye movements
  - Adduction is retained in convergence reaction
  - Dissociated nystagmus: gaze to the opposite side → nystagmus of the abducted contralateral eye

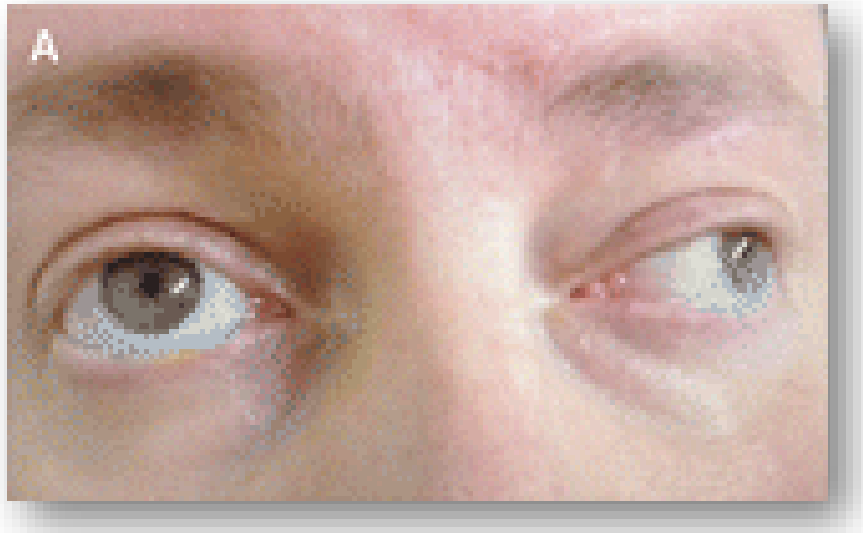


Internuclear ophthalmoplegia



Internuclear ophthalmoplegia

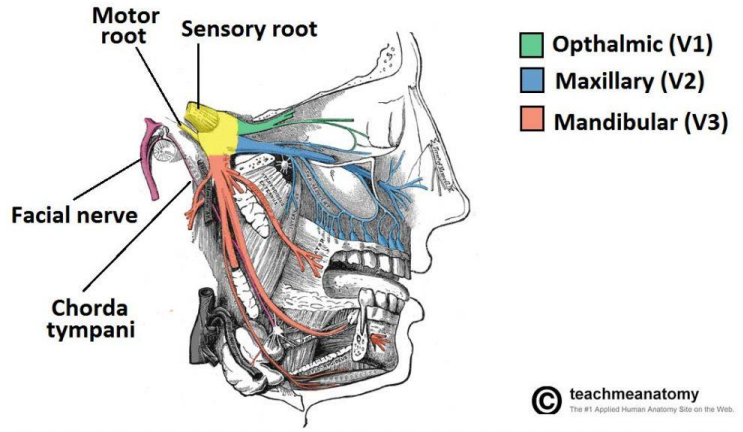
- During lateral gaze test, the patient left eye developed nystagmus
- **Where is the lesion and which side ?**
  - Right medial longitudinal fasciculus

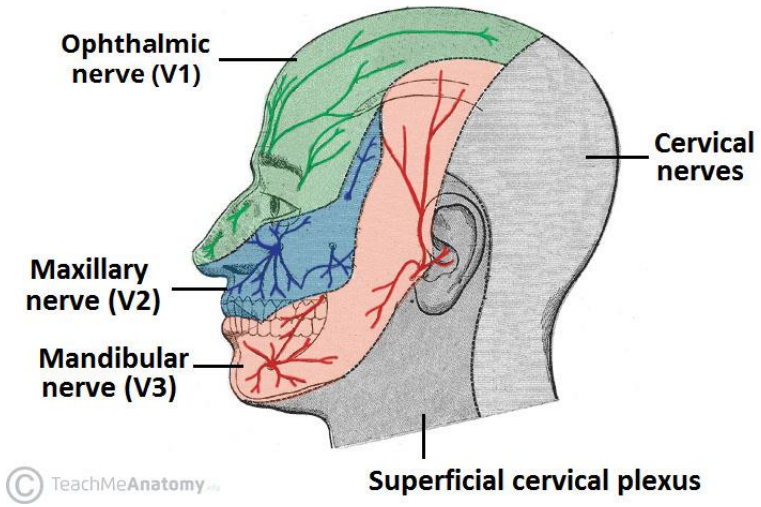


Trigeminal (5th) Nerve

Trigeminal nerve

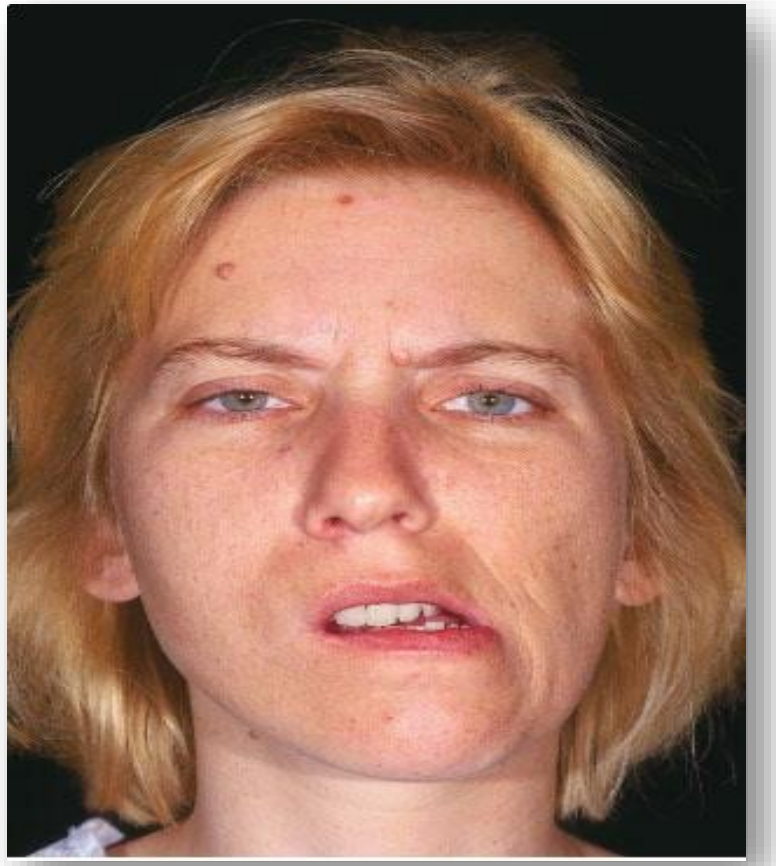
- **Palsy symptoms**:
  - Numb face
  - Weak jaw ⟶ deviates to affected side
    - Unopposed action of normal side
  - Trigeminal neuralgia
    - Recurrent, sudden sharp pains in half of face
    - **Treatment**: Carbamazepine
- **Corneal Reflex**:
  - Touch eye with Q-tip
  - **Afferent limb**: Ophthalmic nerve
  - **Efferent limb**: Facial nerve





Mandibular nerve palsy

- **What is the affected muscle ?**
  - Left pterygoid muscle
- **What is the abnormality ?**
  - Left jaw deviation
- **Where is the lesion ?**
  - Mandibular branch of trigeminal nerve CN V on the same side



Jaw jerk reflex test

- **What is the name of the test**
  - Jaw-jerk test
- **What nerve dies it assist ?**
  - Mandibular branch of the trigeminal nerve

MCQ – Trigeminal nerve

❖**Trigeminal nerve examination may include all of the following except ?**

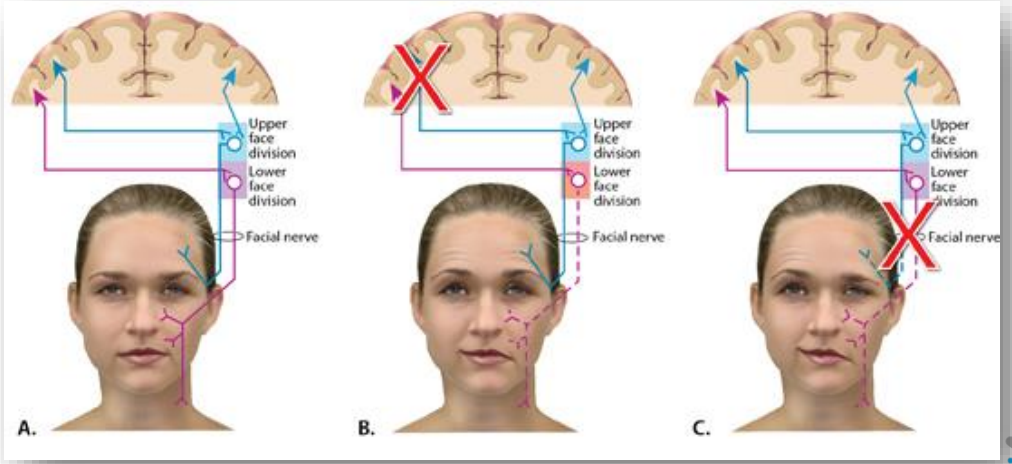
a. Pupillary reflex
b. Somatic sensation from the tongue
c. Jaw movement
d. Corneal reflex
e. Jaw reflex

Facial (7^{th}) nerve

Facial nerve

- Have both motor, sensory
- Muscles of facial expression
- Taste, salivation, lacrimation
- Some ear muscles
- **Palsy**:
  - Loss of corneal reflex (motor part)
  - Loss of taste anterior 2/3 tongue
  - Hyperacusis (stapedius paralysis)
    - Pt cannot tolerate sounds

- Special feature:
  - Dual UMN innervation
  - UMN damage (MCA Stroke)
    - Upper face intact (dual supply)
    - Lower face affected
  - LMN damage
    - Whole half of face affected



MCQ

❖**Which of the following manifestations this patient might have ?**

A. Tongue deviation
B. Loss of facial sensation the left side
C. Loss of taste sensation on the left side
D. Palate drop
E. Hyperreflexia of jaw

❖**Which of the following manifestations this patient might have ?**

A. Tongue deviation
B. Loss of facial sensation the left side
C. Loss of stapedial reflex in left side
D. Palate drop
E. Hyperreflexia of jaw

MCQ

❖**Which of the following <u>can not be found</u> in this patient ?**

A. Loss of taste sensation
B. Loss of facial sensation
C. Left ear vesicles
D. Excessive lacrimation
E. Impairment in hearing

سنوات (7)

Facial nerve

سنوات (5)

❖**What is your diagnosis and which side is affected ?**

- Facial nerve palsy, Left side

سنوات (2)

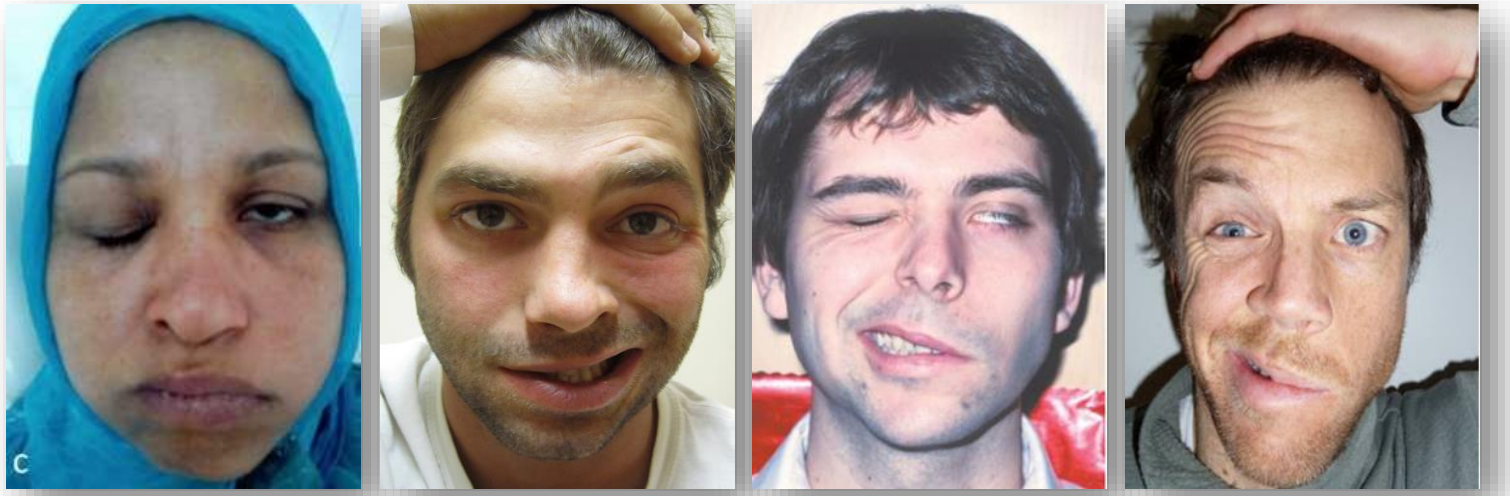
❖**What should you inspect, that may affect your management?**

- External ear and mouth for Ramsay hunt syndrome

سنوات (1)

❖**How would you treat this patient ?**

- Corticosteroid, acyclovir, analgesia, protect the exposed eye (artificial tears taping the eye lid down, Lubricants)



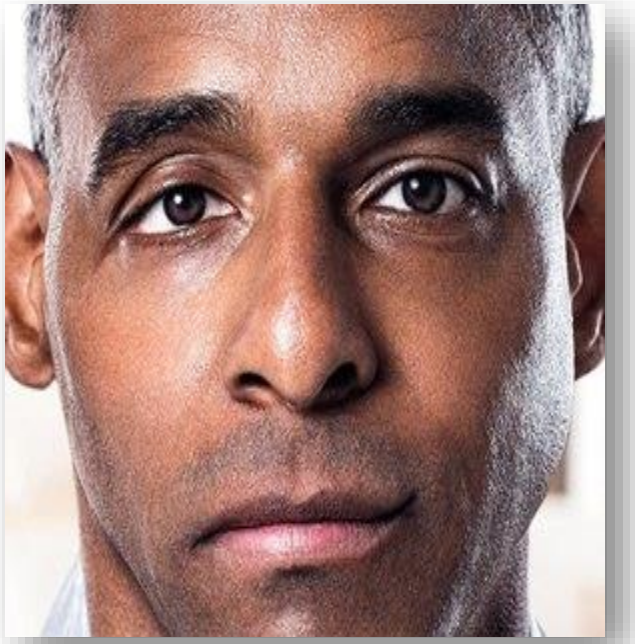
Facial nerve

❖What is the abnormality ?

- Bell's palsy

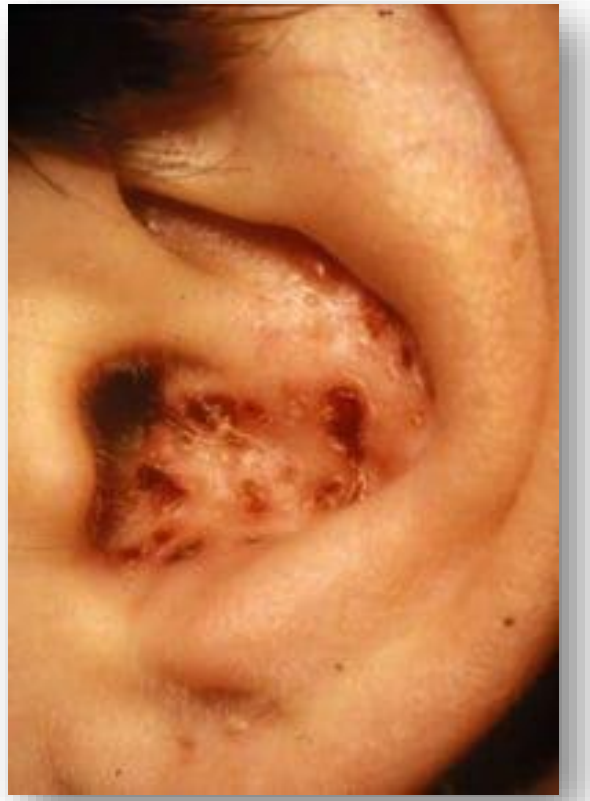
❖What is the treatment ?

1. Injections or oral medications are improving the outcome and prognosis
2. Eye protection (a patch and eye drops preventing the eye from getting dry and developing keratitis)
3. Exercises of the affected muscles may improve the progress
4. Surgical decompression is generally not recommended



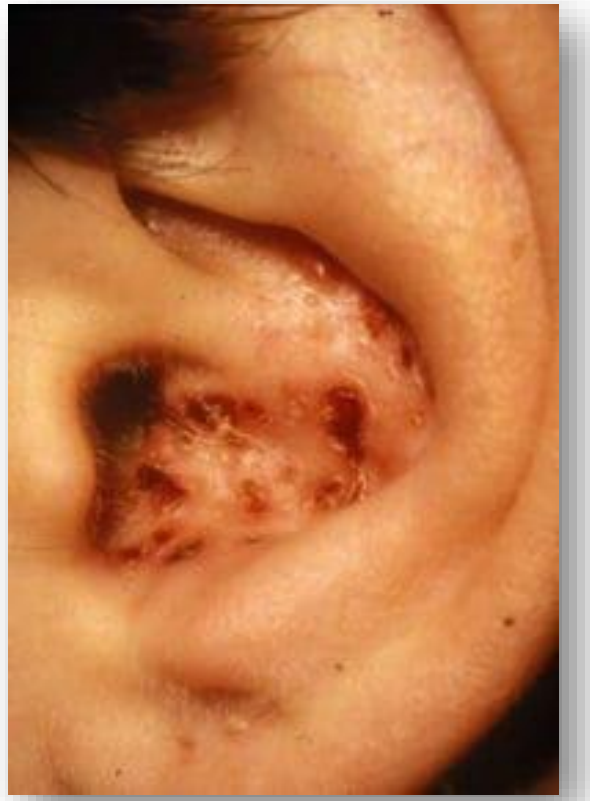
Ramsay hunt syndrome

- **what should you examine ?**
  - Facial nerve
- **If what you have examine was abnormal, what is your diagnosis ?**
  - Ramsay hunt (herpes zoster oticus)



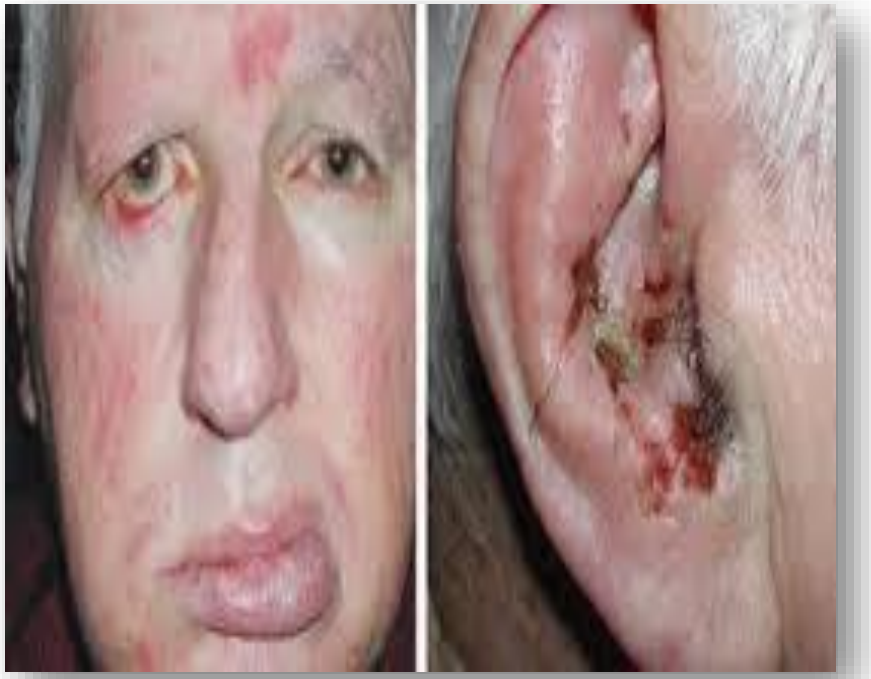
Which is of the following is wrong

a. This condition is known as Ramsay Hunt Syndrome
b. The geniculate ganglion can be affected in this disease
c. Cytomegalovirus can cause this condition
d. Other cranial nerves can be also be involved
e. Treated with antivirals



Ramsay hunt syndrome

- **What is your diagnosis ?**
  - Ramsay Hunt Syndrome, Herpes Zoster Oticus infection of the geniculate ganglion
- **What is the pathophysiology of this disease ?**
  - Reactivation of VZV in the geniculate ganglion, affecting the seventh (facial) and eighth (vestibulocochlear) cranial nerves



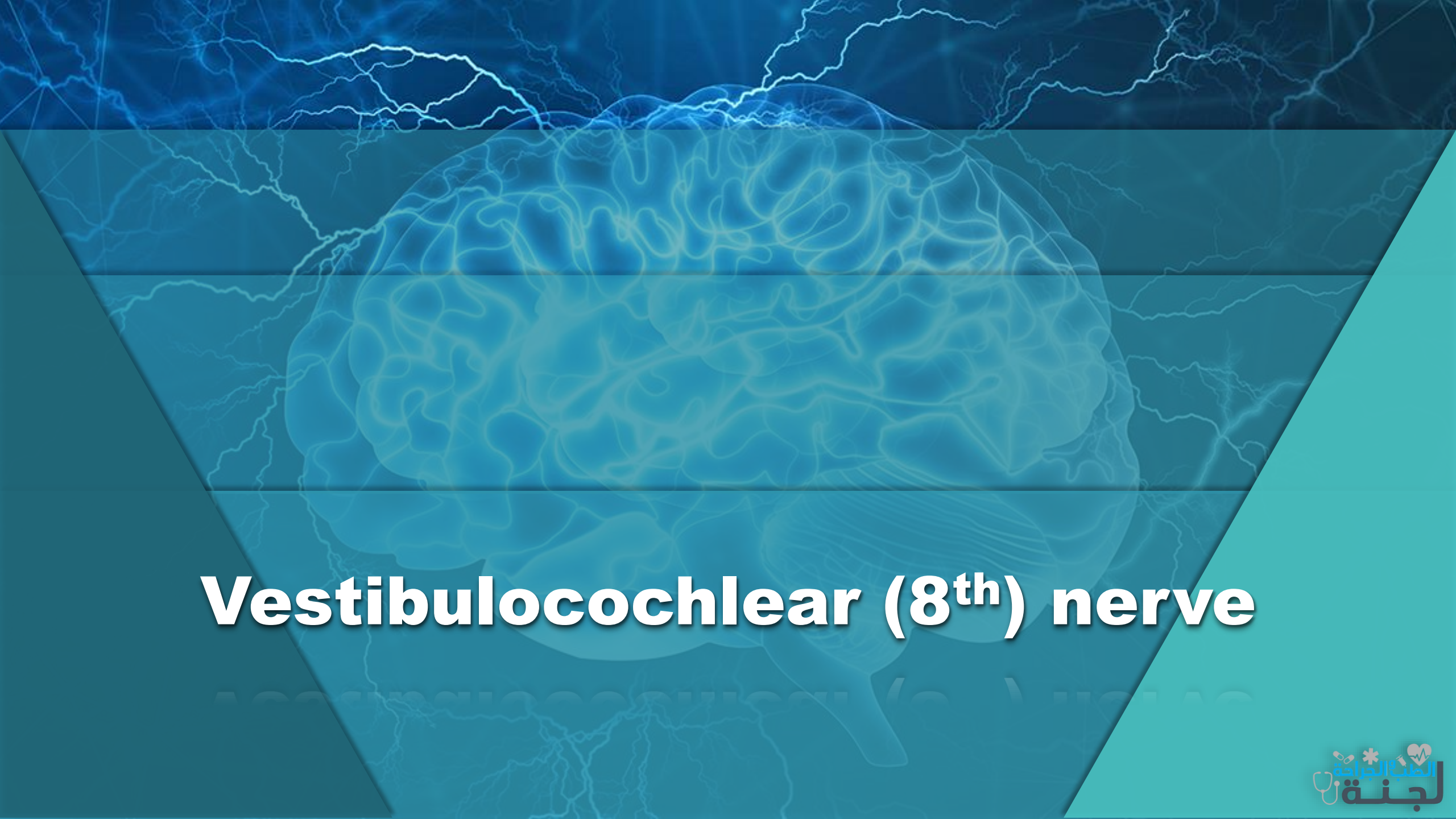
Herpes zoster oticus

- **Clinical features**:
  - Unilateral LMNL facial palsy (VII) nerve
  - Vesicle in external auditory meatus
  - Severe ear pain + vertigo
  - Loss of taste at ant 2\3 of tongue
- **Diagnosis**: physical exam
- **Treatment**:
  1. Antiviral drugs. acyclovir
  2. Corticosteroids. high-dose prednisone
  3. Anti-anxiety medications diazepam
  4. Pain relievers

Facial nerve

❖**Facial nerve examination may include all of the following except ?**

a. Taste sensation from the tongue
b. Jaw reflex
c. Corneal reflex
d. Lacrimation reflex
e. Eye closing



Vestibulocochlear (8th) nerve

Vestibulocochlear nerve

- **Cochlear nerve**:
  - Whisper test from behind.
  - Weber + Rinne test.
- **Vestibular nerve**:
  - Fukuda test.
  - Nystagmus testing.
- **Nystagmus**:
  - **Definition**: involuntary, repetitive, and twitching movement of one or both eyes
  - **Classification**:
    - Jerk nystagmus
    - Pendular nystagmus

Nystagmus Classification

1. **Jerk nystagmus**:
   - A slow movement of the eyes towards a defined direction followed by a fast, corrective movement backward (the name of the nystagmus is determined by the direction of movement in the fast phase, i.e., left-beating, right-beating, downbeat, upbeat)
   A. **End-gaze nystagmus**: a physiological horizontal jerk nystagmus caused by maintenance of extreme eye position
   B. **Horizontal nystagmus**: a type of jerk nystagmus in which the eyes move horizontally
   C. **Vertical nystagmus**: a type of jerk nystagmus in which the eyes move vertically
   D. **Torsional nystagmus**: a type of jerk nystagmus with rotary oscillations of the eye along its anteroposterior axis (clockwise, counterclockwise)
   E. **Mixed nystagmus**: a mixed pattern of different types of jerk nystagmus
2. **Pendular nystagmus**:
   - A type of nystagmus defined by sinusoidal oscillating movements of one or both eyes
   - Often related to multiple sclerosis
   - Always considered pathological

Nystagmus

- **Patient look to right, fast phase of nystagmus to left, what the type of nystagmus ?**
  A. Right jerky nystagmus.
  B. Left jerky nystagmus.
  C. Right pendular nystagmus.
  D. Left pendular nystagmus.
  E. Multidirectional nystagmus.
- **Patient look to left, fast phase of nystagmus to right, what the type of nystagmus ?**
  A. Left jerky nystagmus.
  B. Right jerky nystagmus.
  C. Right pendular nystagmus.
  D. Left pendular nystagmus.
  E. Multidirectional nystagmus.

Nystagmus

❖ **Patient look to right, fast phase of nystagmus to left, patient look to right again, fast phase of nystagmus to right, what the type of nystagmus ?**

a. Left jerky nystagmus.
b. Right jerky nystagmus.
c. Right pendular nystagmus.
d. Left pendular nystagmus.
e. Multidirectional nystagmus.

Vagus (10th) nerve

Vagus nerve

- **Palsy symptoms**:
  - Hoarseness, dysphagia, dysarthria
  - Loss of gag reflex
  - Loss of sensation pharynx and larynx
  - Weak side of palate collapses (lower)
  - Uvula deviates AWAY from affected side

سنوات (5)

Vagus nerve palsy

سنوات (5)

❖What do you see ?

- Uvula deviation to the left

سنوات (5)

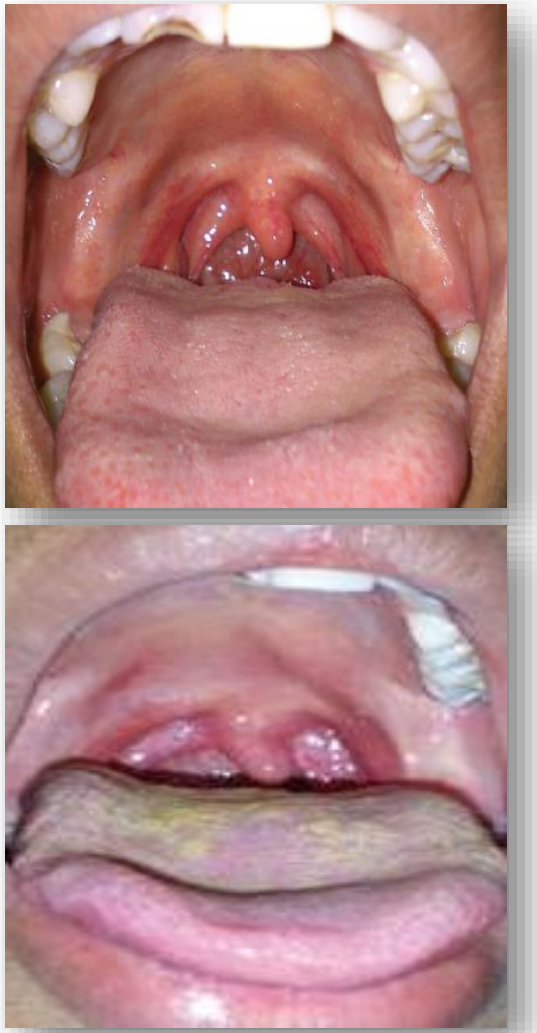
❖Where is the lesion ?

- Vagus nerve CN X on the right side

سنوات (1)

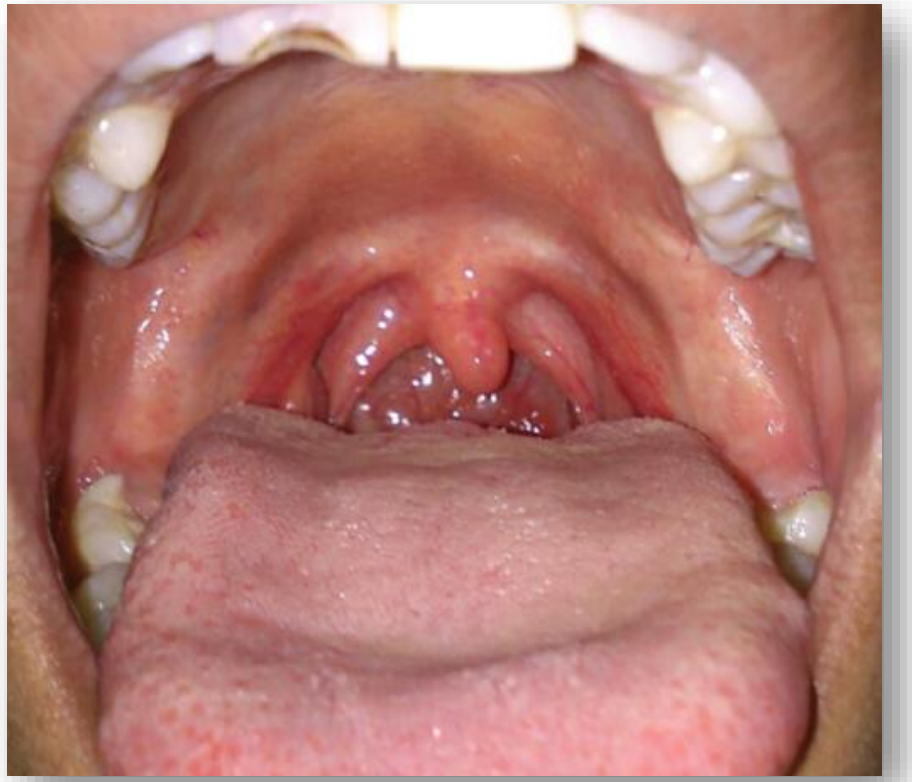
❖What is your management ?

- Expectant management
- Voice therapy
- Laryngeal framework surgery
- Thyroplasty
- Injection laryngoplasty



Which of the following can not be found in this patient ?

a. Hoarseness
b. Dysphagia
c. Loss of gag reflex
d. Palate collapse
e. Nasal regurgitation of food
f. Diplopia
g. Absent jaw reflex
h. Loss of taste sensation in the posterior 1/3 of the tongue



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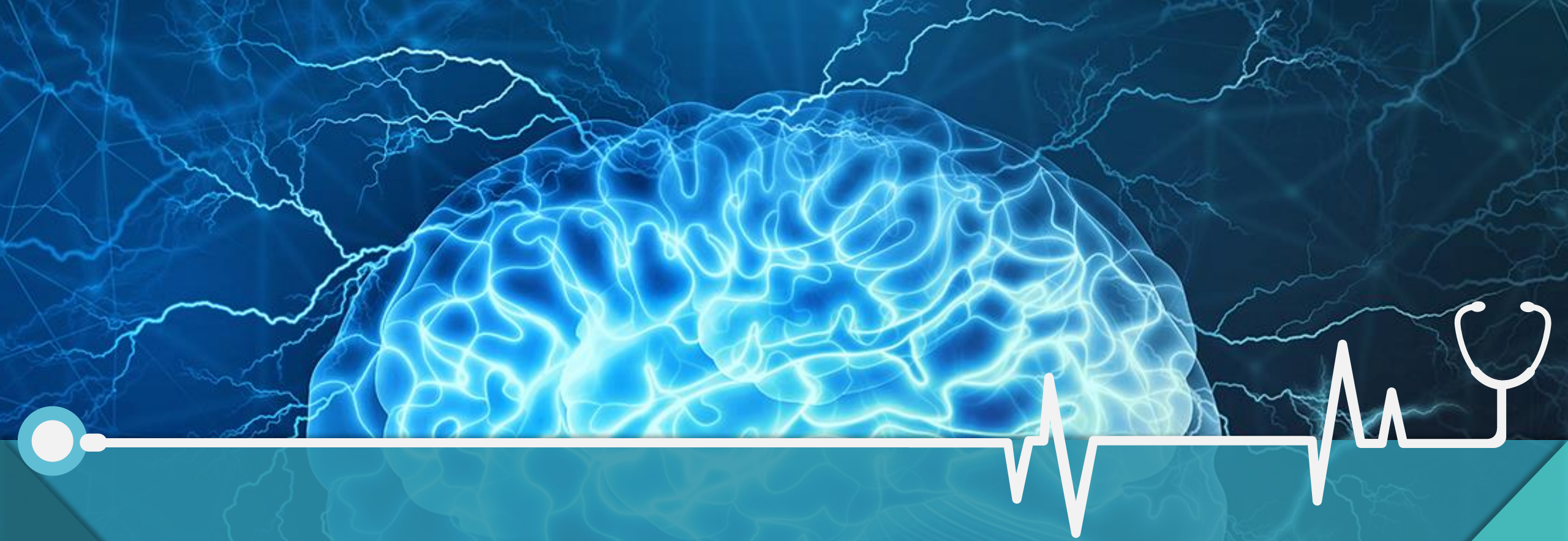


Sensorimotor examination

Sensory and motor

Sensory

- Fine/Deep touch (Touch with Localization): Dorsal column > Gracile and Cuneate tracts
- Crude/Light touch (Touch without Localization): Ventral column > Spinothalamic tract
- Pain and Temperature: Lateral column > Spinothalamic tract
- Pressure and Vibration: Dorsal column > Gracile and Cuneate tracts
- Proprioception (Joint position): Dorsal column > Gracile and Cuneate tracts

Motor

- Inspection:
  - Muscle wasting
  - Scapula winging
  - Foot drop and wrist drop
  - Erb's palsy and Klumpke Palsy
  - Deformities (e.g., clawing)
  - Fasciculations
- Muscle tone
- Muscle power
- Muscle reflexes
- Coordination

MCQ – Sensorimotor examination

فاينل (1)

❖ All of the following are part of the motor examination except:

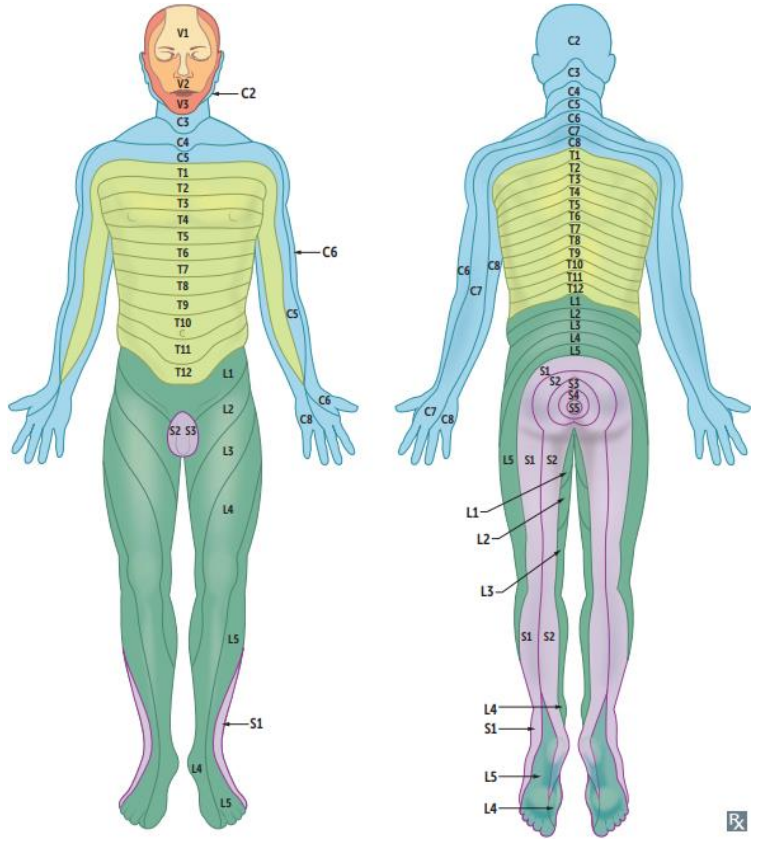
a. Power
b. Reflexes
c. Coordination
d. Vibration
e. Tone

Upper limb

Sensory and Motor assessment

Dermatomes of the upper limb

- Anterolateral part of the forearm: C5
- Anteromedial part of the forearm: T1
- Lateral part of the forearm & the thumb: C6
- Posterior part of the forearm & Index and middle fingers: C7
- Medial part of the forearm & ring and little fingers: C8



شرح

Overview of cervical radiculopathies

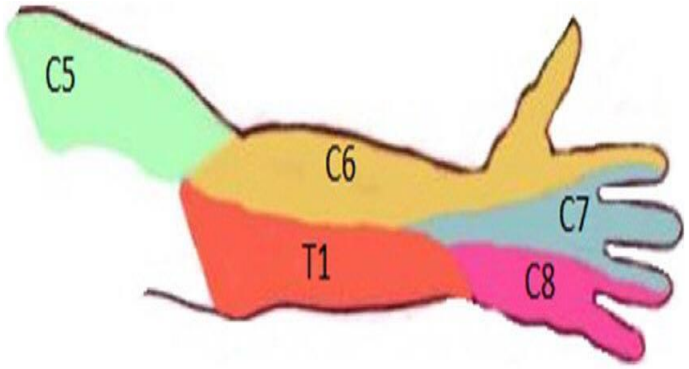
Overview of cervical radiculopathies [9]				
Radiculopathy	Causative disk	Sensory deficits	Motor deficits	Reduction of reflexes
C3/4 radiculopathy	• C2–C4	• Shoulder and neck area	• **Scapular winging**	• None
C5 radiculopathy	• C4–C5	• Anterior shoulder	• Biceps and deltoid	• Biceps reflex
C6 radiculopathy	• C5–C6	• From the upper lateral elbow over the radial forearm up to the thumb and radial side of index finger	• Biceps and wrist extensors	• Biceps reflex • Brachioradialis reflex
C7 radiculopathy	• C6–C7	• Palmar: fingers II–IV (II ulnar half, III entirely, IV radial half) • Dorsal: medial forearm up to fingers II–IV	• Triceps, wrist flexors, and finger extensors	• Triceps reflex
C8 radiculopathy	• C7–T1	• Fingers IV (ulnar half) and V, hypothenar eminence, and ulnar aspect of the distal forearm	• Finger flexors	• None

Radiculopathies of the upper limb

سنوات (5)

❖**Sensation loss over thumb and lateral part of forearm, where is the lesion ?**

a. C5 radiculopathy
b. C6 radiculopathy
c. C7 radiculopathy
d. C8 radiculopathy
e. T1 radiculopathy



سنوات (2)

❖**Sensation loss over the specified area, where is the lesion ?**

a. C5 radiculopathy
b. C6 radiculopathy
c. C7 radiculopathy
d. C8 radiculopathy
e. T1 radiculopathy

Radiculopathies of the upper limb

فاينل (2)

➢ A patient had shoulder trauma, he was found to have flaccid paralysis of the right hand with miosis and ptosis

❖ **Which of the following nerve roots is involved in his injury ?**

a. C5
b. C6
c. C7
d. C8
e. T1

فاينل (1)

➢ Paresthesia at 4th and 5th fingers, medial forearm, and arm

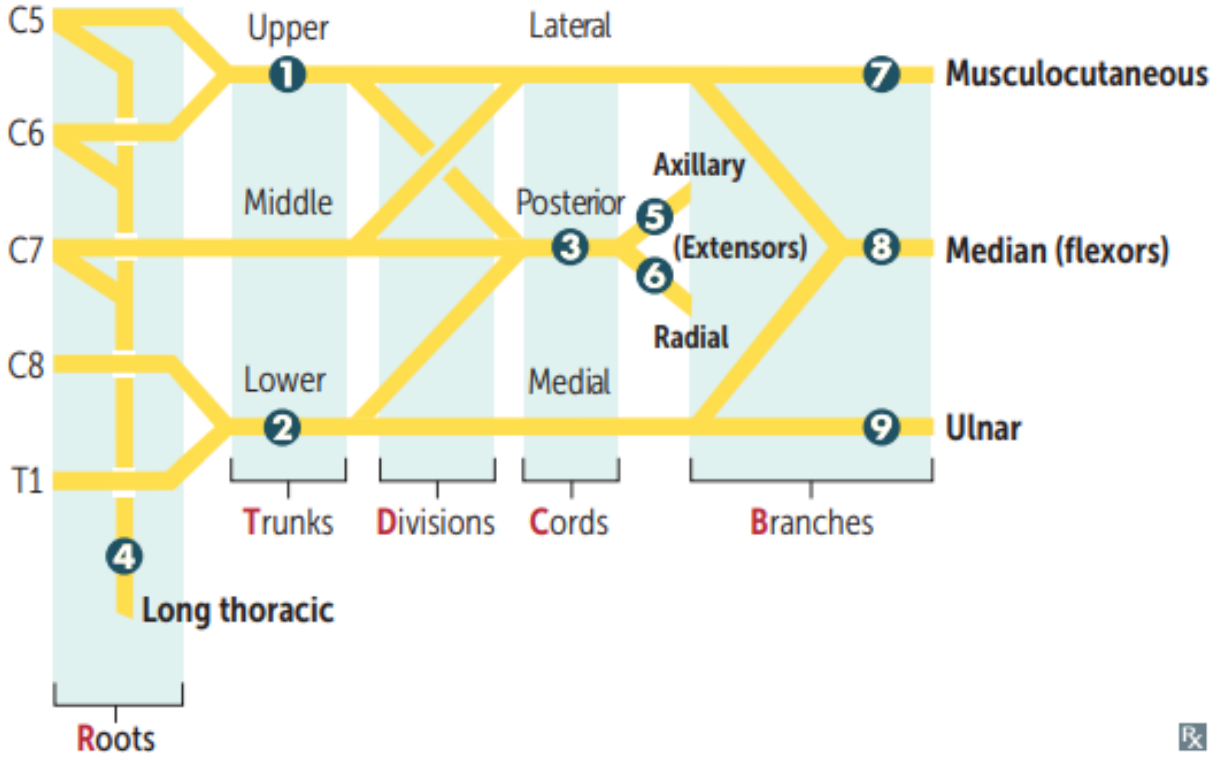
❖ **Disc prolapse at what level is the cause of this paresthesia ?**

- Disc prolapse at C7-T1 (not ulnar nerve palsy)

Brachial plexus lesions

Brachial plexus lesions

1. Erb palsy ("waiter's tip")
2. Klumpke palsy (claw hand)
3. Wrist drop
4. Winged scapula
5. Deltoid paralysis
6. "Saturday night palsy" (wrist drop)
7. Difficulty flexing elbow, variable sensory loss
8. Decreased thumb function, "hand of benediction"
9. Intrinsic muscles of hand, claw hand



Divisions of brachial plexus:

Remember
To
Drink
Cold
Beer

Trunks of brachial plexus and the subclavian artery pass between anterior and middle scalene muscles. Subclavian vein passes anteromedial to the scalene triangle.

