NEUROLOGY

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- The nervous system is composed of central & peripheral nervous system .
- The central & peripheral nervous system includes :

1- The brain . Composed from 2 cerebral hemisphere , they execute higher brain functions . Each are divided to functional lobes , namely frontal , parietal , temporal & occipital lobes . Each lobe carry group of specific functions. The dominant hemisphere in right handed people is left lobe , while it is dominant in 50% of left handed people.

2- The brain stem : which encompasses the midbrain , cerebellum & medulla oblongata. It contains the sensory & motor pathways , cerebral nuclei & part of sympathetic nervous system.

3- Spinal cord : which is enclosed in the vertebral canal . It contains the pathways which connect the peripheral with the central nervous system , grouped in bundles . It also contains the lower motor neurons.

4-The peripheral nervous system include the peripheral nerves which originate from the anterior horn cells (motor nerves) , & nerves which originate from the peripheral receptor in different body tissues (sensory nerves) .

5-The autonomic nervous system which encompasses the sympathetic & parasympathetic nervous system .

CORTICAL LOBAR FUNCTIONS

- 1- frontal lobe responsible for personality , emotional & social control . It also controls the contralateral motor function, language & micturition.
- 2-parietal lobe : in dominant hemisphere it is responsible for language & calculation. In non dominant hemisphere it is responsible for spatial orientation & constructional skills.
- 3- temporal lobe : in dominant hemisphere it is responsible for auditory perception, language, smell, balance & verbal memory. While in non-dominant one it is responsible for melody \ pitch perception & non- verbal memory with smell , language & balance.
- 4-occipital lobe : mainly responsible for visual perception.
- Depending on these functions of each lobe , one can predict the positive & negative symptoms & signs which occur in disease states.

SENSORY , MOTOR & AUTONOMIC NERVOUS SYSTEM

- The sensory nerve cell are located just outside the spinal cord, in dorsal root ganglia at the spinal exit foramina. The distal ends utilize various specialized endings for conversion of external stimuli into action potentials. The sensory nerves consist of combination of large fast myelinated axons (position & locomotion) , smaller slower unmyelinated axons (pain , temperature & autonomic function).
- The motor peripheral nerve , for which the cell bodies are located in the anterior horn cell of spinal cord (lower motor neurons). The axons are wrapped with myelin sheath for rapid conduction. The transmitter in motor end plate with the muscle is acetyl choline.
- Autonomic nervous system regulate the cardiovascular & respiratory systems., the smooth muscles of the GIT & many exocrine & endocrine glands throughout the body. The system is divided functionally & pharmacologically to sympathetic & parasympathetic systems.

DISEASES OF THE NERVOUS SYSTEM

- The nervous system disorders can manifest by different modalities , depending on the cause , site of involvement, duration of the illness, age of the patient , positive or negative affection of the function.
- Central nervous system dysfunction can arise not just due local pathology , they can present in response to metabolic, toxic derangement in body systems , such as hypoglycemia, hypoxia, renal or hepatic failure , toxic substances & many drugs.
- The main presentation in CNS disorder are : 1- motor dysfunction : upper & lower motor , spasticity , rigidity , tremor , incoordination, choreoathetosis, epileptic seizures .abnormal gait & posture .2- sensory dysfunction : loss of pain , temperature , position , pin prick & numbness , hyperalgesia & sensory seizures. 3- loss of cranial nerve function : such as visual impairment , loss of smell sense, cognitions , orientation , speech & language difficulties , disturbed judgment, hand writing & calculation. 4- autonomic & sphincteric disturbances , in form of incontinence , retention, loss of sweating & accommodation.

