EPILEPSY

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OUTLINE

- DEFINITIONS
- CLASSIFICATION/PRESENTATION
- EPILEPSY SYNDROMES
- ETIOLOGY
- WORK UP
- MANAGEMENT
- COMPLICATIONS

DEFINITIONS

- Seizure:
  - Abnormal, excessive, synchronized firing of the cortical neurons, usually resulting in altered perception or behavior.
- Epilepsy:
  - Tendency to recurrent unprovoked seizures.
- Partial seizures:
  - Start focally and indicate a single unilateral brain region.
- Generalized
  - Appear to arise from both cerebral hemispheres at once.
- Epilepsy syndrome
  - Composite of signs and symptoms that follow a well defined and characteristic pattern.
- Pseudo-Seizure → Paroxysmal Non-Epileptic Seizure

PATHOGENESIS

- Seizures require:
  - Pathologically excitable neurons
  - Increased excitatory activity (glutamate)
  - Reduced inhibitory projections (GABA)

- Why are neurons excitable:
  - De-afferented so remain in partial depolarization
  - Susceptible to activation → Spread of excitation

CLASSIFICATION OF SEIZURES/PRESENTATION

- Partial
  - Simple partial seizure
  - Complex partial seizure
    - Consciousness is not lost fully
    - Automatisms e.g. a stare and a blinking of the eye
  - Partial with secondary generalization
    - Starts as a single twitch then involves the whole body
- Generalized
  - Absence
    - Tend to occur in children. Typical age of onset at 4 – 7 years.
    - Ask about school performance
    - Automatisms can be present
    - They are very frequent and can occur many times a day
    - EEG → 3 hertz spike and wave pattern
  - Myoclonic
    - Jerks tend to occur most in the morning involving a limb or two
    - Tend to drop things and are described as clumsy

CONT.

- Clonic
  - Jerks involving the whole body
- Tonic
  - Lose consciousness and become stiff e.g. opisthotonos
- Tonic-clonic
  - Become stiff (contraction)
  - Tonic grunt during the tonic phase and stops at the beginning of the clonus phase.
  - Bites are common in the clonic phase where one gets lateral border cuts on the tongue. Urinary incontinence is common.
  - Seizures arising from the temporal lobe tend to have an aura (olfactory, auditory); visual auras are not common, they usually point towards a migraine.
  - Post-ictal phase: Confusion, pain, headache

- Atonic (Salaam attacks)
  - Loss of tone

COMMON EPILEPSY SYNDROMES

- More common in pediatric epilepsy
  1. Febrile convulsions (6 months – 6 years)
  2. Benign Childhood Epilepsy with Centro-Temporal Spikes (BECTs) → (start at around 2 years)
  3. Childhood Absence Epilepsy (CAE or petit mal) → (4 – 8 years)
  4. Juvenile Myoclonic Epilepsy (JME)
     - Tends to progress to adulthood where one can get Generalized Tonic Clonic seizures.
     - 10 – 12 years

CONT.

- Others:
  - Benign Neonatal Convulsions (BNC)
  - Familial Temporal Lobe Epilepsy (FMTLE)
  - Infantile Spasms (IS or West Syndrome)
    - Prognosis of IS if they progress to West Syndrome is very poor
  - Lennox-Gastaut syndrome (LGS)
    - Very difficult to treat
    - Presents with many different types of seizures
    - Poor prognosis

COMMON CAUSES OF SEIZURES BY AGE

NEONATES TO 3 YEARS	3 – 20 YEARS	20 – 60 YEARS	OVER 60 YEARS
• Prenatal injury • Perinatal injury • Metabolic defects • Congenital malformations • CNS infections • Postnatal trauma	• Genetic predisposition • Infections • Trauma • Congenital malformations • Metabolic defects	• Brain tumors • Trauma • Vascular disease • Infections	• Vascular disease • Brain tumors (esp. metastatic tumors) • Trauma • Metabolic derangements • Infections

AETIOLOGY CONT.