Nerves of the upper limb:

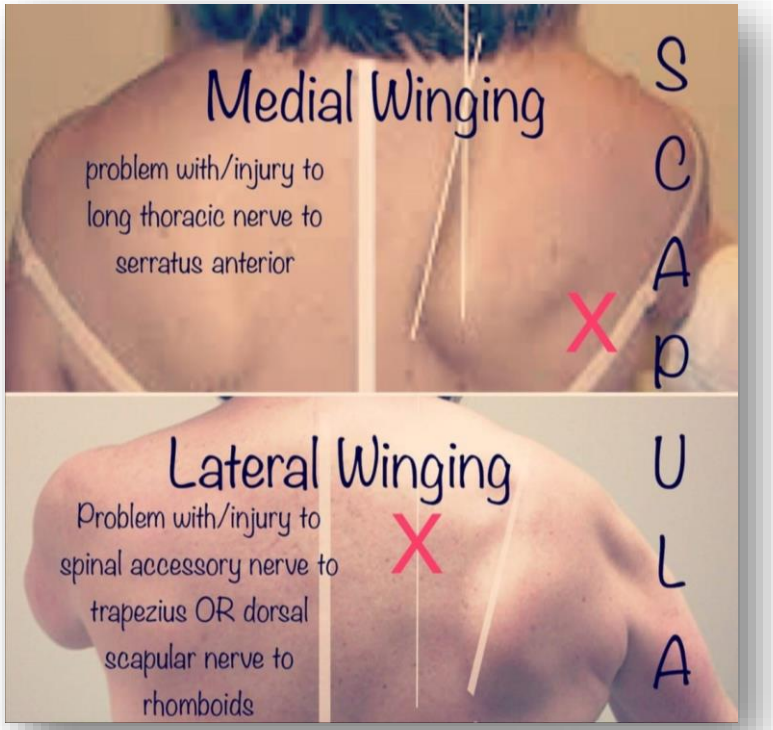
- Axillary, Musculocutaneous, Radial, Median, Ulnar

Erb's palsy and Klumpke palsy

CONDITION	INJURY	CAUSES	MUSCLE DEFICIT	FUNCTIONAL DEFICIT	PRESENTATION
Erb palsy ("waiter's tip")	Traction or tear of **upper** trunk: C5-C6 roots	Infants—lateral traction on neck during delivery Adults—trauma leading to neck traction (eg, falling on head and shoulder in motorcycle accident)	Deltoid, supraspinatus Infraspinatus, supraspinatus Biceps brachii Herb gets DIBs on tips	Abduction (arm hangs by side) Lateral rotation (arm medially rotated) Flexion, supination (arm extended and pronated)	
Klumpke palsy	Traction or tear of **lower** trunk: C8-T1 roots	Infants—upward force on arm during delivery Adults—trauma (eg, grabbing a tree branch to break a fall)	Intrinsic hand muscles: lumbricals, interossei, thenar, hypothenar	Claw hand: lumbricals normally flex MCP joints and extend DIP and PIP joints	

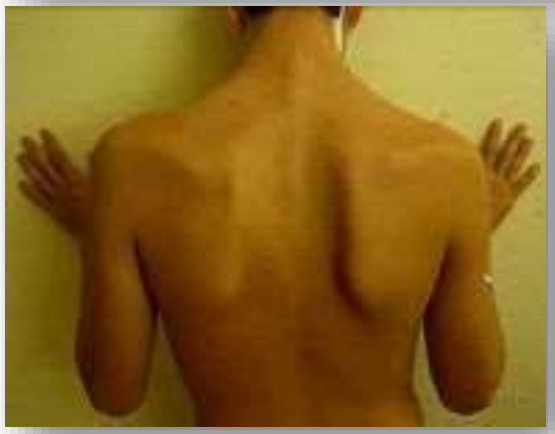
Winging of the scapula

- Medial winging from disruption to Long thoracic nerve ⟶ Serratus anterior
- Lateral winging from disruption to
  - Spinal accessory ⟶ Trapezius
  - Dorsal scapular ⟶ Rhomboids



سنوات (4)

- **Which nerve is affected ?**
  - long thoracic nerve



سنوات (5)

Radial nerve lesion

سنوات (3) ❖**This area is <u>supported by</u> which nerve ?**

- Radial nerve

سنوات (2) ❖**<u>Sensation</u> by which nerve ?**

- Superficial Radial nerve

سنوات (2) ❖**The patient has <u>sensory loss</u> at the specified area, which nerve is affected ?**

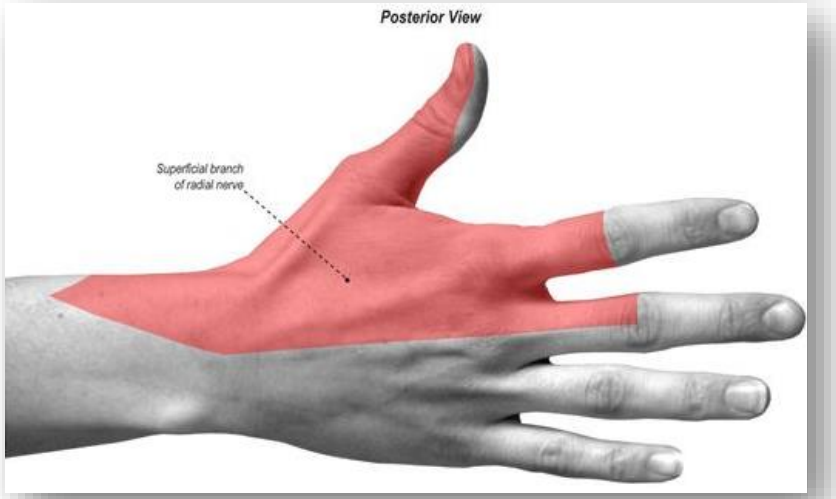
- Superficial Radial nerve

سنوات (1) ❖**What is the most common site of injury ?**

- Midshaft fracture of humerus

سنوات (1) ❖**Mention one clinical sign for nerve lesion**

- Wrist drop (lesion above the elbow)



- Injuries above the elbow cause loss of sensation over posterior arm, forearm and dorsal hand, wrist drop with decreased grip strength
- Injuries below the elbow cause distal paresthesias without wrist drop
- Triceps function and posterior arm sensation spared in midshaft fracture

MCQ – Radial nerve injury

فاينل (1)

❖ **How to exclude Radial nerve palsy ?**

a. Loss of extension at the elbow
b. Cannot flex the arm in pronation position
c. Loss of the triceps jerk
d. Normal sensation at snuff box
e. Cannot adduct the thumb

فاينل (1)

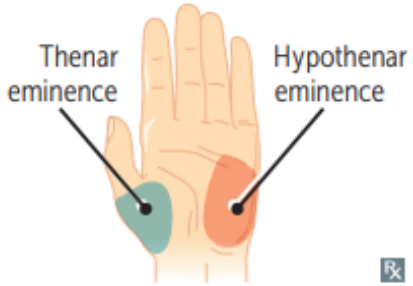
❖ **Radial nerve is responsible about all of the following, except ?**

a. Flexion of the arm when pronated

شرح

Hand muscles

Hand muscles



Thenar (median)—Opponens pollicis, Abductor pollicis brevis, Flexor pollicis brevis, superficial head (deep head by ulnar nerve).

Hypothenar (ulnar)—Opponens digiti minimi, Abductor digiti minimi, Flexor digiti minimi brevis.

Dorsal interossei (ulnar)—abduct the fingers.

Palmar interossei (ulnar)—adduct the fingers.

Lumbricals (1st/2nd, median; 3rd/4th, ulnar)—flex at the MCP joint, extend PIP and DIP joints.

Both groups perform the same functions: Oppose, Abduct, and Flex (OAF).

DAB = Dorsals ABduct.

PAD = Palmars ADduct.

❖Which nerve is affected ? سنوات (1)

- Ulnar nerve
- The ulnar nerve supply all the intrinsic muscles of the hand

Distortions of the hand (Median & Ulnar)

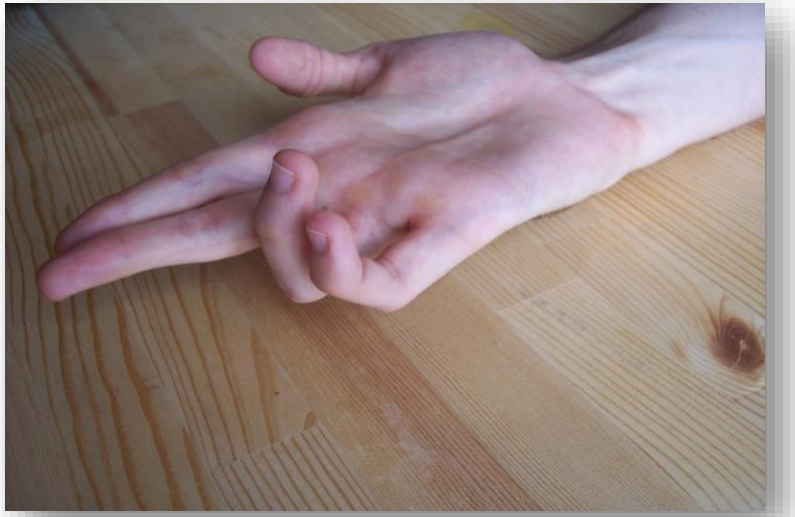
- At rest, a balance exists between the extrinsic flexors and extensors of the hand, as well as the intrinsic muscles of the hand, particularly the lumbrical muscles (flexion of MCP, extension of DIP and PIP joints)
- **Proximal nerve lesion**: Above the elbow (both forearm and hand muscles are affected), deficits present during voluntary flexion of the digits
- **Distal nerve lesion**: Above the branches to the hand muscles (lumbricals), results in clawing upon digits extension

مهم

SIGN	"Ulnar claw"	"Hand of benediction"	"Median claw"	"OK gesture"
PRESENTATION				
CONTEXT	Extending fingers/at rest	Making a fist	Extending fingers/at rest	Making a fist
LOCATION OF LESION	Distal ulnar nerve	Proximal median nerve	Distal median nerve	Proximal ulnar nerve

Note: Atrophy of the thenar eminence can be seen in median nerve lesions, while atrophy of the hypothenar eminence can be seen in ulnar nerve lesions.

The patient is in resting position



سنوات (7) ❖**What is the affected nerve ?**

- Ulnar (Distal ulnar nerve)

سنوات (4) ❖**Name of abnormality ?**

- Ulnar claw hand deformity

سنوات (1) ❖**What is the most common cause ?**

- Fracture of hook of hamate

➢**If this lesion was inspected upon digits flexion**

❖**What is the affected nerve ?**

- Median (Proximal median nerve)

❖**Name of abnormality ?**

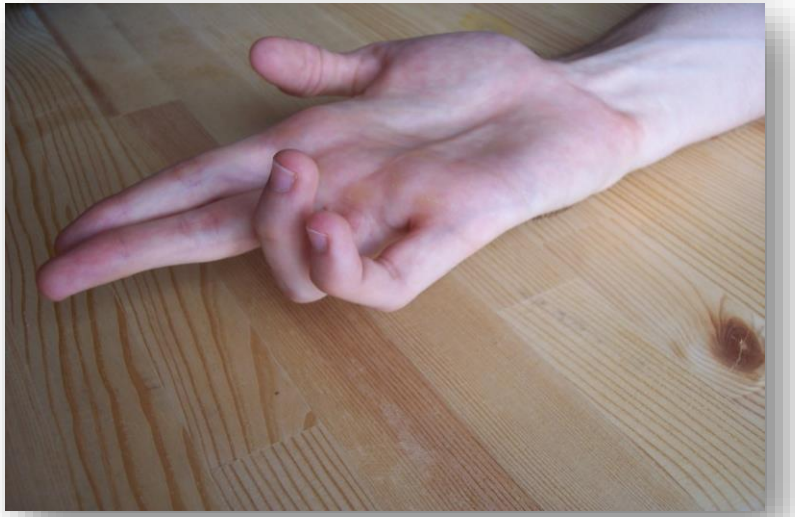
- “Hand of benediction”

❖**What is the most common cause ?**

- Supracondylar fracture of humerus

MCQ – Clawing

- Which of the following is wrong about this deformity ?
  a. The more proximal the Ulnar nerve injury the worse
  b. It is due to distal ulnar nerve palsy
  c. Can result from wrist laceration
  d. Most common cause is fracture of hook of hamate



The patient is in resting position

سنوات (2)

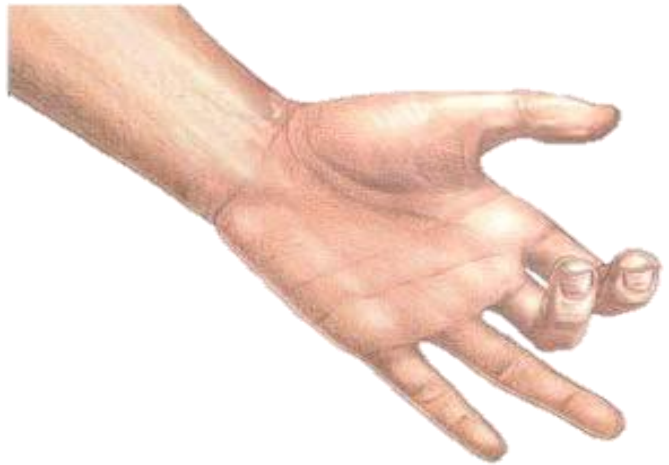
❖**What is the affected nerve ?**

- Median (Distal median nerve)

سنوات (1)

❖**Name of abnormality ?**

- Median claw hand deformity



❖**What is the most common cause ?**

- Carpal tunnel syndrome and wrist laceration

➢**If this lesion was inspected upon digits flexion**

❖**What is the affected nerve ?**

- Ulnar (Proximal ulnar nerve)

❖**Name of abnormality ?**

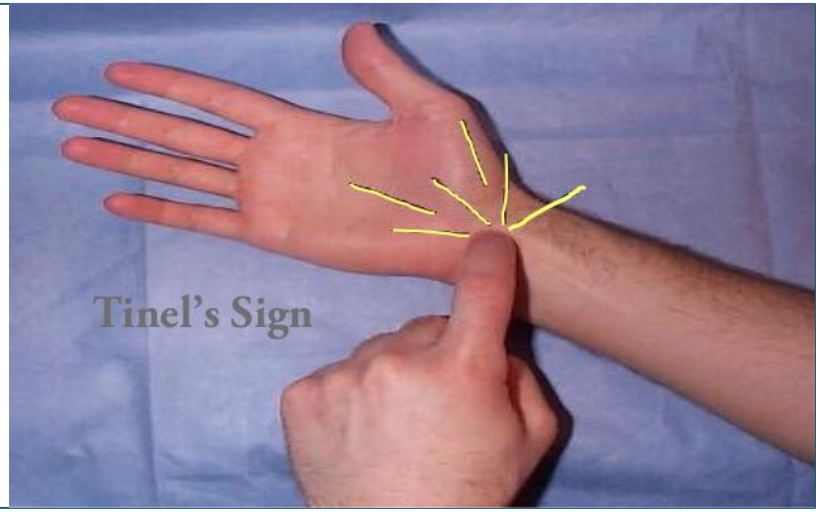
- “OK gesture”

❖**What is the most common cause ?**

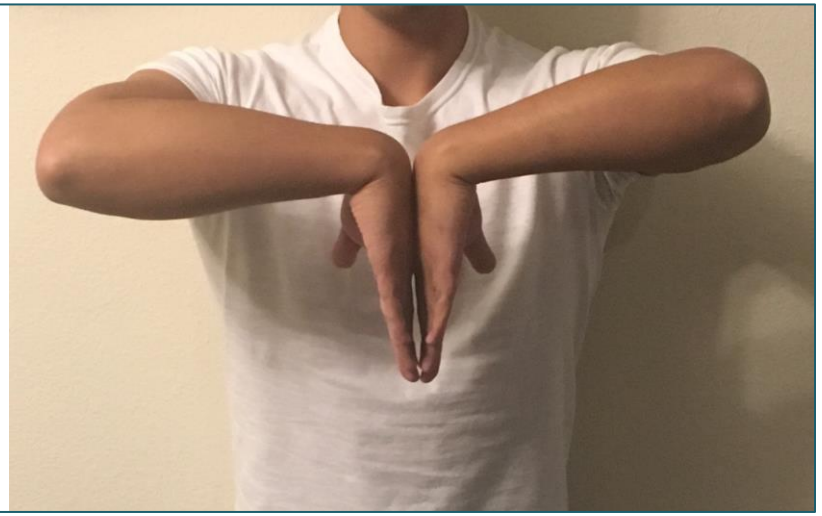
- Fracture of medial epicondyle of humerus

Carpal tunnel syndrome

- **What is the name of this test ?**
  - Tinel's Sign
- **What is the affected nerve ?**
  - Median nerve
- **What is your diagnosis ?**
  - Carpal tunnel syndrome



- **What is the name of this test ?**
  - Phalen maneuver
- **What is the affected nerve ?**
  - Median nerve
- **What is your diagnosis ?**
  - Carpal tunnel syndrome



MCQ

❖**Which of the following is innervated by the anterior interosseous nerve ?** (branch of the medial nerve)

a. Abductor pollicis brevis
b. Pronator teres
c. Extensor indices proprius
d. Flexor pollicis longus
e. First dorsal interosseous

The anterior interosseous nerve innervates the muscles in the anterior compartment of the forearm including the flexor pollicis longus, pronator quadratus, and the flexor digitorum profundus to the index and middle fingers.

❖**Which of the following is innervated by the posterior interosseous nerve ?** (branch of the radial nerve)

a. Extensor carpi radialis
b. Extensor digitorum
c. Adductor pollicis longus
d. Pronator teres muscle

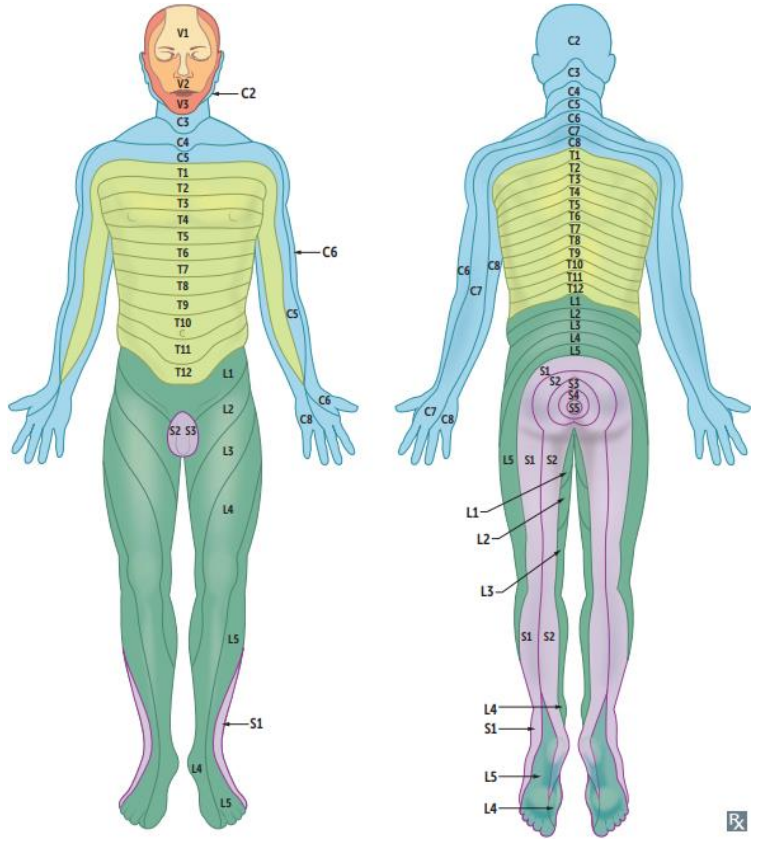
The posterior interosseous nerve innervates the deep extensor muscles of the forearm, including the supinator, abductor pollicis longus, extensor pollicis brevis, extensor pollicis longus, extensor indicis, and extensor digitorum communis in the distal forearm.

Lower limb

Sensory and Motor assessment

Sensory innervation of the Lower limb

- **Iliohypogastric (T12-L1)**: Suprapubic region
- **Genitofemoral nerve (L1-L2)**: scrotum/labia majora, medial thigh
- **Lateral femoral cutaneous (L2-L3)**: Anterior and lateral thigh
- **Obturator (L2-L4)**: Medial thigh
- **Femoral (L2-L4)**: anterior thigh, medial leg
- **Common peroneal (L4-S2)**:
  - Superficial peroneal nerve:
    - Dorsum of foot (except webspace between hallux and 2nd digit)
  - Deep peroneal nerve:
    - Webspace between hallux and 2nd digit
- **Tibial (L4-S3)**: sole of foot



Meralgia paresthetica

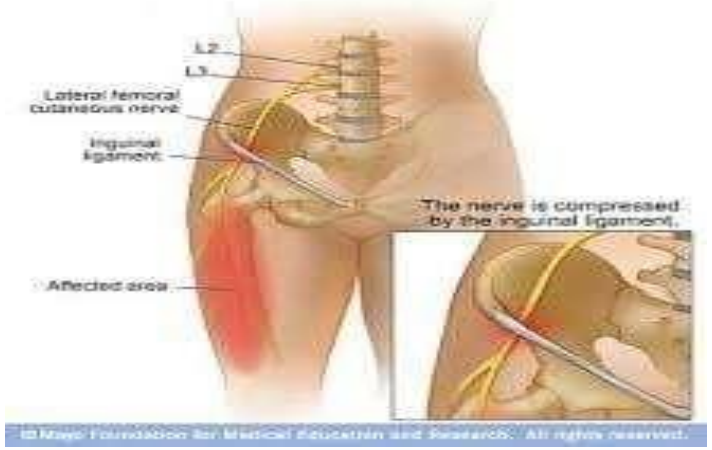
سنوات (5)
❖**The name of this condition?**
- Meralgia paresthetica

سنوات (1)
❖**What nerve is this?**
- Lateral femoral cutaneous nerve of the thigh

❖**What are the most common causes ?**
- tight clothing, obesity or pregnancy

سنوات (1)
❖**Disc prolapse at which level can result in meralgia paresthetica ?**
- L2-L3

سنوات (2)
❖**39 patient has sensory loss in the highlighted area, this patient suffers from what ?**
- Compression on sensory nerve without weakness



Meralgia paresthetica
compression of lateral femoral cutaneous nerve ⟶ tingling, numbness, burning pain in anterolateral thigh

Common peroneal nerve

سنوات (3)

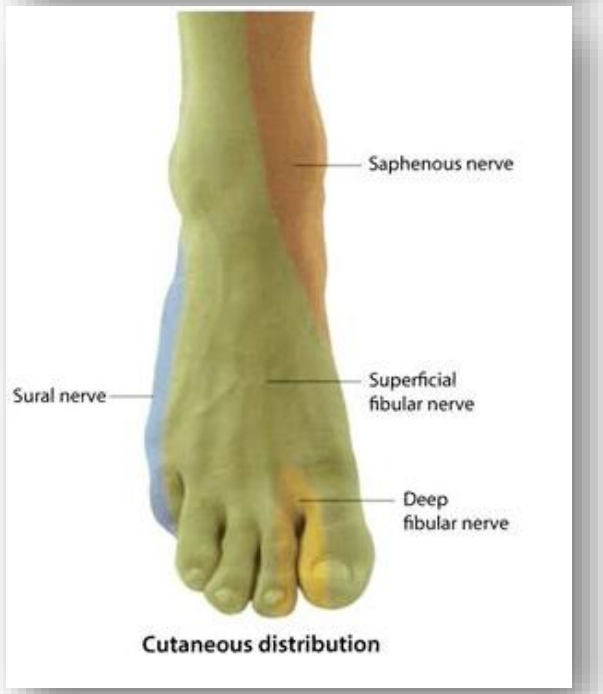
❖ **What is the nerve that the supply the area highlighted in (A) ?**

- Deep peroneal nerve

سنوات (1)

❖ **Mention 1 clinical sign for this nerve**:

- Foot drop (due to tibialis anterior injury)



Deep peroneal nerve

❖**Clinical sign associated with lesion of the nerve supply the area shown in the picture ?**

a. Weak plantar flexion
b. Calf muscle atrophy
c. Absent ankle reflex
d. Cannot stands on tip of toes
e. Tibialis anterior weakness
f. Weak dorsiflexion

Tibialis Anterior

The **tibialis anterior** muscle is located alongside the lateral surface of the tibia. It is the strongest dorsiflexor of the foot.

- **Attachments**: Originates from the lateral surface of the tibia and attaches to the medial cuneiform and the base of metatarsal I.
- **Actions**: Dorsiflexion and inversion of the foot.
- **Innervation**: Deep fibular nerve.

Overview of lumbosacral radiculopathies [9]

Radiculopathy	Causative disk	Sensory deficits	Motor deficits	Reduction of reflexes
L3 radiculopathy	• L2–L3	• Anterolateral area of the thigh	• Hip flexion • Knee extension • Hip adduction	• Adductor reflex • Patellar reflex
L4 radiculopathy	• L3–L4	• Anterolateral thigh, area over the patella, medial aspect of the leg, medial malleolus	• Knee extension • Hip adduction	• Patellar reflex
L5 radiculopathy	• L4–L5	• Lateral aspect of the thigh and knee, anterolateral aspect of the leg, dorsum of the foot, and the big toe	• Tibialis anterior muscle (foot dorsiflexion): difficulty heel walking (foot drop) • Extensor hallucis longus muscle (first toe dorsiflexion)	• Posterior tibial reflex (medial hamstring)
S1 radiculopathy	• L5–S1	• Dorsolateral aspect of thigh and leg, and the lateral aspect of the foot	• Peroneus longus and brevis muscle (foot eversion) and gastrocnemius muscle (foot plantarflexion): difficulty toe walking	• Achilles reflex • Lateral hamstring reflex
S2 radiculopathy, S3 radiculopathy, S4 radiculopathy	• S1–S4	• Posterior aspect of the thigh and leg (S2), perineum (S3–S4), perianal (S4)	• None	• Bulbocavernosus reflex • Perineal reflex

MCQ – Common peroneal nerve injury

- A 45 years old male patients presented with numbness and pins and needles on the lateral aspect of the leg and the dorsum of the left foot. There is no history of low back pain

- He is most likely suffering from:
  a. Disc prolapse L5 S1
  b. Disc proalpse L4 L5
  c. Left Sciatica
  d. Diabetic polyneuropathy
  e. Left common peroneal neuropathy

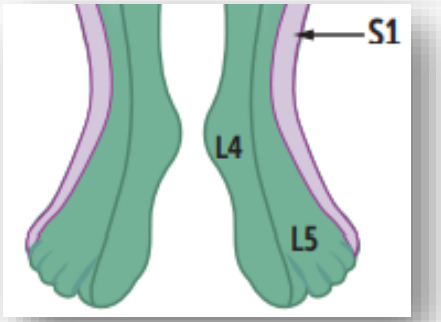
MCQ

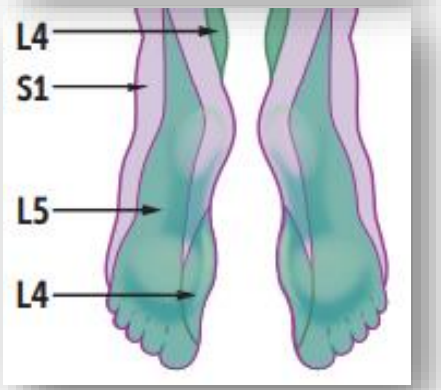
❖ **Deep peroneal nerve injury, where is the lesion ?**

a. Around ankle
b. Around knee
c. L5 radiculopathy
d. S1 radiculopathy

❖ **Dermatomes of the foot**:

- **L4**: Dorsal medial aspect of the big toe
- **L5**: Dorsal lateral aspect of the big toe and 2nd – 4th toes and the plater aspect of all the toes except the little
- **S1**: Dorsal and planter surfaces of the little toe





MCQ

فاينل (2)

❖**Which of the following is the FALSE match ?**

a. Posterior interosseous nerve lesion: wrist drop
b. Upper brachial plexus roots lesion: Klumpke paralysis
c. Ulnar nerve: Claw hand
d. Lateral femoral cutaneous nerve: Meralgia parasthetica
e. Peroneal nerve lesion: foot drop

فاينل (1)

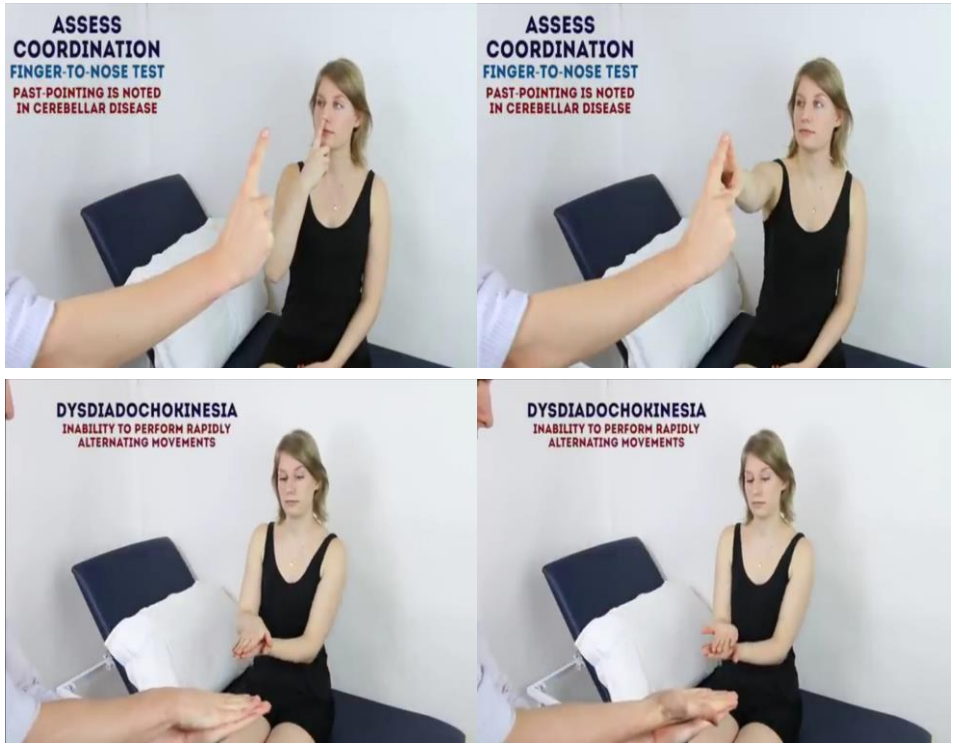
❖**Which of the following is the FALSE match ?**

a. Radial nerve lesion: wrist drop
b. Upper roots lesion: Erb's paralysis
c. Lower roots lesion: Klumpke paralysis
d. L3-L4 disc prolapse: Meralgia parasthetica
e. Peroneal nerve lesion: foot drop

Coordination

Coordination

- Coordination examination is used to assess cerebellar function Ipsilaterally
  1. Finger to nose test (**Detects**: dysmetria, dyssynergia and intention tremor)
  2. Heel to shin test (**Detects** Dysmetria)
  3. Rapid alternating movement (**Detects** Dysdiadochokinesia)
- **Terms**:
  - **Dysmetria**: Inaccurate fine movements
  - **Dyssynergia**: Breakdown of movements into parts
  - **Dysdiadochokinesia**: Clumsy rapid movements



Finger-to-nose test

- **What is the name of this test ?**
  - finger-to-nose test
- **What is the purpose of this test ?**
  - Test of coordination

    (Cerebellar disease leads to inaccuracy in this test (past-pointing) because of inability to judge distances (dysmetria). As the finger approaches the target, it may oscillate increasingly wildly (intention tremor))
- **Name 3 other tests that assess coordination**
  - Tandem gait
  - Heel-to-shin test
  - Rapid alternating hand movements

Heel-knee-shin test

سنوات (1)

❖ **What is this test ?**

- Heel-knee-shin test

سنوات (1)

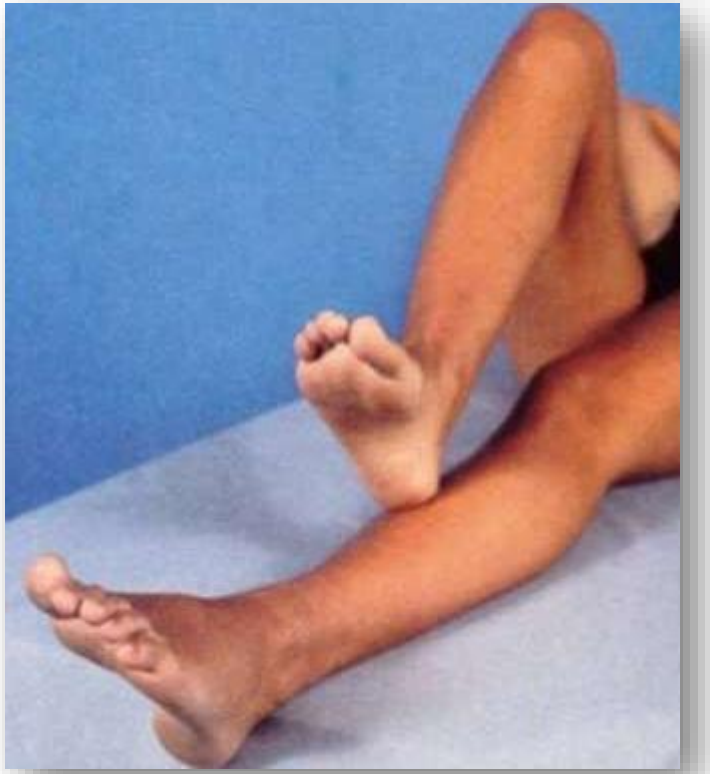
❖ **What does it detect ?**

- Cerebellar function (coordination)

سنوات (5)

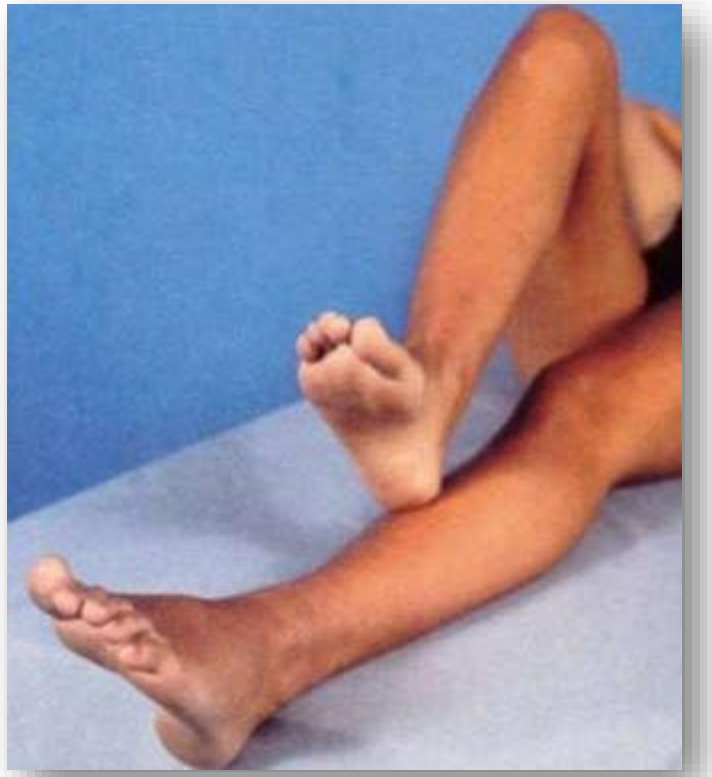
❖ **Which cerebellum (left or right) is the test in the photo examining ?**

a. Right cerebellum
b. Left cerebellum
c. Right cerebral
d. Left cerebral
e. Dorsal columns



MCQ – Heel-knee-shin test

- The purpose of the test is to detect
  - A. Power of the muscles
  - B. Tone of the muscles
  - C. Reflexes of the muscles
  - D. Coordination of the muscles
  - E. Bulk of the muscles



شرح

Motor neuron signs

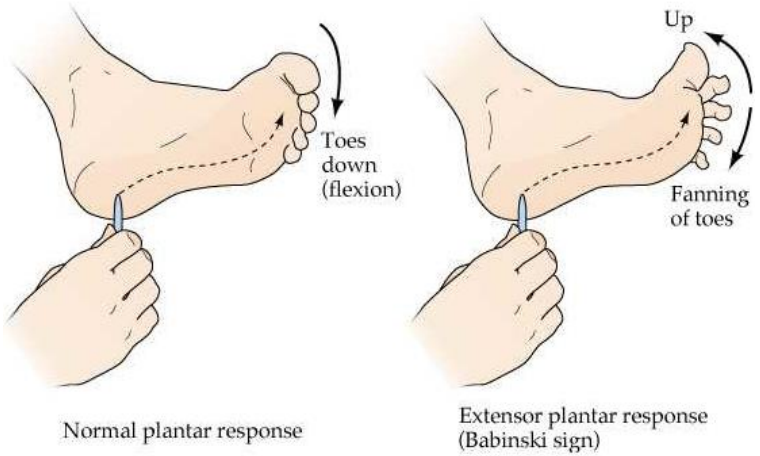
SIGN	UMN LESION	LMN LESION
Weakness	+	+
Atrophy	–	+
Fasciculations	–	+
Reflexes	↑	↓
Tone	↑	↓
Babinski	+	–
Spastic paresis	+	–
Flaccid paralysis	–	+
Clasp knife spasticity	+	–

Lower motor neuron = everything **lower**ed (less muscle mass, ↓ muscle tone, ↓ reflexes, downgoing toes)

Upper motor neuron = everything **up** (tone, DTRs, toes)

Fasciculations = muscle twitching

Positive Babinski is normal in infants

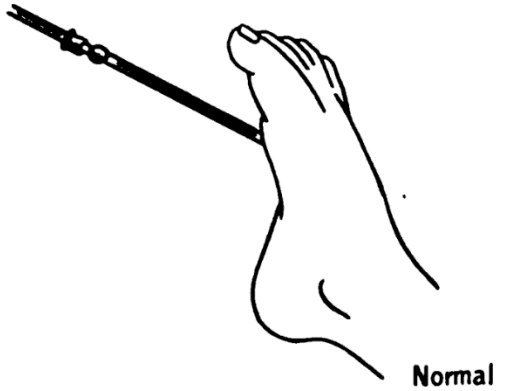


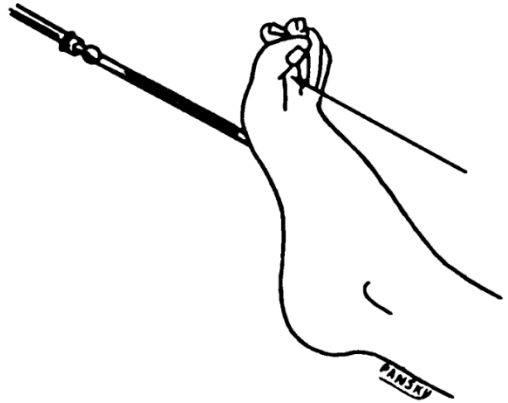
Normal plantar response

Extensor plantar response (Babinski sign)

Babinski's sign

- **What is the name of this test ?**
  - Babinski's sign
- **What does it indicate ?**
  - Upper motor neuron lesion
- **What you suspect about reflexes ?**
  - Hyperreflexia





Positive (+) Babinski sign
(dorsiflexion of big toe)

Autonomic function assessment

We will talk only about Horner’s syndrome ;)

شرح

Horner syndrome

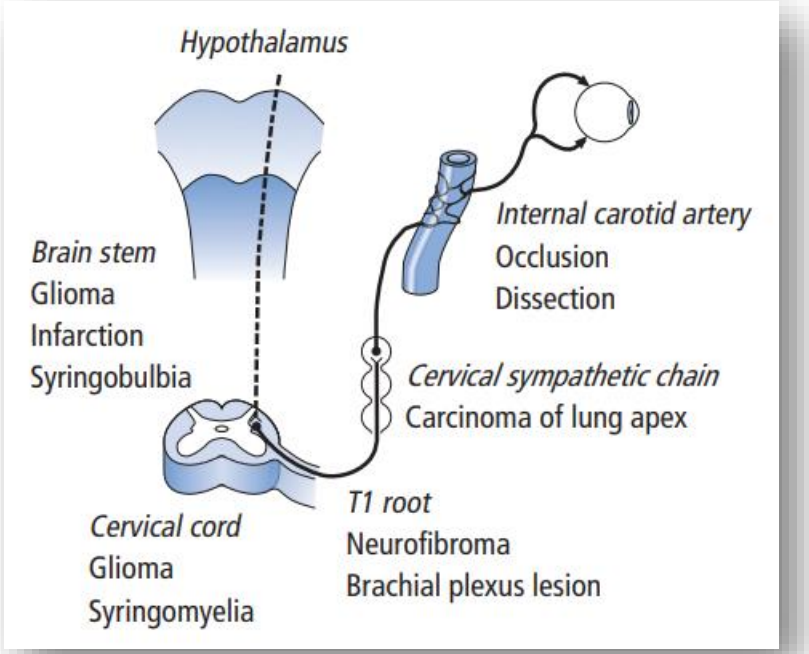
❖**Due to sympathetic denervation of face**:

1. Ptosis (slight drooping of eyelid: superior tarsal muscle)
2. Miosis (pupil constriction)
3. Anhidrosis (absence of sweating) and flushing of affected side of face

❖**Associated with lesions along the sympathetic chain**:

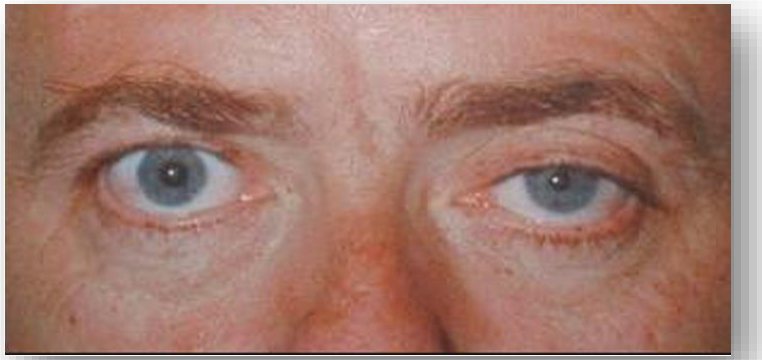
- **1st neuron**: pontine hemorrhage, lateral medullary syndrome, spinal cord lesion above T1 (e.g., Brown-Sequard syndrome, late-stage syringomyelia)
- **2nd neuron**: stellate ganglion compression by Pancoast tumor
- **3rd neuron**: carotid dissection (painful); anhidrosis is usually absent

سنوات (1)



Causes of Horner's syndrome
Classified according to the site of the lesion along the sympathetic pathway from the hypothalamus to the eye

Horner syndrome



سنوات (2) **1. What is this abnormality ?**

- Horner's syndrome

سنوات (2) **2. What component of ANS is affected ?**

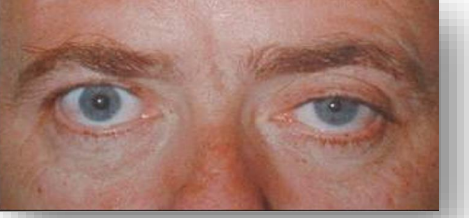
- Sympathetic nervous system

سنوات (1) **3. Mention 1 structural lesion that can cause this abnormality**

- See previous slide

سنوات (2) **4. What is the pathophysiology of the disease and explain why the ptosis and meiosis occur ?**

- It is due to sympathetic denervation of face
- **Ptosis** occur due to weakness of the superior tarsal muscle (muller muscle)
- **Miosis** occur due to weakness of the dilator pupillae muscle



Horner syndrome

سنوات (3) **5. If the patient has right hemiplegia, where is the lesion ?**

- First order neuron (central lesion above level of pyramidal decussation)

سنوات (1) **6. If the patient has anhidrosis, where is the lesion ?**

- Second order neuron (or first if the patient has hemiplegia)

سنوات (7) **7. If the patient has normal sweating, where is the lesion ?**

- Third order neuron; carotid dissection and not internal carotid aneurysm

سنوات (1) **8. If the patient has only left ptosis and miosis, where is the lesion ?**

- Third order neuron (after the cervical sympathetic chain)

سنوات (1) **9. If this patient doesn't suffer from ptosis, where is the lesion ?**

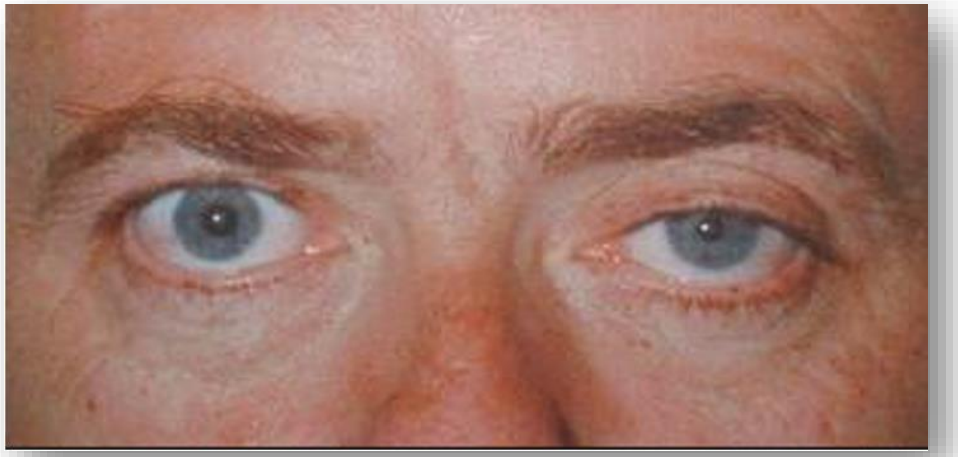
- Long ciliary nerve

سنوات (1) **10. What is the affect of Horner syndrome on pupillary light reflex ?**

- Affected eye has fixed myosis

All the following conditions are associated with Horner except

A. Cervical spine injury
B. Carotid aneurysm
C. Tumor in the apex of the lung
D. Posterior neck trauma
E. Non-reactive pupil
F. Its due to parasympathetic denervation of the face




Neurological Disorders

Headache & Facial pain

ركزوا على الأحمر

Headache & Facial pain

❖**Headaches may be subdivided into**:

1. Those with a defined pathophysiological basis (**secondary headaches**)
   - May represent a threat to the patient's life, vision or other neurological function
   - **Causes include** increased (and decreased) ICP, Idiopathic intracranial hypertension, meningeal irritation, giant cell arteritis and many other causes
2. Those of uncertain pathogenesis (**primary headache syndromes**)
   - Are generally more benign and are generally more common
   - **They are** tension headache, migraine and cluster headache

❖**Facial pain**:

- Many of the previously mentioned causes of headache (ex. Cluster headache) can instead present with facial pain
- There are, however, other distinctive syndromes where pain is restricted to the face such as: Trigeminal neuralgia, Post-herpetic neuralgia

Secondary headaches

- Disorders of intracranial pressure
- Idiopathic intracranial hypertension
- Meningeal irritation
- Giant cell arteritis
- Other causes:
  - Headache often accompanies stroke, especially when caused by hemorrhage, intracranial venous sinus thrombosis or arterial dissection.
  - Metabolic disturbances, e.g., hypoxia, hypercapnia and hypoglycemia
  - Vasoactive drugs and other substances.