SOME SPECIFIC DISEASE ENTITIES

- 1- Stroke or cerebrovascular accident , which can be ischemic or hemorrhagic in etiology , occur in elderly , hypertensive , diabetic patients .stroke can occur in younger patients with congenital vascular malformations. Clinically are divided to 1-completed stroke , 2-progressive stroke , 3-transient ischemic attack.
- 2- Epilepsy , in which sudden jerky loss of consciousness occur in association with tongue biting & loss of sphincteric control. It occur as primary form , or secondary to other pathology such as brain tumor , malformation , hereditary or acquired metabolic conditions. Different types , with or with out loss of consciousness.
- 3- Migraine is one of the most common CNS disorders , characterized mainly by headache , nausea , vomiting , photophobia.
- 4-Parkinsonism , is a disease of elderly people , characterized by muscle rigidity, tremor , abnormal gait & posture, with or with out autonomic dysfunction. It is due to degenerative lesion in basal ganglia .
- 5-Dementia , is a degenerative disorder due to accumulation of abnormal amyloid protein in the brain. The most common type is called Alzheimer disease . It is a disease of elderly people , although younger age could be affected.
- 6-Tremor & abnormal movement disorders , affect any age group though it is disease of elderly people . Can be primary presentation in which familial form can occur , or secondary due to CNS & non- CNS diseases. Drug induced & thyrotoxicosis are examples of the last category.
- 7-Myasthenia gravis , is a disorder in which there is easy muscle fatigability , it affects young age people , female more than male, presents with diplopia, easy fatigability , difficulty in speech & swallowing , & in sever cases the respiratory muscle could be affected causing life threatening situation.
- 8-Loss of special senses , such as visual , auditory, language , smell disorders , all can occur due to local lesions in there specific organs , or due to systemic diseases.
- 9-Paraneoplastic disorders , are malignancy associated neurologic disorders , in form sensory (paranesthesia) , motor (myasthenia gravis, & myositis), incoordination & ataxia (cerebellar atrophy).
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HEADACHE

- Causes of headache :
- 1- Raised intracranial pressure.
- 2-Extracranial disorders.
- 3- Vascular disorders (migraine , hypertension , giant cell arteritis).
- 4- Meningitis.
- 5- Psychogenic.

STROKE

- Majority of cerebral disease are vascular in origin (stroke) , types of stroke:
- 1-Complete stroke .
- 2- Progressive stroke .
- 3-Transient ischemic attack .
- 4- Secondary stroke (bleeding inside brain tumor).

EPILEPSY & SEIZURE

- It is a disorder caused by chaotic , sudden ,neurologic burst of electrical discharge leading to different clinical manifestations (motor , sensory , visual , auditory) , it may associated with or without disturbance of consciousness called generalized & focal epilepsy , respectively. Causes of epilepsy are:
- A- Idiopathic .
- B- Secondary : due to :
- 1-Focal brain lesion. 2- Post- traumatic. 3- Vascular. 4-Dengerative brain diseases.
- 5-Metabolic (hypoglycemia , uremia , hepatic failure).
- 6- Pyrexia . (febrile convulsions in infants & children).
- 7- Drug & chemical agents (xylocaine, alcohol , cocaine).

PERIPHERAL NEUROPATHY

- May be motor , sensory or more commonly mixed types . Causes are:
- 1- Idiopathic .
- 2-Metobolic (DM, Uremia) .
- 3-Defficiency states (B1,B6,B12).
- 4-Infections , Brucellosis .
- 5-Drugs , Isoniazid , vincristine .
- 6-Malignancy .
- 7-Autoimmune diseases .
- 8 – Mechanical , trauma , compression , e.g. carpal tunnel syndrome .
- 9- Hereditary .

TREMOR

- Causes of tremor :
- 1- Parkinsonism .
- 2- Cerebellar lesions.
- 3-Anxity .
- 4- Thyrotoxicosis.
- 5-Acoholism.
- 6-Drugs . Anticonvulsants , salbutamol .
- 7-Familial .
- 8- Neurosyphilis .
- 9- Heavy metal poisoning , mercury .

