First Seizure and Diagnosis
Faculty/Presenter Disclosure

Faculty/Speaker: Jerry Yeou-Wei Chen

2018-10-30

Relationships with commercial interests:
- Grants/Research Support: none
- Speakers Bureau/ Honoraria: none
- Consulting Fee: none
- Other: none

Potential for conflict(s) of interest:
- Speaker has no conflict of interest
Learning Objectives

1. Differentiate between seizures and epilepsy
2. Demonstrate the workup needed for a first seizure
3. Identify and define seizure types
4. Describe the treatment-decision making process for first seizures
What is a seizure?

- Paroxysmal alteration in neurological function that occurs as a result of excitation of a population of cortical neurons

ILAE Official Consensus Report, *Epilepsia* 2014
Seizure vs Epilepsy

Diagram showing the differences in seizure and epileptic seizure thresholds in brain activity.
What defines epilepsy?

| Conceptual | A disorder of the brain:  
|            | • enduring predisposition to generate epileptic seizures,  
|            | • neurobiologic, cognitive, psychosocial consequences  
|            | • requires at least one epileptic seizure. |
Seizure Recurrence Risk over 5 Years Following First Unprovoked Seizure

Recurrence Risk

- Single Seizure = 50% chance next 5 years
- TWO Seizures = 80% chance next 5 years
- Single Seizure PLUS Abnormal EEG OR Imaging = >80%

- We recommend treatment, either:
  - following 2 unprovoked seizures
  - after a single unprovoked seizure with abnormal EEG or CT/MRI
Characteristics that increase likelihood of recurrence

- Previous brain injury (remote symptomatic seizure)
- EEG epileptiform abnormality
- Significant neuroimaging abnormality
- Nocturnal seizure

<table>
<thead>
<tr>
<th>Acute symptomatic (&quot;reactive&quot;/&quot;provoked&quot;)</th>
<th>Occurring in close temporal relationship with an acute CNS insult, which may be metabolic, toxic, structural, infectious, or inflammatory</th>
<th>~20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unprovoked</td>
<td>After 1st 7 days of insult, after acute insult resolves, after successful treatment, or no apparent cause</td>
<td></td>
</tr>
<tr>
<td>Remote symptomatic</td>
<td>Caused by a pre-existing brain injury</td>
<td>~20%</td>
</tr>
</tbody>
</table>

Normal exam, EEG, MRI 20-30%
Abnormal EEG/MRI >50-60% + cognitive delay 90%

AAN practice guideline 2015

~20%
Stroke 71%, trauma 47%, infection 65%
Investigations

EEG

- Routine > Sleep Deprived > Ambulatory EEG > Intensive EEG monitoring

**Sensitivity**
- first EEG: 29-55%
- Repeated 3x: 80-90%
- <24h from sz: 51% vs 34%

**Specificity**
- IEDs in normal adults and children: 0.2-3%

Imaging

MRI is superior to CT

“seizure protocol” – 3T w/ coronal FLAIR

~29% abnormal, ~12% of those with normal CT
Seizure semiology and terminology
ILAE 2017 classification of seizures

Focal Onset
- Aware
- Impaired Awareness

Motor Onset
- automatisms
- atonic
- clonic
- epileptic spasms
- hyperkinetic
- myoclonic
- tonic

Nonmotor Onset
- autonomic
- behavior arrest
- cognitive
- emotional
- sensory

focal to bilateral tonic-clonic

Generalized Onset

Motor
- tonic-clonic
- clonic
- tonic
- myoclonic
- myoclonic-tonic-clonic
- myoclonic-atonic
- atonic
- epileptic spasms

Nonmotor (absence)
- typical
- atypical
- myoclonic
- eyelid myoclonia

Unknown Onset

Motor
- tonic-clonic
- epileptic spasms

Nonmotor
- behavior arrest

Unclassified
**ILAE 2017 classification of seizures**

### Focal Onset
- **Aware**
  - Impaired Awareness

### Generalized Onset
- **Motor**
  - tonic-clonic
  - clonic
  - tonic
  - myoclonic
  - myoclonic-tonic-clonic
  - myoclonic-atonic
  - atonic
  - epileptic spasms
  - Nonmotor (absence)
    - typical
    - atypical
    - myoclonic
    - eyelid myoclonia

### Unknown Onset
- **Motor**
  - tonic-clonic
  - epileptic spasms
- **Nonmotor**
  - behavior arrest
- **Unclassified**

---

focal to bilateral tonic-clonic
Focal vs. Generalized

FOCAL

Start with warning sign
“Aura”
- Burnt toast, déja vu, fear
Focal features at onset
“last clonic jerk”

<table>
<thead>
<tr>
<th>Region of Onset</th>
<th>Partial/Focal Seizure Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frontal</td>
<td>Focal clonic motor</td>
</tr>
<tr>
<td></td>
<td>Hypermotor behavior</td>
</tr>
<tr>
<td>Temporal</td>
<td></td>
</tr>
<tr>
<td>Mesial</td>
<td>Autonomic</td>
</tr>
<tr>
<td></td>
<td>Dysmnesic</td>
</tr>
<tr>
<td></td>
<td>Déjà vu</td>
</tr>
<tr>
<td></td>
<td>Jamais vu</td>
</tr>
<tr>
<td></td>
<td>Gustatory</td>
</tr>
<tr>
<td></td>
<td>Olfactory</td>
</tr>
<tr>
<td>Lateral/posterior neocortical</td>
<td>Auditoriy</td>
</tr>
<tr>
<td></td>
<td>Complex visual</td>
</tr>
<tr>
<td></td>
<td>Dysphasia</td>
</tr>
<tr>
<td>Parietal</td>
<td>Somatosensory</td>
</tr>
<tr>
<td>Occipital</td>
<td>Simple visual</td>
</tr>
</tbody>
</table>