Disorders of intracranial pressure

- **Increased ICP**:
  - Occipital 'bursting' pain exacerbated by sneezing, straining, bending, lifting or lying down, all of which may raise intracranial pressure further
  - Characteristically present on waking up or indeed may wake the patient at night. It may improve later in the day
  - Patients with headache caused by an intracranial tumor generally have a short history (days, weeks or at most months).
  - There is usually a crescendo quality to the symptom, the pain becoming increasingly severe and persistent, and ultimately occurring daily, without fail
- **Decreased ICP**:
  - Related to posture; pain being rapidly relieved by lying down
  - Most commonly due to lumbar puncture, although can occur spontaneously

Idiopathic intracranial hypertension

- **Definition**: increased ICP with no obvious findings on imaging
- **Risk factors** include female sex, Tetracyclines, Obesity, vitamin A excess, Danazol (female TOAD)
- Associated with dural venous sinus stenosis
- **Findings**: headache, tinnitus, diplopia, no change in mental status, papilledema, enlarged blind spot and peripheral constriction.
- Lumbar puncture reveals high opening pressure and provides temporary headache relief
- **Treatment**: weight loss, fluid and salt restriction, acetazolamide, lumbar puncture, Surgical lumbar peritoneal shunt

Case scenario

- 23 years old patient with history of headache for one month associated with nausea, vomiting and blurring of vision.

- **What is the most important initial clinical investigation ?**
  - Fundoscopy
  - Brain MRI
  - Lumbar puncture

Note: Intracranial hypertension may be associated with:

1. Nausea and vomiting
2. Poor urination control
3. Reduced visual acuity (due to papilledema)
4. Tinnitus

Papilledema

سنوات (4) ❖**What is the sign (pathological findings) ?**

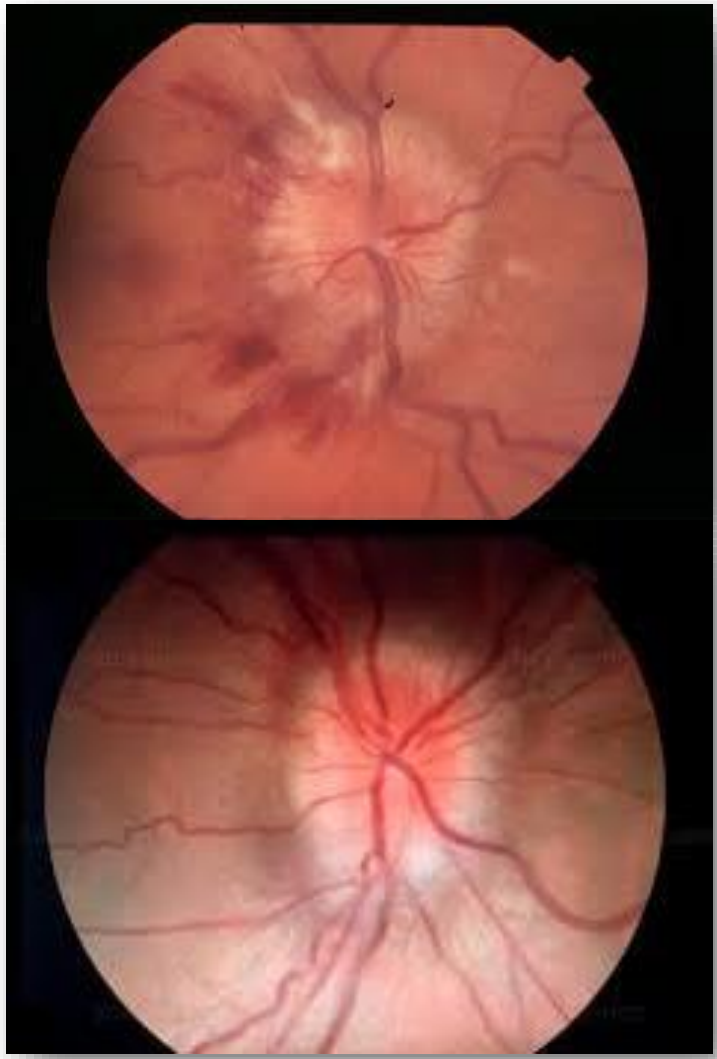
- Papilledema

سنوات (2) ❖**Mention one complication ?**

- Blindness

سنوات (1) ❖**What is the pathophysiology?**

- increase in CSF pressure causes a disruption of the axoplasmic flow in the optic nerve



Papilledema

➢If this patient suffer from headache.

سنوات (1)

❖**What do you suspect the cause ?**

- Increase the ICP

سنوات (1)

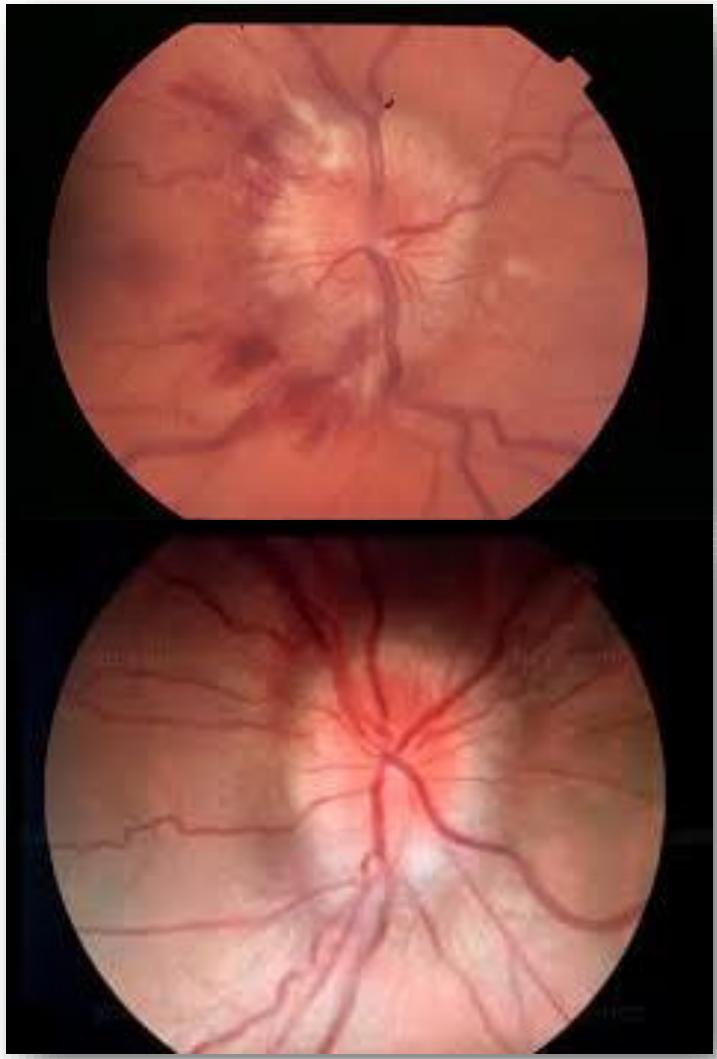
❖**What investigations you would like to order to support your diagnosis ?**

- Head CT, Brain MRI, Ophthalmic examination

سنوات (1)

❖**What is your management ?**

- Treatment of cause. diuretics (acetozolamide) & control blood pressure

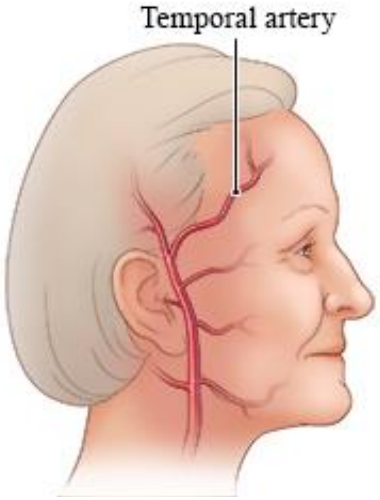


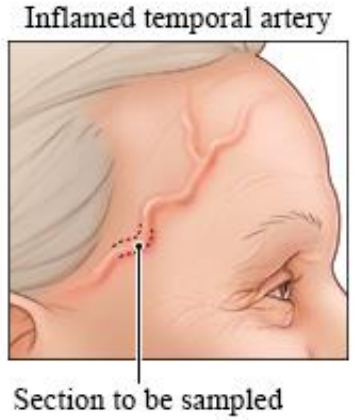
Meningeal irritation

- **Causes** include inflammation or blood
  - In subarachnoid hemorrhage, the pain is usually very sudden in onset (within seconds) and severe, and the patient may lose consciousness.
  - In bacterial meningitis, the headache is also acute in onset, but usually worsening over minutes or hours.
- **Symptoms**: characteristically produces severe global or occipital headache with vomiting, photophobia and neck stiffness (nuchal rigidity)

Temporal Arteritis

- **Epidemiology**: Common in females > 50 years old
- **Duration**: Prolonged (Hours to days); might be episodic early in the disease
- **Location**: Temporal region
- **Description**:
  - **Nature**: Throbbing
  - **Associated symptoms**: Jaw and tongue claudication, tinnitus, decreased visual acuity or sudden visual loss
- **Treatment**:
  - High does prednisolone





MCQ – Temporal Arteritis

- 50 years female come with persistent severe headache from last week, what is the next step ?
  - A. Brain MRI
  - B. Head CT scan
  - C. ESR & CRP
  - D. Lumbar puncture
- **Explanation**:
  - The age and sex rise suspension of temporal (giant cell) arteritis. And because of the threat to vision and other neurological consequences, early diagnosis and treatment are essential.
  - ESR often grossly elevated (greater than 100 mm/h) in temporal (giant cell) arteritis

MCQ – Temporal Arteritis

فاينل (2)

❖**Which of the following is TRUE regarding temporal arteritis ?**

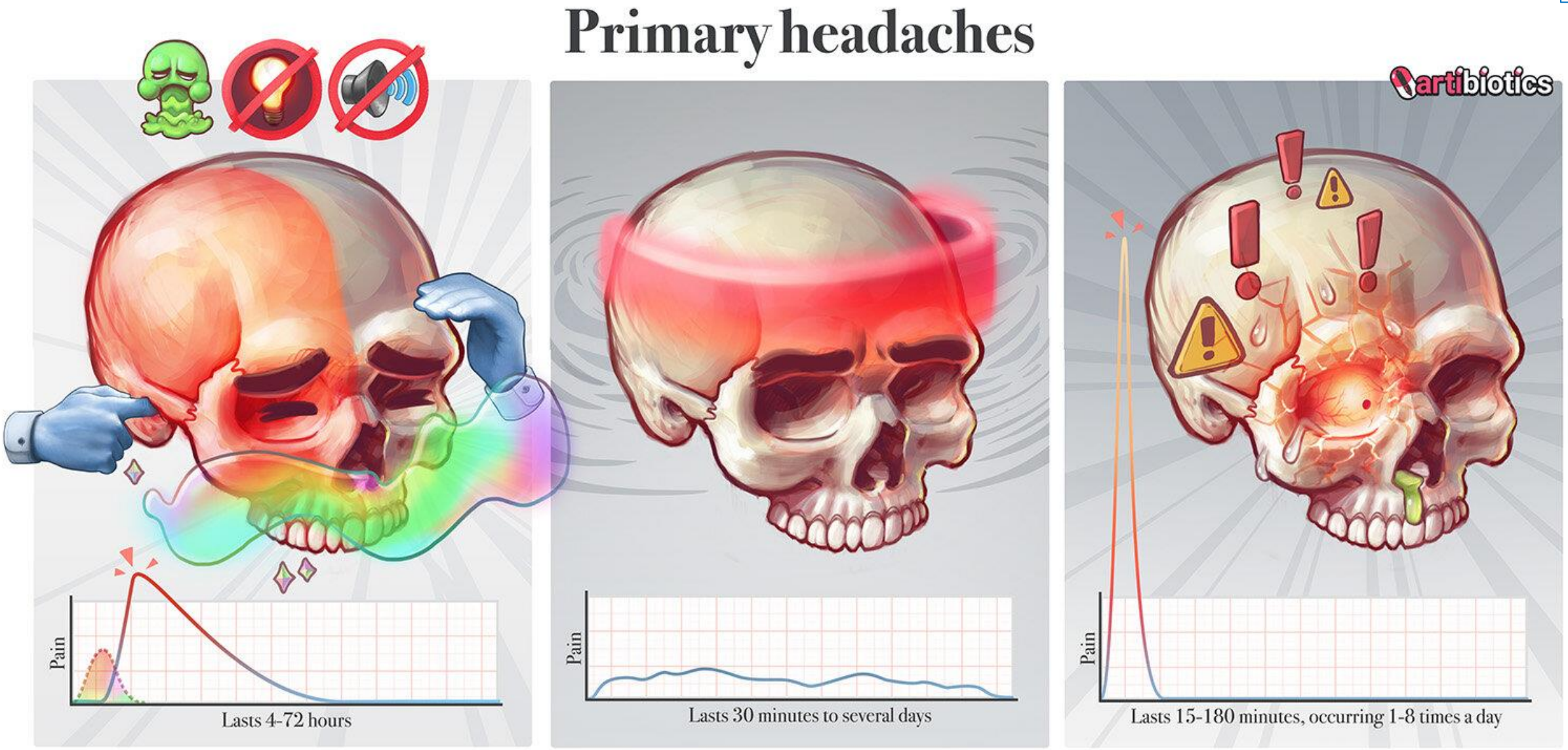
a. It is episodic where each episode lasts few hours
b. ESR is a useful screening test
c. Temporal artery biopsy has 100% sensitivity
d. It affects only extracranial vessels
e. It does not lead to focal neurological deficits

فاينل (2)

❖**Which of the following is TRUE regarding temporal arteritis ?**

a. The duration lasts for minutes
b. ESR is a specific test for temporal arteritis
c. Diagnosis can only be confirmed by biopsy
d. It does not respond to steroids
e. It is usually benign and does not lead to focal neurological deficits

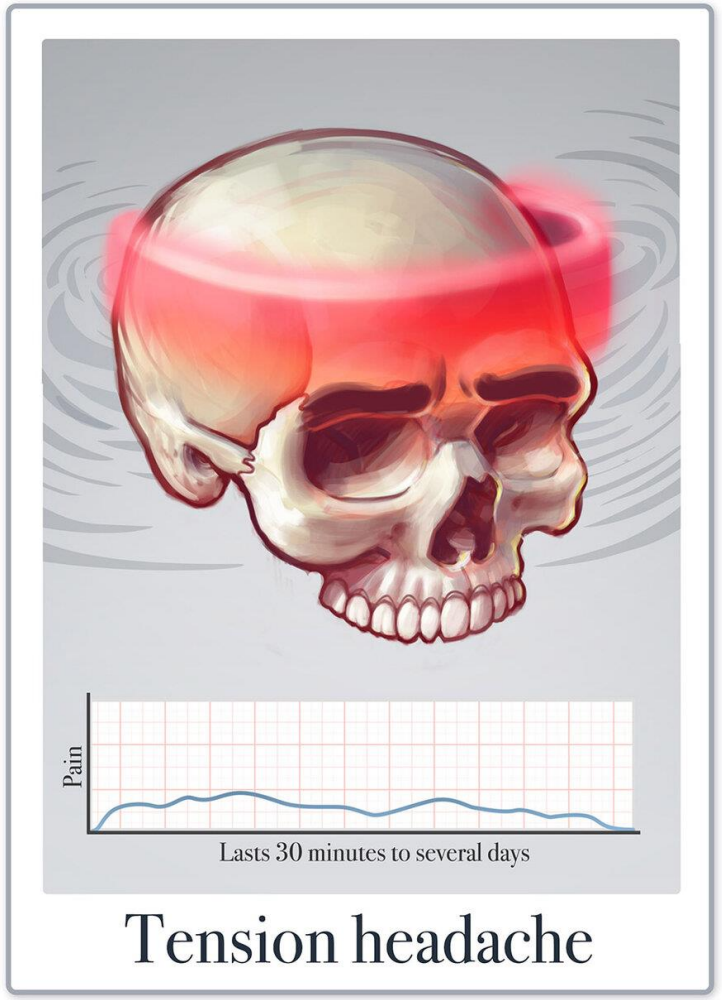
شرح



Headaches that are not the result of another condition

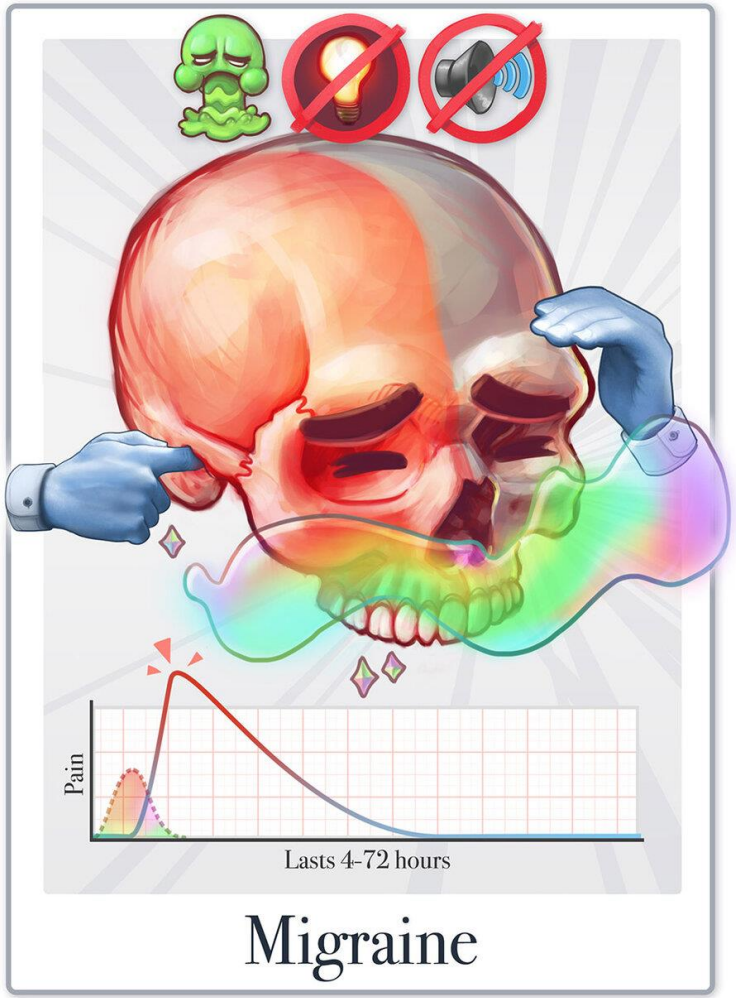
Tension headache

- **Epidemiology**: More common in females
- **Duration**: > 30 min (typically 4-6 hr.)
- **Location**: Bilateral
- **Description**:
  - **Nature**: Steady, “bandlike” pain.
  - No photophobia or phonophobia.
  - No aura.
- **Treatment**:
  - Acute: NSAIDs, Paracetamol
  - Prophylaxis: TCAs



Migraine

- **Epidemiology**: More common in females
- **Duration**: 4-72 hr.
- **Location**: Unilateral frontotemporal and ocular
- **Description**:
  - **Nature**: Pulsating pain.
  - **Associated with** nausea, photophobia, and/or phonophobia
  - May have “aura”
  - Due to irritation of CN V, meninges, or blood vessels
- **Treatment**:
  - Acute: NSAIDs, triptans, dihydroergotamine, antiemetics
  - Prophylaxis: lifestyle changes, β-blockers, amitriptyline, topiramate, valproate, botulinum toxin, anti-CGRP monoclonal antibodies



Migraine - Diagnostic criteria

	Migraine without aura	Migraine with aura
Number of attacks (total lifetime)	• ≥ 5	• ≥ 2
Duration	• 4–72 hours	• N/a
Characteristics	• ≥ 2 of the following: ◦ Unilateral ◦ Pulsating ◦ Moderate or severe pain ◦ Worsened by routine physical activity	• ≥ 1 of the following aura symptoms: ◦ Visual ◦ Sensory ◦ Speech ◦ Motor ◦ Brainstem ◦ Retinal
	• Concomitant symptoms (≥ 1 of the following): ◦ Nausea/vomiting ◦ Photophobia/phonophobia	• ≥ 3 of the following aura characteristics: ◦ ≥ 1 spreads gradually over ≥ 5 minutes. ◦ ≥ 2 occur in succession. ◦ Each one lasts 5–60 minutes. ◦ ≥ 1 is unilateral. ◦ ≥ 1 involves a positive symptom. ◦ Accompanied or followed by headache (within 60 minutes)

MCQ – Migraine

سنوات (1)

❖**One of the following is true about migraine:** السؤال مش كامل الخيارات (c, d, e) من عندي

a. Need 5 attacks to diagnose
b. Can be diagnosed without phonophobia and photophobia
c. More common in males
d. Migraine usually lasts more than 72 hours
e. Described as steady, “bandlike” pain

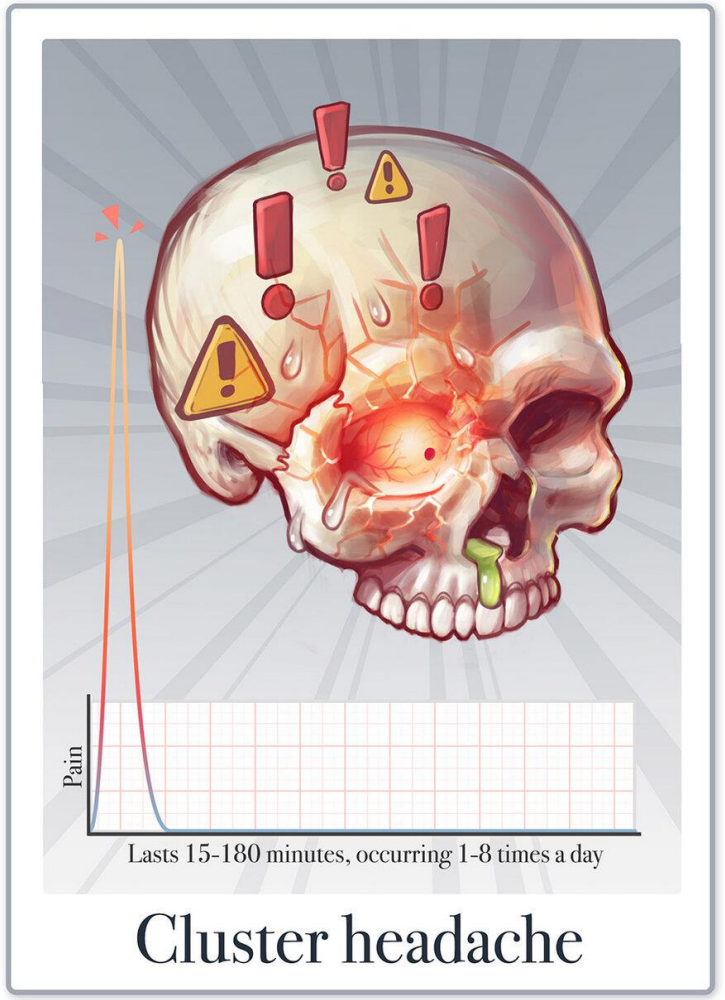
فاينل (2)

❖**Migraine is characterized by all of the following except:**

a. Always unilateral
b. Mostly throbbing in nature
c. Can be associated with nausea and vomiting
d. Photophobia and phonophobia are typical
e. It is not usually associated with autonomic symptoms

Cluster headache

- **Epidemiology**: More common in males
- **Duration**: 15 min-3 hr.
- **Location**: Unilateral periorbital, and may radiate to the neck and shoulder
- **Description**:
  - **Nature**: Excruciating periorbital pain
  - **Associated with** autonomic symptoms (ex. lacrimation, rhinorrhea, conjunctival injection)
  - May present with Horner syndrome
- **Treatment**:
  - Acute: sumatriptan, 100% O2
  - Prophylaxis: verapamil



Trigeminal neuralgia

- **Epidemiology**: More common in females
- **Duration**: typically lasts for seconds to minutes
- **Location**: Unilateral
- **Description**:
  - **Nature**: Repetitive, unilateral, shooting/shock-like pain in the distribution of CN V
  - Triggered by chewing, talking, touching certain parts of the face
  - Episodes often increase in intensity and frequency over time
- **Treatment**: فاينل (4)
  - First-line therapy: carbamazepine, oxcarbazepine
  - Alternatives and additional considerations:
    - Other anticonvulsants (e.g., lamotrigine, oxcarbazepine, baclofen, phenytoin, gabapentin) may be used on an individual basis.

MCQ – Trigeminal neuralgia

فاينل (1)

❖**Trigeminal neuralgia is characterized by all of the following except:**

a. Sharp or electric shooting pain
b. Can be rarely bilateral but not simultaneous
c. It is aggravated by chewing and talking
d. It is always primary
e. It does not respond well to simple analgesia

فاينل (2)

❖**Trigeminal neuralgia is characterized by all of the following except:**

a. Sharp or electric shooting pain
b. Typically lasts for seconds
c. May be secondary
d. Common in MS patients
e. Responds well to simple analgesia

Post-herpetic neuralgia

- Patients who have suffered shingles in one of the branches of the trigeminal nerve (often the first – zoster ophthalmicus) may experience persistent facial pain after the rash has healed.
- The pain may be very severe and intractable, lasting 2–3 years after the eruption, but sometimes responds to tricyclic antidepressants, carbamazepine or topical application of capsaicin.
- **Risk factors**:
  - Age > 50 years (Strong association with age)
  - Severe infection
  - Ocular involvement
  - Immunosuppression

MCQ – Post-herpetic neuralgia

❖A 60 years old notes increasingly severe pain on the right side of the face followed by eruption of a vesicular lesion on the area. Which of the following may be at risk of experiencing ?

a. Ocular complications
b. Disseminated infection
c. Cavernous sinus thrombosis
d. Meningitis
e. Trigeminal neuralgia

Compare between Migraine, Cluster headache and Temporal arteritis headache

	Migraine	Cluster Headache	Temporal Arteritis
Epidemiology (Age, Sex)	Common in females (75%) Common in adolescence	Common in males (2:1) Older than 30	Common in females Older than 50
Duration	Few hours to three days	15 mins to few hours	Hours to days
Location	Unilateral frontotemporal and ocular	unilateral Periorbital, may radiate to the neck and shoulder	Temporal region
Nature	Throbbing	Stabbing	Throbbing
Associated symptoms	Nausea, vomiting, photophobia, phonophobia, fatigue, light-headedness	Ptosis, meiosis, conjunctival injection, lid edema, rhinorrhea, lacrimation	Jaw and tongue claudication, tinnitus, decreased visual acuity or sudden visual loss
Treatment	NSAIDs, triptans, opioids, ergotamine	Sumatriptan, Dihydroergotamine	High dose prednisolone

Compare between cluster headache and trigeminal neuralgia

	Trigeminal neuralgia	Cluster headache
Nature of the pain	severe, sudden, shock-like in one side of the face(sensory distribution of cranial nerve V)	unilateral headache (dull or aching) around the eye or temporal area
Duration	seconds to a few minutes	15 minutes to 3 hours
Frequency	More frequent (from less than 1 per day to 12 per day or more)	Less frequent (once every other day to 8 times a day)
Associated symptoms	grimace, wince, or make an aversive head movement, as if trying to escape the pain, thus producing a tic; hence the term "tic douloureux"	conjunctival injection, lacrimation, nasal congestion, rhinorrhea, forehead and facial sweating, miosis, ptosis, or eyelid edema
Treatment	Carbamazepine lamotrigine gabapentin	symptomatic (oxygen, triptans, ergotamine, and anesthetics) prophylactic (calcium channel blockers, mood stabilizers, and anticonvulsants)

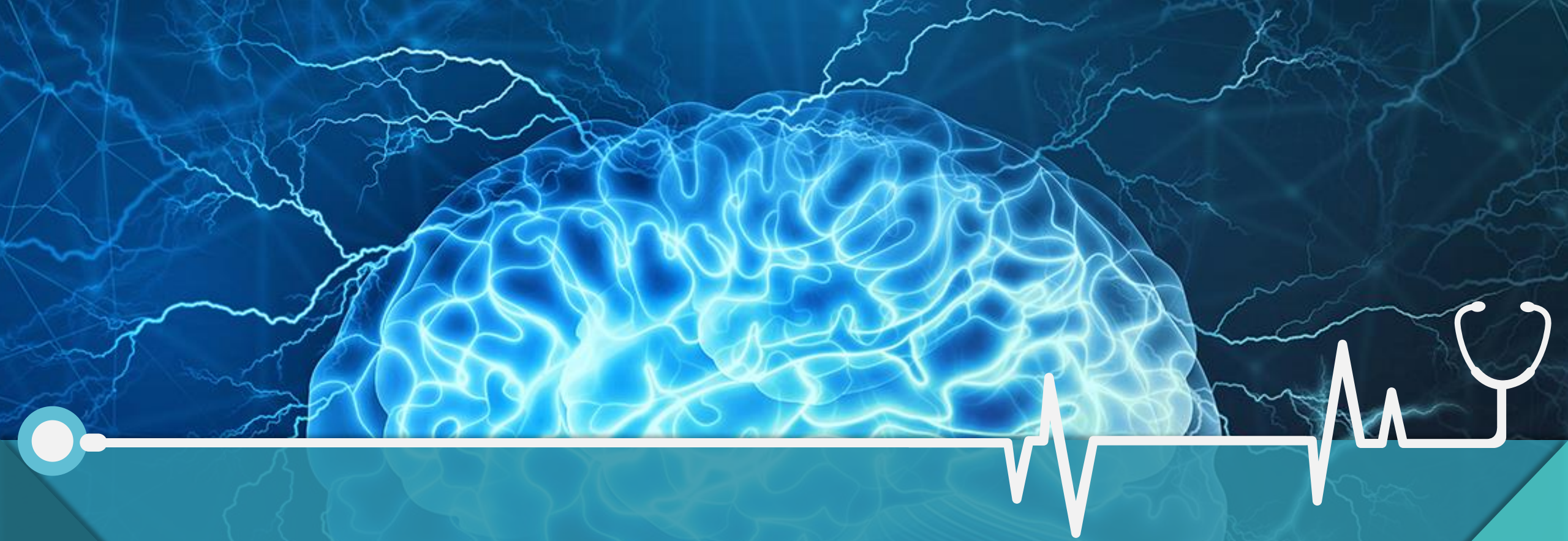
MCQ – Cluster headache and trigeminal neuralgia

❖**Cluster headache is different from Trigeminal neuralgia in that**:

a. It is unilateral
b. It is periorbital
c. It is associated with photophobia
d. It is associated with nausea
e. Longer duration

How to differentiate cluster headache from migraine

A. Cluster headache is unilateral
B. Topiramate is good as a prophylaxis for cluster headache
C. Migraine have less frequency but longer duration
D. Cluster is more common in females
E. Associated with nausea and vomiting



Epilepsy

شرح

Seizure

Partial (focal) seizures

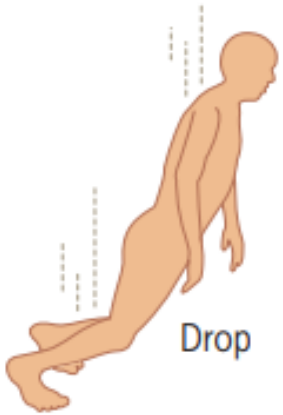
2° generalized

Impaired consciousness?

- Simple partial
- Complex partial

Generalized seizures

Tonic-clonic (grand mal)	Tonic	Myoclonic	Atonic	Absence (petit mal)
Alternating stiffening and movement	Stiffening	Quick and repetitive jerks	Drop seizure (falls to floor)	Blank stare no postictal confusion



شرح

Seizures Subtypes

Seizures	Characterized by synchronized, high-frequency neuronal firing. Variety of forms.	
Partial (focal) seizures	Affect single area of the brain. Most commonly originate in medial temporal lobe. Types: ▪ Simple partial (consciousness intact)—motor, sensory, autonomic, psychic ▪ Complex partial (impaired consciousness, automatisms)	Epilepsy—disorder of recurrent, unprovoked seizures (febrile seizures are not epilepsy). Status epilepticus—continuous (≥ 5 min) or recurring seizures that may result in brain injury. Causes of seizures by age: ▪ Children—genetic, infection (febrile), trauma, congenital, metabolic ▪ Adults—tumor, trauma, stroke, infection ▪ Elderly—stroke, tumor, trauma, metabolic, infection
Generalized seizures	Diffuse. Types: ▪ Absence (petit mal)—3 Hz spike-and-wave discharges, no postictal confusion, blank stare ▪ Myoclonic—quick, repetitive jerks ▪ Tonic-clonic (grand mal)—alternating stiffening and movement, postictal confusion, urinary incontinence, tongue biting ▪ Tonic—stiffening ▪ Atonic—"drop" seizures (falls to floor); commonly mistaken for fainting	

MCQ – Seizures Subtypes 1

فاينل (1)

❖ All the following are generalized seizure, except:

a. Tonic clonic
b. Temporal lobe seizure
c. Atonic seizure
d. Absence seizure
e. Myoclonic seizure

فاينل معدل (1)

❖ **Partial epilepsy is characterized by all of the following except:**

a. Temporal lobe epilepsy can be associated with aura
b. Temporal lobe epilepsy can be associated with automatism
c. Partial epilepsy may progress to loss of consciousness
d. Partial epilepsy can be associated with temporary paralysis of the limb (Todd's paralysis)
e. Frontal lobe is associated with oroalimantary automatism (associated with temporal not frontal)

MCQ – Seizures Subtypes 2

فاينل (1)

❖**Partial epilepsy is characterized by all of the following except:**

a. Temporal lobe epilepsy can be associated with aura
b. Temporal lobe epilepsy can be associated with automatism
c. Partial epilepsy may progress to loss of consciousness
d. Partial epilepsy can be associated with temporary paralysis of the limb (Todd's paralysis)
e. It does not progress to secondary generalization

فاينل (1)

❖**Which of the following statements is FALSE regarding absence epilepsy (petit mal)?**

a. Typically starts in childhood
b. Females are more affected
c. Child becomes fatigue and tired for several hours after the attack (post ictal state takes hours)
d. Characterized by daily attacks each lasting for seconds
e. Associated with 3 H-z generalized symmetrical spike-wave complexes

MCQ – Seizures Subtypes 3

فاينل (2)

❖**Elementary auditory seizures such as humming or buzzing sound arise from which area ?**

a. frontal lobe
b. frontorbital area
c. lateral temporal lobe
d. mesial temporal lobe
e. parietal lobe

فاينل (1)

❖**A transient neuro deficit, contralateral to seizure site is called:**

a. Quadriplegia
b. Hemiplegia
c. Todd's Paralysis
d. Dystonia
e. Myoclonus

MCQ – Seizures Subtypes 4

فاينل (1)

❖ **Regarding Primary generalized epilepsy, which of the following statements is FALSE ?**

a. Typically, tonic clonic
b. Associated with loss of consciousness
c. Incontinence does not occur
d. Patient might remain tired for several hours after the attack
e. Patient might bite their tongue

فاينل (1)

❖ **All of the following about generalized epilepsy are true, EXCEPT:**

a. Composed of tonic and clonic stages.
b. There is loss of consciousness.
c. Post ictal state lasting for few minutes.
d. Urinary incontinence occurs during clonic stage.
e. EEG may confirm the diagnosis

Diagnosis

Diagnosis Approach

❖First seizure

- Confirmation of seizure: Determine if the patient had a true seizure.
- If possible, identify the underlying cause at the initial presentation.
  - Clinically evaluate the type of seizure (e.g., focal seizure vs. generalized tonic-clonic seizure) and identify potential seizure triggers.
  - Obtain laboratory tests to identify metabolic abnormalities.
  - Consider neuroimaging to evaluate for structural causes.
- Obtain an EEG.

❖Previously diagnosed epilepsy

- Assess for common causes of breakthrough seizures and increased seizure frequency, e.g.:
  - Poor adherence and other medication-related issues
  - Intercurrent infection or systemic illness
  - Alcohol consumption and/or recreational drug use
- Check antiepileptic drug levels.
- Consider further investigations based on clinical suspicion, e.g., septic workup, selective neuroimaging.
- Consider EEG for patients with treatment-refractory seizures, those who have had a change in seizure type, or if there is insufficient information for seizure classification.

MCQ – Diagnosis Approach

- 24 years old female came with unprovoked seizure. which of the following is false ?
  a. An electroencephalogram is recommended after the first seizure
  b. Neuroimaging is mandatory after the first seizure
  c. Prolactin level is important for prognostic purposes
  d. A complete metabolic profile and lumbar puncture are recommended
  e. Antiepileptic's are not usually prescribed after the first unprovoked seizure

MCQ

فاينل (2)

❖ **Regarding neurophysiological studies, which of the following statements is FALSE ?**

a. Normal EEG excludes epilepsy
b. Epileptic EEG record can be obtained from normal individuals
c. EMG study can differentiate between neuronal or muscular diseases
d. Optic neuritis shows delay with Visual evoked potentials
e. Nerve conduction study can diagnose peripheral nerve demyelination

فاينل (1)

❖ **Regarding neurophysiological studies, which of the following statements is FALSE ?**

a. The typical EEG finding in epilepsy is spikes and waves activity
b. Epileptic EEG record can be obtained from normal individuals
c. Normal EEG does not exclude epilepsy
d. In nerve conduction study, demyelination show reduced amplitude while axonal loss shows reduced velocity
e. Nerve conduction study can diagnose peripheral axonal polyneuropathy

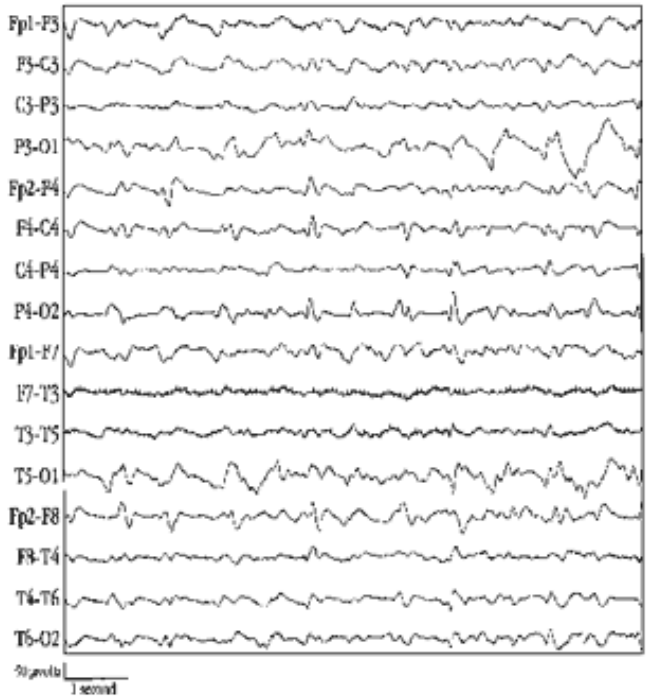
MCQ

❖ **All are true except:**

a. EEG could be abnormal in normal people
b. EEG could be normal in epileptic patient
c. Neuroimaging is not recommended after first unprovoked seizure
d. We don’t give antiepileptic drugs for first attack even there is abnormal EEG
e. EEG shows spike wave in epilepsy

❖ **All are true except:**

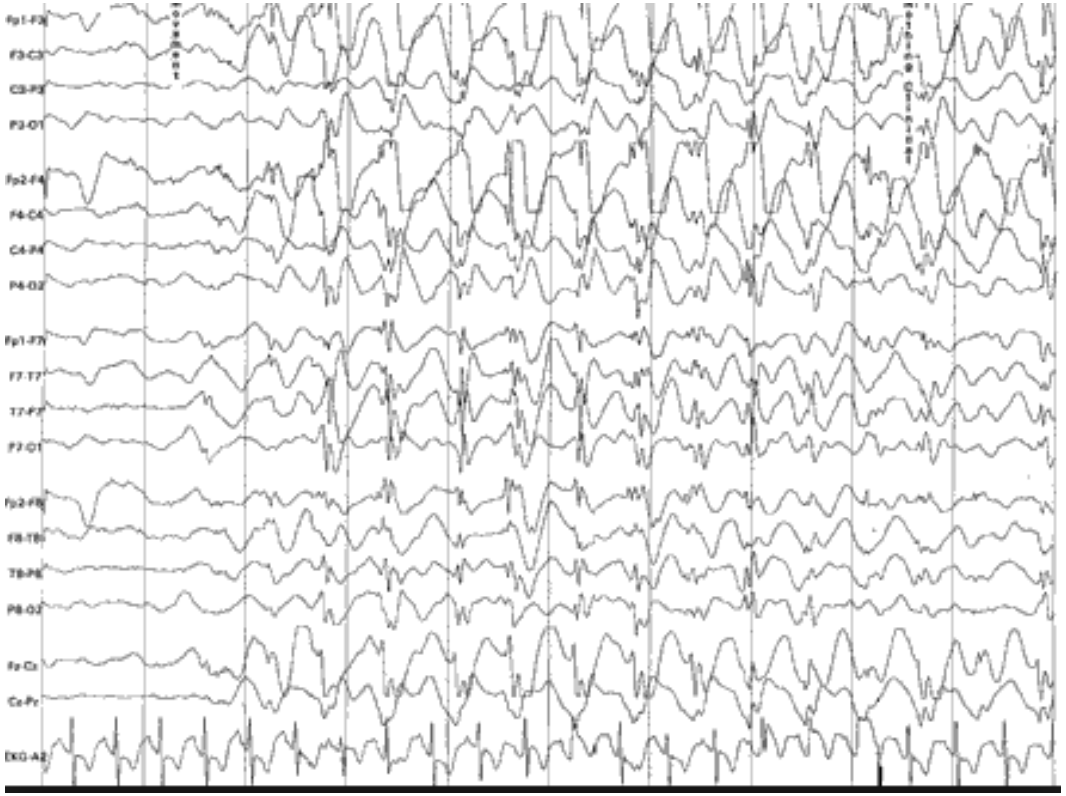
a. EEG could be abnormal in normal people
b. EEG could be normal in epileptic patient
c. Neuroimaging is recommended after first unprovoked seizure
d. We give antiepileptic drugs after first attack
e. EEG shows spike wave in epilepsy



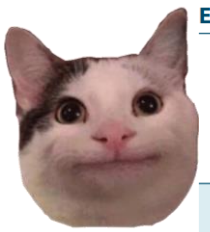
الصورة مش نفسها، وآخر خيار مش حرفي قريب منه تقريبا.