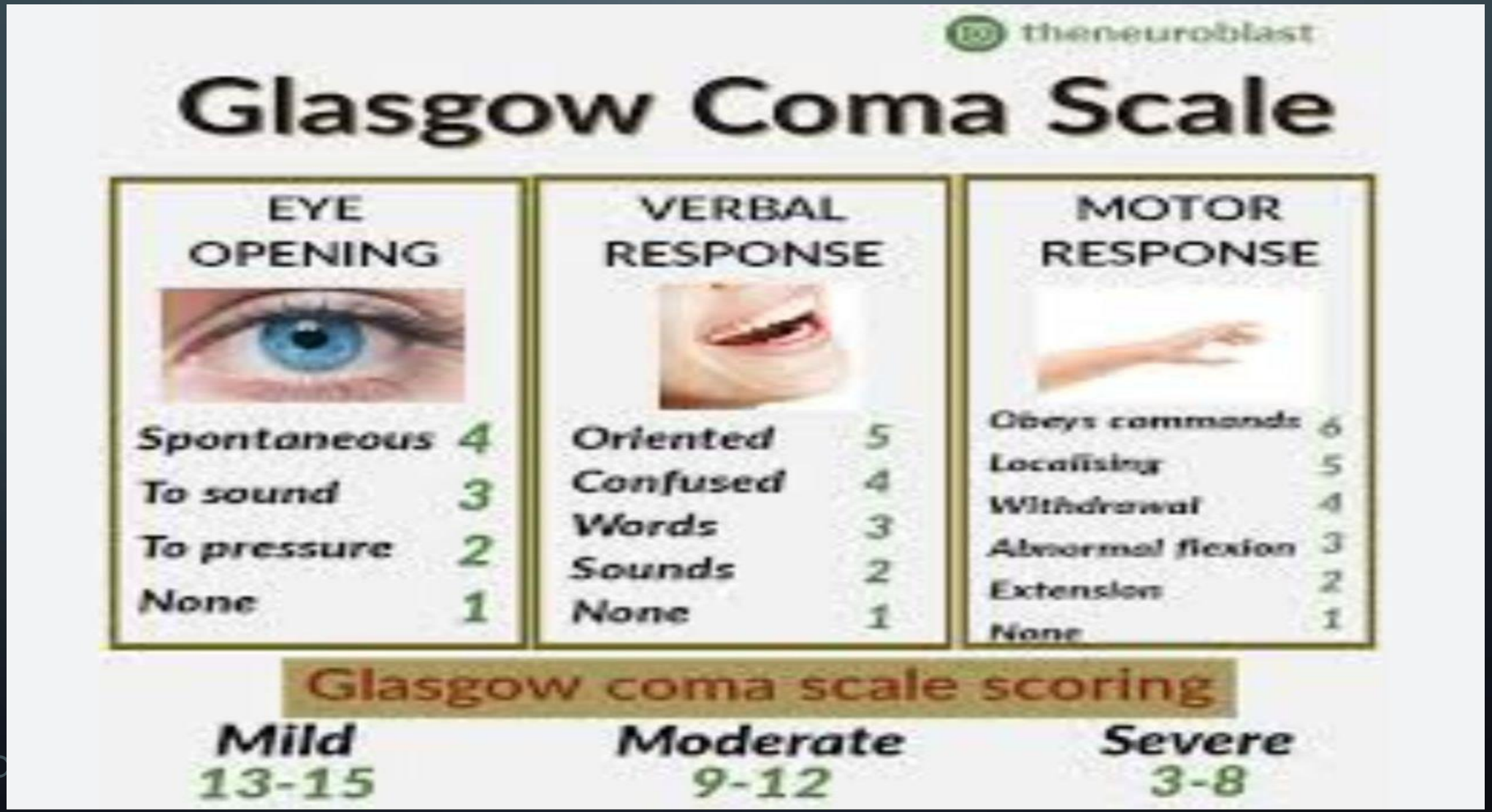
CAUSES OF VERTIGO

- 1- Vascular : stroke , intracranial hemorrhage .
- 2-Labyrinthitis . Viral infection.
- 3-Drugs : quinine , salicylate overdose.
- 4-Otitis media.
- 5-Motion sickness.
- 6- Tumors of the VIII cranial nerve (acoustic neuroma).
- 7- Post traumatic positional vertigo .

CAUSES OF COMA

- 1- Epilepsy : post-ictal state .
- Head injury : concussion , contusion & laceration, with or without cerebral oedema.
- 3- Drug & alcohol : narcotic or neuroleptic overdose.
- 4-metabolic : diabetic ketoacidosis, hepatic encephalopathy , uremia.
- 5-Vasular : stroke (hemorrhagic , ischemic).
- 6- Elevated intracranial pressure : space occupying lesion, acute obstructive hydrocephalus.
- 7- CNS infection : (meningitis , encephalitis, cerebral malaria).
- 8- Hypothermia , heat stroke (environmental).
- 9- Psychogenic : hysteria.

