Semiology in Epilepsy Diagnosis

Dr Shih-Hui Lim
Senior Consultant, National Neuroscience Institute, Singapore
Professor, Duke - National University of Singapore - Graduate Medical School
Professor, Department of Medicine, Yong Loo Lin School of Medicine, NUS
What is Semiology?

- That branch of linguistics concerned with the study of signs and/or symptoms
  - Symptomatology
Seizure Semiology

- The clinical expression of seizure = ictal phenomenology
- Prior to advent of EEG, semiology served to identify suspected anatomic localization of the physiologic dysfunction
- Patient may be amnesic for their symptoms and/or observers may not have “seen” the subtle features of the seizure onset → incomplete or inadequate seizure description
- Semiology is the main feature in diagnosis of epileptic syndromes
Diagnosis

- The word *diagnosis* (/daɪ.əɡˈnɒsɪs/) is derived through Latin from the Greek word διάγιγνωσκειν, meaning **to discern or distinguish**

- This Greek word is formed from διά, meaning *apart*, and γιγνωσκειν, meaning *to learn*
Medical Diagnosis

- The process of attempting to determine and/or identify a possible disease or disorder and the opinion reached by this process
- From the point of view of statistics they are classification tests
## Classification Rule

<table>
<thead>
<tr>
<th>Test outcome</th>
<th>Condition (as determined by &quot;Gold standard&quot;)</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Positive</td>
<td>True Positive</td>
<td>False Positive</td>
</tr>
<tr>
<td>Negative</td>
<td>False Negative</td>
<td>False Negative</td>
<td>True Negative</td>
</tr>
</tbody>
</table>

- Sensitivity
- Specificity
# Classification Rule Example

<table>
<thead>
<tr>
<th>History Taking</th>
<th>Patient with Epilepsy (as confirmed by Video-EEG Test)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive</strong></td>
<td>True Positive</td>
<td>False Positive</td>
</tr>
<tr>
<td><strong>Negative</strong></td>
<td>False Negative</td>
<td>True Negative</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
</table>

→m

→m

→m
## Classification Rule Example

<table>
<thead>
<tr>
<th>Routine EEG</th>
<th>Patient with Epilepsy (as confirmed by Video-EEG Test)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Positive</strong></td>
</tr>
<tr>
<td><strong>Positive</strong></td>
<td>True Positive</td>
</tr>
<tr>
<td></td>
<td>False Positive</td>
</tr>
<tr>
<td><strong>Negative</strong></td>
<td>False Negative</td>
</tr>
<tr>
<td></td>
<td>True Negative</td>
</tr>
</tbody>
</table>

- **Positive (Interictal Epileptiform Discharges)**
  - → Positive predictive value
  - → Negative predictive value

- Sensitivity
- Specificity
Types of Diagnosis

- Clinical Diagnosis
- Differential Diagnosis
- Seizure Diagnosis
- Epilepsy Syndrome Diagnosis
- Laboratory Diagnosis
- Radiological Diagnosis
- Admitting Diagnosis
- Discharge Diagnosis
- Diagnostic Criteria
- Diagnosis of Exclusion
- Self Diagnosis
- Computer-aided Diagnosis
- Overdiagnosis
- Wrong Diagnosis
- Retrospective Diagnosis
- Others
Diagnosis → Treatment

Correct Diagnosis → Correct Treatment
Wrong Diagnosis → Wrong Treatment
No Diagnosis → No Treatment
Ethical Principles of Treating Patients

- The Principle of
  - Non-Maleficence (Do No Harm!!!)
  - Beneficence
  - Autonomy
  - Veracity
  - Confidentiality or Fidelity
  - Social Responsibility and Justice
Diagnosis of Seizures and Epilepsy

- **Diagnostic Process**
  - Is this an epileptic seizure or a non-epileptic event?
  - If it is indeed epileptic
    - Is this an acute symptomatic or unprovoked epileptic seizure?
    - What is the Seizure Classification?
  - Does the patient have Epilepsy?
    - What is the Epilepsy Syndrome Classification?
Diagnosis of Seizures and Epilepsy