This is an EEG record

- **What is the abnormality ?**
  - Multiple spike, evolution in frequency, evolution in amplitude
- **What is the diagnosis ?**
  - Generalized epilepsy




Antiepileptic drugs



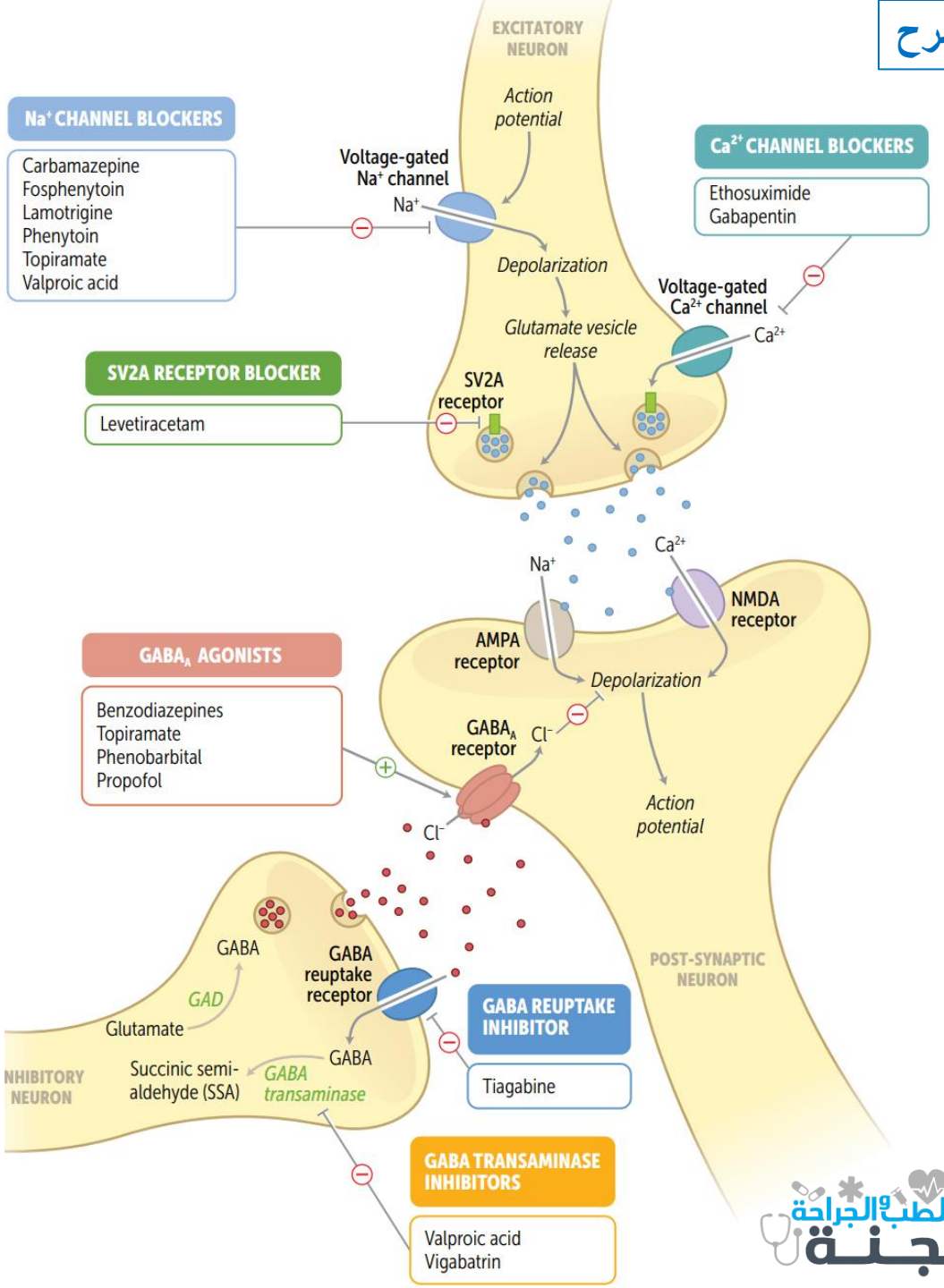
نعم عزيزي هذا شكلك أول ما شفت السلايد

Epilepsy therapy

	GENERALIZED						
	PARTIAL (FOCAL)	TONIC-CLONIC	ABSENCE	STATUS EPILEPTICUS	MECHANISM	SIDE EFFECTS	NOTES
Benzodiazepines				** ✓	↑ $GABA_A$ action	Sedation, tolerance, dependence, respiratory depression	Also for eclampsia seizures (1st line is $MgSO_4$)
Carbamazepine	* ✓	✓			Blocks Na^+ channels	Diplopia, ataxia, blood dyscrasias (agranulocytosis, aplastic anemia), liver toxicity, teratogenesis (cleft lip/palate, spina bifida), induction of cytochrome P-450, SIADH, SJS	1st line for trigeminal neuralgia
Ethosuximide			* ✓		Blocks thalamic T-type Ca^{2+} channels	EFGHIJ—Ethosuximide causes Fatigue, GI distress, Headache, Itching (and urticaria), SJS	Sucks to have Silent (absence) Seizures
Gabapentin	✓				Primarily inhibits high-voltage-activated Ca^{2+} channels; designed as GABA analog	Sedation, ataxia	Also used for peripheral neuropathy, postherpetic neuralgia
Lamotrigine	✓	✓	✓		Blocks voltage-gated Na^+ channels, inhibits the release of glutamate	SJS (must be titrated slowly), hemophagocytic lymphohistiocytosis (black box warning)	
Levetiracetam	✓	✓			SV2A receptor blocker; may modulate GABA and glutamate release, inhibit voltage-gated Ca^{2+} channels	Neuropsychiatric symptoms (eg, personality change), fatigue, drowsiness, headache	
Phenobarbital	✓	✓		✓	↑ $GABA_A$ action	Sedation, tolerance, dependence, induction of cytochrome P-450, cardiorespiratory depression	1st line in neonates ("phenobabytal")
Phenytoin, fosphenytoin	✓	* ✓		*** ✓	Blocks Na^+ channels; zero-order kinetics	PHENYTOIN: cytochrome P-450 induction, Hirsutism, Enlarged gums, Nystagmus, Yellow-brown skin, Teratogenicity (fetal hydantoin syndrome), Osteopenia, Inhibited folate absorption, Neuropathy. Rare: SJS, DRESS syndrome, SLE-like syndrome. Toxicity leads to diplopia, ataxia, sedation.	
Topiramate	✓	✓			Blocks Na^+ channels, ↑ GABA action	Sedation, slow cognition, kidney stones, skinny (weight loss), sight threatened (glaucoma), speech (word-finding) difficulties	Also used for migraine prophylaxis
Valproic acid	✓	* ✓	✓		↑ Na^+ channel inactivation, ↑ GABA concentration by inhibiting GABA transaminase	GI distress, rare but fatal hepatotoxicity (measure LFTs), pancreatitis, neural tube defects, tremor, weight gain, contraindicated in pregnancy	Also used for myoclonic seizures, bipolar disorder, migraine prophylaxis
Vigabatrin	✓				↑ GABA. Irreversible GABA transaminase inhibitor	Permanent visual loss (black box warning)	Vision gone all bad with Vigabatrin

* = Common use, ** = 1st line for acute, *** = 1st line for recurrent seizure prophylaxis.

شرح



Epilepsy drugs

سنوات (1)

- A patient with epilepsy who was prescribed Lamictal
  - **What is the most serious complication that you should warn the patient about ?**
    - Stevens Johnsons Syndrome
  - **Define epileptic fits**
    - Involuntary movements and brief postictal symptoms

فاينل (1)

- **Pregnant on Topiramate, what should you do ?**
  - Stop Topiramate

Epilepsy drugs

❖ **18 years old female patient is taking Valproic acid for juvenile myoclonic epilepsy. Because she was gaining weight, she was prescribed lamotrigine. After three weeks she developed skin rash. what is the next step?**

a. Continue same treatment and give antihistamines
b. Send her to the primary health care physician
c. Stop lamotrigine
d. Stop valproic acid
e. Check levels of valproic acid and lamotrigine

Status epilepticus

شرح

Status epilepticus

❖**Status epilepticus** is a seizure that lasts ≥ 5 minutes or a series of seizures in rapid succession without full neurological recovery.

سنوات (1)

❖**Management may be divided into three components**:

- Immediate resuscitative measures – airway, breathing, circulation
- Control of seizures, further subdivided:
  - **Premonitory phase**: diazepam IV, rectal 10-20mg repeated 15min, alternation: clonazepam IV 1-2 mg
  - **Early status**: Lorazepam 4-mg bolus repeated once if necessary, after 10min
  - **Established status**: phenobarbitone bolus (10 mg/kg; 100 mg/min) and/or phenytoin infusion (15 mg/kg; 50 mg/min, with ECG monitoring)
  - **Refractory status**: GA thiopental +ventilation -12h+ EEG monitor
- Identification (and treatment) of underlying cause

Status epilepticus

- You witnessed adult patient with epilepsy who started to have fits in the ward

1. **Do you start treating him as status epilepticus directly ?**
   - NO
2. **If you decided to wait, how much you would wait ?**
   - 5 minutes
3. **What will you give him initially and what is the dose and route of administration?**
   - IV or rectal diazepam 10-20 mg
4. **If your patient did not respond to the first medication and continues to have fits, what will you give him next including the dose and route ?**
   - intravenous lorazepam (4-mg bolus)

Status epilepticus

- A patient with epilepsy came to the emergency room with status epilepticus

1. **What do you give him initially including the dose ?**
   - Diazepam 10-20 mg IV
2. **If the patient did not improve, what do you give him next ?**
   - Lorazepam 4mg IV
3. **If the patient did not improve, what do you give him next ?**
   - Phenytoin 15mg IV
4. **The patient improved but he is unconscious what do you do next ?**
   - GA (thiopental), put him on ventilator & EEG MONITORING

MCQ – Status epilepticus

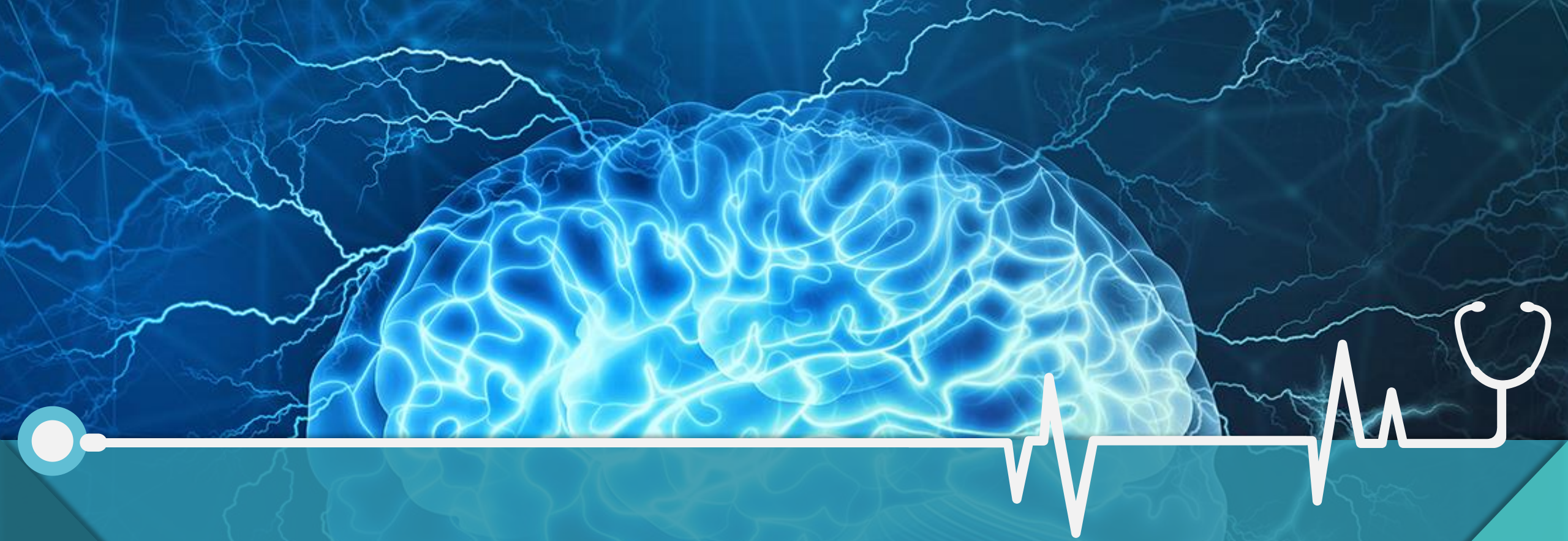
❖**A patient presented with status epilepticus, he was given 10mg of diazepam but didn't get better, he was given another 10 mg, but it also didn't work. What is the next step ?**

a. 20mg of phenytoin + saline for 2 minutes
b. 20mg of phenytoin + glucose infusion
c. 20mg of phenytoin + saline infusion
d. 20mg of phenytoin + glucose for 2 minutes
e. Propofol

MCQ – Status epilepticus

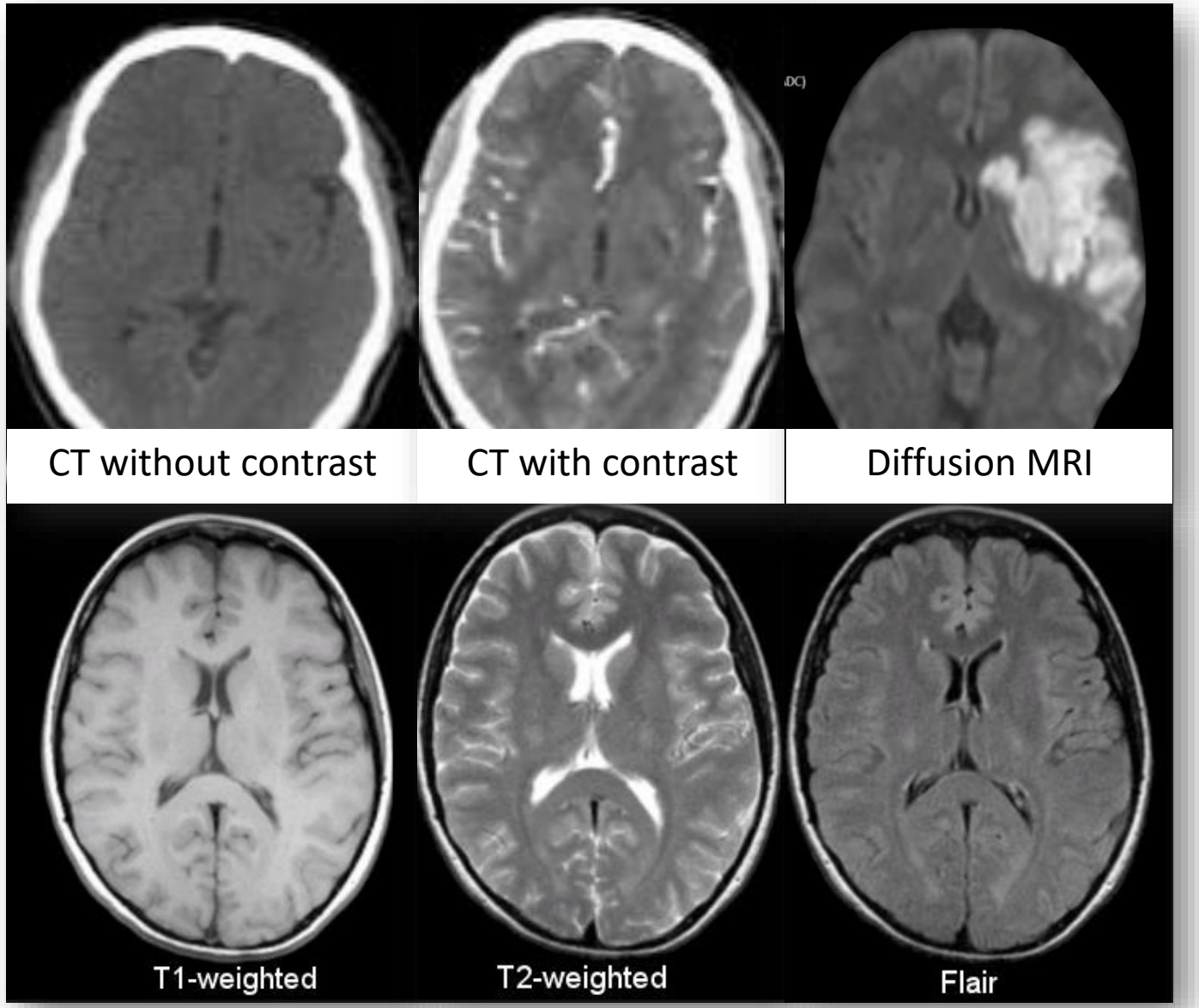
❖**Which of the following is the correct order for treatment of status epilepticus ?**

a. Benzodiazepine - Phenytoin - Phenobarbital - coma
b. Phenytoin - Phenobarbital - coma - Benzodiazepine
c. Phenobarbital - coma - Benzodiazepine - Phenytoin
d. Phenytoin - Phenobarbital- Benzodiazepine - coma
e. Phenytoin - Benzodiazepine - Phenobarbital - coma



Vascular diseases

Reminder



MCQ – Brain imaging

❖Regarding brain imaging, which of the following is TRUE ?

a. The CT scan is superior to MRI in soft tissue imaging
b. CT scans cannot diagnose hemorrhage
c. Brain CT scan can be normal in early ischemic stroke
d. Brain CT with contrast is superior to MRI in detecting white mater and grey mater lesions
e. PET and SPECT are structural brain imaging and do not provide functional information

شرح

Extra Axial Hematomas Summary

❖Epidural hematoma

- Lens (lentiform) in shape
- Respect the sutures
- Can cause mass effect (discussed later)
- Most common from the middle meningeal artery

❖Subdural hematoma

- Lacunar in shape
- Doesn't respect suture
- Less likely to cause mass effect
- Most common from the bridging veins

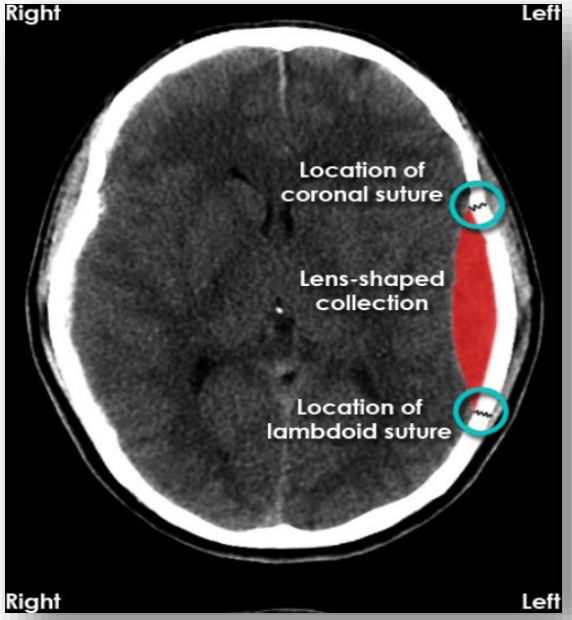
❖Subarachnoid hematoma

- Bleeding in sulci & citterns
- Usually found centrally (around the circle of Willis) but can occur in other parts of the brain
- Most commonly due to rupture of an intracranial aneurysm (berry aneurysm)
- Commonly present with "The worst headache in my life" complain

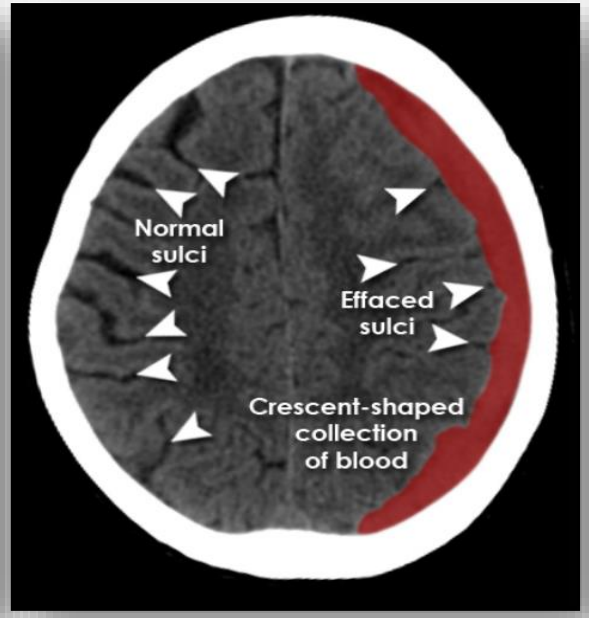
❖Intraventricular hematoma

- Inside cerebral ventricles
- Can be primary or secondary to a large extraventricular component with secondary extension into the ventricles

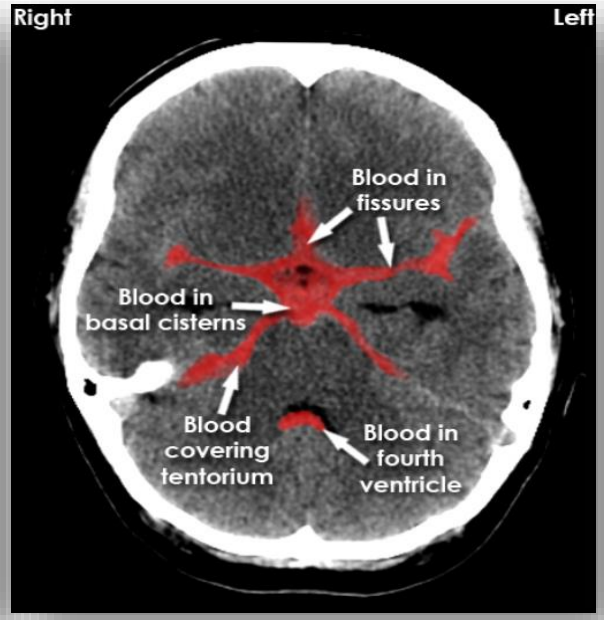
Extra Axial Hematomas Summary



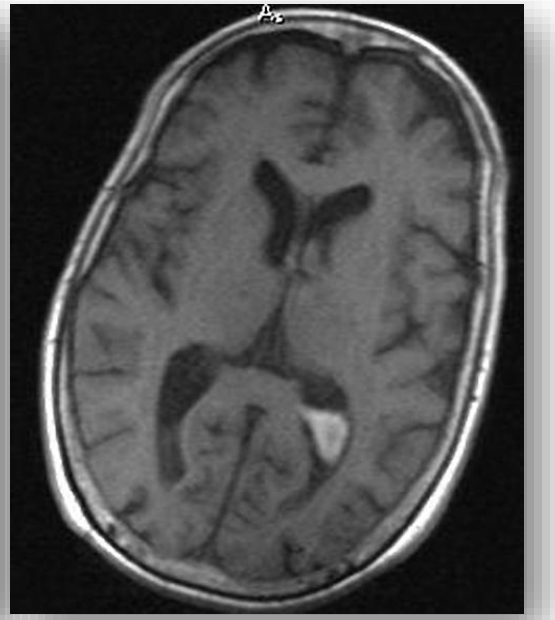
Epidural hematoma



Subdural hematoma



Subarachnoid hematoma



Intraventricular hematoma

Subarachnoid hemorrhage

❖What are the causes ?

- Trauma, Spontaneous (Ruptured intracranial aneurysms, Ruptured arteriovenous malformations, Others: cortical thrombosis, angioma, neoplasm, infection)

❖What are the symptoms ?

- Thunderclap headache, Meningeal signs, Impaired consciousness

❖What are the indicated investigations ?

- Best initial test: immediate head CT without contrast
- Second-line tests (if CT failed): lumbar puncture (LP) or CT angiography (CTA)

❖What do you see in Lumber Puncture ?

- presence of red blood cells (RBCs) and/or xanthochromia

Subarachnoid hemorrhage

❖What is the management ?

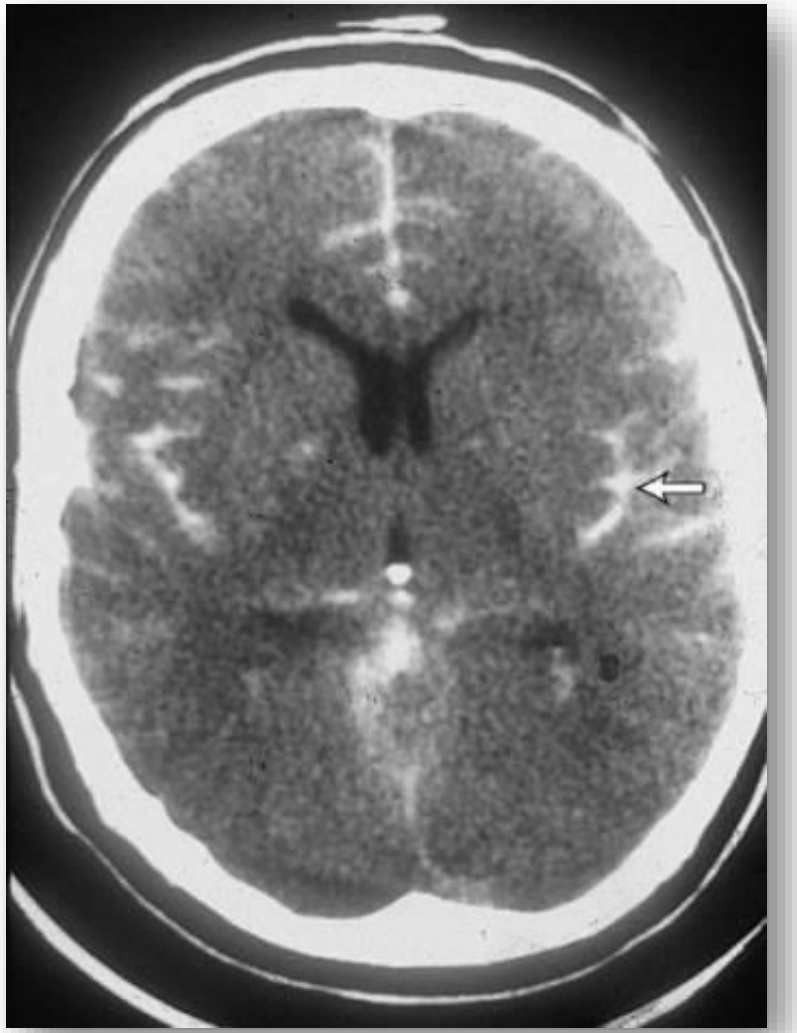
1. **Stabilization**
   - Perform an ABCDE survey
   - Secure the airway if indicated
   - Provide hemodynamic support as needed
2. **Prevention of rebleeding**
   - Anticoagulant reversal (give antidotes)
   - Management of blood pressure and cerebral perfusion pressure (CPP)
3. **Other neuroprotective measures**
   - Start ICP management (e.g., elevate head 30°, IV mannitol, short-term controlled hyperventilation)

Subarachnoid hemorrhage

❖Which of the following is wrong about the management ?

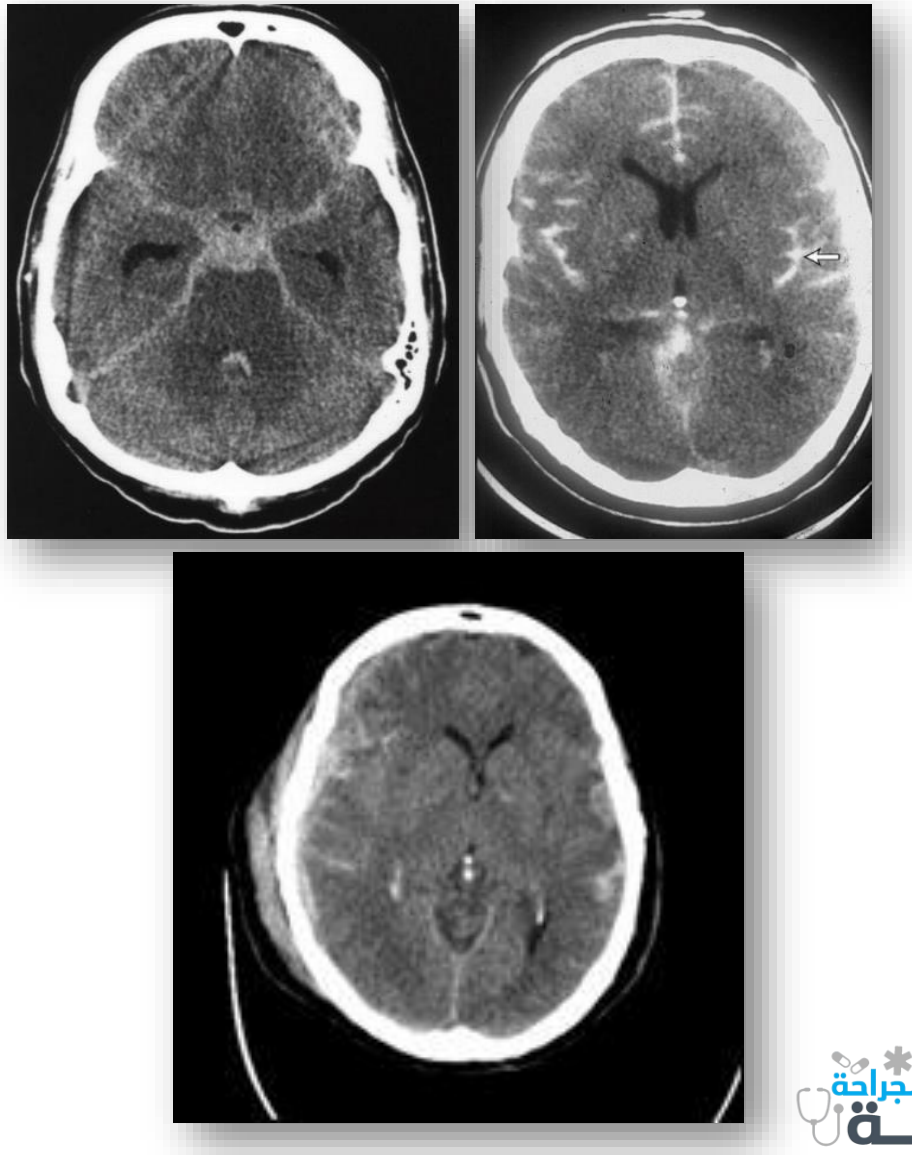
a. Reduce warfarin without antidote
b. Strict management of blood pressure
c. Give diuretics
d. intubate and hyperventilate
e. Surgical treatment is indicated to prevent rebleeding

الأرشيف مكتوب فقط الإجابة باقي الخيارات من عندي



Subarachnoid hemorrhage

- **What is the diagnosis ?**
  - Subarachnoid hemorrhage
- **What are the most common causes?**
  - trauma, aneurysms, arteriovenous malformations



MCQ – Subarachnoid hemorrhage

- A 48 years old female awakens with a severe thunderclap headache and a stiff neck. She was taken to hospital and the brain CT reveals no hemorrhage

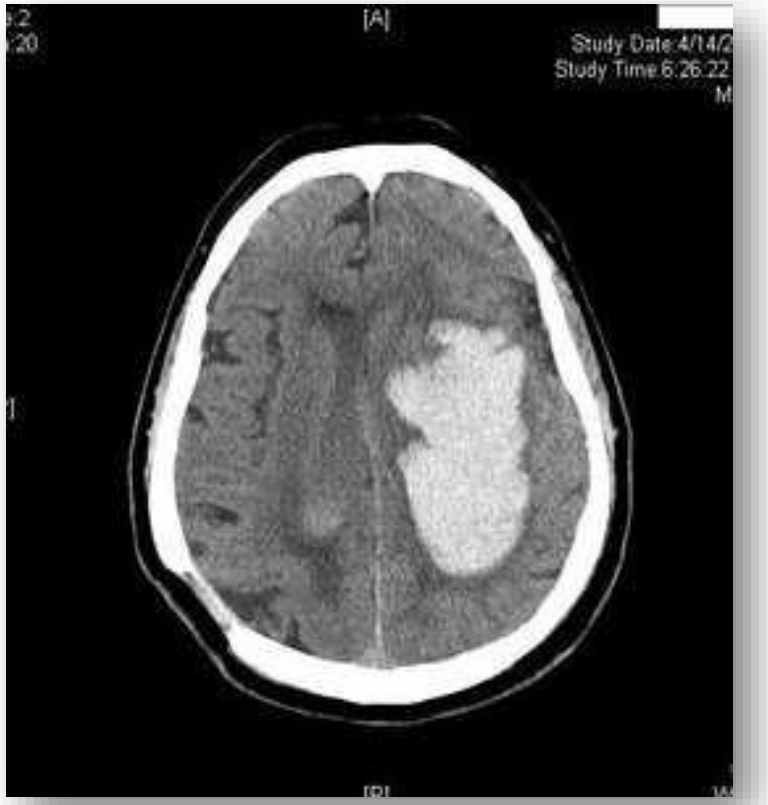
- Which of the following is the next step?

a. Lumbar Puncture
b. Angiogram
c. Start ergotamine therapy
d. Start Nimodipine
e. Venography

Intracerebral hemorrhage

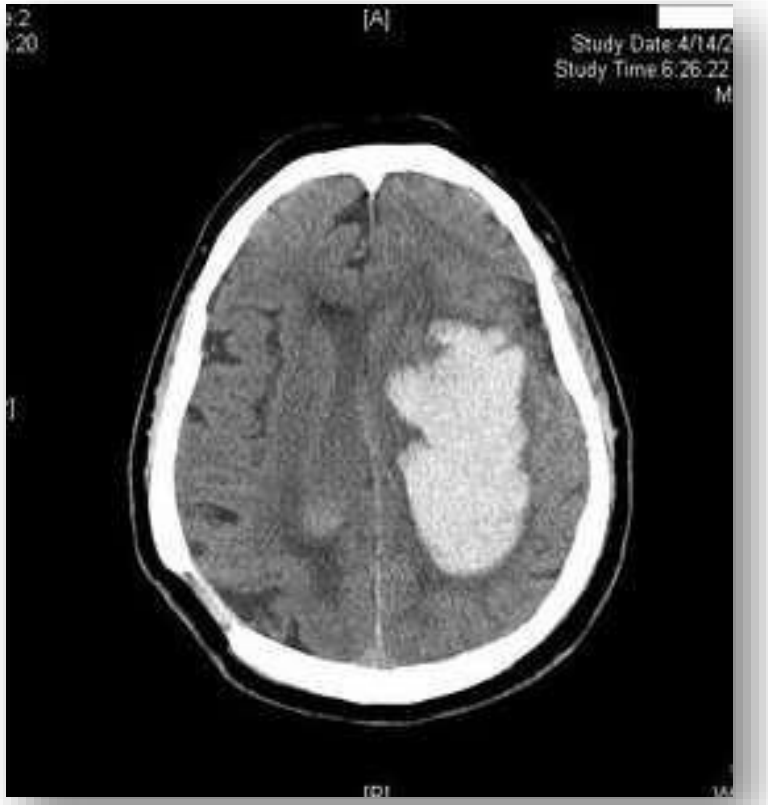
❖**What is the diagnosis ?**

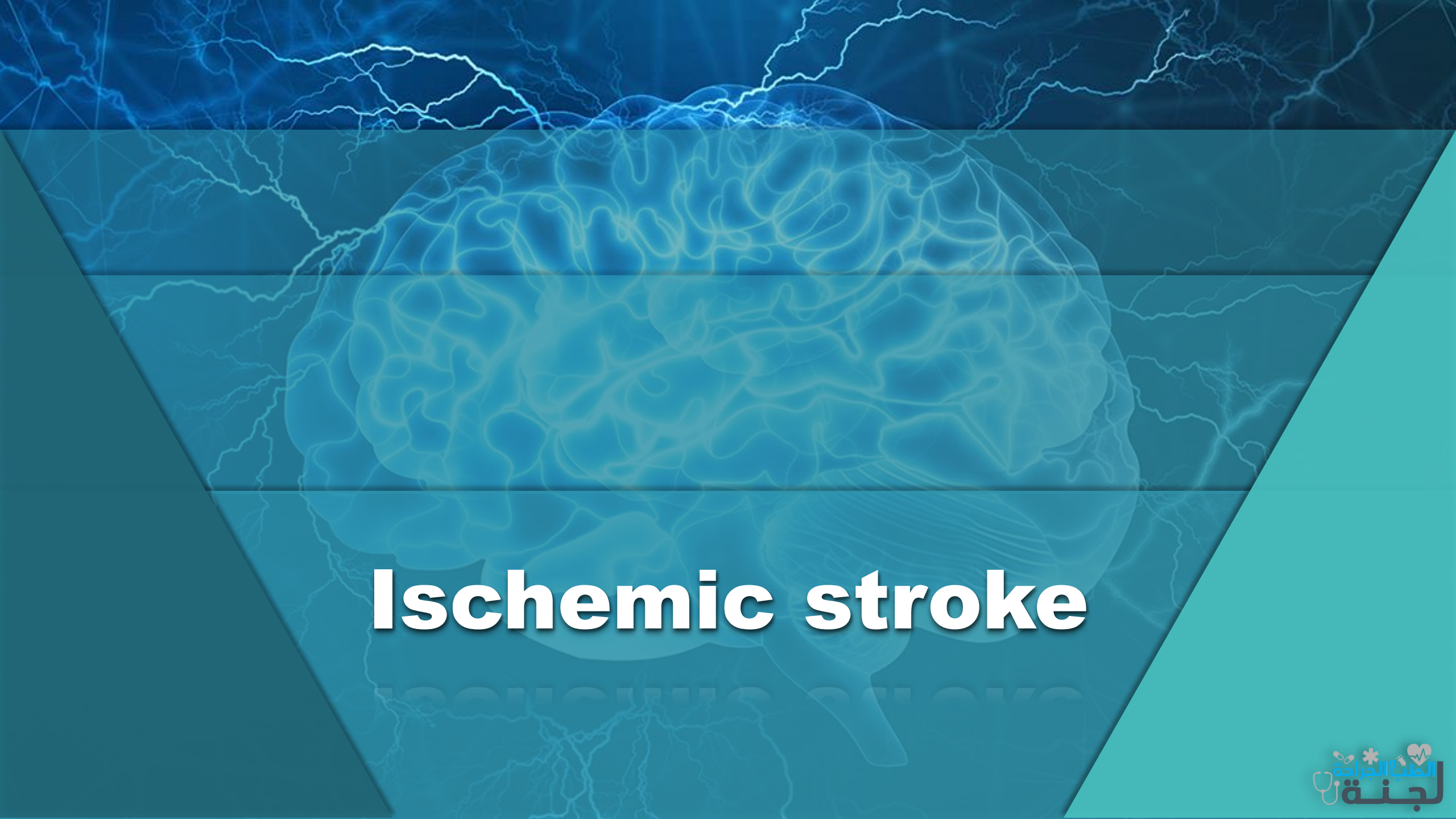
a. Infarction
b. Intracerebral / intraparenchymal hemorrhage
c. Multiple sclerosis
d. Intracranial edema
e. Increased intracranial pressure



Intracerebral hemorrhage

- Which of the following is wrong regarding the management
  a. controlling blood pressure
  b. antidote for warfarin
  c. antidote for heparin
  d. risk for brain herniation
  e. LP and CSF analysis for Sub-arachenoid hemorrhage




Ischemic stroke

شرح

Ischemic stroke

❖ **Risk factors**:

- **Nonmodifiable**: Age ≥ 65 years, Sex ♂ > ♀, ethnicity, Family history, History of TIA, Migraine with aura.
- **Modifiable**: Systemic hypertension, Hyperlipidemia, DM, Atherosclerosis, Cardiovascular disease, Carotid artery stenosis, Atrial fibrillation, Obesity, Coagulopathy, hyperhomocysteinemia, Heavy alcohol use, Tobacco use, Cocaine, Oral contraceptive use, Hormone replacement therapy

سنوات (1)

❖ **Mention 3 cardiac risk factors of stroke**: (Risk of embolism)

- Atrial fibrillation, valvular vegetation, ventricular septal defect, sudden hypotension, HTN

MCQ – Stroke risk factors

فاينل (2)

❖ Which of the following is not a risk factor for stroke ?

a. Lipman sacks syndrome
b. Infective endocarditis
c. Anterior wall hypokinesia
d. Atrial hypertrophy
e. Patent foramen ovale

According to Dr. Omar
Patent foramen ovale with DVT is a risk but DVT without patent foramen ovale or patent foramen ovale without DVT are not risk factors ☺