GLASGOW COMA SCALE



MUSCULAR DISEASES

- Any muscle disorder is called myopathy . Muscle function is also affected by diseases affecting neuro- muscular junction , such as myasthenia gravis, or diseases of motor nerve supply (with muscle atrophy).
- Generally the muscular disorder are classified as :

1- Myositis : inflammation of muscle fibers , may be primary (dermatomyositis, polymyositis) , or be secondary to malignant disease else where in the body.

2- Myotonia : delayed relaxation of muscle contraction (myotonia congenita)

3- Muscular dystrophies : hereditary in nature (Duchenne muscular dystrophy).

4- Secondary myopathies: by drugs (steroids) , electrolyte disturbances (hypokalemia, hypercalcemia) , endocrine disease (hypo & hyperthyroidism).

5-Rhabdomyolysis : it is sever form of muscle damage & necrosis, a can occur due deferent causes , metabolic , electrolyte disturbance, drug induced (statins).

1-INVESTIGATIONS OF CNS DISORDERS

A-Imaging studies : are usually the initial tests which are performed for these patients, as most of them are available , non- invasive & not costly . The followings are the major imaging studies:

i- X- ray \ CT scan : they are useful for bony structure detection , such as fractures & foreign bodies, CT is initial test in stroke patients. It can be elaborated more for future studies such as CT-angiography, myelography, radiculography. The disadvantages are limited & include radiation risk, contrast reactions, & sometimes invasive such as myelography , but they are cheap, quick & readily available.

ii- MRI : They are useful for structural imaging , MR- angiography , functional MRI , & MR spectroscopy. The last 2 are mainly research tools. MRI gives high quality soft tissue images, useful for posterior fossa & temporal area lesions , there is no risk of radiation exposure & non-invasive. The disadvantages are, expensive, claustrophobic, less wide available , metal & pacemaker implantation contraindicates its use.

iii - Ultrasound & Doppler studies : are cheap , quick , non invasive , but it is operator dependent & have poor anatomical definition.

2- INVESTIGATIONS

iv- Radioisotope studies : such as isotope brain scan, SPECT & PET scan. They are useful for functional anatomy as they depend on ligand binding & blood flow. They are expensive , have risk of ionizing radiation & not widely available. Useful to study epilepsy & dementia patients.

B- Cerebrospinal fluid studies : CSF studies are important when suspecting CNS infection for bacteriological , cytological , fungal , glucose & protein level estimation, also for CSF pressure estimation & color . It is useful in cases of Alzheimer dementia to study the beta-amyloid & tau- level estimation & also for oligoclonal band detection in multiple sclerosis patients. , but it has its limitation & contraindications & considered as an invasive test .

C-Electroencephalogram : EEG is used to asses the electrical activity of the brain , & main advantage is in epileptic patients for diagnosis & follow up . Normal EEG wave are 8-13 Hz background activity .

3- INVESTIGATIONS

D- Evoked potential studies : such as visual evoked , auditory evoked & brainstem evoked potentials. The tests are useful to study cases of suspected multiple sclerosis , though the advance & availability of imaging studies , made them less useful . They also used to confirm the functional integrity of visual & auditory pathways.

E-Nerve conduction studies & electromyogram : are useful to study the integrity of peripheral nerves & if any interruption in conduction occur dur to nerve entrapment such as carpal tunnel syndrome , & also to differentiate between demyelination & axonopathy in different disease entities (Guillain-Barre syndrome , metabolic peripheral neuropathy & hereditary neuropathies. Electromyogram is useful to study myopathies & myasthenia gravis.

F- Brain biopsy : is sometimes used to get histological specimen for malignant lesions , for cell origin confirmation & degree of aggressiveness. It is occasionally used in AIDs patient with CNS manifestation , when other modality for diagnosis can not inform the health team about the exact etiology of the disease.