- Metabolic causes of seizures
  - Hypocalcemia
  - Hyponatremia
  - Hypoglycemia
  - Hypomagnesemia
  - Liver failure
  - Renal failure
  - Anoxia
  - Non-ketotic hyperglycemic states
- Drugs
  - Cocaine and amphetamines
  - Withdrawal from alcohol, barbiturates or benzodiazepines
  - Toxic levels:
    - Penicillin, aminophylline, isoniazid, lidocaine
  - Lower threshold: Bupropion, Clozapine

COMPLICATIONS: STATUS EPILEPTICUS

- Continuous seizures over 5 minutes or > 1 seizure without the full return to consciousness.
- This is a neurological emergency.
- High mortality.
- Use IV medications to control:
  - Lorazepam, Phenytoin, Fosphenytoin, Phenobarbital, Valproic acid, Levetiracetam, Midazolam, Propofol.
- Precipitants of Status Epilepticus: (Refer to Kumar & Clark)
  - Less well controlled seizures
  - More than one precipitants of seizures

WORK UP

- History
- HPI
  - Preceding illness/fever
  - Trauma
  - Aura
  - Ictal and postictal phenomena
  - Confusion
  - Depression
  - Aphasia
  - Embarrassment
  - Headache
  - Sleep
  - Exhaustion
  - Fear
  - Psychosis
  - Weakness

CONT.

- PMH/SE
  - Early history (pre, peri and postnatal)
  - Febrile seizures
  - Milestones
  - Birthmarks
  - Congenital anomalies
  - Myoclonic jerks
  - Family history
  - Stroke
  - Head trauma
  - CNS infection
  - Relation to menses (Catamenial seizures)
- Triggers
  - Emotion
  - Exercise
  - Loud music
  - Flashing lights
  - TV
  - Fever
  - Menses
  - Sleep deprivation
- Prior AEDs

CONT.

- Examination

- General
  - Neuro-ectodermal sign of tuberous sclerosis
    - Sub-ungal firbomas
    - Nasal bridge rash
    - Nail changes
  - NF → Café au Lait

- Neuro
  - Focal signs

- CVS

TESTS

- Labs
  - Sodium, calcium, magnesium, U/E/Cs, FBS, ESR< CRP, LFTs, Serum and urine Tox screen
- EEG
- Imaging
  - CXR
  - CT scan in focal signs
  - MRI preferable if not urgent
    - To look for focal regions amenable to surgery
- LP: HIV positive, meningitis or encephalitis
- Prolactin level: rises in 10 to 20 minutes after event

MANAGEMENT

- General considerations
  - Underlying cause
  - Reserve AEDs for > 1 idiopathic seizure, abnormal EEG, focal signs on examination
  - Consider: Side effects, gender, comorbidities, age, other medication, cost

- Specific
  - 1st generation:
    - Phenytoin, carbamazepine, valproic acid, phenobarbitone, ethosuximide, BDZs
  - 2nd generation:
    - Lamotrigine, Gabapentine, Topiramate, Oxcarbazepine, Levetiracetam, Pregabalin
  - Epilepsy surgery

DO NOT START AEDS IN A PATIENT PRESENTING WITH A SINGLE SEIZURE, WORK UP THE LIKELIHOOD FOR RECURRENCE!

CONT.

- Choice of AED
  - Seizure type
  - Cost
  - Female → (Teratogenecity)
  - IV formulations
- Lifestyle advice
  - Adequate sleep
  - Avoid alcohol
  - Avoid dangerous activities:
    - Swimming alone
    - Cooking alone
    - Driving

MEDICATION

- Partial seizures:
  - Carbamazepine
  - Phenytoin
  - Levetiracetam
- Generalized seizures (idiopathic):
  - Sodium valproate
  - Levetiracetam
  - Lamotrigine
  - Phenytoin (not too bad)
- Absence seizures:
  - Ethosuximide
  - Sodium valproate (can also be used)
- JME:
  - Valproic acid
  - Clonazepam

SUMMARY

- Epilepsy is a common neurological condition
- Classification weighs heavily on observation and description of the seizure
- EEG is useful first investigation for primary epilepsy but it is not diagnostic
  - Best time to take an EEG is during the seizure
- Drugs if needed are started low dose mono-therapy and slowly titrated upwards.

LAB EVALUATION IN CNS DISEASE

INTRODUCTION

- Neurological diagnosis **PRIMARILY** relies on history and examination
- Investigations support or rule out a diagnosis
- Neurological symptoms and signs often result from systemic disorders.

