Epilepsy and EEG in Clinical Practice

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Disclosures

Relevant financial relationship(s) with industry
• None

References to off-label usage(s) of pharmaceuticals or instruments
• None
Seizure either …

Focal

Generalized
# Electroclinical Syndromes

<table>
<thead>
<tr>
<th>EEG</th>
<th>Clinical</th>
<th>Imaging</th>
<th>Syndrome</th>
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<tbody>
<tr>
<td>3 Hz SW</td>
<td>4yo</td>
<td>NI</td>
<td>CAE</td>
</tr>
<tr>
<td>Hypsarrhythmia</td>
<td>spasms</td>
<td>+/-</td>
<td>West</td>
</tr>
<tr>
<td>Spikes O1</td>
<td>visual</td>
<td><strong>Tram-track</strong></td>
<td>Sturge-Weber</td>
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## EEG helps in Epilepsy Syndrome Diagnosis

<table>
<thead>
<tr>
<th></th>
<th>Idiopathic</th>
<th>Symptomatic /cryptogenic</th>
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<tbody>
<tr>
<td>Development Exam</td>
<td>Normal</td>
<td>MR</td>
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<tr>
<td>Imaging</td>
<td>Normal</td>
<td>Deficits +</td>
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<tr>
<td>EEG background</td>
<td>Normal</td>
<td>Lesion+</td>
</tr>
<tr>
<td>Epileptiform discharges</td>
<td>Focal or Gen</td>
<td>Focal or Gen</td>
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</table>
Epilepsy Syndrome = 
Seizure type + EEG Background + Epileptiform discharge + Neuro Exam + Imaging + Cognitive development

Why bother?
AED selection
Prognosis
Seizure freedom
?out grow epilepsy
genetics
Focal Epilepsy Syndromes

Idiopathic

- BRE
- BPEOP

Symptomatic

- Rasmussen's
- Temporal epilepsy

Age:
1m 1 y 2y 5y 10y 15y 18y Adult
Centro-Temporal Spikes
17 yo with epigastric rising & Staring
Seizure either ...

Focal

Idiopathic BRE

Symptomatic TLE

Idiopathic Absence

Symptomatic LGS

Generalized
Generalized Epilepsy

Idiopathic

Absence

Symptomatic

West

LGS

1m  1 y  2y  5y  10y  15y  18y  Adult
Childhood Absence Epilepsy

- 2.5-5 Hz bi-synchronous and symmetrical spike and wave
- Frontal central voltage predominance
- Precipitated by hyperventilation
- May be associated with OIRDA
- Discharges fragmented during sleep
GSW distribution after initiation of AED
GSW distribution with maintenance AED
Poly-Spike & wave - JME

- 3.5-6 Hz generalized spike and wave / poly-spike and wave
- Prominent in the frontal central regions
- Precipitated by photic stimulation and hyper-ventilation
- Less prominent during sleep, but abundant upon awakening
EEG in Catastrophic Epilepsies of childhood

• Common:
  • West - Infantile Spasms
  • Lennox Gastaut Syndrome
  • Sturge Weber Syndrome
Infantile Spasms

- West syndrome Triad:
  - Infantile Spasms
  - EEG Hypsarrhythmia
  - MR

- Onset: 3-18 months  Most <12 mo (clustering between 4 and 7 months)
Infantile Spasms

- Frequency:
  - Clusters, brief, consisting of as many as 150 seizures
  - At onset of sleep or after awakening.
  - Crying or irritability during or after a flurry of spasms is commonly observed.

- Dramatic correlation between irritability/regression and onset of spasms and *improvement following successful Rx!*
IS: EEG patterns

• Hypsarrhythmia
  • High-voltage, slow record dominated by delta activity with frequent and multifocal spikes, sharp waves, and spike and slow wave complexes
  • Chaotic!
Lennox-Gastaut Syndrome

- Slow spike & wave (2 Hz)
- Seizures
  - Tonic
  - Atonic
  - Atypical Absence
- MR
Lennox-Gastaut Syndrome
3 year old

Perinatal L. MCA stroke

Sturge-Weber

8 yo

[Images of MRI scans and EEG tracings, labeled A through E]
Less common:

- Ohtahara
  - Infantile epileptic encephalopathy with suppression burst
  - Neonatal myoclonic encephalopathy and early epileptic encephalopathy in the neonatal period
- Dravet’s
  - Severe myoclonic epilepsy of infancy
- Doose
  - Astatic-myoclonic epilepsy
- Rasmussen encephalitis
- Continuous spike waves in slow sleep and
- Hemimegalencephaly
- Other migrational disorders
- Progressive myoclonus epilepsy
Ohtahara syndrome or Early Infantile Epileptic Encephalopathy

- Onset age:<3 months (often <10 days)
- Tonic seizures
  - Can have partial seizures
  - Rarely myoclonic seizures.
- Often unknown
- Metabolic disorders – non-ketotic hyperglycinemia
- Hemispheric underdevelopment

- EEG “Burst suppression”
EEG in PME
2010 P Satishchandra, S Sinha