GENERALIZED

NO warning sign
- Atonic
- Tonic
- Tonic-clonic
- Absence

*Can be associated with morning myoclonic jerks*
Focal Seizure with Impaired Awareness vs. Absence Seizure

<table>
<thead>
<tr>
<th>FOCAL SEIZURE</th>
<th>ABSENCE SEIZURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANY age</td>
<td>Mostly children</td>
</tr>
<tr>
<td>Aura (déja vu, smell, taste, epigastric rising)</td>
<td>NO aura</td>
</tr>
<tr>
<td>Focal features</td>
<td>&lt;30sec</td>
</tr>
<tr>
<td>(eye or head deviation, lip smacking, motor)</td>
<td>Daily, frequent</td>
</tr>
<tr>
<td>&gt;1 minute</td>
<td>SUDDEN onset</td>
</tr>
<tr>
<td>Weekly</td>
<td>NO post-ictal state, keep performing activity</td>
</tr>
<tr>
<td>Gradual onset</td>
<td>Inducible: Hyperventilation, photic stimulation</td>
</tr>
<tr>
<td>Post-ictal state</td>
<td>Normal imaging</td>
</tr>
<tr>
<td>Not inducible</td>
<td></td>
</tr>
<tr>
<td>CAN be lesional</td>
<td></td>
</tr>
</tbody>
</table>
Treatment

**Carbamazepine CR / Tegretol CR** (200-800mg BID)
- First line therapy for **FOCAL** seizures
- Dizziness, fatigue, double vision
- Increased risk of SJS in individuals of Asian descent
- Women of childbearing age - also use Folic acid 5mg po od, advise that it decreases OCP efficacy

**Divalproex Sodium / Epival** (250-1000mg BID)
- First line therapy for **GENERALISED** seizures
- Weight gain, hair loss, fatigue, tremor
- AVOID in women of childbearing age due to teratogenic effects
- Folic acid 5mg po od
Treatment

BOTH Carbamazepine CR and Divalproex can cause
- liver dysfunction, blood count abnormalities, hyponatremia
  - MONITOR liver function enzymes, CBC, lytes
- WATCH for allergic rash
- Many drug/drug interactions

- Folic acid 5mg PO OD for women
- Vitamin D 2000IU po daily to decrease risk of osteoporosis
Treatment

Lamotrigine / Lamictal (75mg-200mg BID)
- First line therapy for FOCAL OR GENERALIZED seizures
- Tremor, trouble sleeping, rarely headache
- 1% risk severe allergic rash ie; SJS
- No drowsiness, mood stabilizer
- Safer in pregnancy
  - 1/300 cleft lip and palate
  - Rare cardiac defects
  - Levels drop in pregnancy
- Start low and go SLOW: 25mg OD and increase by 25 mg OD every 2 weeks
Treatment

**Levetiracetam / Keppra (500-1500mg BID)**
- For **FOCAL OR GENERALISED** seizures
  - Few side effects or interactions
  - **20% mood disturbance**
    - Irritability, depression, suicidal thoughts, hallucinations
  - No blood monitoring necessary
  - Safer in pregnancy
    - Levels drop in pregnancy
  - Can initiate at a therapeutic dose
Risks of Ongoing Seizures

- Prolonged loss of driver’s license
- Loss of employment
- Low self worth
- Depression
- Anxiety
- Isolation
- Risk of status epilepticus
  - Sudden unexpected death in epilepsy
    - Not clear regarding risk following a first seizure
Driving (Ontario)

Driving

- Duty to report in Ontario
- NO driving for 6 months if single seizure.
- If seizure occurs again within 6 months, patient must wait a year to regain license (CCMTA Guidelines)
- 5 Years for a class G license
Safety Considerations...

Consider asking the patient to avoid the following for 6 months:

- No swimming alone
- No baths alone
- No working at heights (roofs, ladders)
- Wear a helmet (biking, ...)
- No power tools
- No firearms
- Being sole caretaker for young children
- Change babies on the floor, not change table
Summary

- Please consider early treatment if the first unprovoked seizure is:
  - Associated with structural brain lesion
  - EEG findings consistent with increased seizure risk
  - A nocturnal seizure

- Consider treatment if there are ≥ 2 unprovoked seizures
Thursday, November 1, 2018
Presenter: Dr. Bernd Pohlmann-Eden
Topic: The value of collecting longitudinal data in a City-Wide First Seizure Clinic - Understanding disease evolution and improving health care strategies in one conceptual framework

Join us in person: Toronto Western Hospital auditorium, 2nd floor, west wing

CME Credits available
Acknowledgement

- These presentation slides contain material from slides prepared by Lysa Boisse-Lomax, Neurologist with Kingston Health Sciences Centre
Questions and Discussion