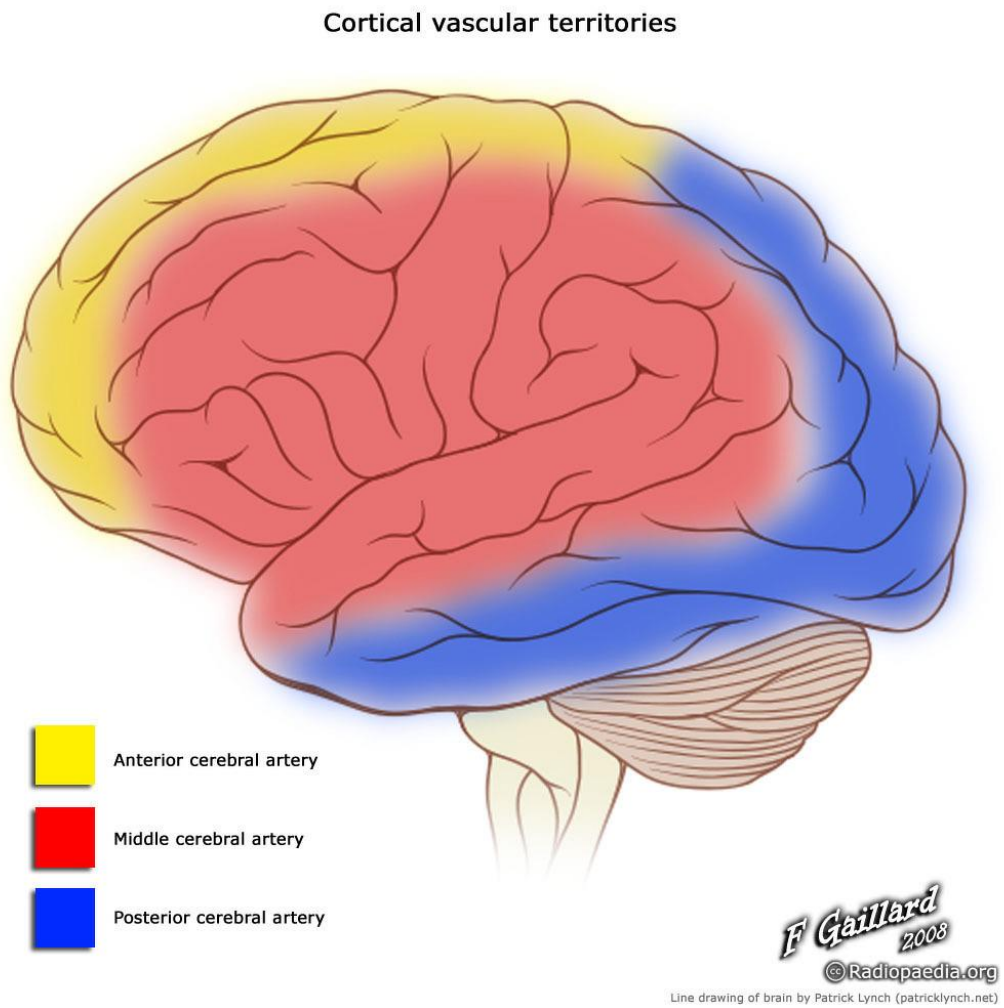
فاينل (1)

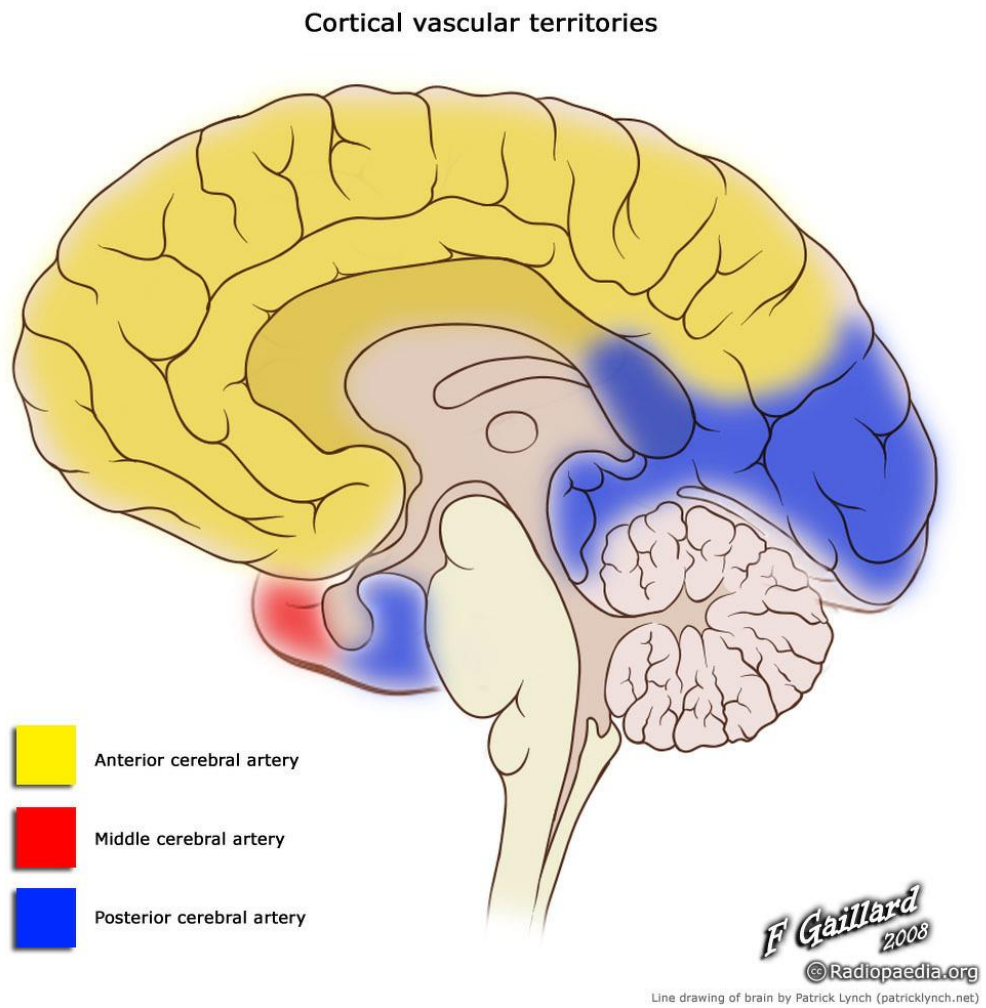
❖ Most single risk factor for stroke:

a. Smoking
b. Hyperlipidemia
c. D.M.
d. Hypertension

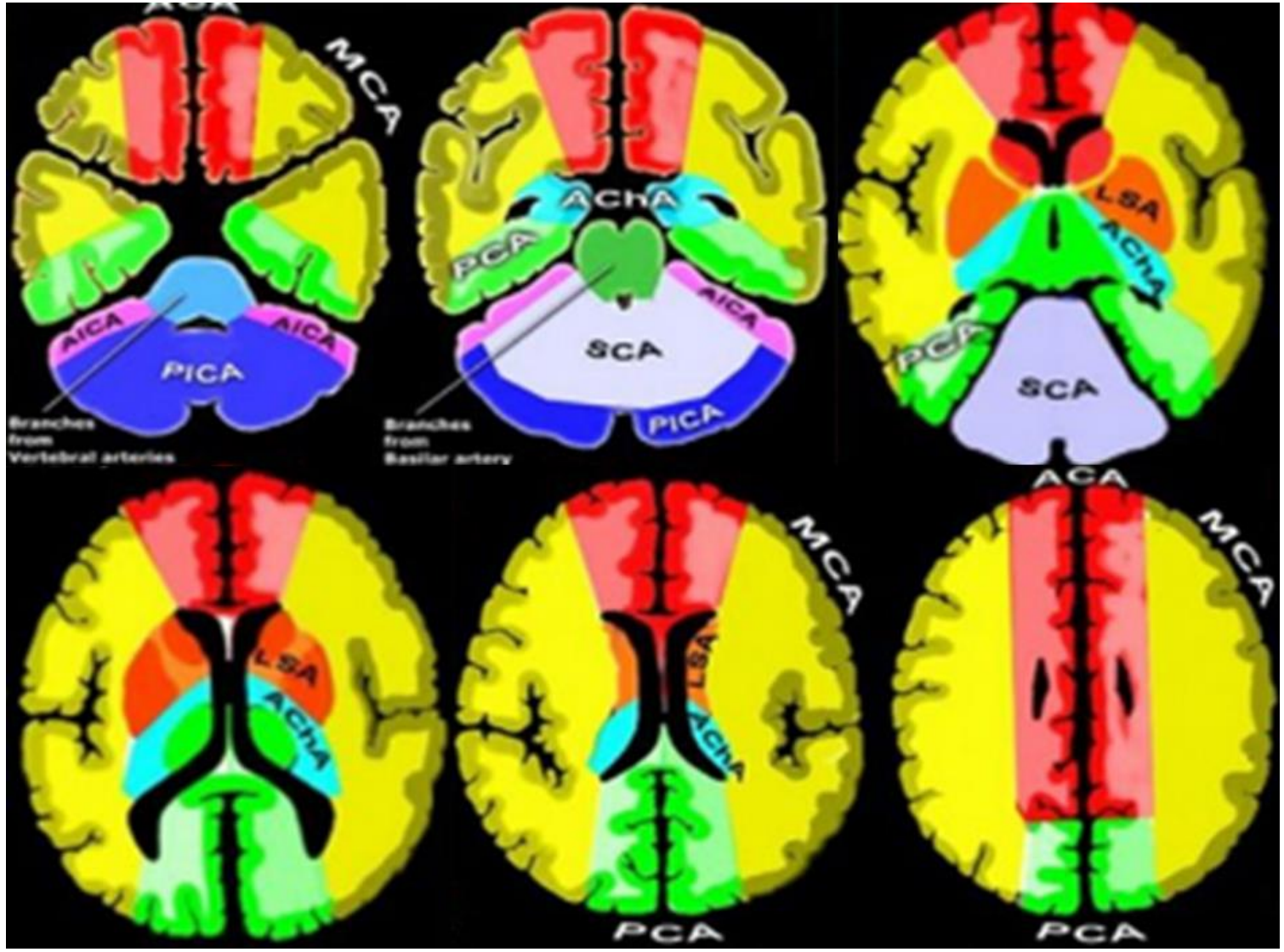
شرح

Cerebral Blood Supply



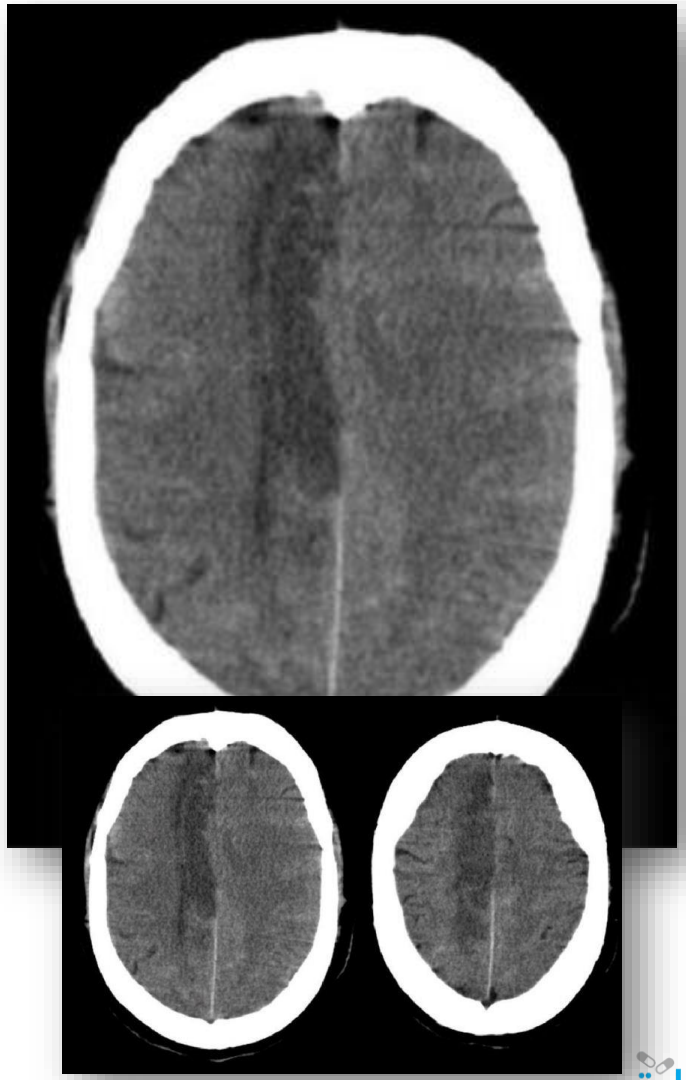


Cerebral Blood Supply



ACA infarction

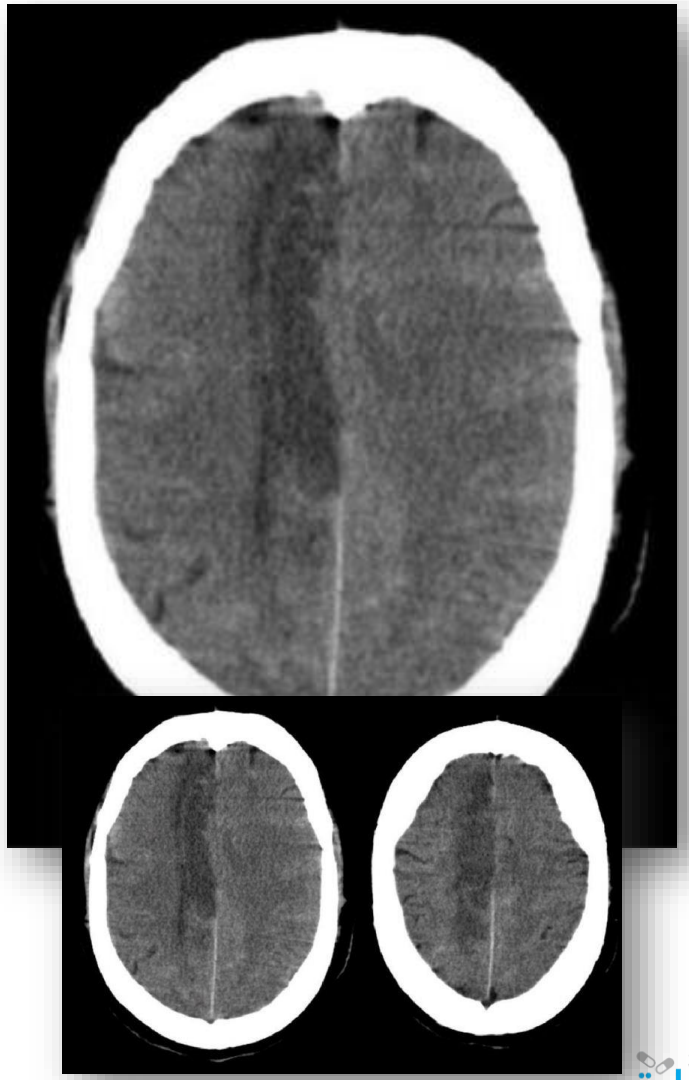
1. **What is this scan ?**
   - Head CT without contrast
2. **What is the diagnosis ?**
   - Ischemic stroke in medial surface of right frontal and parietal lobes (ACA distribution)
3. **What arterial territory is affected ?**
   - Right anterior cerebral artery



ACA infarction

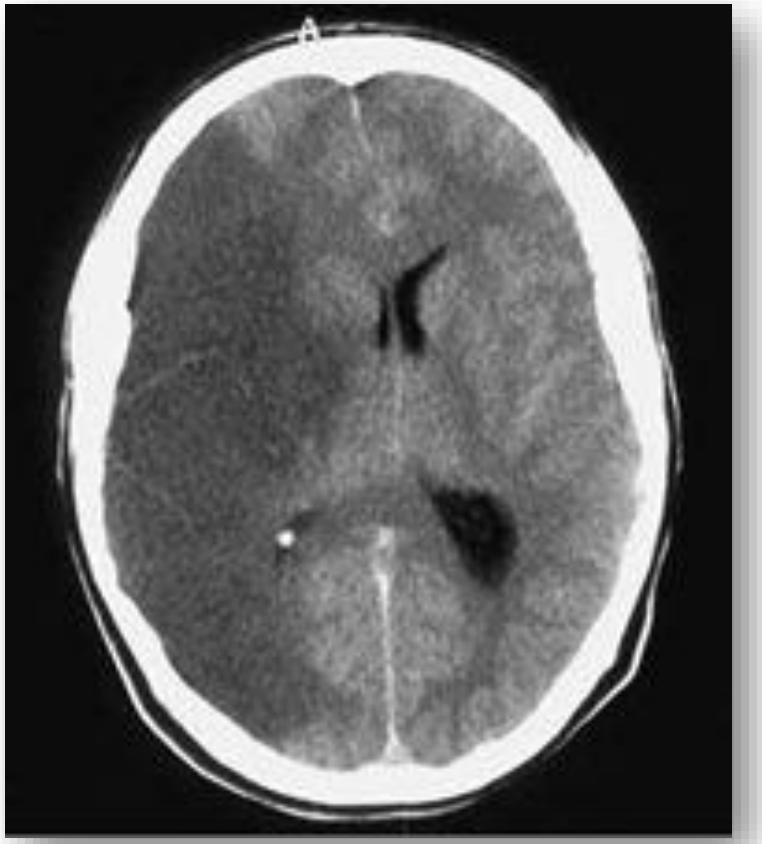
4. Mention one peculiar clinical consequence to this abnormality

- Contralateral weakness and sensory loss in the lower limbs more marked than in upper limbs
- Abulia
- Urinary incontinence
- Dysarthria
- Transcortical motor aphasia
- Frontal release signs
- Limb apraxia



MCA infarction

- **Name of study**:
  - Head CT without contrast
- **Diagnosis**:
  - Right MCA infarction
- **Which side of brain ?**
  - Right side
- **Mention one fatal complication ?**
  - Cardiac dysfunction (arrhythmias, myocardial infarction)
  - Elevated intracranial pressure and brain herniation (Cushing triad)

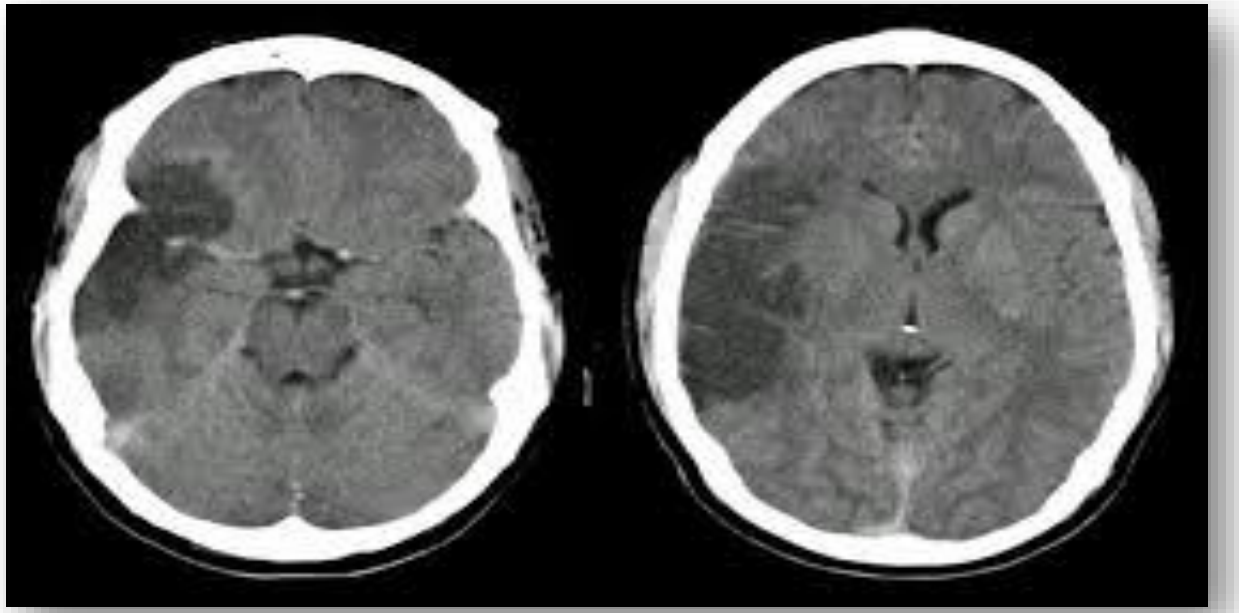


MCA infarction – Clinical presentation

- Contralateral weakness and sensory loss more marked in the upper limbs and lower half of the face than in lower limbs
- Gaze deviates toward the side of infarction
- Contralateral homonymous hemianopia without macular sparing or superior/inferior quadrantanopia
- Aphasia if in dominant hemisphere (usually left MCA territory)
- Hemineglect if in nondominant hemisphere (usually right MCA territory)

MCA infarction

- **Describe what you see in picture**:
  - Brain CT scan without contrast showing hypo dense lesion on the right side
- **Mention the cause of changes in this picture**:
  - Suspected of acute right middle cerebral artery infarction



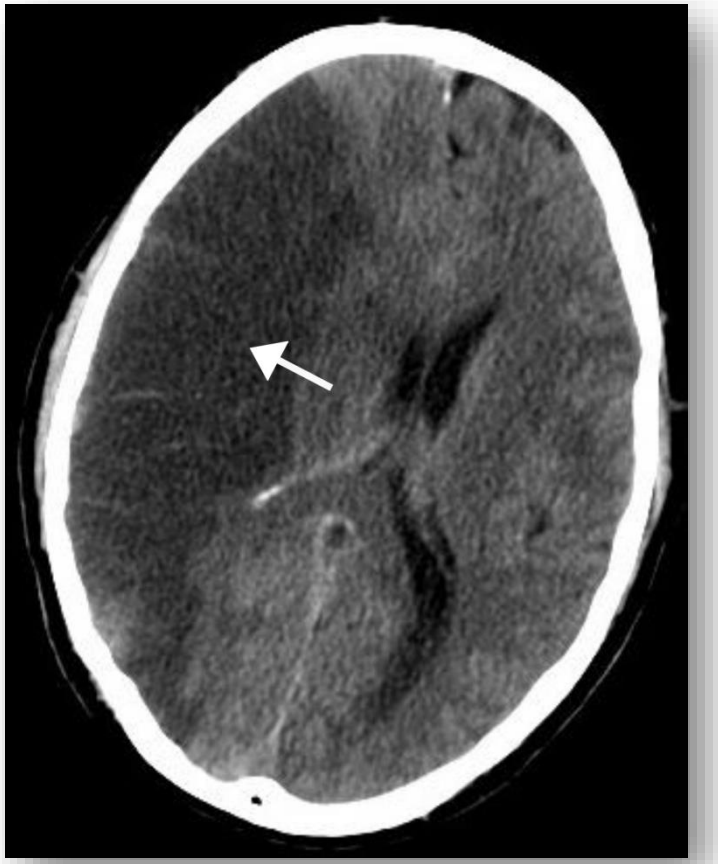
MCQ – MCA infarction

❖**All are causes of this lesion except:**

A. Hypertension
B. Left carotid artery stenosis
C. Valvular heart disease
D. Atrial fibrillation
E. Patent foramen ovale with DVT

❖**All are causes of this lesion except:**

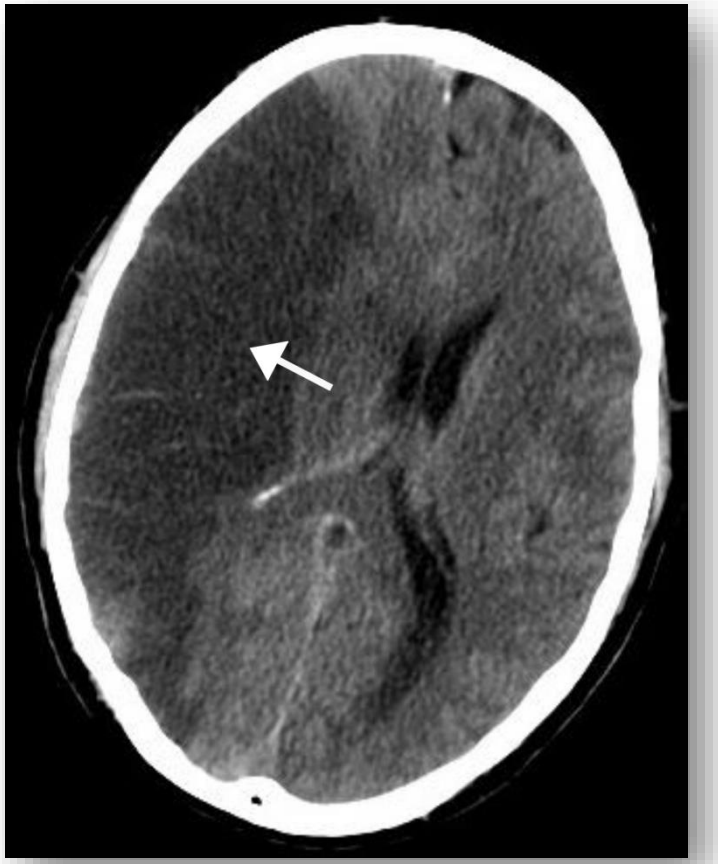
A. Hypertension.
B. Right carotid artery stenosis
C. Valvular heart disease.
D. Atrial fibrillation.
E. DVT with normal esophageal echo



MCQ – MCA infarction

❖**All are causes of this lesion except:**

A. Hypertension.
B. Patent foramen ovale
C. Valvular heart disease.
D. Atrial fibrillation.
E. Left atrial hypertrophy

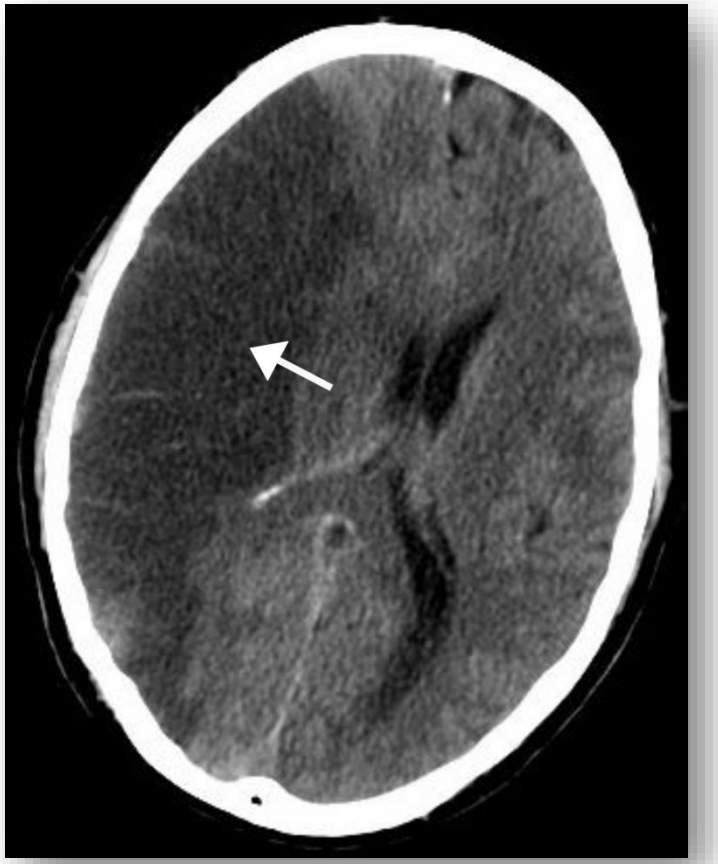


- Patent foramen ovale with DVT is a risk but DVT without patent foramen ovale or patent foramen ovale without DVT are not risk factors ☺

MCQ – MCA infarction

❖**If the patient with this CT scan is right-handed, which of the following symptom is not found ?**

a. Hemiparesis
b. Paresthesia
c. Aphasia
d. Homonymous hemianopia
e. Hemineglect

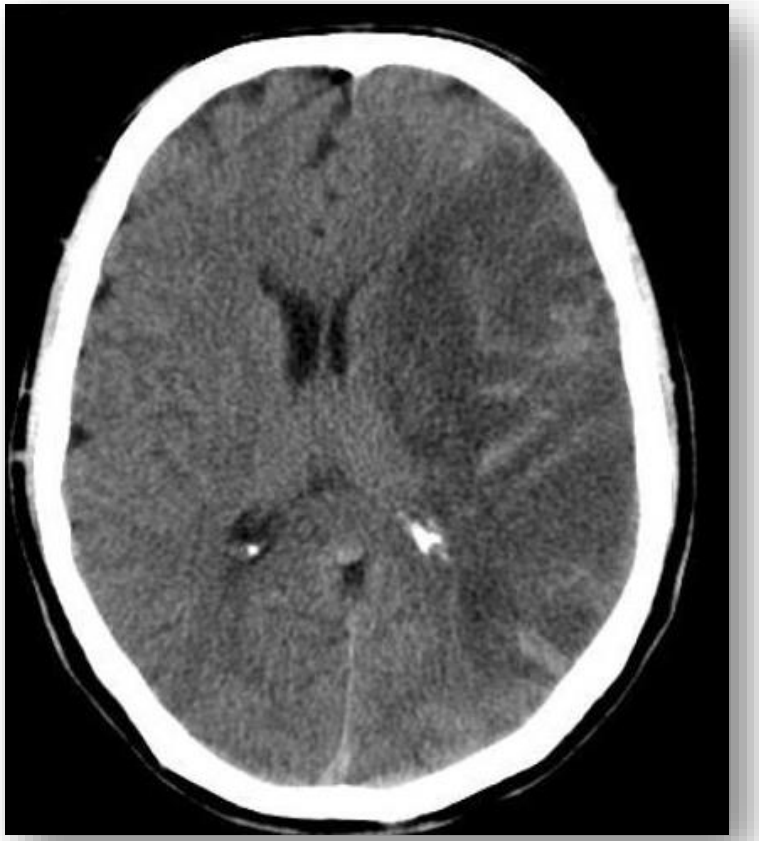


❖**Archive Note**: The patient is Rt. Handed so the cerebral hemisphere domain is the LEFT → Aphasia occurs only if the dominant hemisphere is affected, while with our case here the non-dominant (right) hemisphere is affected

MCQ – MCA infarction

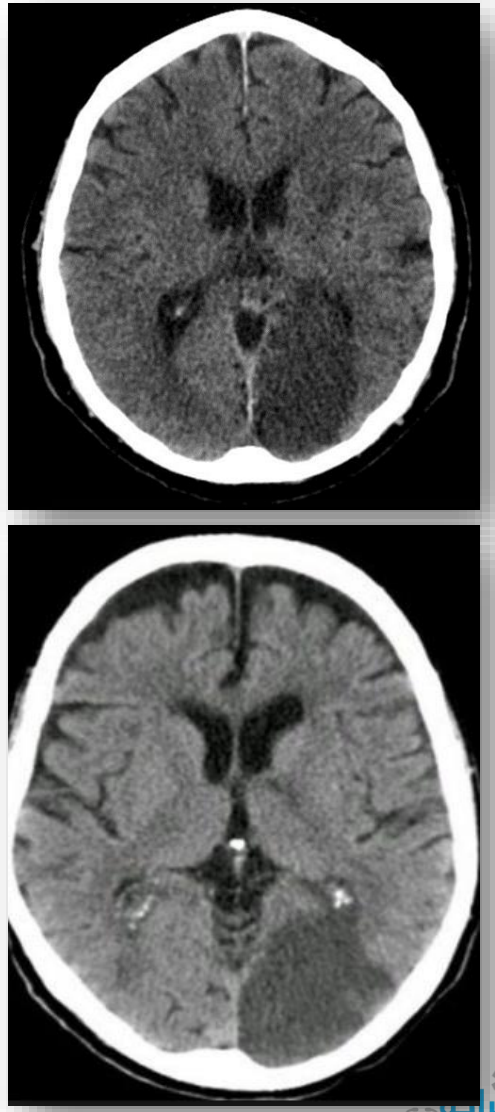
❖**The patient can present with all the following except ?**

A. Motor aphasia
B. Sensory aphasia
C. Right upper limb weakness
D. Right lower limb weakness



PCA infarction

- **What is this scan ?**
  - Head CT without contrast
- **What's the abnormality ?**
  - PCA infarction
- **What is the diagnosis ?**
  - Ischemic stroke in left occipital lobe
- **what arterial territory is affected ?**
  - Left posterior cerebral artery
- **Mention one peculiar clinical consequence to this abnormality**
  - See next slide



PCA infarction – Clinical presentation

❖General findings

- Contralateral homonymous hemianopia with macular sparing due to occipital lobe involvement
- Contralateral sensory loss due to lateral thalamic involvement: light touch, pinprick, and positional sense may be reduced.
- Memory deficits
- Vertigo, nausea

❖Hemisphere-dependent findings

- PCA territory of the **dominant hemisphere** (usually left):
  - Alexia without agraphia
  - Anomic aphasia
  - Agnosia: impairment of recognition of sensory stimulus (most commonly visual)
- PCA territory of the **nondominant hemisphere** (usually right):
  - Prosopagnosia

Watershed infarction

سنوات (3)

❖What is the abnormality ?

- Watershed area infarction

سنوات (5)

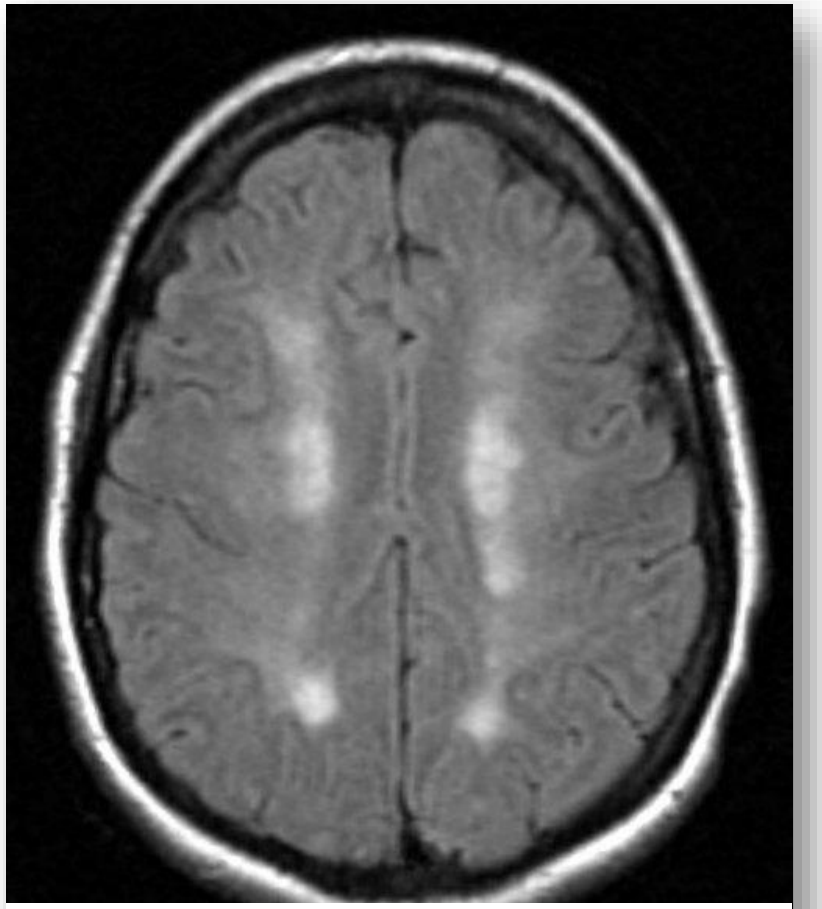
❖This condition caused by

- Severe hypotension

سنوات (1)

❖What is the pathophysiology ?

- Severe hypotension



Flair MRI

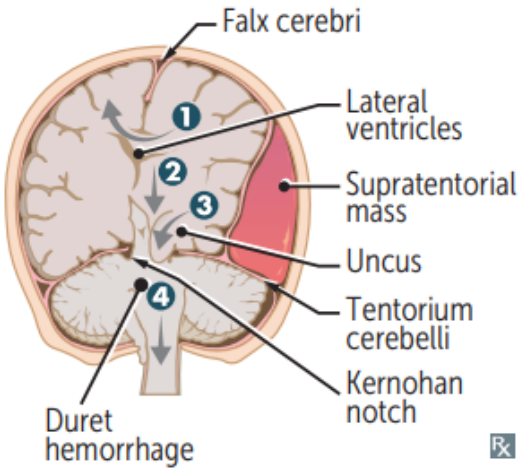
MCQ

- Mortality is lowest following:
  a. Lacunar Infarction
  b. Hemorrhagic Stroke
  c. Embolism
  d. Thrombotic Infarction
  e. TIA

Brain hernia & Cerebral edema

Brain hernias

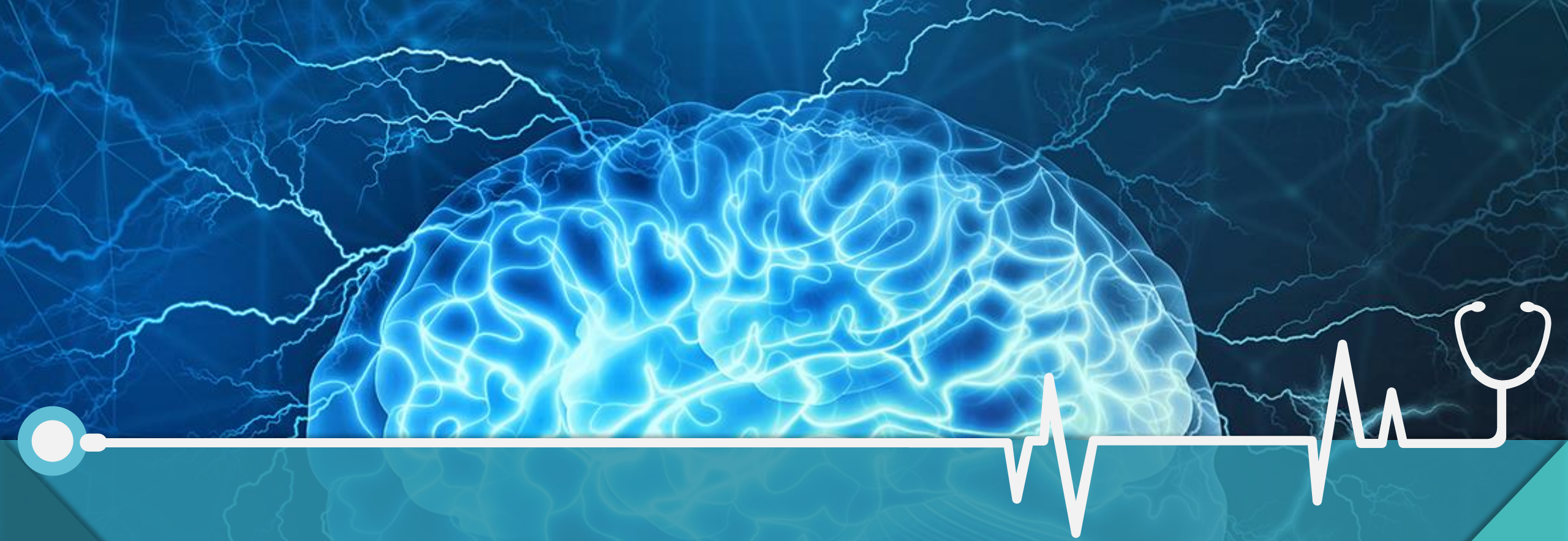
Herniation syndromes



❶ Cingulate (subfalcine) herniation under falx cerebri	Can compress anterior cerebral artery.
❷ Central/downward transtentorial herniation	Caudal displacement of brain stem → rupture of paramedian basilar artery branches → Duret hemorrhages. Usually fatal.
❸ Uncal transtentorial herniation	Uncus = medial temporal lobe. Early herniation → ipsilateral blown pupil (unilateral CN III compression), contralateral hemiparesis. Late herniation → coma, Kernohan phenomenon (misleading contralateral blown pupil and ipsilateral hemiparesis due to contralateral compression against Kernohan notch).
❹ Cerebellar tonsillar herniation into the foramen magnum	Coma and death result when these herniations compress the brain stem.