- **Diagnostic Process**
  - Is this an epileptic seizure or a non-epileptic event?
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  - Does the patient has Epilepsy?
    - What is the Epilepsy Syndrome Classification?
Special Article

Epileptic Seizures and Epilepsy: Definitions Proposed by the International League Against Epilepsy (ILAE) and the International Bureau for Epilepsy (IBE)


*Stanford University Medical Center, Department of Neurology, Stanford, California, U.S.A.; †Stichting Epilepsie Instellingen, Department of EEG and EMU, Heemstede, The Netherlands; ‡University of Western Ontario, London Health Sciences Centre, London, Ontario, Canada; §University of Bonn, Clinic of Epileptology, Bonn, Germany; ||Centre Saint-Paul, Hôpital Henri Gastaut, Marseille, France; ¶British Epilepsy Association, Leeds, England; and **David Geffen School of Medicine at UCLA, Department of Neurology, Los Angeles, California, U.S.A.
Definition

Epileptic Seizure

A transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain

Epilepsia, 2005;46:470-472
Elements of a Definition of Epileptic Seizure

Epilepsia, 2005;46:470-472

- Mode of onset and termination
- Clinical manifestations
- Abnormal enhanced synchrony
Mode of Onset & Termination of Epileptic Seizure

Epilepsia, 2005;46:470-472

- ES is transient, demarcated in time, with a clear start and finish
- Termination is often less evident than onset
  - Symptoms of postictal state can blur the end of a seizure
- Start and finish can be determine on behavioural or EEG grounds
  - These two do not always coincide
Clinical Manifestations of Epileptic Seizure

ES is a clinical event

**Detail specification of subjective and objective phenomena during ES is difficult**

Seizure presentation depends on

- Location of seizure onset in the brain
- Patterns of propagation
- Maturity of brain
- Confounding disease process
- Sleep-wake cycle
- Presence of medication

*Epilepsia, 2005;46:470-472*
Abnormal Enhanced Synchrony

Epilepsia, 2005;46:470-472

- Definition assumes that abnormal electrical discharges
  - Must be present
  - Could be ascertained under ideal circumstances
    - How best to determine it is a separate issue

- Without electrical discharge criteria, many other clinical events that are not epileptic seizures would meet the other definition criteria
Diagnosis of epilepsy is essentially clinical, based on a bonafide history of epileptic seizures. Diagnosis should be confirmed by a health professional with expertise in epilepsy, using available medical history, seizure description, and neurologic examination. Standardized study methods should be used to obtain information about the above three diagnostic elements, and standardized criteria should be used for their interpretation. If available, EEG records and other diagnostic tools should also be used, but lack of these instruments should not preclude the diagnosis of epilepsy. EEG contributes but does not always confirm a diagnosis of epilepsy: An abnormal EEG must not be considered as a requisite for inclusion since it could be normal (or indicate nonspecific abnormalities) in epileptic subjects. On the other hand, an abnormal EEG (with epileptiform abnormalities), after an isolated seizure, could suggest classification of the seizure as epilepsy.
Guidelines for Epidemiologic Studies on Epilepsy

- “Diagnosis of Epilepsy is essentially clinical, based on a bonafide history of epileptic seizures.”

- “Diagnosis should be confirmed by a health professional with expertise in epilepsy, using available medical history, seizure description, and neurologic examination.”
“In taking the history, follow each line of thought; ask no leading questions; never suggest; give the patient’s own words in the complaint”

Sir William Osler

(1849-1919)
“If you have 30 min to see a patient, spend 28 min on history, 2 min on the examination, and no time on the skull X-ray or EEG”

Adolph L Sahs, 1906 - 1986
“Listen! Listen to your patient! He is giving you the diagnosis”

René-Théophile-Hyacinthe Laennec
(1781 – 1826)
Diagnosis of Epilepsy Based on Seizure Semiology

