Seizure Semiology

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Value and Limitation of Seizure Semiology Analysis

- Symptomatogenic Zone: Area of cortex which, when activated, produces the initial ictal symptoms or signs.
- Seizure Onset Zone: Area of cortex that initiates clinical seizures.
- Epileptogenic Zone: Area of cortex that is indispensable for the generation of epileptic seizures.
Value and Limitation of Seizure Semiology Analysis

• The symptomatogenic zone is not frequently overlapped with either seizure onset zone or epileptogenic zone.

• The seizure semiology may not be reliable in localizing seizure onset to a lobe in the hemisphere and sometimes results in false localization.
<table>
<thead>
<tr>
<th>Lateralizing sign</th>
<th>Frequency</th>
<th>Lateralizing value</th>
<th>Symptomatogenic zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aura</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unilateral sensory aura [10]</td>
<td>6.1% epilepsy patients</td>
<td>89% contralateral</td>
<td>Brodmann areas 1, 2, and 3</td>
</tr>
<tr>
<td>Hemifield visual aura [26]</td>
<td>28.6% OLE [a]</td>
<td>100% contralateral</td>
<td>Brodmann areas 17–19 and adjacent areas</td>
</tr>
<tr>
<td>Motor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Version [46,53]</td>
<td>22.2% FLE</td>
<td>100% contralateral</td>
<td>Brodmann areas 6 and 8</td>
</tr>
<tr>
<td>Clonic activity [53]</td>
<td>44.4% FLE</td>
<td>83% contralateral</td>
<td>Brodmann areas 4 and 6</td>
</tr>
<tr>
<td>Tonic activity [53]</td>
<td>48.1% FLE</td>
<td>89% contralateral</td>
<td>SMA, possibly also Brodmann area 6, the anterior cingulate gyrus, and subcortical structures</td>
</tr>
<tr>
<td>“Figure-of-4 sign” [60,64]</td>
<td>17.7% TLE; 15% ETLE</td>
<td>89% contralateral</td>
<td>SMA or prefrontal areas</td>
</tr>
<tr>
<td>Unilateral dystonic posturing [75,78]</td>
<td>43.9% TLE</td>
<td>100% contralateral</td>
<td>Activation of basal ganglia</td>
</tr>
<tr>
<td>Automatisms and preserved consciousness [85,88]</td>
<td>5.7% TLE</td>
<td>100% non-dominant</td>
<td>Unknown, possible impairment of consciousness with left or bilateral hippocampal impairment</td>
</tr>
<tr>
<td>Ictal spitting [97]</td>
<td>0.3% EMU patients</td>
<td>75% non-dominant</td>
<td>Possible asymmetry of the CAN</td>
</tr>
<tr>
<td>Ictal vomiting [102,105]</td>
<td>2% EMU patients</td>
<td>81% non-dominant</td>
<td>Medial, lateral superior and inferior structures of the nondominant temporal lobe and Papez circuit</td>
</tr>
<tr>
<td>Unilateral ictal eyeblinking [112]</td>
<td>1.5% EMU patients</td>
<td>83% ipsilateral</td>
<td>Unknown</td>
</tr>
<tr>
<td>Language</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ictal speech [145]</td>
<td>34.2% EMU patients</td>
<td>83% non-dominant</td>
<td>Impairment of areas other than those involved in language production</td>
</tr>
<tr>
<td>Ictal dysphasia and aphasia [145]</td>
<td>34.2% EMU patients</td>
<td>100% dominant</td>
<td>Impairment of language areas</td>
</tr>
<tr>
<td>Postictal features</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Postictal palsy [157]</td>
<td>0.6% EMU patients</td>
<td>93% contralateral</td>
<td>Possible exhaustion or inhibition of Brodmann areas 4 and 6</td>
</tr>
<tr>
<td>Postictal nosewiping [170]</td>
<td>53.2% TLE</td>
<td>92% ipsilateral</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Source: Loddenkemper T & Kotagal P (2005)
Seizure Semiology in Children

• Clinically generalized motor seizures were seen in either focal or generalized epilepsy
  – In temporal lobe epilepsy, motor features with tonic, clonic, hypermotor features or epileptic spasms were frequently observed in young children.

• Complex partial seizure in infants and non-verbal children is best described as hypomotor seizure.
  – Inability to report aura
  – Difficulty assessing the ictal level of consciousness
  – Inability to participate in tests for ictal amnesia
  – Rare and subtle automatisms
Video-EEG Monitoring

- Characterize seizures for the correct diagnosis.
- Lateralize/localize seizure onset zones or epileptogenic zones as a presurgical test for epilepsy surgery.
- Antiepileptic drug withdrawal during Video-EEG monitoring can increase the duration and intensity of seizures and the likelihood of secondary generalization and can rarely precipitate previously unrecognized seizures from an occult seizure focus.
- A sample of the recorded seizures should be shown to the patient's care takers to verify if it is representative of habitual seizures.
AT

- Age: 2 year 8 months
- Handedness: Ambidextrous
- Seizure onset age: 17 months
- Multiple seizures a day
- Current AEDs: Keppra, Topamax, Depakote
- Previous AEDs: Trileptal
AT: Video Presentation
AT

- **Epilepsy Classification**
  - Localization
    Right hemispheric epilepsy
  - Seizure type
    Type A: Epileptic spasms
    Type B: Hypermotor -> Axial tonic seizure
  - Etiology
    Tubers, Tuberous sclerosis
  - Associated condition
    SEGA, Left foramen Monroe
    Renal angiomyolipomas
Cortical stimulation
- Left arm
- Left leg
- Frontal eye field

Spasms (TNTC)
- Onset, LAFA
- Leading spike

Ictal-Cortical Map

Date: 6/25-6/30/2010
Date:

Clinic Number:

Name:
Ictal-Cortical Map

Cortical stimulation
- Left arm
- Left leg
- Frontal eye field

Spasms (TNTC)
- Onset, LAFA
- Leading spike
- Spasms
AT

- Pathology: Tuber
- Seizure free
- No neurologic deficits
- AEDs on tapering
MJ

- Age: 6 years old
- Handedness: Right
- Seizure onset age: 6 years old
- Multiple seizures a day
- Current AEDs: Vimpat
- Previous AEDs: Trileptal, Topamax, Keppra, Depakote
MJ: Video Presentation
MJ

- Epilepsy Classification
  - Localization
    Right hemispheric epilepsy
  - Seizure type
    Type A: Tonic seizure
  - Etiology
    Unknown
  - Associated condition
    Hyperactivity
    Rage attack
Cortical map

- LUE motor
- Left face motor
- Left face sensory
- Left face sensory (identified as "sz")
- Seizure (SZ)
- SSEP

Markers:
- A7-Left thumb
- B7-Left wrist, 1st & 2nd fingers
- B8-Left hand fisting with flexion at elbow

Date: MJ 8/11-8/16/2011
MJ

- Pathology: FCD Type IIB
- Seizure free
- No neurologic deficits
- No rage attack
References