Cerebral edema

- **Definition**: The collection of additional fluid within the white matter of the brain. It is the brain's response to an insult.
- **May take 2 forms**: Vasogenic & Cytotoxic cerebral edema
- **Vasogenic cerebral edema**:
  - Refers to a type of cerebral edema in which the blood brain barrier is disrupted
  - It is an extracellular edema which mainly affects the white matter via leakage of fluid from capillaries.
  - It is most frequently seen around brain tumors and cerebral abscesses
- **Cytotoxic cerebral edema**:
  - Refers to a type of cerebral oedema, in which extracellular water passes into cells, resulting in their swelling.
  - It is an intracellular edema which affects both the white and gray matters
  - It is most frequently seen in cerebral ischemia

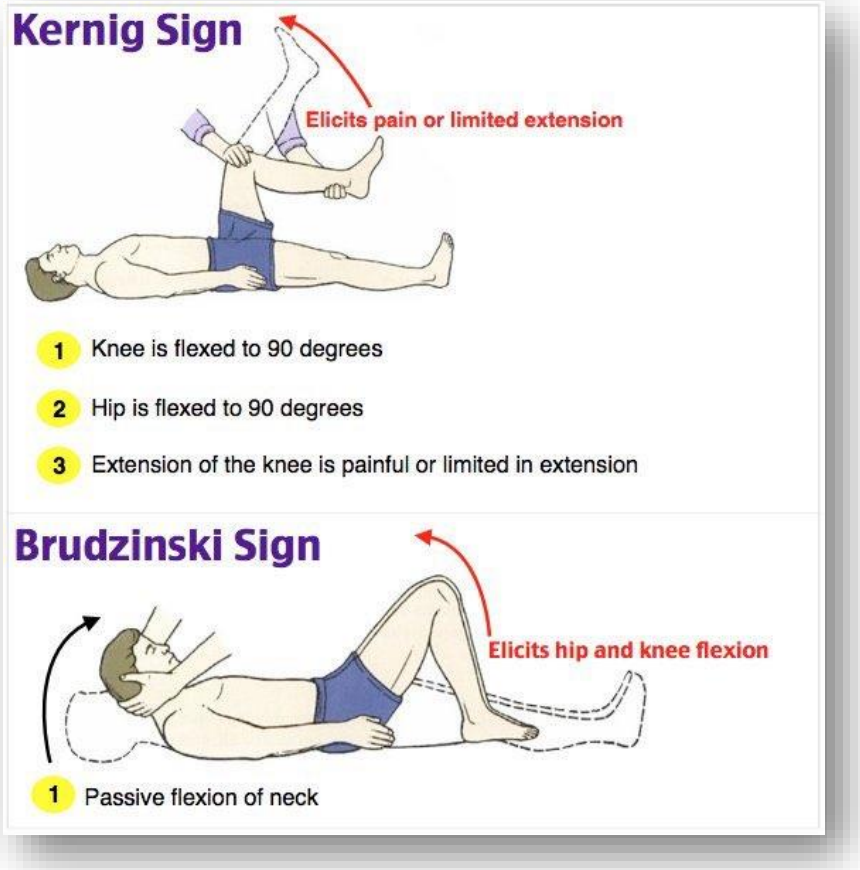


Neurological infections

Meningitis

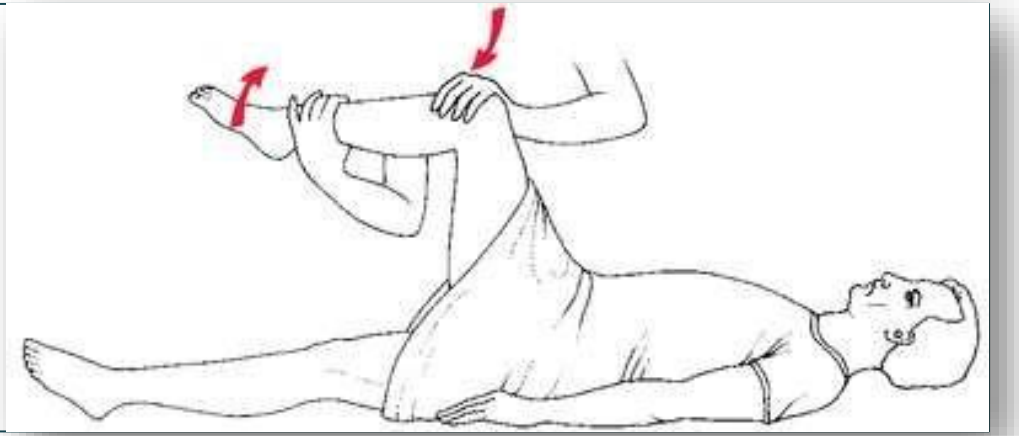
Meningitis

- Inflammation of the leptomeninges
- Usually infectious: viral, bacterial, fungal
- **Symptoms**: Fever, headache, photophobia, nuchal rigidity
- **Skin manifestations**:
  - Cutaneous petechiae in meningococcal meningitis: suggestive of **meningococcemia**
  - Maculopapular rash in some viral meningitis (e.g., West Nile virus, enterovirus)
- **Examination**: Kernig sign and Brudzinski sign

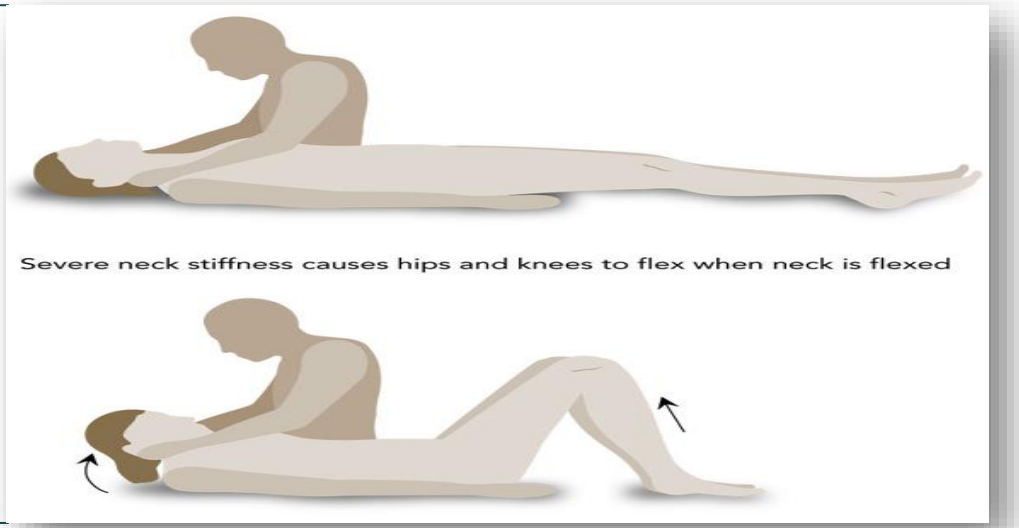


Meningitis Signs

- What the name of this sign ? سنوات (5)
  - Kernig sign



- What is this sign ? سنوات (3)
  - Brudzinski's sign
- What does it indicate ? سنوات (1)
  - Meningitis, Encephalitis, Subarachnoid hemorrhage



CSF Meningitis Findings

	Bacterial	Viral	TB/Fungal
Appearance	Turbid	Clear	Turbid
Cell count	>1000	5-1000	>1000
Cell differential	↑ Neutrophils	↑ Lymphocytes	↑ Lymphocytes
Opening pressure	Elevated (>250)	↑ or Normal	Elevated (>250)
Protein	↑	↑ or Normal	↑
Glucose	↓↓	Normal	↓

- Meningitis, one of the following is true:
  - You can do lumber puncture after giving antibiotics

فش كمان خيارات بالأرشيف فقط الإجابة

CSF Meningitis Findings

سنوات (3)

❖Which type of meningitis is A,B

A. A:bacterial B:TB
B. A:TB, B:bacterial
C. A:bacterial, B:viral
   - (glucose marginally low = slightly low)

	A	B
WBCs/uL	>100-5000+	5-1000
Cell predominance	Neutrophils	Lymphocytes
Protein	Raised	Mildly raised
Glucose	Very low	Low/normal
CSF/plasma glucose	Very low	Low/normal

سنوات (8)

❖These are CSF results, what do you expect the cause of these findings in A and in B?

- A: TB meningitis
- B: Acute bacterial meningitis

	A	B
Opening pressure	elevated	elevated
WBCs	Elevated mainly lymphocytes	Elevated mainly neutrophils
RBCs	none	few
Glucose	Significantly low	low
Protein	high	high
Appearance	turbid	turbid

CSF Meningitis Findings

سنوات (1)

- **CSF analysis showed**:
  - A: turbid, low glucose, high protein, high lymphocyte
  - B: turbid, Normal to low glucose, high protein, high neutrophils

- **What do you expect the cause of these findings in A and in B ?**
  - A: TB meningitis
  - B: Bacterial meningitis

فاينل (3)

- **CSF analysis: Clear, colorless fluid. Total protein 2.8 g/L (0.15-0.45). Glucose 3 mmol/L (3.3-4.4). Lymphocyte count 90%. Gram stain No organisms seen. What is the most likely diagnosis ?**
  a. Bacterial meningitis
  b. Guillain-Barre syndrome
  c. Subarachnoid hemorrhage
  d. Tuberculous meningitis
  e. Viral meningitis

شرح

Bacterial Meningitis

Common causes of meningitis

NEWBORN (0–6 MO)	CHILDREN (6 MO–6 YR)	6–60 YR	60 YR +
Group B *Streptococcus*	*S pneumoniae*	*N meningitidis*	*S pneumoniae*
E coli	*N meningitidis*	*S pneumoniae*	*N meningitidis*
Listeria	*H influenzae* type b	Enteroviruses	*H influenzae* type b
	Group B *Streptococcus*	HSV	Group B *Streptococcus*
	Enteroviruses		*Listeria*

Give ceftriaxone and vancomycin empirically (add ampicillin if *Listeria* is suspected).

Viral causes of meningitis: enteroviruses (especially coxsackievirus), HSV-2 (HSV-1 = encephalitis), HIV, West Nile virus (also causes encephalitis), VZV.

In HIV: *Cryptococcus* spp.

Note: Incidence of Group B streptococcal meningitis in neonates has ↓ greatly due to screening and antibiotic prophylaxis in pregnancy. Incidence of *H influenzae* meningitis has ↓ greatly due to conjugate *H influenzae* vaccinations. Today, cases are usually seen in unimmunized children.

سنوات (1)

❖ **Mention 2 empirical treatments**:

- Ceftriaxone & vancomycin

Diagnostics

- **What are the next steps in a patient with suspected bacterial meningitis and NO alarm symptoms?**
  - Blood cultures → lumbar puncture → IV antibiotics (empirical treatment until the results of the culture then start guided treatment)
- **What are the next steps in a patient with suspected bacterial meningitis and alarm symptoms?**
  - Blood culture + start empirical antibiotics/steroids → CT scan → LP to prevent herniation
- **What are important alarm symptoms in suspected meningitis?**
  - Signs of elevated ICP
  - Functional neurological disorder (e.g., weakness)
  - Altered mental status
  - Immunocompromised

Empirical treatment

- **Neonatal meningitis (<1-month)**
  - Ampicillin (for listeria) + Cefotaxime (for GBS & E.coli); Ceftriaxone is contraindicated in <1-month due to the risk of jaundice and kernicterus
- **Neonatal meningitis (>1-month – 90-days)**
  - Ampicillin (for listeria) + Cefotaxime OR Ceftriaxone (for GBS & E.coli)
  - Vancomycin is used in case of suspected highly resistant pneumococcus
- **Post-neonatal meningitis**
  - Dexamethasone (in case of S.pneumonae or meningococcemia)
  - 3rd generation cephalosporin (Cefotaxime OR Ceftriaxone) + Vancomycin
- **Meningitis in immunocompromised patients**
  - Ampicillin + Vancomycin + Cefepime or Meropenem

Visual mnemonic: Empirical treatment of bacterial meningitis

- Van = Vancomycin; Not used in neonatal meningitis (patient <3-month-old)
- 3 axes = Ceftriaxone; use cefotaxime instead in patient <1-month-old
- AMP = Ampicillin; if listeria suspected
- List = Add ampicillin if you suspect listeria (<6 months & >60 years old)

MCQ –Bacterial Meningitis 1

فاينل (2)

❖**The most common bacterial cause of meningitis for neonates is:**

a. Group B Streptococcus
b. Hemophilus influenza
c. Neisseria meningitides
d. Pseudomonas aeruginosa
e. staphylococcus aureus

فاينل (3)

❖**Which medications are the best choice for empiric treatment of bacterial meningitis in a 30 years old male patient who is otherwise healthy ?**

a. Third-generation cephalosporin, and vancomycin
b. Dexamethasone, third-generation cephalosporin, and vancomycin
c. Dexamethasone third-generation cephalosporin and vancomycin and ampicillin
d. Ampicillin and ceftriaxone
e. Acyclovir, third-generation cephalosporin and vancomycin

- Why not **C**; because ampicillin is added when we suspect listeria (<6 months & >60 years old)

MCQ –Bacterial Meningitis 2

فاينل (1)

❖**Which medications are used for empiric treatment of bacterial meningitis in patients younger than 50 years old who are otherwise healthy ?**

a. A second-generation cephalosporin and vancomycin
b. Dexamethasone, a third-generation cephalosporin, and vancomycin
c. Ceftriaxone alone
d. Ampicillin and ceftriaxone
e. Acyclovir

فاينل (3)

❖**In the treatment of meningitis, ampicillin is added to antibiotic regimens to treat which of the following organisms ?**

a. Group B Streptococcus
b. Haemophiles influenza
c. Klebsiella pneumonia
d. Listeria monocytogenes
e. Herpes Simplex

MCQ –Bacterial Meningitis 3

فاينل (1)

❖**Which medications are the best choice for empiric treatment of bacterial meningitis in a 60 years old male patient who is otherwise healthy ?**

a. Third-generation cephalosporin, and vancomycin
b. Dexamethasone, third-generation cephalosporin, and vancomycin
c. Third-generation cephalosporin, vancomycin and ampicillin
d. Ampicillin and ceftriaxone
e. Acyclovir, third-generation cephalosporin and vancomycin

MCQ –Bacterial Meningitis 4

مش نفس الخيارات بالزبط

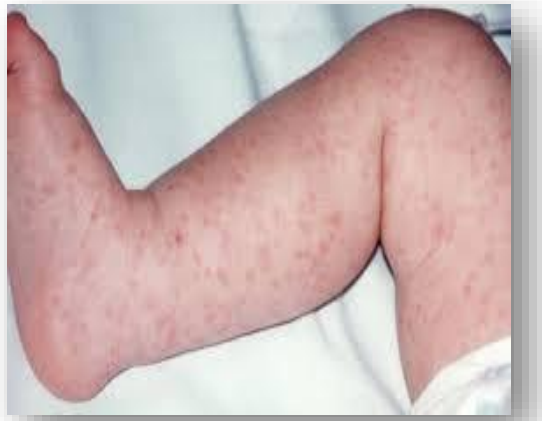
❖**Which is wrong about meningitis**

a. Blood culture is necessary for the diagnosis
b. Immunocompromised patients are treated with the same empirical antibiotic as other patients
c. Meningeal irritation suggests the diagnosis
d. You can’t do lumber puncture after giving antibiotics
e. CSF analysis and PCR can confirm the diagnosis

Meningococcal meningitis

- **Etiology**: Neisseria meningitidis
- **Epidemiology**: Usually occur in epidemics
- **Clinical features**: Meningitis signs + petechial rash
- **Complications**: Seizure, abscess, hydrocephaly, SIADH, septic shock
- **Diagnosis**: Blood culture, CT scan, lumbar puncture, CSF culture, skin biopsy, CBC
- **Treatment**: 3rd generation cephalosporin + Steroids + dopamine + IV fluids + antipyretic + antiepileptic
- **Prevention**: rifampicin/ciprofloxacin

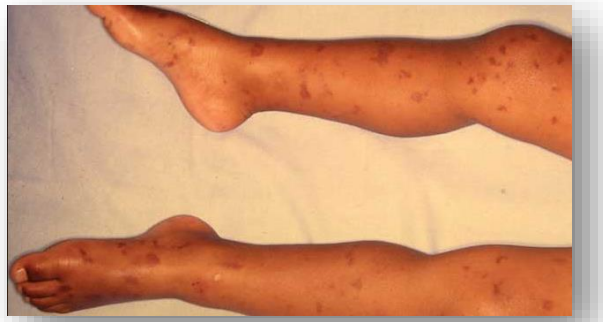
Meningococcemia



- **What examination you should do ?**
  - Brudzinski & Kernig's signs
- **If the signs were positive, what is your treatment ?**
  - 3rd generation cephalosporin
  - Steroids + IV fluids Analgesic + antipyretic + antiepileptic
- **If the patient complained of headache, what should you order ?**
  - Brain MRI
- **If what you have ordered was negative, what should you order next ?**
  - Lumber puncture

Meningococcemia

- This patient has fever, headache, neck stiffness and photophobia

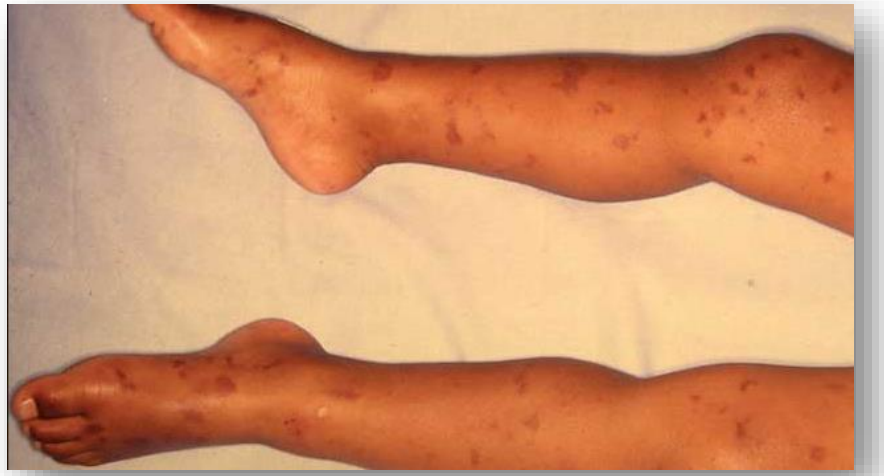


- **What your diagnosis ?**
  - Meningococcemia, IV antibiotics
- **What is the treatment ?**
  - 3rd generation cephalosporin
  - Steroids + IV fluids Analgesic + antipyretic + antiepileptic
- **The patient fundoscopic examination showed papilledema, what would do next ?**
  - CT head
- **The previous investigation was normal, what is the next investigation ?**
  - Lumbar puncture

Meningococcemia

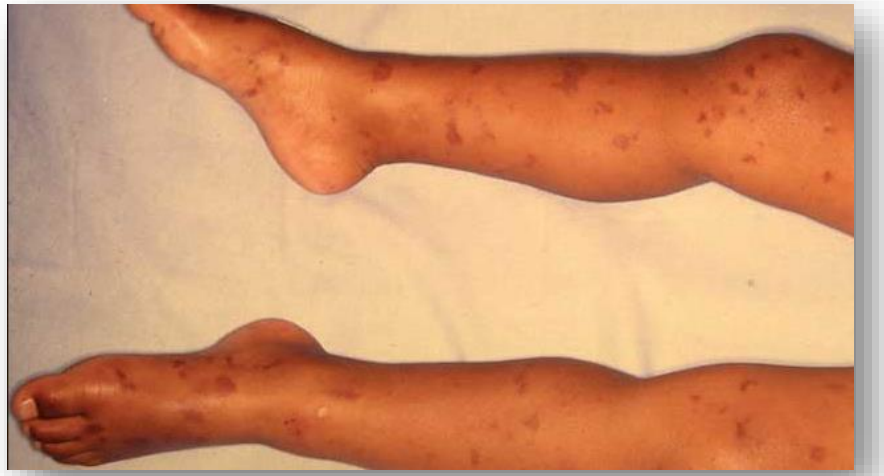
- This patient has fever, headache, neck stiffness and photophobia

1. **What would you examine to exclude serious infectious process ?**
   - Kernig's sign, Brudzinski and neck stiffness
2. **If what you have examined was positive, what is the next important urgent step to manage this patient ?**
   - 3rd generation cephalosporin
   - Steroids + IV fluids Analgesic + antipyretic + antiepileptic



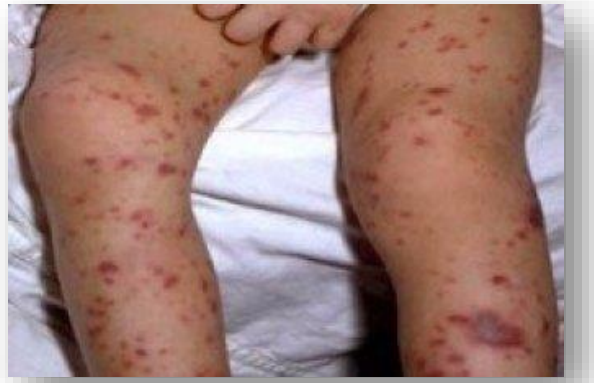
Meningococcemia cont.

- This patient has fever, headache, neck stiffness and photophobia



3. **You have done an important step in this patient management, you examined the patient again and you found left abducens nerve palsy, what is the next important investigation ?**
   - CT head
4. **The previous investigation was normal, what is the next investigation ?**
   - Lumbar puncture

Meningococcemia



- **What you suspect the cause of this picture ?**
  - Meningococcemia
- **What is your emergent management ?**
  - 3rd generation cephalosporin
  - Steroids + IV fluids Analgesic + antipyretic + antiepileptic
- **If this patient immunocompromised, what is your management ?**
  - Vancomycin + Ampicillin + (Cefepime or Meropenem)

الأرشيف: صورة رجلين ولد صغير ما عليهن اشي

- This patient has fever, headache, photophobia

❖ **What is your next step to exclude serious infections ?**

- Kernig's sign, Brudzinski and neck stiffness

❖ **If the tests was positive, what's your emergent management ?**

- Vancomycin + Benzylpenicillin + Ceftriaxone

❖ **If the abducent nerve affected, what is your investigations?**

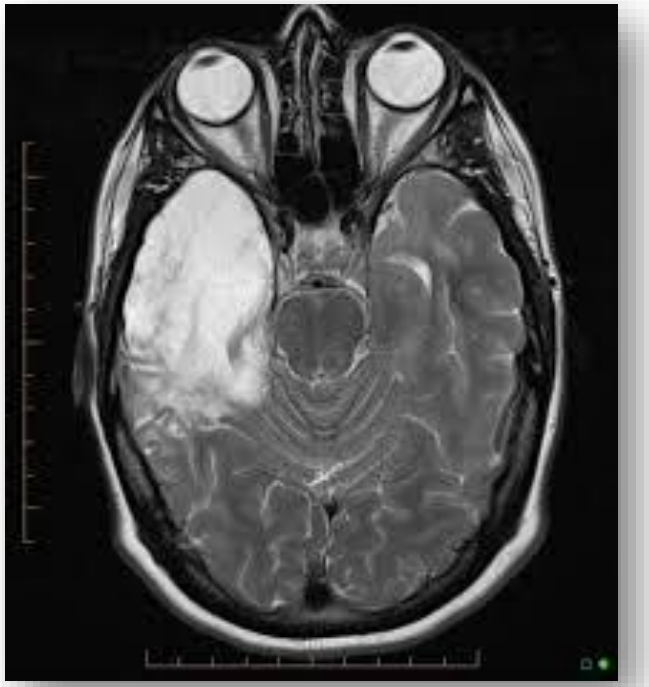
- CT scan

❖ **If it was negative, what is your next investigation?**

- Lumbar puncture

Encephalitis

Viral encephalitis



سنوات (1)

❖ **What's the abnormality ?**

- There is a hyperintensity of the right temporal lobe.

سنوات (1)

❖ **Which of the following is true ?**

a. Start acyclovir as soon as possible
b. MRI with contrast can confirm the diagnosis

سنوات (1)

❖ **Which of the following is wrong ?**

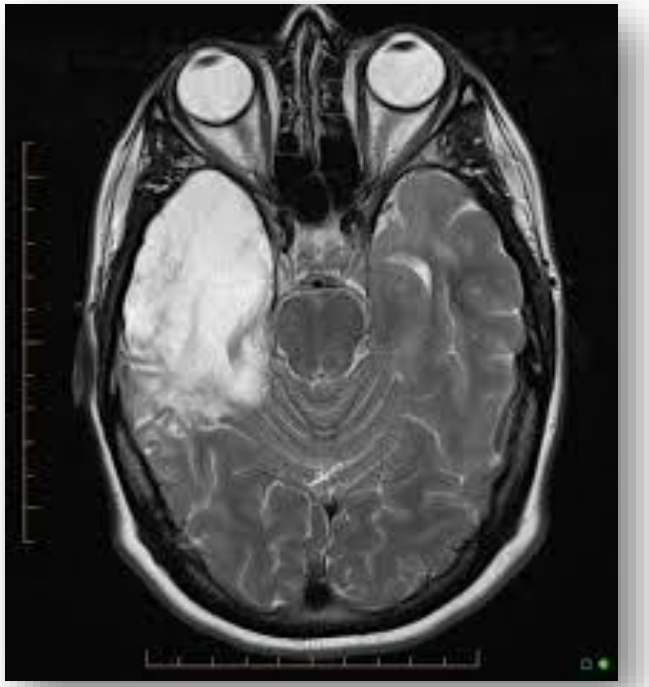
a. The protein is usually low
b. The sugar is usually normal
c. Surgery doesn't help in treating this condition
d. It is usually caused by herpes simplex virus
e. Start acyclovir as soon as possible

Viral encephalitis

سنوات (1)

❖**Which of the following is wrong ?**

a. The protein is high
b. The sugar is usually normal
c. Surgery is recommended for treating this condition
d. It is usually caused by herpes simplex virus
e. Start acyclovir as soon as possible



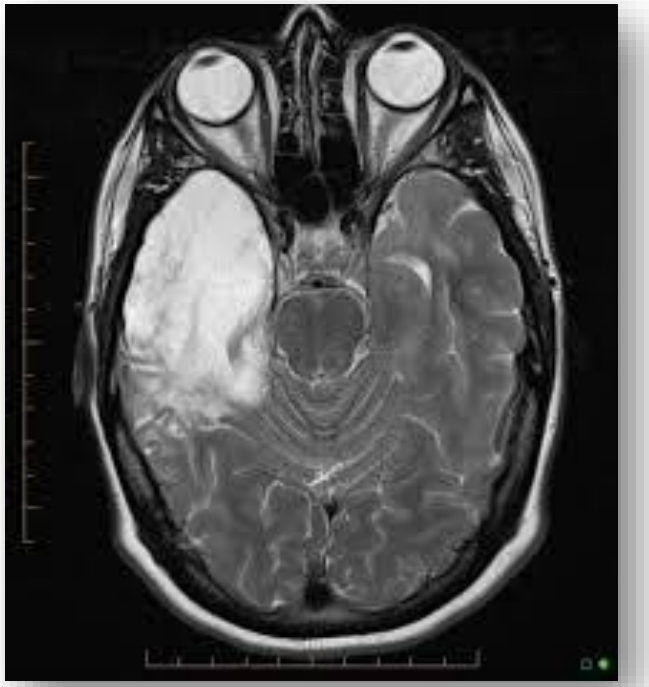
سنوات (2)

❖**Which of the following is wrong ?**

a. The protein is high
b. The sugar is usually normal
c. Surgery is not recommended for treating this condition
d. It is usually caused by herpes simplex virus
e. We can delay treatment, or we start treatment after investigation

Viral encephalitis

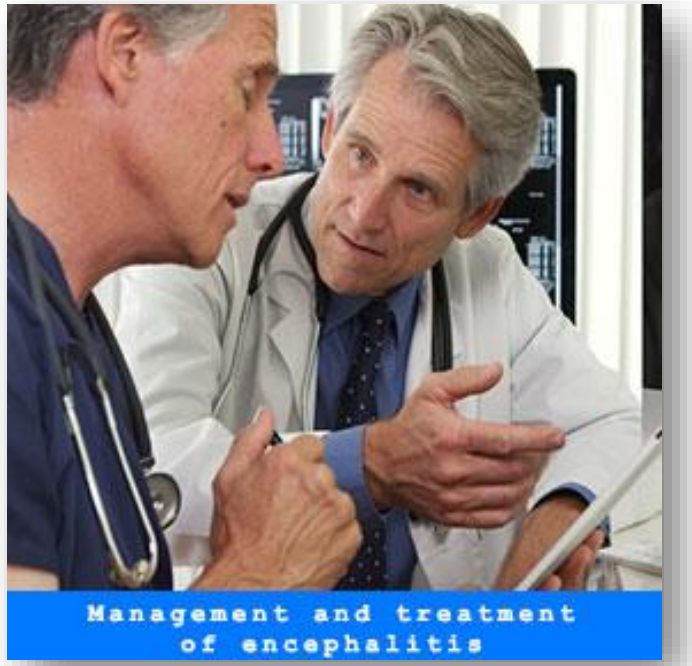
- This MRI of a patient with acute confusion, fever, and seizures. There is a hyperintensity of the right temporal lobe. You suspected viral encephalitis



- **What is the most common cause ?**
  - Herpes simplex virus (HSV-1)
- **The diagnosis confirmed by:**
  - Lumbar puncher (Lymphocytosis with normal glucose) and CSF PCR (is the most specific and sensitive test)
- **How would you treat this patient ?**
  - Acyclovir
- **For how long you treat this patient ?**
  - For 2 to 3 weeks

Management of viral encephalitis

1. Supportive care, mechanical ventilation if necessary
2. Antiviral therapy
   A. There is no specific antiviral therapy for most causes of viral encephalitis.
   B. HSV encephalitis—acyclovir for 2 to 3 weeks 10mg/kg IV
   C. CMV encephalitis—ganciclovir or foscarnet
3. Management of possible complications
   A. Seizures—require anticonvulsant therapy
   B. Cerebral edema—Treatment may include hyperventilation, osmotic diuresis, and steroids.



* Step up to medicine 3rd edition

Management of viral encephalitis

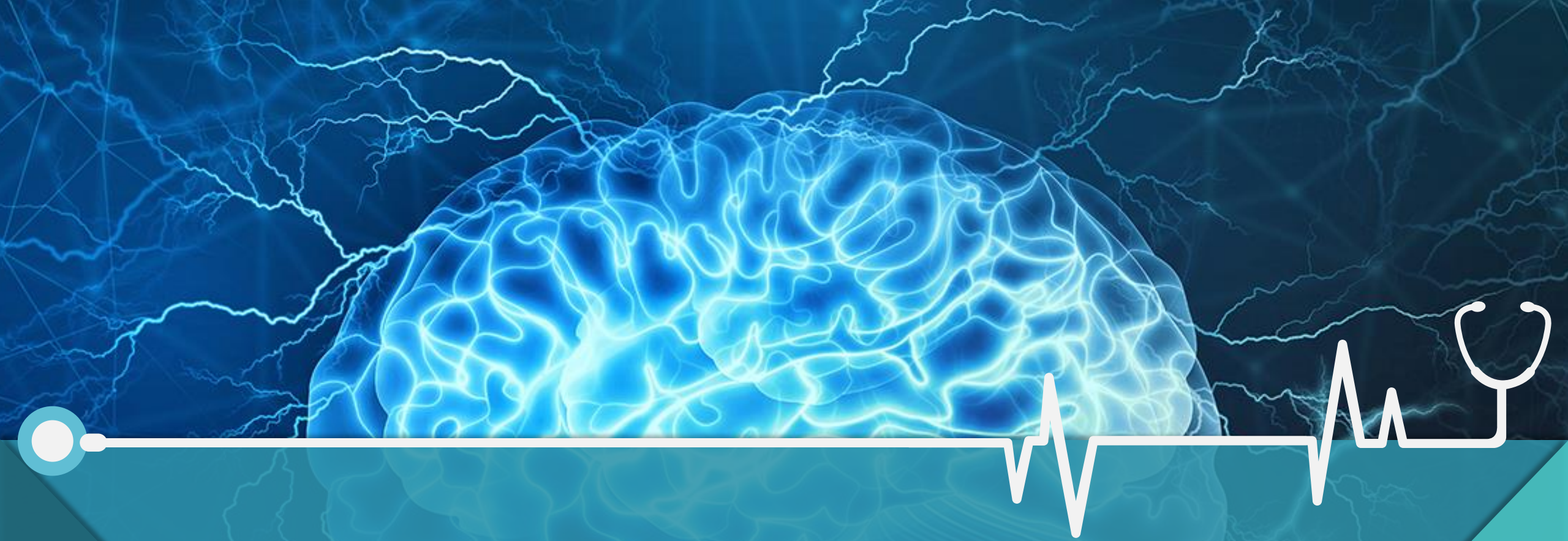
❖ **Female patient present with weakness, personality changes with low grade fever. What is your management ?**

a. Referral to psychiatry
b. Give IV acyclovir 10mg/ kg
c. Take CSF sample under general anesthesia to exclude meningitis and encephalitis

Subacute sclerosing panencephalitis

❖**Subacute sclerosing panencephalitis is the name for a chronic infection with which of the following viruses ?**

a. Measles virus
b. Mumps virus
c. Rubella virus
d. Varicella virus
e. Herpes



Spinal conditions

Transverse myelitis

Transverse myelitis

- **Definition**: an acute or subacute inflammatory myelopathy that results in motor, sensory, and autonomic symptoms below the level of the affected segment
- **Etiology**:
  - Most often idiopathic
  - **Other causes**: Parainfectious, CNS demyelinating disorders, Systemic inflammatory autoimmune disorders, Paraneoplastic syndromes, Drug induced
- **Clinical features**:
  - Motor dysfunction (e.g., paresis, paraplegia)
  - Sensory dysfunction (e.g., numbness, paresthesias)
  - Autonomic dysfunction (e.g., bladder and/or bowel incontinence)

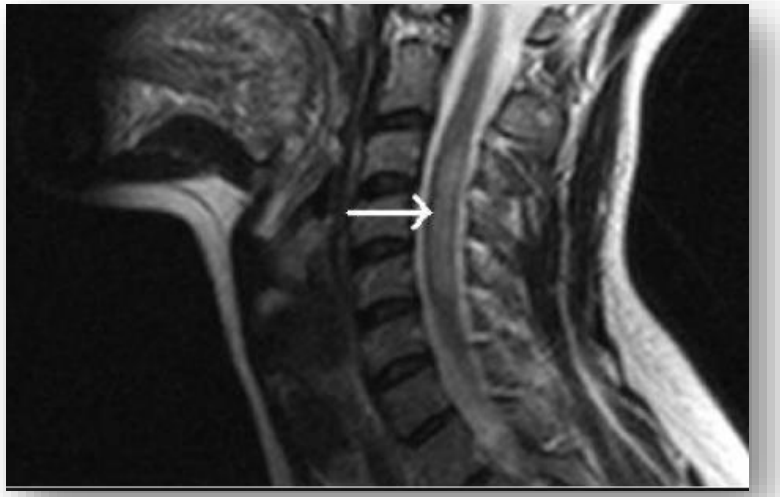
Transverse myelitis *(continued)*

- **Diagnostics**:
  - MRI of the brain and spine (Investigation of choice)
    - **Finding**: focal, gadolinium-enhancing lesion in the spinal cord (T2-weighted sequence)
  - Laboratory studies: elevated ESR, CRP
  - CSF analysis: pleocytosis and/or elevated IgG index
- **Differential diagnoses**:
  - Guillain-Barré syndrome (GBS)
  - Compressive myelopathy
- **Treatment**:
  - **First-line**: immediate high-dose IV corticosteroids
  - **Second-line**: Plasmapheresis, Cyclophosphamide

Transverse myelitis

❖**This is a transverse myelitis of the cord. What is the most peculiar clinical finding for this condition?**

- Affects both sides of the body below the affected area of the spinal cord
  - Sensory :Pain, numbness, tingling, coldness or burning
  - Motor : weakness to paralysis
  - Bladder and bowel problems (urine retention)

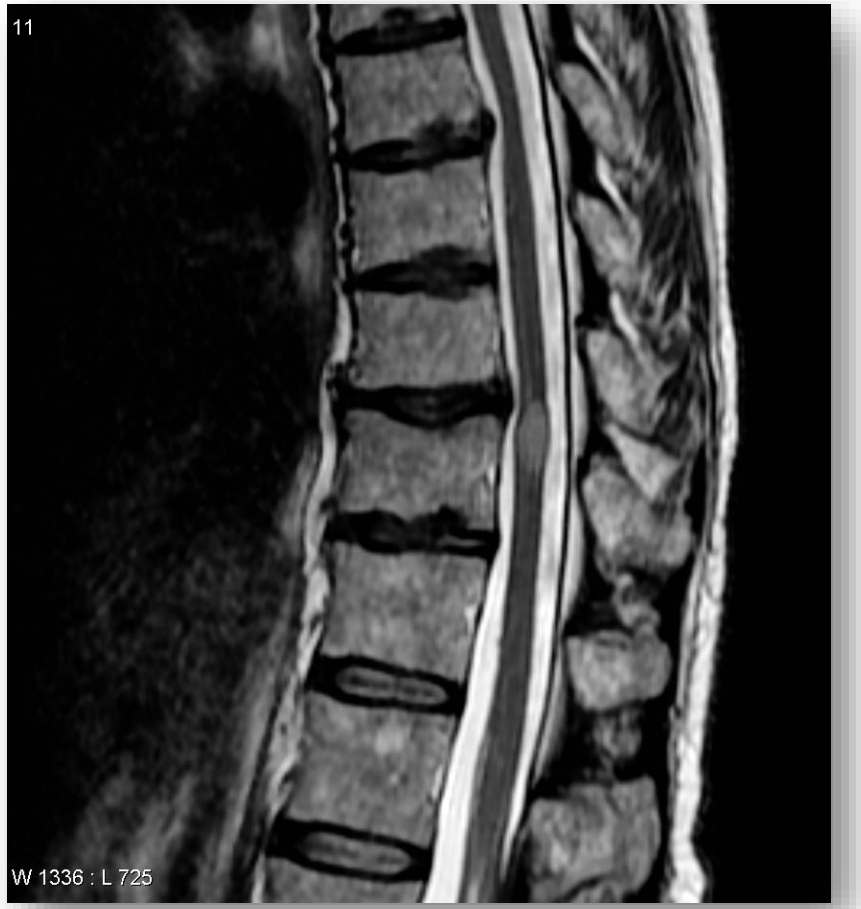


سنوات (1)

Transverse myelitis

❖ **Diagnosed with transverse myelitis, what are the expected symptoms ?**

1. Urine incontinence & bowel problems (most important)
2. Sudden sharp pain in lower back
3. Numbness, tingling or burning sensation
4. Weakness in arms or legs



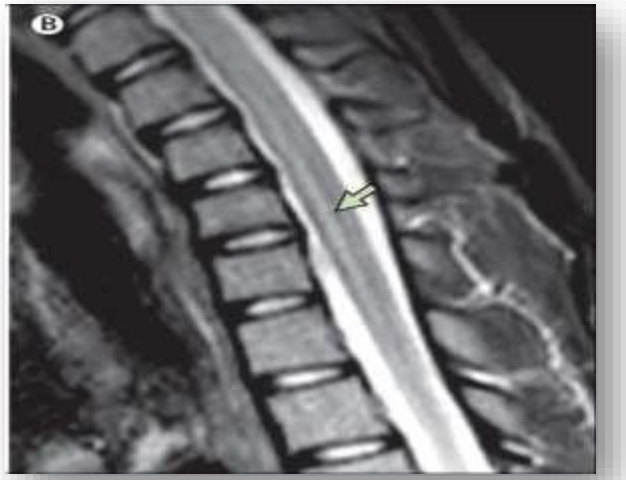
سنوات (2)

➢ **Note**: Transverse myelitis is associated with more urine symptoms than GBS

MCQ – Transverse myelitis

❖ **What is the diagnosis ?**

a. T1 Transverse myelitis
b. T2 Transverse myelitis
c. T1 syringomyelia
d. T2 syringomyelia
e. None of the above



- Note: T1 and T2 here are meant to be T1-weighted MRI & T2-weighted MRI and not T1, T2 spine ☺

MCQ – Transverse myelitis

- A 20 years old patient came with weakness and numbness of lower extremities more than upper extremities, urine retention, & normal reflexes.

❖The most important next step in diagnosis will be:

a. Nerve conduction study
b. Perform spinal MRI
c. Perform lumbar puncture and CSF analysis
d. Examine for dermatomal sensory loss
e. Examine for glove and stocking sensory loss

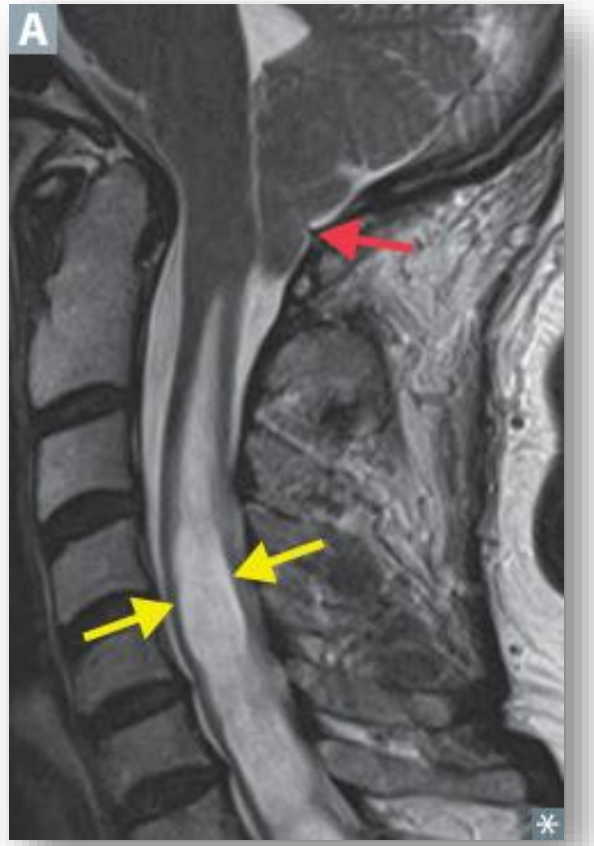
Golden rule for these questions

- A 20 years old patient came with weakness and numbness of lower extremities more than upper extremities.
- When you see this presentation (weakness & numbness more in the lower limbs) there are 3 deferential diagnoses:
  1. **If there is normal reflexes, it's transverse myelitis:**
     - Next step: perform spinal MRI (must contain thoracic spines)
  2. **If there is hyperreflexia, it's Conus medullaris syndrome:**
     - Next step: perform lumber MRI
  3. **If there is hyporeflexia, it's Gillian-Barre syndrome:**
     - Next step: perform lumber puncture + CSF analysis

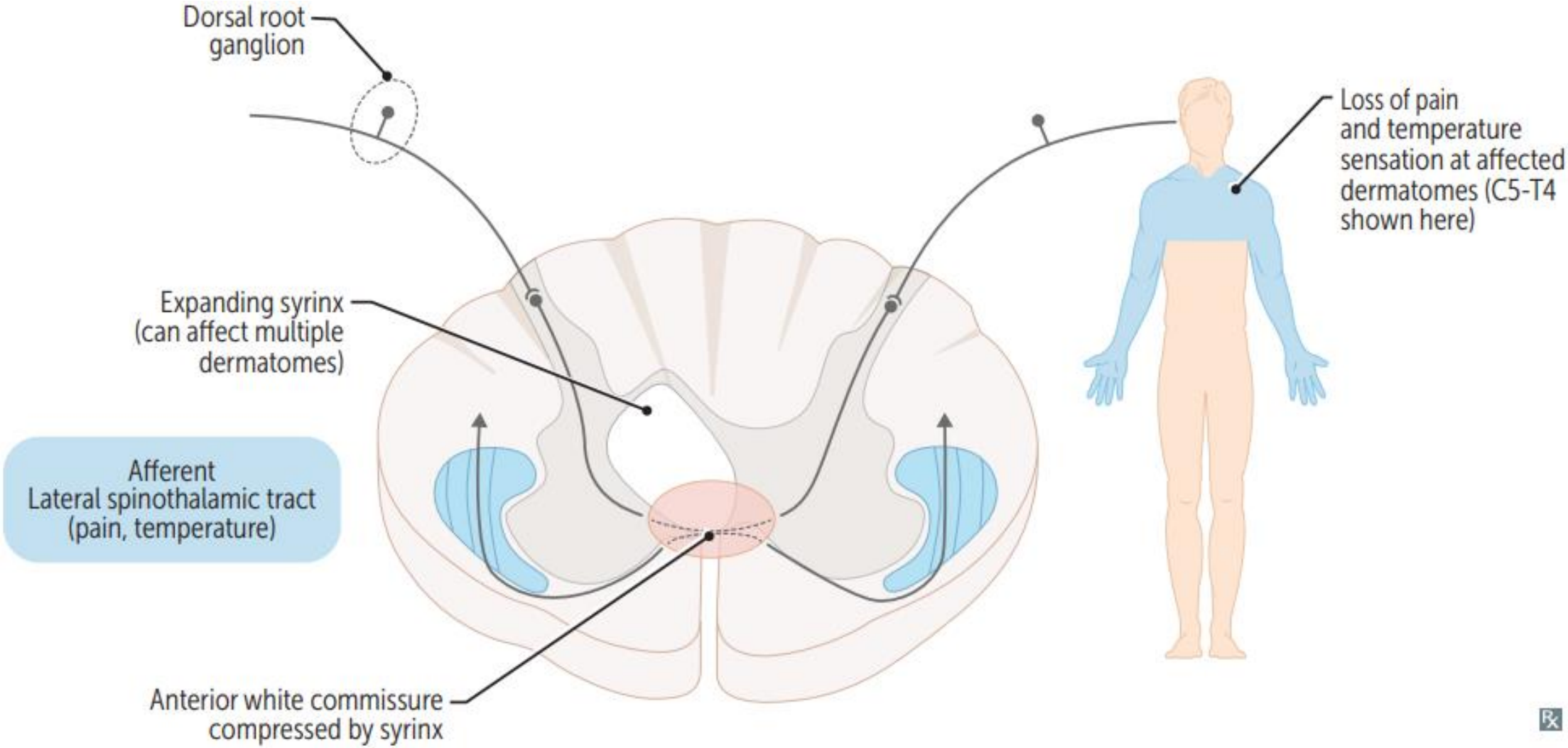
Syringomyelia

Syringomyelia

- Cystic cavity (syrinx) within central canal of spinal cord (yellow arrows in A). Syrinx = tube, as in “syringe.
- Fibers crossing in anterior white commissure (spinothalamic tract) are typically damaged first. Results in a “cape-like,” bilateral, **symmetrical** loss of pain and temperature sensation in upper extremities (fine touch sensation is preserved).
- **Associated with** Chiari I malformation (red arrow in A shows low-lying cerebellar tonsils), scoliosis and other congenital malformations; acquired causes include trauma and tumors.
- **Most common location** cervical > thoracic >> lumbar.