INVESTIGATIONS

- Basic tests
  - Hematological
  - Renal
  - Hepatic
  - Urinalysis
  - Basic imaging
    - CXR

- Specialized tests
  - LP
  - Neurophysiology
  - Neuroradiology
  - Neuro-genetics

BLOOD TESTS

INVESTIGATION	USUAL INDICATION
HEMOGLOBIN	SYNCOPE, SEIZURES, STROKE
MCV	VITAMIN B12 DEFICIENCY
WBC COUNT	INFECTION (MENINGITIS)
PBF	NEURO - ACANTHOCYTOSIS
ESR, CRP	GIANT CELL ARTERITIS
B12, FOLIC ACID	PERIPHERAL NEUROPATHY, DEMENTIA
RED CELL THIAMINE	WERNICKE-KORSAKOFF SYNDROME
CLOTTING, THROMBOPHILIA SCREEN	STROKE
BLOOD CULTURE	MENINGITIS, ENDOCARDITIS - STROKE

CONT.

INVESTIGATION	USUAL INDICATION
ANGIOTENSIN CONVERTING ENZYME	SARCOIDOSIS
ANTINUCLEAR FACTOR AND ds DNA	STROKE
RF AND ANTIPHOSPHOLIPID ANTIBODY	PERIPHERAL NEUROPATHY,S TROKE
ACHR ANTIBODIES	MYASTHENIA GRAVIS
ANTI-hu /ANTI-Yo ANTIBODIES	ENCEPHALITIS
ANTI-CALCIUM CHANNEL ANTIBODIES	LAMBERT-EATON MYASTHENIC SYNDROME
SERUM IMMUNOGLOBULINS	MYELOMA

CSF ANALYSIS

- Indications
  - Meningitis
  - Encephalitis
  - MS
  - Malignant infiltration

LP FINDINGS IN MENINGITIS

	OPENING PRESSURE (mmH_20)	CELL COUNT	PROTEIN	GLUCOSE
NORMAL	50 - 200	> 5 LYMPHOCYTES	0.2 – 0.45	2/3 OF BLOOD GLUCOSE
ACUTE BACTERIAL	INCREASED	100 – 60000 NEUTROPHILS	0.5 – 5	DECREASED
TUBERCULOUS	INCREASED	10 – 500 NEUTROPHILS THEN LYMPHOCYTES	0.5 - 5	DECREASED
FUNGAL	INCREASED	25 – 500 (LYMPHOCYTES)	0.5 - 5	DECREASED
VIRAL	N OR RAISED	LYMPHOCYTOSIS	0.5 - 2	NORMAL

LP FINDINGS IN OTHER DISORDERS

	OPENING PRESSURE (mmH_20)	CELL COUNT	PROTEIN	GLUCOSE
NORMAL	50 - 200	> 5 LYMPHOCYTES	0.2 – 0.45	2/3 OF BLOOD GLUCOSE
AUTOIMMUNE POLYNEUROPATHY	NORMAL	NORMAL	INCREASED	NORMAL
SAH	NORMAL OR INCREASED	INCREASED (ERYTHROCYTES, MACROCYTES & SIDEROBLASTS)	INCREASED	NORMAL
MS	NORMAL OR INCREASED	NORMAL OR INCREASED LYMPHOCYTES	NORMAL	NORMAL
LEPTOMENINGEAL SYNDROME	NORMAL OR INCREASED	NORMAL OR INCREASED (MALIGNANT OR MONOCYTES)	INCREASED	NORMAL OR DECREASED

URINE TESTS

- URINE GLUCOSE
- URINE KETONES
- URINE BENCE JONES PROTEINS
- URINE PORPHOLBILINOGEN

SUMMARY

- Investigations do not cover up for an adequate history and examination
- Pragmatism in choice of investigation
- Practice doing LPs.

PEACE DOESN'T MEAN TO BE IN A PLACE WHERE THERE IS NO NOISE TROUBLE OR HARD WORK.

IT MEANS TO BE IN THE MIDST OF THOSE THINGS AND STILL BE CALM IN YOUR HEART.

JESUS IS THE PRINCE OF PEACE.