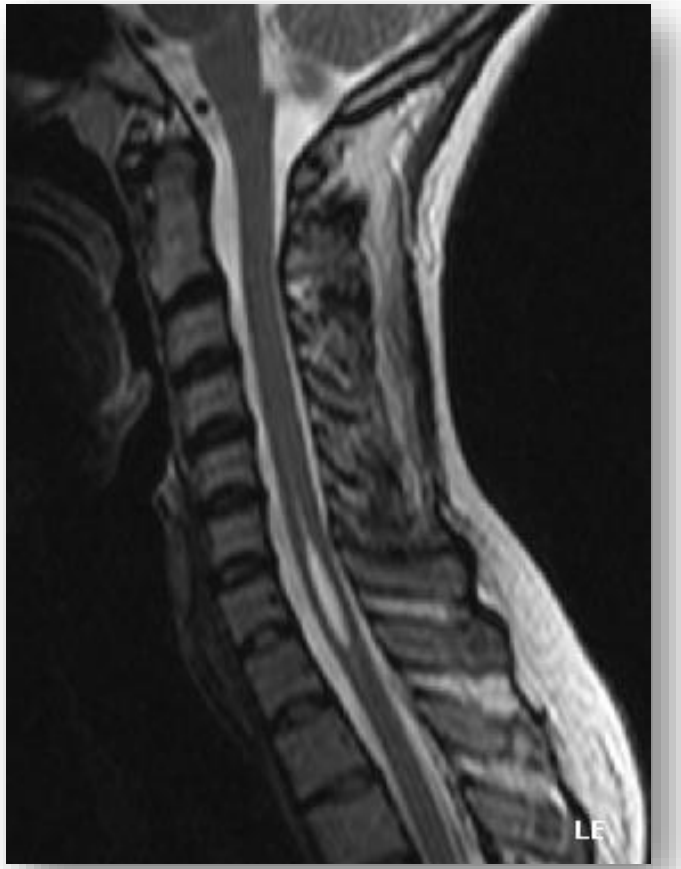


Syringomyelia



Syringomyelia

- **Mention 3 symptoms in this patient**
  - Cape like distribution loss of pain and temperature
  - Cape like distribution dysesthetic pain
  - Cape like distribution muscle atrophy, fasciculations, and areflexia
  - Spastic paraparesis of the lower limbs may occur
  - Autonomic disturbances
  - Respiratory insufficiency
- **What you think about reflexes ?**
  - Hyper (UML)



MCQ – Syringomyelia 1

فاينل (1)
سنوات (4)

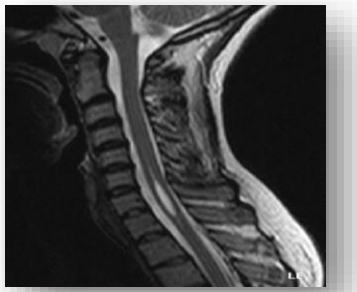
❖**Features of syringomyelia include all of the following except**:

a. It causes bilateral but not symmetrical pain and temperature loss.
b. Proprioception and vibration sense are not affected early in the disease.
c. It usually causes gloves and stocking sensory loss distribution.
d. Cranial nerves may be affected with syringobulbia
e. Syringobulbia can cause Horner’s syndrome

فاينل (3)

❖**Features of syringomyelia include all of the following except**:

a. It causes bilateral pain and temperature loss
b. Proprioception and vibration sense are affected early in the disease
c. It is called syringobulbia when it extends to the medulla
d. Cranial nerves may be affected with syringobulbia
e. Syringobulbia can cause Horner's syndrome



MCQ – Syringomyelia 2

فاينل (1)

❖**All about is true Syringomyelia, Except ?**

a. Loss of pain and temperature sensation in cap distribution
b. Loss of touch sensation in cap distribution
c. Central canal dilation
d. Compression on fibers dorsal spinothalamic tract
e. Compression on fibers ventral spinothalamic tract

Disc prolapse

Disc prolapse

- Disk herniation (disk extrusion or disk prolapse): complete extrusion of the nucleus pulposus through a tear in the annulus fibrosus
- Disk herniation is the cause of back pain in roughly 5% of cases.
  - Cervical and thoracic disk herniations: rare
  - Lumbosacral disk herniation
    - L5–S1 (most common site)
    - L4–L5 (second most common site)

Overview of cervical radiculopathies

Overview of cervical radiculopathies [9]				
Radiculopathy	Causative disk	Sensory deficits	Motor deficits	Reduction of reflexes
C3/4 radiculopathy	• C2–C4	• Shoulder and neck area	• Scapular winging	• None
C5 radiculopathy	• C4–C5	• Anterior shoulder	• Biceps and deltoid	• Biceps reflex
C6 radiculopathy	• C5–C6	• From the upper lateral elbow over the radial forearm up to the thumb and radial side of index finger	• Biceps and wrist extensors	• Biceps reflex • Brachioradialis reflex
C7 radiculopathy	• C6–C7	• Palmar: fingers II–IV (II ulnar half, III entirely, IV radial half) • Dorsal: medial forearm up to fingers II–IV	• Triceps, wrist flexors, and finger extensors	• Triceps reflex
C8 radiculopathy	• C7–T1	• Fingers IV (ulnar half) and V, hypothenar eminence, and ulnar aspect of the distal forearm	• Finger flexors	• None

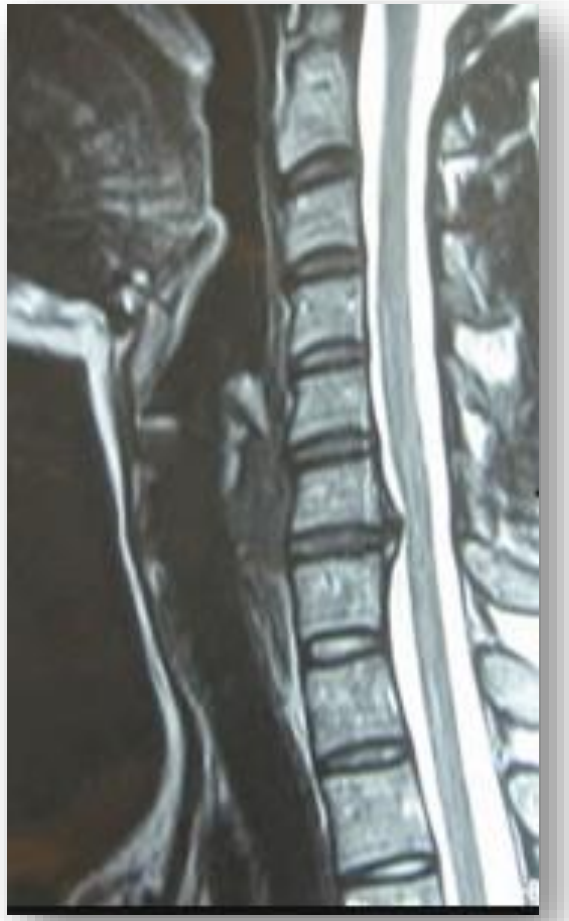
Overview of lumbosacral radiculopathies

Overview of lumbosacral radiculopathies [9]

Radiculopathy	Causative disk	Sensory deficits	Motor deficits	Reduction of reflexes
L3 radiculopathy	• L2–L3	• Anterolateral area of the thigh	• Hip flexion • Knee extension • Hip adduction	• Adductor reflex • Patellar reflex
L4 radiculopathy	• L3–L4	• Anterolateral thigh, area over the patella, medial aspect of the leg, medial malleolus	• Knee extension • Hip adduction	• Patellar reflex
L5 radiculopathy	• L4–L5	• Lateral aspect of the thigh and knee, anterolateral aspect of the leg, dorsum of the foot, and the big toe	• Tibialis anterior muscle (foot dorsiflexion): difficulty heel walking (foot drop) • Extensor hallucis longus muscle (first toe dorsiflexion)	• Posterior tibial reflex (medial hamstring)
S1 radiculopathy	• L5–S1	• Dorsolateral aspect of thigh and leg, and the lateral aspect of the foot	• Peroneus longus and brevis muscle (foot eversion) and gastrocnemius muscle (foot plantarflexion): difficulty toe walking	• Achilles reflex • Lateral hamstring reflex
S2 radiculopathy, S3 radiculopathy, S4 radiculopathy	• S1–S4	• Posterior aspect of the thigh and leg (S2), perineum (S3–S4), perianal (S4)	• None	• Bulbocavernosus reflex • Perineal reflex

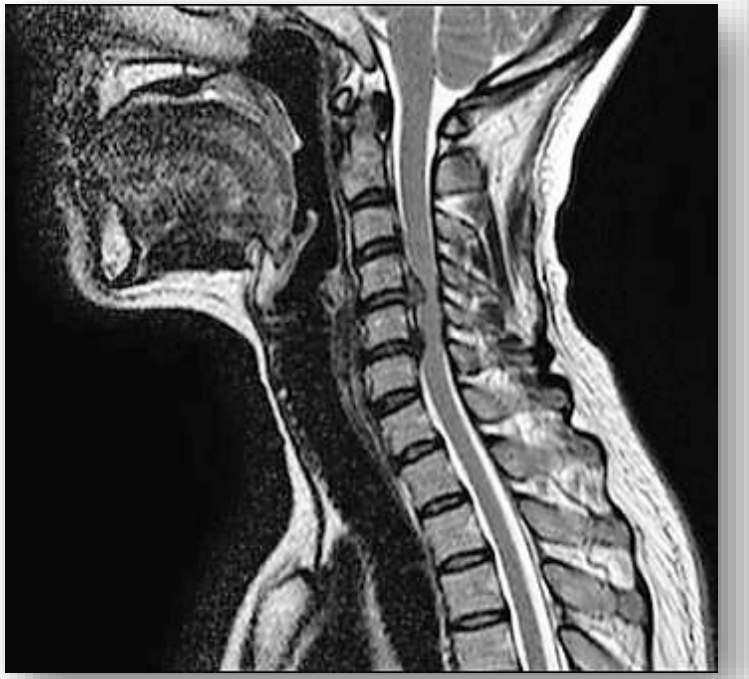
Disc prolapse

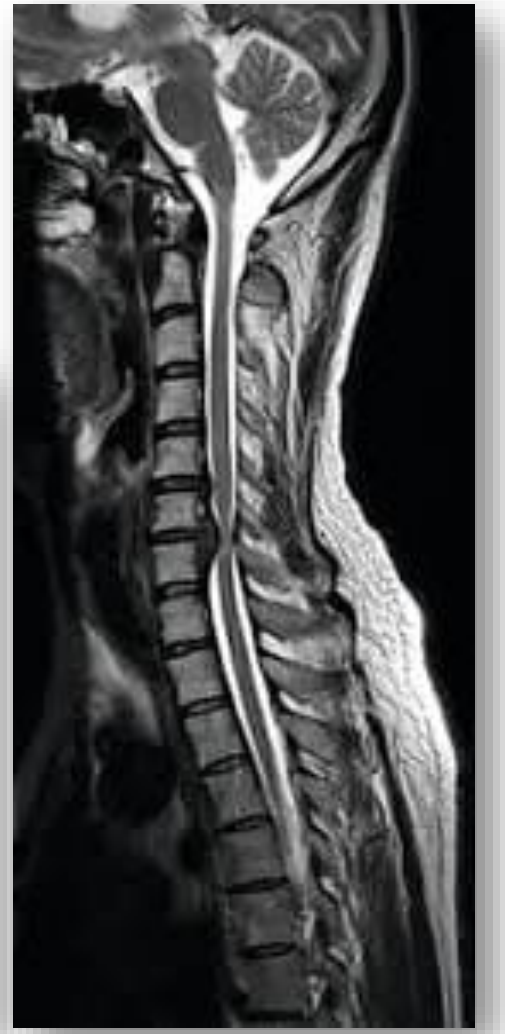
- This is a cervical MRI.
- **What do you notice ?**
  - Disc prolapse at level C6-C7 lead to Spinal cord compression
- **What the effect that will appear on patient arm ?**
  - Hyporeflexia



Disc prolapse

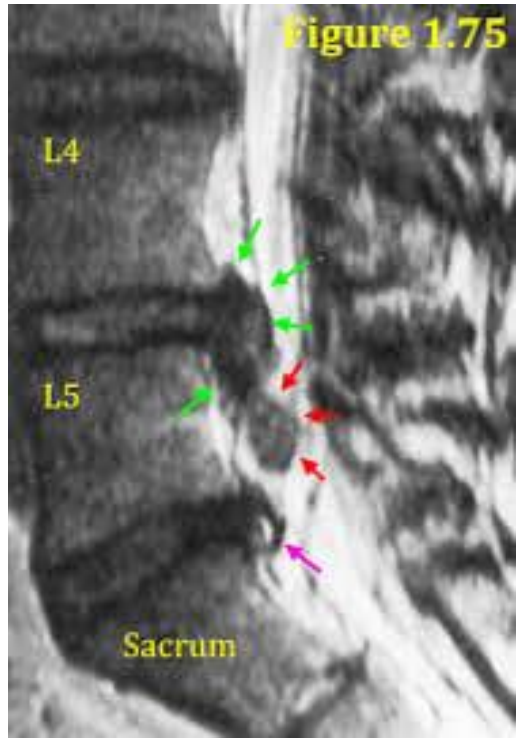
- **What the effect that will appear on patient arm ?**
  - Hyporeflexia
- **What is your diagnosis ?**
  - Disc prolapse





Disc prolapse

- **What do you see ?**
  - Disc prolapse
- **What do you think about the reflex ?**
  - Hyporeflexia
- **If this patient present with symmetrical loss of sensation, proprioception, temperature in the foot until ankle, their condition is caused by disc herniation at what level ?**
  - Disc herniation at L5/S1



MCQ – Conus medullaris syndrome

- A patient presented to the neurology clinic with bilateral lower limb weakness. He also complains of urinary urgency and frequency. On examination there was spasticity of both lower limbs and hyperreflexia of the ankles and knees.

The most important next step in diagnosis will be:

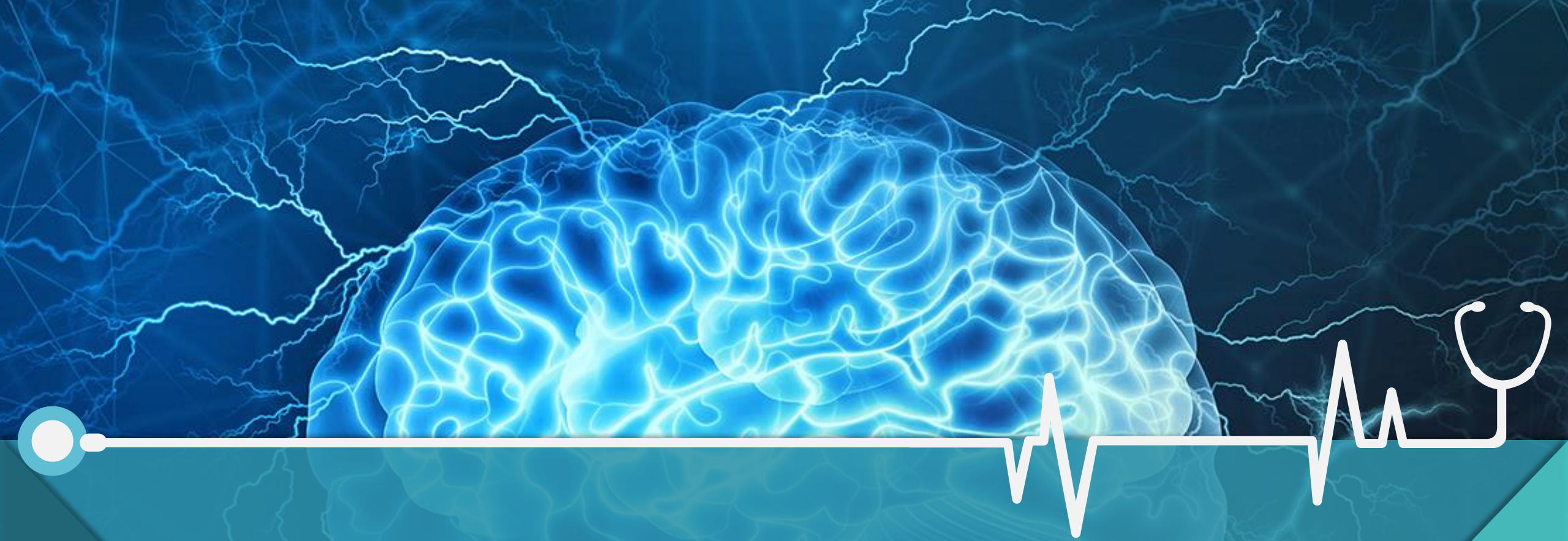
a. Perform brain MRI
b. Perform lumbar MRI
c. To examine for sensory level
d. Examine for dermatomal sensory loss
e. Examine for glove and stocking sensory loss

MCQ – Cauda equina syndrome

- All of the followings are manifestation of cauda equina compression, except:
  a. Lower limbs weakness
  b. Reduced or absent reflexes
  c. Urinary retention
  d. Sensory loss
  e. Clonus

Overview of compressive spinal emergencies [25]

	Compressive myelopathies		Cauda equina syndrome
	Spinal cord compression	Conus medullaris syndrome	
Etiology	• Damage to or compression of the spinal cord at any level • Apart from degenerative disk diseases, can also be caused by vertebral metastases, trauma (epidural hematoma, vertebral fracture), and epidural abscess	• Damage to or compression of the spinal cord at the vertebral level **T12–L2**, resulting in injury to the conus medullaris (sacral and coccygeal spinal segments) [26][27] • Common causes include spondylolisthesis, tumors, and trauma (e.g., vertebral fracture).	• Damage to or compression of the cauda equina (nerve fibers L3–S5) located **below L2** • Common causes include large posteromedial disk herniation, trauma, and tumors.
Onset	• Variable, bilateral	• Sudden, bilateral	• Gradual, typically unilateral
Pain	• Localized neck or **back pain**	• Lower back pain • Less severe radicular pain	• Lower back pain • Severe radicular pain
Motor symptoms	• Bilateral paralysis below the affected level of the spinal cord • Hyperreflexia • Positive Babinski sign	• Symmetric, hyperreflexic distal paresis of lower limbs, possibly fasciculations • Achilles reflex may be absent.	• Asymmetric, areflexic, flaccid paresis of the legs • Muscle atrophy
Sensory symptoms	• Loss or reduction of all sensation below the affected level of the spinal cord	• Symmetric bilateral perianal numbness • Sensory dissociation	• **Saddle anesthesia**: lack of sensitivity in the dermatomes S3–S5, affecting the areas around the anus, genitalia, and inner thighs (may be asymmetric) • Asymmetric unilateral numbness and/or paresthesia in lower limb dermatomes
Urogenital and rectal symptoms	• **Sphincter dysfunction with urinary or bowel urgency, retention, or incontinence**	• Early onset of bladder and fecal incontinence • Erectile dysfunction	• Late onset of urinary retention • Change in bowel habits due to loss of anal sphincter control • Decreased rectal tone or bulbocavernosus reflex • Erectile dysfunction



Multiple sclerosis

Multiple sclerosis

- Multiple sclerosis (MS) is a chronic degenerative disease of the CNS characterized by demyelination and axonal degeneration in the brain and spinal cord white matter, which are caused by an immune-mediated inflammatory process.
- **Epidemiology**:
  - Sex: ♀ > ♂ (3:1)
  - Age of onset: 20–40 years of age
  - Ethnicity: ↑ prevalence among the white population
- The etiology of multiple sclerosis is unclear; it is believed to develop in genetically predisposed people who have been exposed to certain environmental factors.
  - **Genetic predisposition**
    - Presence of HLA-DRB1*15 allele increases the risk of MS.
    - Presence of HLA-A*02 allele appears to be protective against MS.
    - 35% disease concordance among monozygotic twins
    - 3–4% disease concordance among first-degree relatives
  - **Environmental risk factors**
    - Low vitamin D levels (insufficient intake, decreased exposure to UV radiation)
    - Cigarette smoking
    - Pathogens: EBV, HHV 6
    - Obesity early in life

شرح

Multiple sclerosis – Clinical features

- Most commonly manifests with:
  - Constitutional symptoms: fatigue, headache
  - Optic neuritis (Most often the earliest manifestation, very common)

فاينل (2)

- May also present with: (mnemonic = SIIIN)
  - S: Scanning speech
  - I: Intention tremor
  - I: Incontinence
  - I: INO (commonly bilateral)
  - N: Nystagmus

MCQ – Multiple sclerosis

فاينل (1)

❖**Which of the following statements is TRUE regarding multiple sclerosis ?**

a. Multiple sclerosis is caused by a genetic anomaly of MHC gene
b. There is no effect of environmental factors on multiple sclerosis prevalence
c. Multiple sclerosis affects mainly old people
d. The disease affects the white matter and the grey matter
e. Optic nerves are rarely affected by multiple sclerosis

فاينل (3)

❖**The least important observation in the diagnosis of multiple sclerosis is:**

a. Disseminated brain demyelinating lesions in time and space
b. Demyelinating round to oval periventricular and perivenular lesions
c. The presence of demyelinating lesions in the cervical spinal cord
d. The presence of oligoclonal bands
e. Lhermitte phenomenon

- **Lhermitte sign**: a shooting electric sensation that travels down the spine upon flexion of the neck

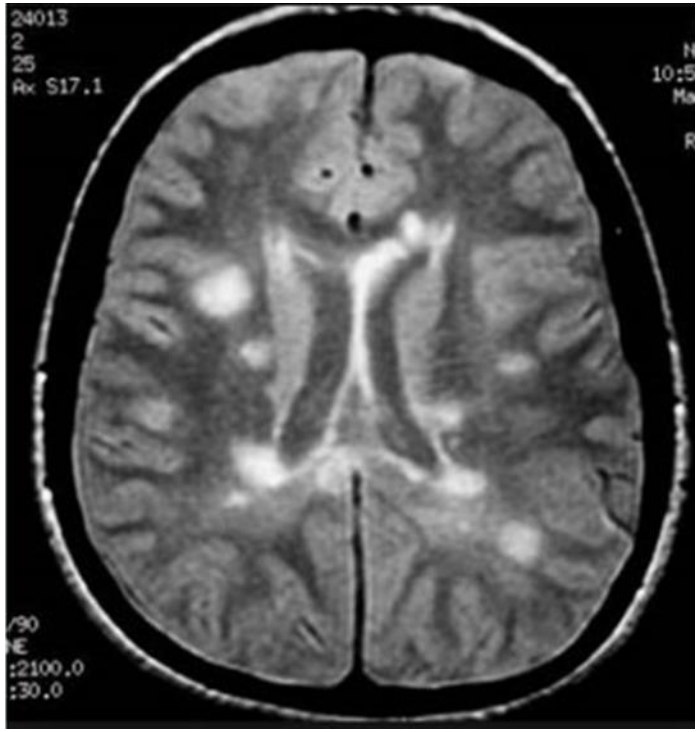
Multiple sclerosis

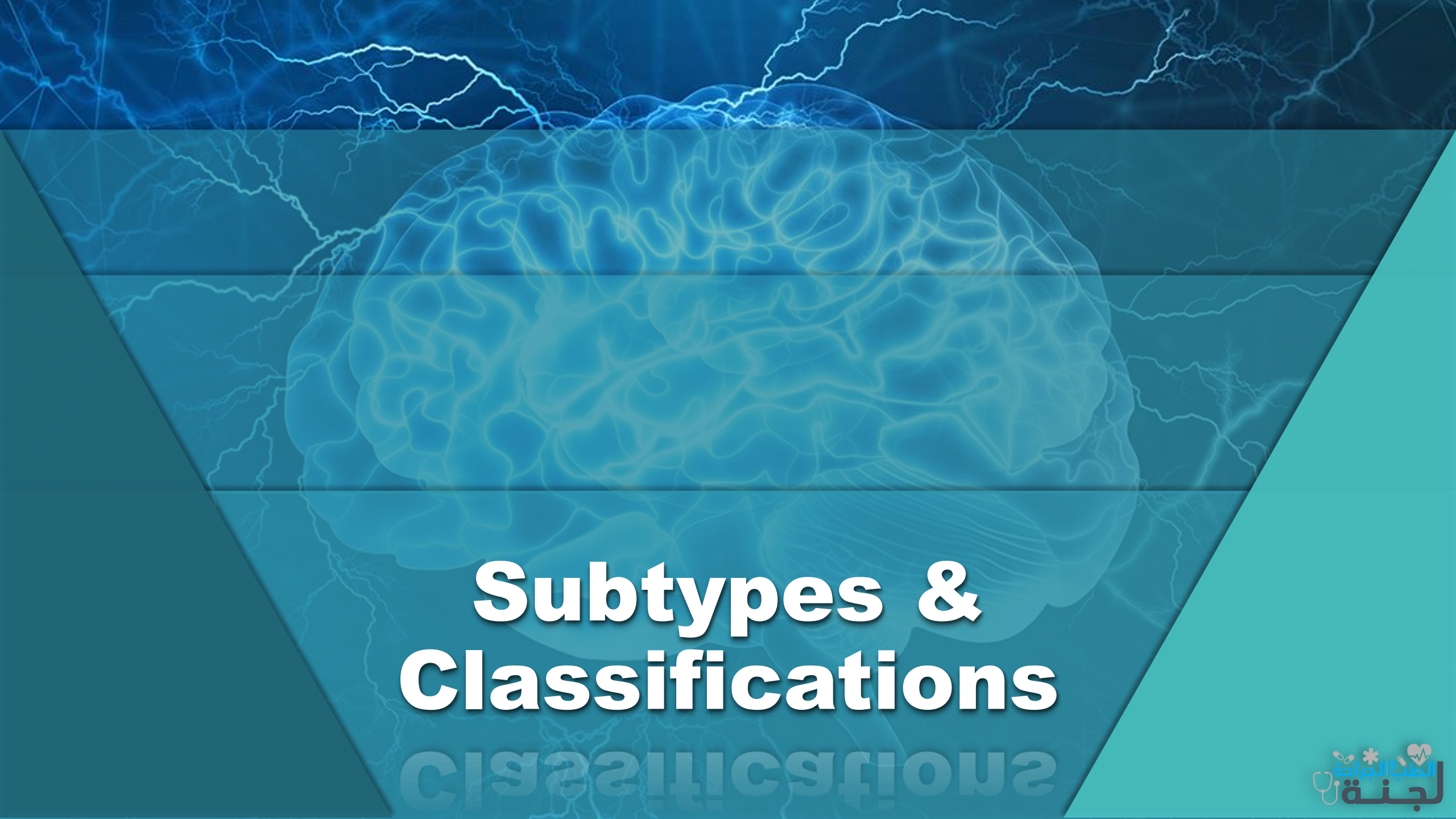
❖**What is the abnormality ?**

- Brain MRI showing high intensity periventricular plaques

❖**What is the possible diagnosis ?**

a. Infarction
b. Multiple sclerosis
c. Intracranial hemorrhage
d. Intracranial oedema
e. Increased intracranial pressure




Subtypes &
Classifications

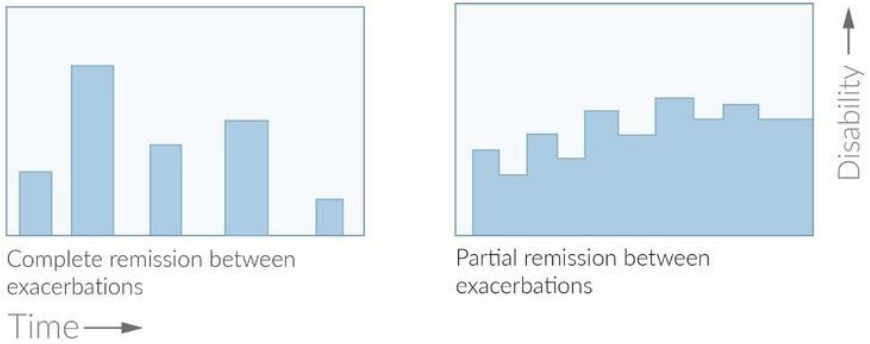
Multiple sclerosis – Definitions

- **Exacerbation**:
  - New symptoms or significant worsening of symptoms caused by CNS demyelination that last at least 24 hours and are not accompanied by fever or infection, also referred to as an attack, relapse, or flare
- **Remission**:
  - A period of recovery after an exacerbation during which clinical symptoms resolve completely or almost completely
- **Pseudo relapse**:
  - Recurrence or significant worsening of existing symptoms due to stressors (e.g., infection, heat)
- **Radiologically isolated syndrome (RIS)**:
  - The presence of demyelinating lesions characteristic of MS in an asymptomatic individual
  - Not considered an MS phenotype but may progress to MS
- **Clinically isolated syndrome (CIS)**:
  - A single episode of neurological symptoms resulting from CNS demyelination
  - A second episode of such symptoms increases the likelihood that the symptoms are not clinically isolated and that the patient meets the diagnostic criteria for MS.

Multiple sclerosis – Clinical course

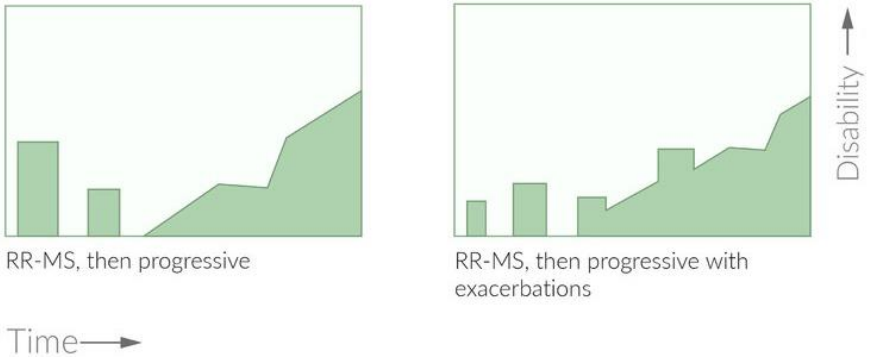
Relapsing-remitting (RR) MS (~ 90 % of patients): either full recovery between exacerbations (left column) or increasing residual disability with each exacerbation (right column).

Relapsing-remitting MS



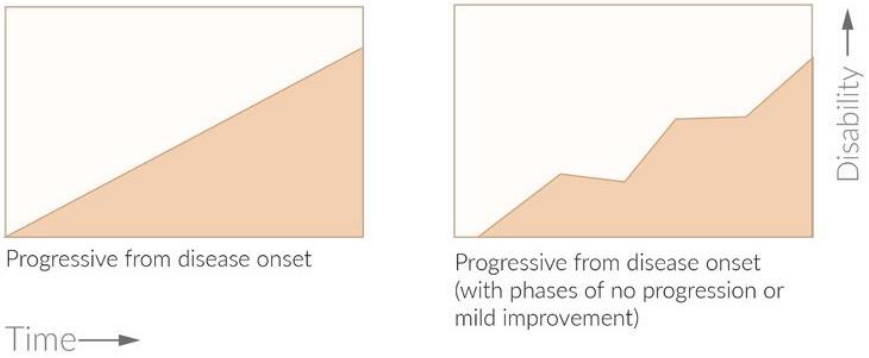
Secondary progressive (SP) MS: > 50 % of patients initially presenting with relapsing-remitting MS later develop a pattern of continuous progression (left column), which may also include further exacerbations (right column).

Secondary progressive MS



Primary progressive(PP) MS (~ 10 % of patients): continuous worsening of symptoms from disease onset (left column) but may include phases of no progression or even mild clinical improvement (less pronounced than in relapsing-remitting MS; right column). Exacerbations may also occur (not depicted).

Primary progressive MS



Multiple sclerosis – Define the following

- **Clinically isolated syndrome**:
  - Initial presentation with localized deficit, patient may not develop multiple sclerosis, and the presentation is not sufficient to fulfill the criteria of multiple sclerosis
- **Radiological isolated syndrome**:
  - White matter lesions fulfilling the criteria for multiple sclerosis occur in individuals without a history of a clinical demyelinating attack or alternative etiology
- **Primary progressive**:
  - Accumulating disability from the onset
- **Secondary progressive**:
  - Start with relapsing remitting then changes to gradual worsening

MCQ – Multiple sclerosis 1

فاينل (1)

❖**Which of the following is not a type of multiple sclerosis ?**

a. Primary progressive MS
b. Secondary progressive MS with relapses
c. Relapsing remitting MS
d. Intermitted progressive
e. Progressive releasing

فاينل (3)

❖**The most common course of multiple sclerosis is:**

a. Primary progressive MS
b. Secondary progressive MS
c. Relapsing remitting MS
d. Neuromyelitis optica
e. Relapsing on top of primary progressive

MCQ – Multiple sclerosis 2

سنوات (3)

❖ **Patient presented with optic neuritis and didn't have any episode of neurological symptoms before, then MRI suggest multiple sclerosis, what is the diagnosis ?**

A. Relapsing remitting MS
B. Primary progressive
C. Secondary progressive
D. Clinically isolated syndrome
E. Radiologically isolated syndrome

فاينل (1)

سنوات (2)

❖ **A patient had head trauma and MRI was performed. Lesions consistent with multiple sclerosis were seen in his MRI. what is the patient diagnosis ?**

a. Relapsing remitting multiple sclerosis
b. Clinically isolated syndrome
c. Radiologically isolated syndrome
d. Possible multiple sclerosis
e. Probable multiple sclerosis

MCQ – Multiple sclerosis 3

فاينل (1)

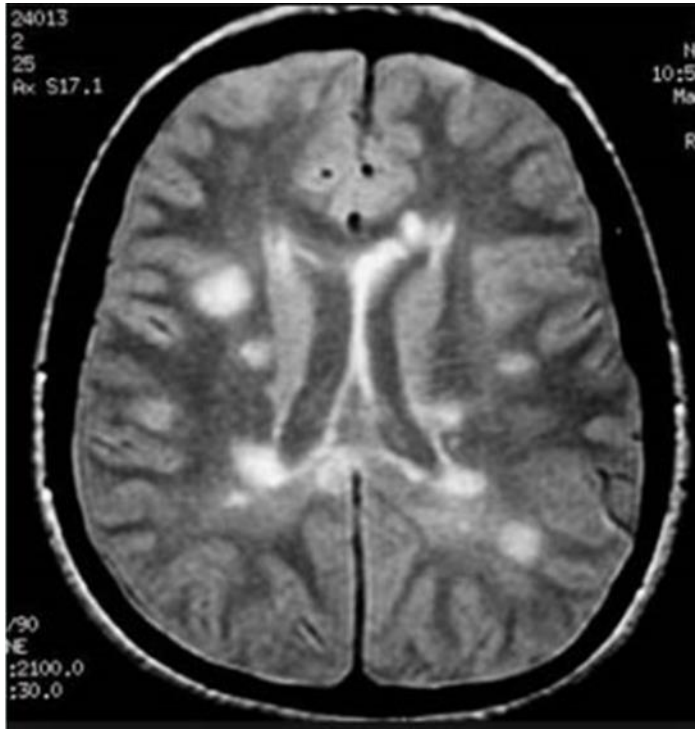
❖**35 y old female patient has MS from 15 y. from one year she was able to walk 300m now she came on wheelchair. What is the type of his disease?**

a. Primary progressive MS
b. Secondary progressive MS
c. Relapsing remitting MS
d. Progressive releasing MS

MCQ – Multiple sclerosis

❖**Last year, patient suffered from lower limb weakness that improved spontaneously after several weeks ?**

A. Relapsing remitting
B. secondary progressive
C. isolated radiological
D. isolated clinical



Management

General principals

- **Acute exacerbations**: Treat all acute exacerbations that affect physical functioning.
  - First line: high-dose IV or PO glucocorticoids (e.g., methylprednisolone)
  - Alternatives: plasmapheresis or adrenocorticotropic hormone (ACTH) gel
- **Long-term management**: Combine pharmacological and nonpharmacological measures to prevent exacerbations and improve quality of life.
  - Disease-modifying MS therapy
  - Lifestyle modifications (e.g., exercise, smoking cessation) and management of comorbidities (e.g., cardiovascular disease, sleep disorders)
  - Vitamin D supplementation may be beneficial.
  - Management of symptoms (e.g., spasticity, pain, bowel and bladder dysfunction)

MCQ – MS Management

فاينل (2)

❖**A female patient came with eye pain and burring of vision for the last few days. On examination is no defect. brain MRI was normal. What is the best next option ?**

a. IV methylprednisolone followed by oral tapering
b. Oral prednisolone
c. Lumbar puncture
d. Brain MRI with contrast
e. Repeat MRI in 6 months

MCQ – MS Management

فاينل (2)

➢A patient with multiple sclerosis is being treated with interferon. She presented to the neurology clinic with a positive pregnancy test.

❖**The most appropriate next step is:**

a. Stop interferon
b. Continue same dose of interferon
c. Increase dose of interferons
d. Reduced dose of interferons
e. Continue interferon but with monthly brain MRI to monitor disease progression

Nerve and muscle

Neuropathy

Neuropathy

- **Mononeuropathy**:
  - Peripheral nerves may be affected individually by trauma, particularly pressure, or by damage to their blood supply (the vasa nervorum).
  - Systemic disorders that generally render nerves excessively sensitive to pressure, e.g., diabetes mellitus, or that produce widespread compromise of their vasculature, e.g., vasculitic diseases, may lead to a multifocal neuropathy (or mononeuritis multiplex).
- **Polyneuropathy**:
  - Multiple peripheral nerves are more commonly affected by inflammatory, metabolic or toxic processes that lead to a diffuse, distal, symmetrical pattern of damage usually affecting the lower limbs before the upper limbs.

Mononeuropathies

- The common mononeuropathies are the following:
  - Carpal tunnel syndrome
  - Ulnar neuropathy
  - Radial palsy
  - Brachial plexus lesions
  - Meralgia paraesthetica
  - Lateral popliteal palsy

- **All are discussed earlier in section 10: Sensorimotor examination**

Multifocal neuropathy (Mononeuritis multiplex)

- **Causes include**:
  - Malignant infiltration, vasculitis or connective tissue disease, sarcoidosis, diabetes mellitus, infection
- **Onset**: stepwise fashion acutely or subacutely
- The lower limbs are more commonly affected
- **Clinical picture**: Patchy and asymmetrical
- Classically, multifocal neuropathy due to vasculitis presents with:
  - Pain, weakness and sensory loss in the distribution of multiple peripheral nerves

Polyneuropathy

- Diffuse disease of the peripheral nerves may be subclassified according to whether there is sensory or motor involvement or both.
- Pathophysiologically, further subdivision is possible, depending on whether the site of disease is the myelin sheath or the nerve fiber itself (demyelinating and axonal neuropathies, respectively, distinguishable by nerve conduction studies).
- **Causes include**:
  - Inherited, Infection, Inflammatory (e.g., Guillain–Barre syndrome), Neoplastic, Metabolic (e.g., DM, Thyroid disease), Nutritional, Toxic, Drugs, etc.
- **Clinical presentation**:
  - Diffuse, distal, symmetrical pattern of damage usually affecting the lower limbs before the upper limbs.

MCQ – Peripheral polyneuropathy

فاينل (5)

سنوات (5)

❖A patient presented with symmetrical loss of position, touch, vibration sensations of both feet up to the ankle joints. He is likely suffering from:

a. Brain lesion
b. Spinal cord lesion
c. Upper Cervical Syringomyelia
d. Peripheral polyneuropathy
e. Diffuse L5 S1 disc prolapses

سنوات (1)

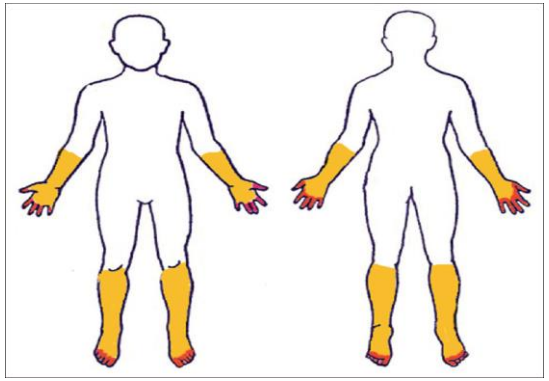
❖A patient presented with symmetrical loss of position, touch, vibration sensations of both feet up to the ankle joints. He is likely suffering from:

a. Multiple Sclerosis
b. Tumor in the left brain
c. Thoracic disc prolapse

MCQ – Peripheral polyneuropathy

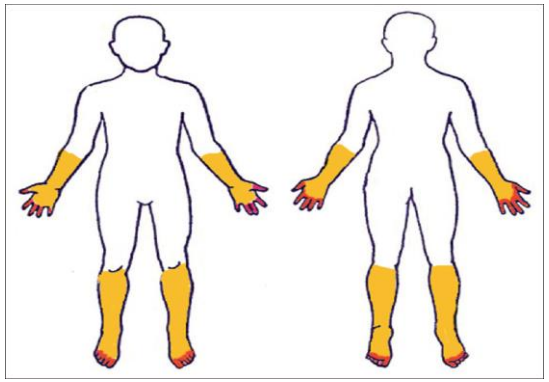
❖All of the following can cause this condition except:

a. DM
b. Drug induced neuropathy
c. Chronic polyneuropathy
d. Severe thyroid disease
e. Mononeuritis multiplex



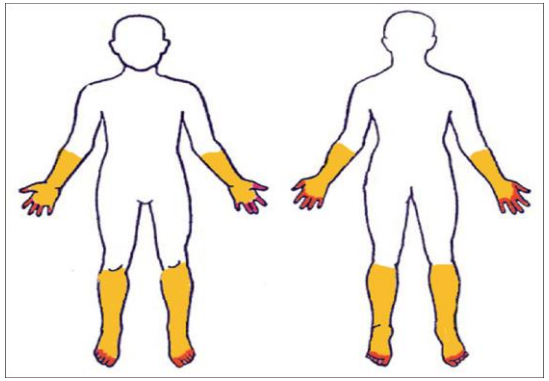
❖All of the following can cause this condition except:

a. Diabetic neuropathy
b. Chronic polyneuropathy
c. Brown sequard syndrome
d. Stroke
e. MS



MCQ – Peripheral polyneuropathy

- All of the following can cause this condition except:
  a. DM
  b. Drug induced neuropathy
  c. Chronic polyneuropathy
  d. Transverse myelitis
  e. Severe thyroid disease



- All of the following can cause this condition except:
  a. Diabetic neuropathy
  b. Chronic polyneuropathy
  c. Transverse myelitis
  d. MS

Guillain-Barre syndrome

- **Presentation**:
  - progressive ascending symmetrical muscle weakness begin in legs moving upward + mild distal paresthesia + Areflexia (sensory normal)
- **Causes**: unknown, ascend infection (campylobacter jejuni, URTI)
- **Diagnosis**:
  - LP: CSF increase protein more than 55 without pleocytosis (albumin dissociation)
  - EMG (nerve conduction) demyelination neuropathy (normal or mild abnormal in early stage)
  - Antibody gangliosity 1\4 patient
- **Complications**:
  - Respiratory compromise, arrhythmia, hypotension, aspiration

Guillain-Barre syndrome

- **Management**:
  - Admission
  - Ventilation (vital capacity) less than 12-15 or P_{CO2} less than 70 mmHg
  - Immunoglobulin (5 days)
  - Plasma exchange (first 2 weeks) 4-6 exchange
- **Prognosis**: 5% die complication , 10% permanently disable
- **Differential diagnosis**:
  - Acute spinal cord lesion
  - Poliomyelitis
  - MG
  - botulism

Guillain-Barre syndrome

- Old patient came to ER with bilateral lower limb weakness, (&other signs), areflexia.

❖What is your diagnosis ?

- GBS (Guillain-Barre syndrome)

❖What is are the investigations ?

- LP: CSF increase protein more than 55 without pleocytosis (albumin dissociation
- EMG (nerve conduction) demyelination neuropathy (normal or mild abnormal in early stage)
- Antibody gangliosity 1\4 patient

❖What is the treatment ?

- IVIG
- Plasmapheresis

Guillain-Barre syndrome

- Patient present with bilateral limb weakness, paresthesia numbness. More prominent in lower than upper, generalized areflexia
- **What's your investigation ?**
  - LP: CSF increase protein more than 55 without pleocytosis (albumin dissociation
  - EMG (nerve conduction) demyelination neuropathy (normal or mild abnormal in early stage)
  - Antibody gangliosity 1\4 patient
- **What's your management ?**
  - IVIG
  - Plasmapheresis

Guillain-Barre syndrome

- A 20 years old patient came with weakness and numbness of lower extremities more than upper extremities. He was found to have generalized areflexia

- **What is the serious condition that you should think about ?**
  - GBS (acute inflammatory demyelination polyneuropathy)
- **How would you confirm your diagnosis ?**
  - LP, EMG
- **How would you treat this condition ?**
  - IVIG, Plasmapheresis
- **How would you monitor this patient respiratory function ?**
  - Ventilation (vital capacity) less than 12-15 or pco2 less than 70 mmhg

MCQ – Guillain-Barre syndrome

- A 20 years old patient came with weakness and numbness of lower extremities more than upper extremities. He was found to have generalized areflexia.

❖The most important next step in diagnosis will be:

a. Perform brain MRI
b. Perform lumbar MRI
c. Perform lumbar puncture and CSF analysis
d. Examine for dermatomal sensory loss
e. Examine for glove and stocking sensory loss

Guillain-Barre syndrome

- Medically free Young patient, come to your clinic with progressive bilateral lower limb weakness

- **First step management**:
  - IVIG
- **Second step management**:
  - Plasmapheresis

MCQ – Guillain-Barre syndrome

فاينل (2)

❖Which of the following is FALSE regarding Guillain-Barre syndrome?

a. It is commonly preceded by infection
b. It is acute peripheral neuropathy that results in ascending numbness and paralysis
c. It can affect sensory and motor fibers
d. One of the most common findings is areflexia
e. Once diagnosis is suspected, high dose corticosteroid should be given

❖Ascending loss of sensation to the chest. on examination normal power and reflexes with loss of the sensation. What is your management ?

a. Give IVIG

Subtypes and variants of Guillain-Barre syndrome

	Description	Etiology	Clinical features	Treatment
Acute inflammatory demyelinating polyneuropathy (AIDP) [7]	• Acute variant of Guillain-Barré syndrome • Predominant sub-type affecting 60–80% of GBS patients in North America and Europe	• Associated with *Campylobacter* and CMV • Autoantibodies against various antigens	• Ascending paralysis • Autonomic neuropathy • CN defects and pain • Peak at ~ 4 weeks	• Intravenous immunoglobulin • Plasmapheresis
Chronic inflammatory demyelinating polyneuropathy (CIDP) [8]	• A chronic autoimmune polyneuropathy	• CIDP has not been linked to any pathogen in particular. • Macrophage-induced demyelination • Autoantibodies (e.g., anti-GM1 ganglioside autoantibodies)	• Symmetric distal and/or proximal weakness • Sensory involvement • Autonomic dysfunction and cranial nerve involvement is rare • Developing symptoms for > 8 weeks	• Intravenous immunoglobulin or corticosteroids • Plasmapheresis • Immunomodulatory drugs (e.g., azathioprine, cyclophosphamide)

Subtypes and variants of Guillain-Barre syndrome

	Description	Etiology	Clinical features	Treatment
Miller-Fisher syndrome	• A limited variant of GBS characterized by cranial nerve involvement	• Autoantibodies directed against ganglioside GQ1b, GT1a	• Ophthalmoplegia • Ataxia • Areflexia	• Intravenous immunoglobulin
Multifocal motor neuropathy (MMN) [9]	• A variant of GBS solely affecting the motor neurons. • Differential diagnosis for amyotrophic lateral sclerosis	• Multifocal motor conduction block • Anti-GM1 ganglioside autoantibodies • Usually normal protein levels in CSF [10]	• Asymmetric paralysis and areflexia • Initially involves the distal upper limbs	• Immunosuppression
Acute motor axonal neuropathy (AMAN)	• An abrupt-onset variant of GBS • Affects motor nerve fibers with variable severity and spares sensory fibers	• Typically occurs after an infection with *Campylobacter jejuni* and may be associated with antibodies directed toward GM1 ganglioside-like epitopes.	• Acute paralysis • Areflexia without sensory loss	• Intravenous immunoglobulin • Plasmapheresis

MCQ – Guillain-Barre syndrome

❖Which Guillain-Barre variant is associated with ophthalmoplegia, ataxia and areflexia and tends to be associated with GQ16 antibodies?

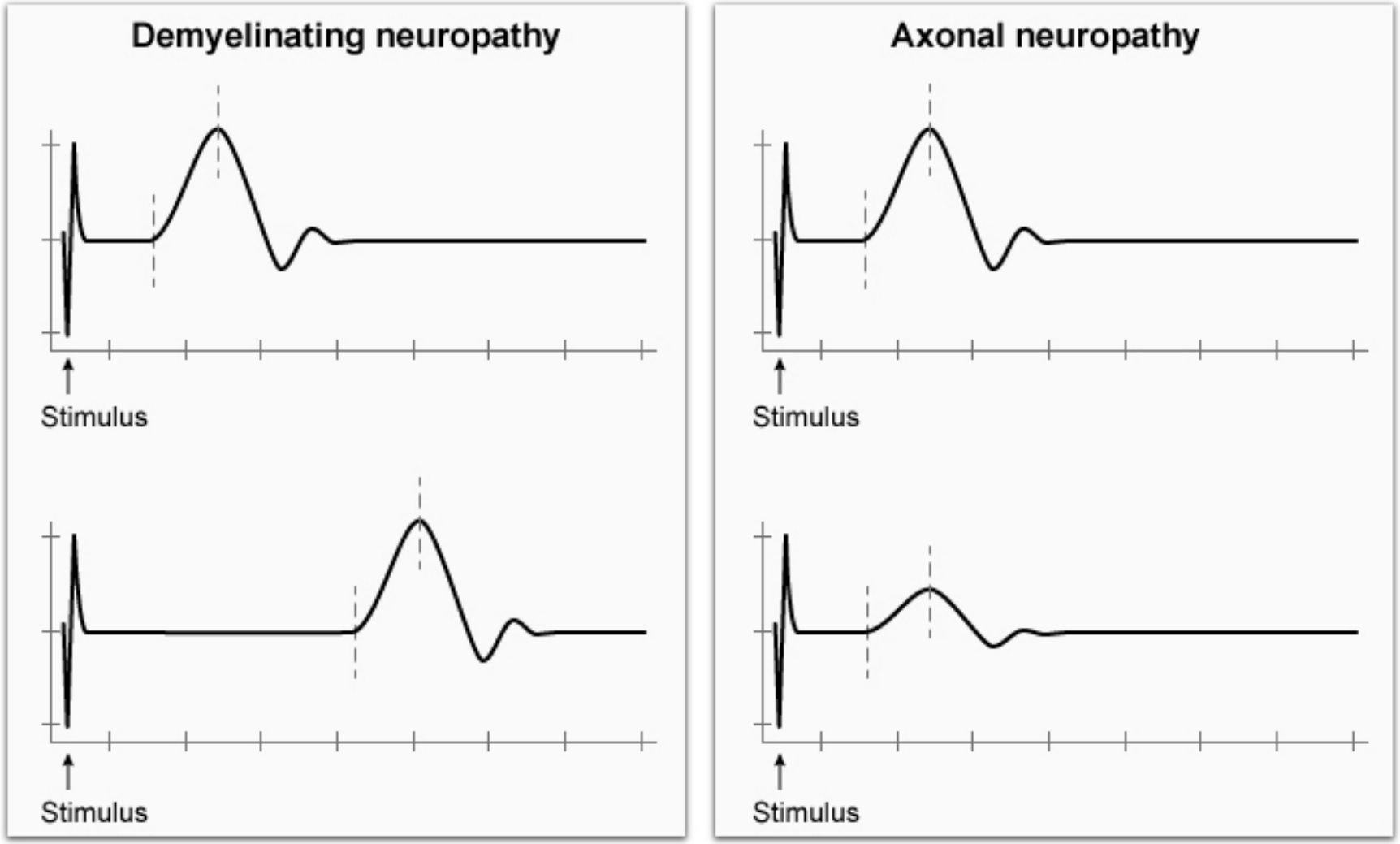
a. Sensory GBS
b. Acute inflammatory demyelinating polyneuropathy
c. Acute motor sensory axonal polyneuropathy
d. Miller-Fisher syndrome
e. Acute motor axonal polyneuropathy

Nerve conduction studies

Nerve conduction studies

- Involve electrical stimulation of a nerve and measurement of several variables, including the conduction **velocity** (both motor and sensory) and **amplitude** of the action potential
- **Neuropathy**: may primarily involve the axons themselves, in which case the electrodiagnostic hallmark is a reduction in the amplitude of the action potential
- **Demyelinating**: the dominant feature in nerve conduction studies is a reduction in conduction velocity
- Sometimes, a mixed picture is seen

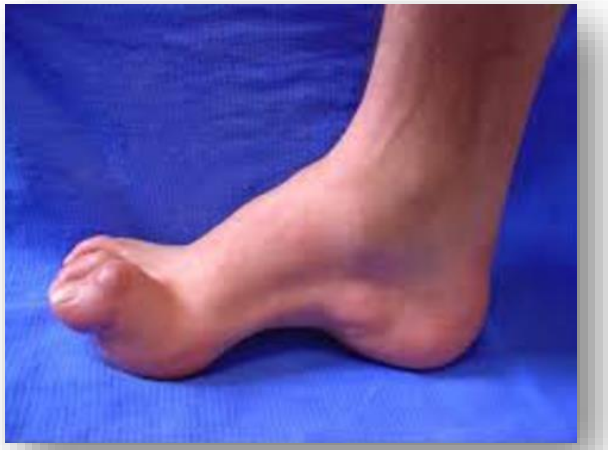
Nerve conduction studies



Charcot–Marie–Tooth disease

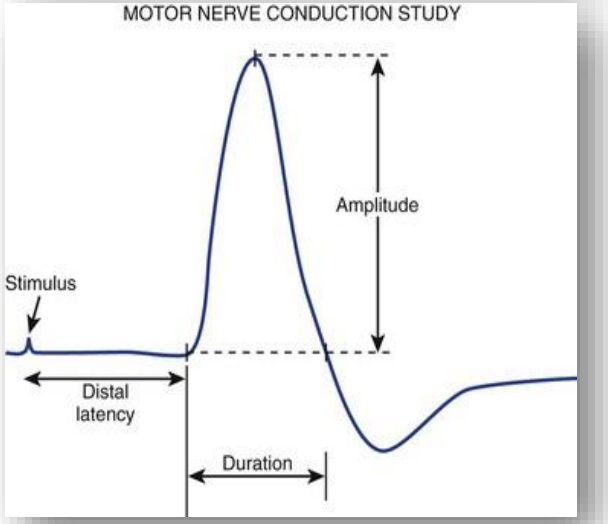
سنوات (8)

- In NCS (nerve conduction study) the patient showed demyelination so what's the diagnosis ?
  - Charcot–Marie–Tooth disease



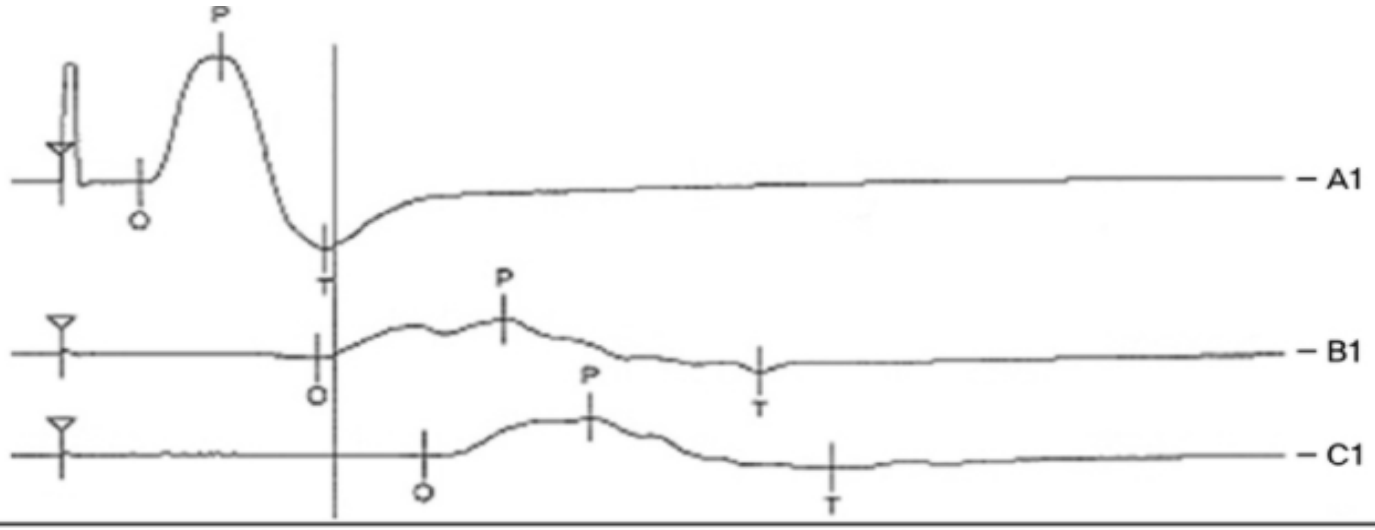
سنوات (1)

- Compound muscle action potential (CMAP) If the amplitude low
  a. Axonal injury
  b. Demyelination
  c. Loss of motor fibers



Nerve conduction study

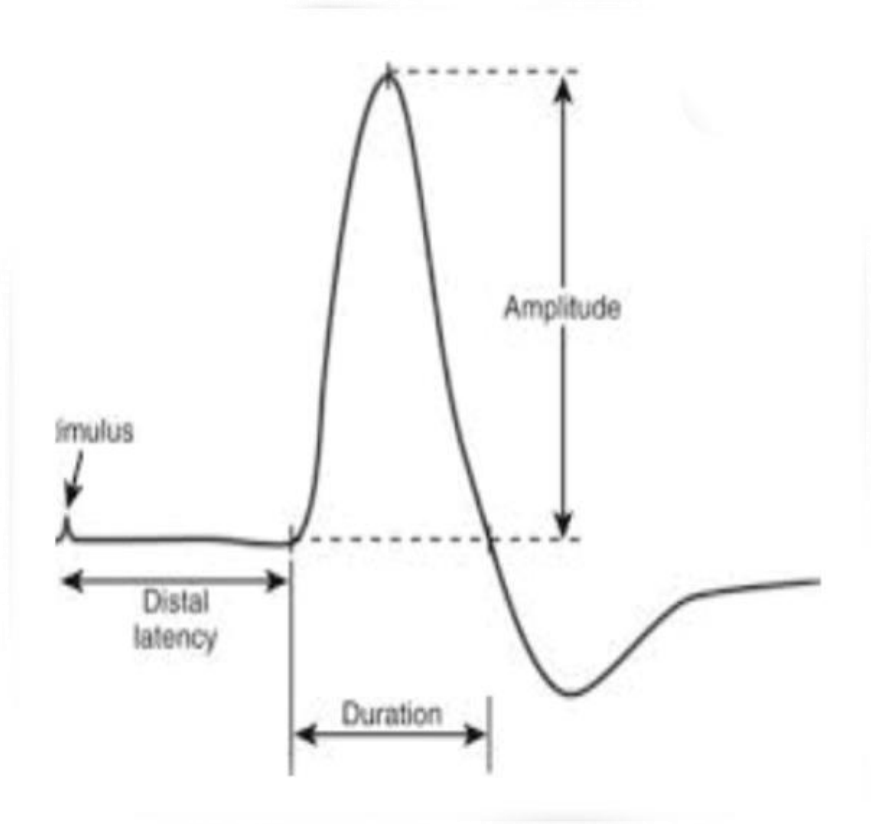
- This is a nerve conduction study of a patient with weakness
- What do you notice?
  - There is decrease in velocity
  - Causes: nerve entrapment, demyelination



Stimulation site	Latency (ms)	Amplitude (mV)	NCV (m/s)
Wrist	3.0	15.9	
Elbow		4.3	33.8
Axilla		4.2	23.1

About nerve conduction study, Which is true

A. Reduced amplitude – demyelinating disease
B. Reduced velocity – neuropathy
C. Amplitude resembles motor unit
D. EMG can’t diagnose myopathies



Neuromuscular junction

Myasthenia gravis

- This is an autoimmune disorder in which most patients have circulating antibodies to acetylcholine receptors at the neuromuscular junction
- There may be associated thymus hyperplasia or thymoma.
- **Clinical course**:
  - Symptoms worsen with increased muscle use throughout the day and improve with rest.
  - Sometimes associated with exacerbating factors, including medications, pregnancy, stress. Infection

Myasthenia gravis

- **Clinical manifestations**:
  - **Eye muscle weakness**: most common initial symptom; Ptosis, Diplopia, Blurred vision
  - **Bulbar muscle weakness**; Slurred speech, Difficulty chewing and/or **swallowing**
  - **Proximal limb weakness**; Rising from a chair, Climbing stairs, Brushing hair, Deep tendon reflexes are not affected.
  - **Respiratory muscle weakness**; causes dyspnea
- **Treatment**
  - **Cholinesterase inhibitor**: first-line agent is pyridostigmine
  - **Immunosuppressants** (inadequate symptom control with (or intolerance to) pyridostigmine): Common initial regimen: glucocorticoids and/or azathioprine

Myasthenic Crisis

- **Definition**: acute, life-threatening exacerbation of myasthenic symptoms that leads to respiratory failure
- **Epidemiology**:
  - Affects 15–20% of patients with MG
  - Most commonly occurs within 8–12 months after onset
- **Etiology**:
  - Infection
  - Surgery, anesthesia
  - Pregnancy
  - Medications (e.g., steroids)
- **Differential diagnosis**: cholinergic crisis
- **Treatment**:
  - IVIG 400mg/kg for 5 days
  - Plasmapheresis
  - Early endotracheal intubation

MCQ – Myasthenia Gravis 1

فاينل (1)

❖**All of the following regarding myasthenia gravis are true except:**

a. It is commonly autoimmune disease
b. It is usually associated with circulating acetylcholine receptor antibodies
c. Patient can present with ocular, bulbar and skeletal muscles weakness
d. It can be associated with thymoma
e. Thymectomy is not recommended for young patients with myasthenia gravis

فاينل (1)

❖**All of the following regarding myasthenia gravis are true except**:

a. Myasthenia crisis occurs early in the course of the disease
b. Initiation of steroids can trigger myasthenia crisis
c. Anticholinesterase medications should be continued while treating myasthenia crisis
d. Respiratory function in myasthenia crisis is assessed by respirometry
e. Thymectomy is recommended for young patients with generalized myasthenia gravis

MCQ – Myasthenia Gravis 2

فاينل (1)

❖**Which of the following is false regarding myasthenia gravis ?**

a. Initiation of steroids can trigger myasthenia crisis
b. O2 sat is the predictor of respiratory affection by the disease
c. Anticholinesterase medications should be continued while treating myasthenia crisis
d. It is commonly autoimmune disease
e. It can be associated with thymoma

فاينل (1)

❖**Which of the following is false regarding myasthenia gravis ?**

a. Anticholinesterase medications should be continued while treating myasthenia crisis
b. Administration of corticosteroid cause remission of the disease
c. It is commonly autoimmune disease
d. Respiratory function in myasthenia crisis is assessed by spirometry
e. Thymectomy is recommended for young patients with generalized myasthenia gravis

MCQ – Myasthenia Gravis 3

فاينل (2)

❖ **Which of the following is false regarding myasthenia crisis ?**

a. It is acute respiratory muscle weakness that affects breathing
b. Cholinergic crisis is different from myasthenia crisis by the presence of hypersalivation, lacrimation, increased sweating,
c. It can be treated with IV immunoglobulins
d. It can be treated with plasma exchange
e. Treatment of myasthenia crisis is the same as cholinergic crisis

شرح

Myasthenic Crisis and Cholinergic Crisis

Myasthenic crisis vs. cholinergic crisis		
	Myasthenic crisis	**Cholinergic crisis**
Shared symptoms	• Muscle weakness • Dyspnea • Sweating • Agitation • Disorientation • Drowsiness • Urinary and fecal urgency	
Pupil	• Normal	• Miosis
Fasciculations	• None	• Present
Heart rate	• Tachycardia	• Bradycardia
Skin	• Cold and faint	• Warm and flushed
Bronchial secretion	• Normal	• Increased

Fill in the blank

سنوات (1)

- Patient has history of myasthenia gravis , come to ER with difficulty of breathing (&other signs)
- **You have to distinguish between _____ & _____ for management**
  - Myasthenia crisis & cholinergic crisis

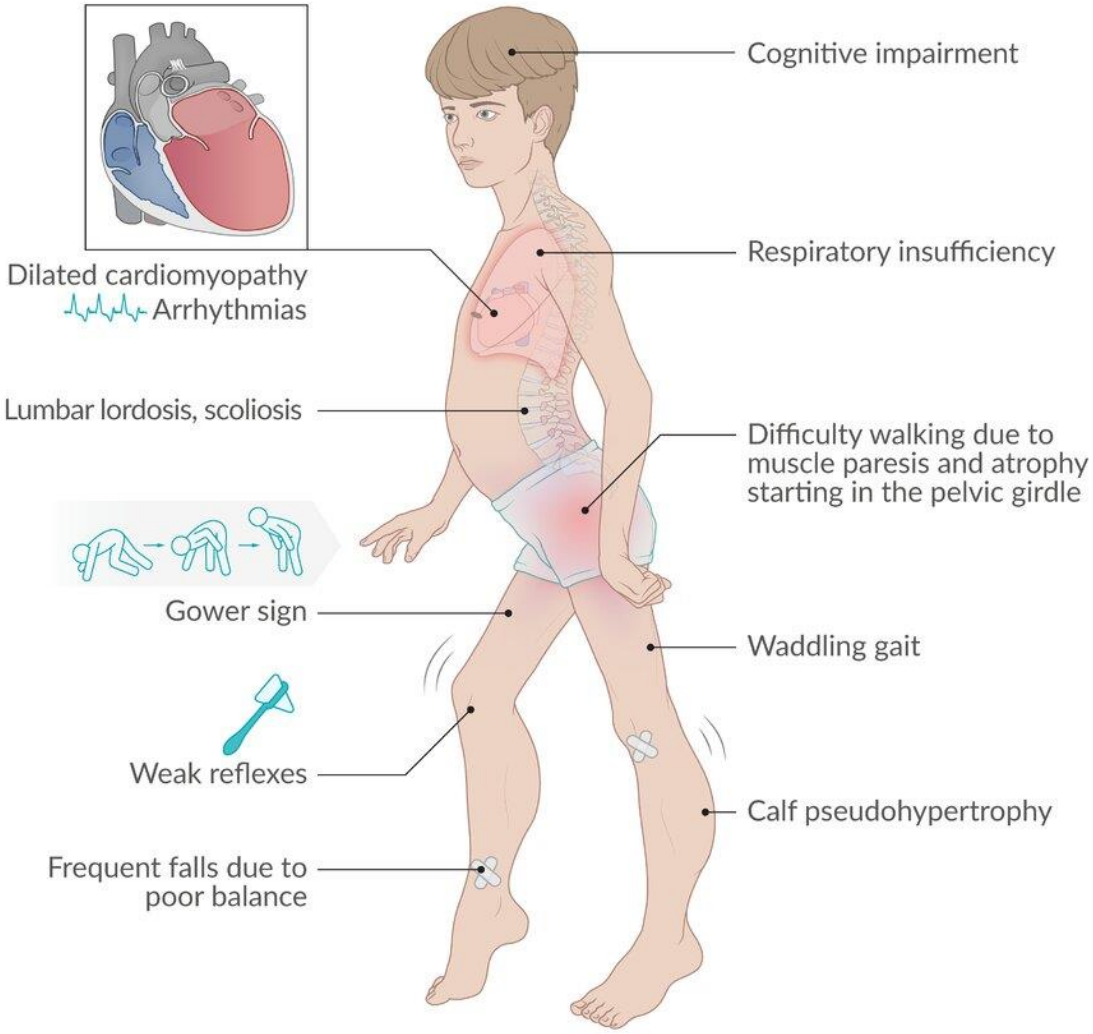
فاينل (1)

- All of the following can cause VII (Facial) cranial nerve palsy, except:
  a. Guillain–Barré syndrome
  b. Lyme Disease
  c. Myasthenia Gravis
  d. Sarcoidosis
  e. Sphenoidal ring meningioma

Myopathy

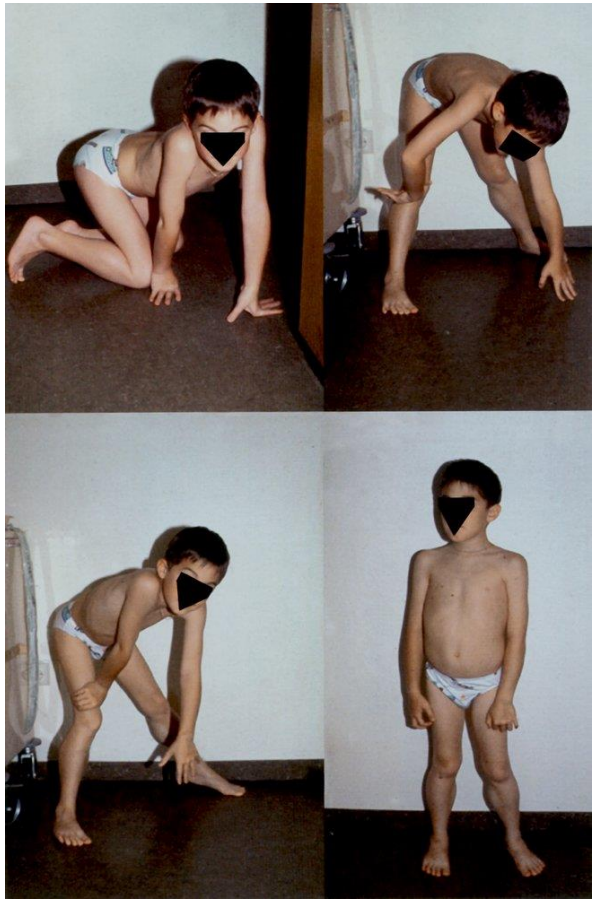
Muscular Dystrophy

	Duchenne muscular dystrophy	Becker muscular dystrophy
Etiology	**X-linked recessive**, dystrophin gene mutation	
Dystrophin protein	**Absent**	**Reduced**
Age of onset	2–5 years	> 15 years
Symptoms	Rapid progression, inability to walk by approx. 12 years	Less severe, slower progression, cardiac involvement is more common
Diagnostics	↑↑ **Creatine kinase,** ↑ serum aldolase, genetic analysis (confirmatory test), muscle biopsy	
Treatment	Supportive, glucocorticoids	
Life expectancy	~ 30 years	~ 40–50 years



Gower sign

The individual arrives at a standing position by supporting themselves on their thighs and then using the hands to “walk up” the body until they are upright



Myotonic dystrophies

- Both types, myotonic dystrophy type I (Curschmann-Steinert disease) and myotonic dystrophy type II (proximal myotonic myopathy), are autosomal dominant conditions with CTG trinucleotide repeat and CCTG tetranucleotide repeat expansions, respectively.
- Type I is a severe (often life-threatening) form of disease, while type II is usually mild.
- Both present with skeletal muscle weakness and myotonia, muscle pain, heart conduction defects, cataracts, testicular atrophy, and frontal balding.
- Electromyography may confirm myotonia that is not identified during clinical examination; however, genetic tests usually confirm the diagnosis.
- As no curative therapy exists, treatment is symptomatic. Except for DM1, patients with myotonic syndromes have a normal lifespan.

Muscle dystrophies

فاينل (2)

❖**Which of the following is false regarding muscle dystrophies ?**

a. Duchenne muscular dystrophy is x linked associated with absent dystrophin
b. Becker's muscular dystrophy is x linked associated with deficient dystrophin
c. Myotonic dystrophy is associated with facial weakness
d. Cardiac involvement is very rare in Duchene muscular dystrophy
e. Myotonic dystrophy is associated delayed relaxation of muscles called myotonia

فاينل (2)

❖**Which of the following is false regarding muscle dystrophies ?**

a. Duchene muscular dystrophy is x linked associated with absent dystrophin
b. Becker's muscular dystrophy is x linked associated with deficient dystrophin
c. Myotonic dystrophy is associated with normal facial muscles.
d. Cardiac involvement is common in Duchene muscular dystrophy
e. Myotonic dystrophy is characterized by myotonia.

Acquired myopathies

- **Dermatomyositis**:
  - **Definition**: an inflammatory myopathy characterized by progressive symmetrical proximal muscle weakness and distinctive skin findings (Heliotrope erythema, Gottron's papules)
  - **Etiology**: idiopathic or paraneoplastic antibody-mediated vasculopathy, associated with malignancies
- **Polymyositis**:
  - **Definition**: an inflammatory myopathy affecting the proximal skeletal muscles, with evidence of elevated CK and myositis on EMG and biopsy in the absence of any of the characteristic findings of the other idiopathic inflammatory myopathies
  - **Etiology**: cell-mediated cytotoxicity against unidentified skeletal muscle antigens, chiefly affecting the endomysium

شرح

Acquired myopathies

Characteristic presentations of idiopathic inflammatory myopathies (IIM) [2][6][15][16]			
	Muscle weakness	Cutaneous features	Systemic features
Dermatomyositis (DM)	• Progresses over weeks to months • Mild to moderately severe weakness	• Typically present	• Common • Typically: ◦ Increased risk of malignancy ◦ Interstitial lung disease (may be severe)
Polymyositis (PM)		• Absent	

❖ **Treatment**: (Both Dermatomyositis and Polymyositis)

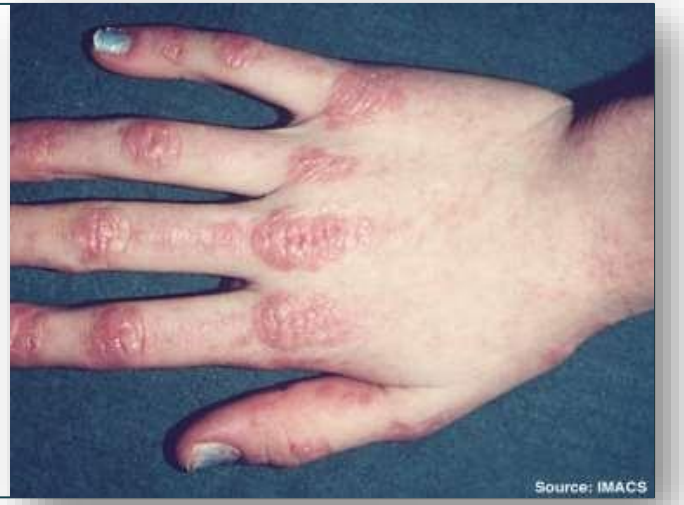
- **First-line**: glucocorticoids and (usually) a steroid-sparing immunosuppressive agent (e.g., Methotrexate, Azathioprine)

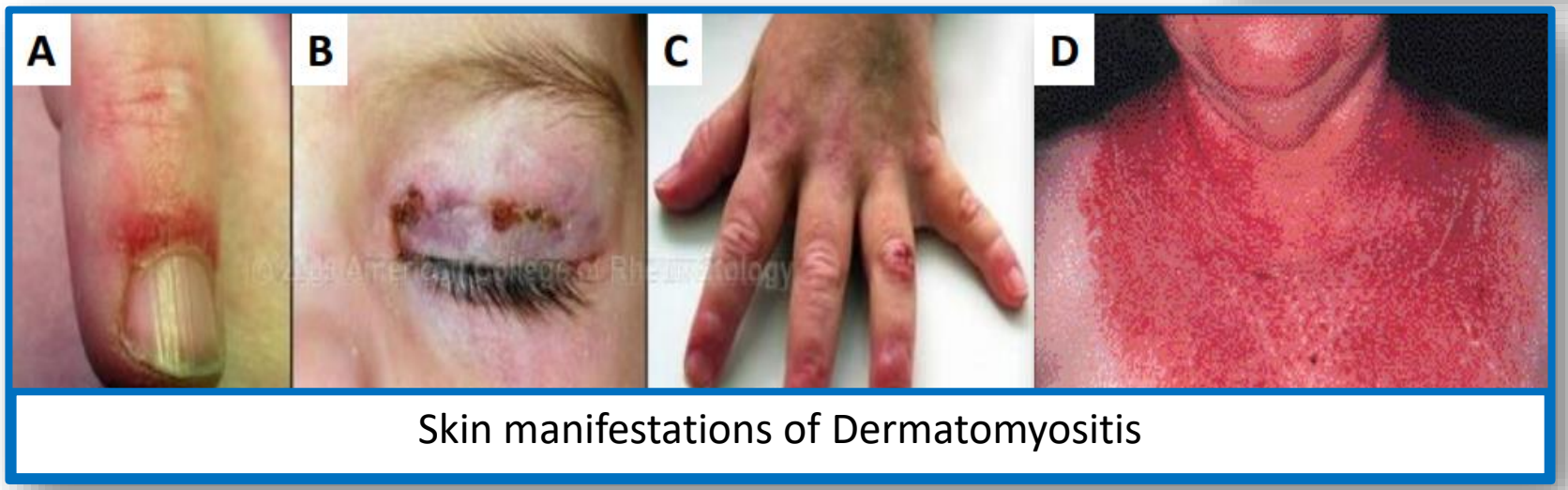
طبعا مش بس هذول ال2 هم ال"acquired myopathies" لكن هم أهم 2

MCQ

❖**What is the diagnosis ?**

a. Curschmann-Steinert disease
b. proximal myotonic myopathy
c. Polymyositis
d. Dermatomyositis
e. Duchenne muscular dystrophy





Skin manifestations of Dermatomyositis

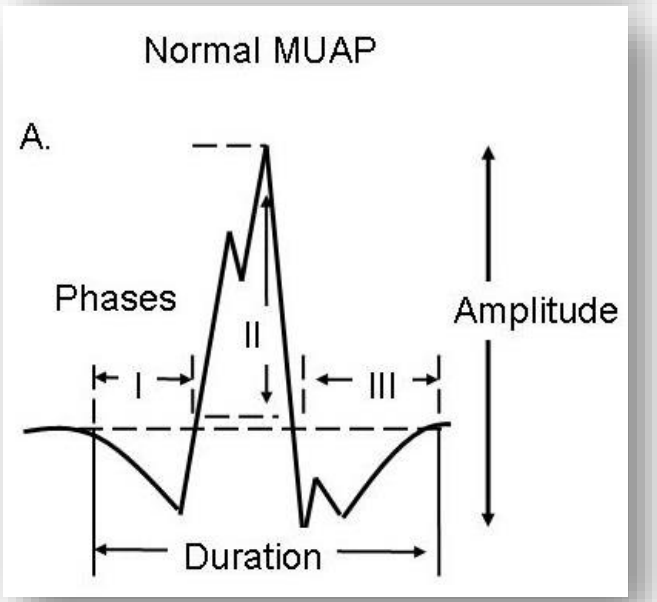
Electromyography

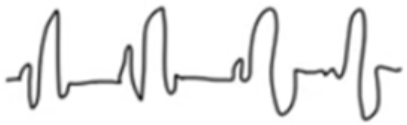
Electromyography (EMG)

- **Definition**: A record of electrical activity of muscles and motor neurons via a cathode
- **Types of electrodes used**:
  - **Metal disk** used for skin and superficial muscles (Surface EMG)
  - **Hypodermic needle** used for deep muscles (Needle EMG)
- Diseases of the peripheral nervous system, neuromuscular junction and muscle are all amenable to electrodiagnostic investigation.
- **Distinguish** myopathy from neurogenic disorder.
- **Procedure**: EMG involves insertion of a concentric needle electrode into a muscle to record its electrical activity directly, both at rest and on contraction.

Electromyography (EMG)

- During rest, normally, the muscles show almost no activity.
- With ↑ contractions, the muscles start to show waves that have a duration (X-axis) and an amplitude (Y-axis);
  - **Duration** is measured from the initial deflection from baseline to the terminal deflection back to baseline; it reflexes the muscle fiber density in a muscle unit
  - **The amplitude** resembles the number of muscle fibers within the unit.
  - Waves show different shapes due to recruiting different motor units each time
- At fully active muscles, overlapping and interference occur.



	Normal	Myopathy	Neurogenic disease
During rest	No activity	No activity	Spontaneous activity (loss of inhibition)
			
Weak contraction	Normal:	Decreased amplitude and duration	Bigger amplitude
			
Full activity	Normal:	Decreased amplitude, duration & interference	Decreased interference
			

Electromyography (EMG)

- **Muscle fasciculations & fibrillations**:
  - Fasciculations (visible by naked eye): Only seen in neurogenic diseases
  - Fibrillations (only seen on EMG): Seen in both neurogenic & myogenic diseases
- **Surface EMG V.s. Needle EMG**
  - **Surface EMG**: Noninvasive, painless, wide area (more global view), allows prolonged simultaneous recordings of muscle activity from multiple sites, has a relatively low-signal resolution, is highly susceptible to movement artifacts, and deeper muscle units cannot be assessed
  - **Needle EMG**: Invasive, painful, a small number of active muscle units, prolonged nEMG recording is not possible, and time and temperature sensitive

MCQ

سنوات (1)

❖ **Needle EMG one is false**:

A. single nerve fiber
B. motor unite
C. Can’t diagnose neural disease (false)
D. Can’t diagnose neuromuscular disease (false)

❖ هذه إجابة الأرشيف وللأمانة حاس السؤال ناقص أو مكتوب غلط

فاينل (1)

❖ **Wrong statement**:

- We can't differentiate between muscular and neuronal problems by EMG

Neurodegenerative disorders

Alzheimer disease

Alzheimer disease

- Most common cause of dementia in elderly.
- Down syndrome patients have ↑ risk of developing Alzheimer disease, as APP is located on chromosome 21.
- ↓ ACh.
- **Associated with the following altered proteins**:
  - ApoE-2: ↓ risk of sporadic form
  - ApoE-4: ↑ risk of sporadic form
  - APP, presenilin-1, presenilin-2: familial forms (10%) with earlier onset

Alzheimer disease (Histology & Gross)

- Gross features
  - Widespread cortical atrophy, especially hippocampus.
  - Narrowing of gyri and widening of sulci.
- Microscopic features
  - **Senile plaques in gray matter**: extracellular β-amyloid core; may cause amyloid angiopathy → intracranial hemorrhage; Aβ (amyloid-β) synthesized by cleaving amyloid precursor protein (APP).
  - **Neurofibrillary tangles**: intracellular, hyperphosphorylated tau protein = insoluble cytoskeletal elements; number of tangles correlates with degree of dementia.
  - **Hirano bodies**: intracellular eosinophilic proteinaceous rods in hippocampus.

MCQ – Alzheimer disease

فاينل (1)

❖Which of the following is not a characteristic of Alzheimer disease?

a. Episodic memory is usually affected early
b. Impaired immediate recall
c. Difficulty managing finances
d. Impaired procedural memory is usually affected early
e. It is associated with neurofibrillary tangles

فاينل (3)

❖Regarding Alzheimer's disease, choose the FALSE statement:

a. The most common form of dementia
b. Associated with neurofibrillary tangles
c. Associated initially with forgetfulness of long-term memories
d. Later stage is associated with Personality disintegration
e. There is also neuritic plaques and neuronal loss


Parkinson disease

شرح

Parkinson disease

❖**Clinical features**: (Mnemonic: Parkinson TRAPSS your body)

- Tremor (pill-rolling tremor at rest)
- Rigidity (can be lead pipe or cogwheel)
- Akinesia (or bradykinesia)
- Postural instability
- Shuffling gait
- Small handwriting (micrographia)

Parkinson's disease (PD) is diagnosed based on the presence of parkinsonism, which includes bradykinesia (slowness of movement) and either resting tremor, rigidity, or both. Additional features that support a diagnosis of PD include a clear improvement in symptoms with dopaminergic medication, resting tremor, levodopa-induced dyskinesia (which usually occurs in later stages of PD), and olfactory loss

❖**Histologic & gross findings**:

- Loss of dopaminergic neurons (i.e., depigmentation) of substantia nigra pars compacta
- Lewy bodies: composed of α-synuclein (intracellular eosinophilic inclusions A)

MCQ – Parkinson disease 1

فاينل (2)

❖ **Parkinson is characterized by all the following features except:**

a. Bradykinesia
b. Lead pipe Rigidity
c. Cogwheel rigidity
d. Monotonic speech
e. Bilateral symmetrical resting tremor

Mnemonic: **TRAPS**

T: Pill-rolling Tremor

R: Cogwheel Rigidity

A: Akinesia/bradykinesia

P: Postural instability

S: Shuffling gait

فاينل (1)

❖ **All are features of Parkinson Disease, except:**

a. Bradykinesia
b. Tremor
c. Rigidity
d. Hypotonia
e. Shuffling gait

Parkinsonism – Clinical evaluation

- Consider other causes of parkinsonism if any of the following are present:
  - **Features**: Vertical gaze palsy, Cortical signs, Cerebellar signs, Pyramidal tract signs, Absence of typical nonmotor signs
  - **Disease trajectory**: Rapid progression (e.g., early dementia, progressive aphasia, falls, gait impairment, severe autonomic or bulbar dysfunction), No progression of typical motor signs, No benefit from dopaminergic medication
  - **Distribution of symptoms**: Bilateral symmetric parkinsonism, Limited to legs
  - **History suggestive of alternative causes**: Use of dopaminergic blockers within 6–12 months, Traumatic brain injury, Encephalitis

MCQ – Parkinson disease 2

فاينل (1)

❖**Which of the following suggests that a patient may have a diagnosis other than Parkinson disease**:

a. Asymmetric tremor
b. Tremor improves with action
c. Cogwheel rigidity
d. Responds well to dopamine therapy
e. Early gait instability

فاينل (1)

❖**Which of the following suggests that a patient may have a diagnosis other than Parkinson disease**:

a. Resting tremor
b. Tremor improves with action
c. Urine incontinence
d. Cogwheel rigidity
e. Asymmetric tremor

Huntington disease

Huntington disease

❖ **Description**:

- Autosomal dominant trinucleotide $(CAG)_n$ repeat expansion in the huntingtin (HTT) gene on chromosome 4.
- Symptoms manifest between ages 20 and 50: chorea, athetosis, aggression, depression, dementia (sometimes initially mistaken for substance abuse).
- Anticipation results from expansion of CAG repeats.
- Caudate loses ACh and GABA.

❖ **Histologic & gross findings**:

- Atrophy of caudate and putamen with ex vacuo ventriculomegaly.
- ↑ dopamine, ↓ GABA, ↓ ACh in brain.
- Neuronal death via NMDA-R binding and glutamate excitotoxicity

Wilson disease

MCQ – Wilson disease

❖**Choose the incorrect statement:**

a. Huntington disease onset is between 35 and 50
b. Huntington disease is usually associated with caudate atrophy and brain atrophy
c. Wilson disease is inherited as autosomal recessive
d. Wilson disease is associated with high plasma copper and ceruloplasmin
e. Friedreich's ataxia is inherited as autosomal recessive

❖**Which of the following is Autosomal dominant ?**

a. Tuberous sclerosis
b. Wilson disease
c. Gaucher disease
d. phenylketonuria

Subacute combined degeneration

MCQ – B12 deficiency

❖**Which of the following Vit deficiency is associated with subacute degeneration of the cord ?**

a. Vit B12
b. Vit D
c. Vit B6
d. Vit B1
e. Vit C

MCQ – B12 deficiency

- A 36 years old with a history of gastric bypass. Surgery developed numbness in his legs, later he started to have falls and then urine incontinence. he has reduced vibration and position good power. He has brisk knee reflexes and absent ankle reflexes.

❖ **Which of the following vitamin deficiency is the result of his condition ?**

a. Vit B12
b. Vit D
c. Vit B6
d. Vit B1
e. Vit C


"That's all Folks!"