- The diagnosis of epilepsy is dependent upon a very detailed and accurate history
  - Meticulously record the chronological sequence of recurrent, transient, self-limited, involuntary, alteration in the neurological state, i.e., the semiology
Diagnosis of Epilepsy Based on Seizure Semiology

- The first encounter often requires
  - Follow-up visits with the patient who may be able to obtain additional information from individuals who have witnessed her/his seizures
  - Phone calls to other witnesses e.g. family member or friend
  - Formal consultations with witnesses
  - Request of home video taping of seizures when this is possible
Diagnosis of Epilepsy Based on Seizure Semiology

- A previous diagnosis of epilepsy should not necessarily be accepted without a confirmatory history, if there are any reasons to question its quality.
  - Inaccurate initial histories were accepted → wrong diagnosis → transferred from one document to another.
  - Diagnosis revisited because discordance in the subsequent investigation, course, diagnosis, and/or management.
Request for the interviewees to mimic the patients’ seizures may actually be the most important information leading to the diagnosis +/- lateralization / localization!
ILAE Commission Report


Warren T. Blume—Chair, Hans O. Lüders, Eli Mizrahi, Carlo Tassinari, Walter van Emde Boas, and Jerome Engel, Jr., Ex-officio

London Health Sciences Centre—University Campus, Epilepsy Unit University of Western Ontario
London, Ontario, Canada, N6A 5A5
Terms Describing Epileptic Seizure Semiology

1. Motor
2. Non-Motor
3. Autonomic events
4. Somatotopic modifiers
5. Modifiers and descriptors of seizure timing
6. Duration
7. Severity
8. Prodrome
9. Post-ictal phenomenon
1.0 Motor Semiology

1.1 Elementary Motor
   - 1.1.1 Tonic
     - 1.1.1.1 Epileptic spasm
     - 1.1.1.2 Postural
       - Versive, dystonic,
   - 1.1.2 Myoclonic
     - 1.1.2.1 Negative myoclonic
     - 1.1.2.2 Clonic
       - Jacksonian march
   - 1.1.3 Tonic-Clonic
     - 1.1.3.1 Generalized tonic-clonic
   - 1.1.4 Atonic
   - 1.1.5 Astatic
   - 1.1.6 Synchronous

1.2 Automatism
   - 1.2.1 Oro-elementary
   - 1.2.2 Mimetic
   - 1.2.3 Manual or pedal
   - 1.2.4 Gestural
   - 1.2.5 Hyperkinetic
   - 1.2.6 Hypokinetic
   - 1.2.7 Dysphasic
   - 1.2.8 Dyspraxic
   - 1.2.9 Gelastic
   - 1.2.10 Dacrytic
   - 1.2.11 Vocal
   - 1.2.12 Verbal
   - 1.2.13 Spontaneous
   - 1.2.14 Interactive
2.0 Non-Motor Semiology

- Aura
- Sensory
  - Elementary
    - Somatosensory, visual, auditory, olfactory, gustatory, epigastric, cephalic, autonomic
  - Experiential
    - Affective, mnemonic, hallucinatory, illusory
- Dyscognitive
3.0 Autonomic Events

- Autonomic Aura
- Autonomic Seizures
4.0 Somatotopic Modifiers

- 4.1 Laterality
  - 4.1.1 Unilateral
    - 4.1.1.1 Hemi-
  - 4.1.2 Generalized (syn. "bilateral")
    - 4.1.2.1 Asymmetrical
    - 4.1.2.2 Symmetrical

- 4.2 Body Part

- 4.3 Centricity
  - 4.3.1 Axial
  - 4.3.2 Proximal limb
  - 4.3.3 Distal limb
5.0 Modifiers and Descriptors of Seizure Timing

- 5.1 Incidence
  - 5.1.1 Regular, Irregular
  - 5.1.2 Cluster
  - 5.1.3 Provocative factor
    - 5.1.3.1 Reactive
    - 5.1.3.2 Reflex

- 5.2 State Dependent

- 5.3 Catamenial
9.0 Postictal Phenomenon

- 9.1 Lateralising (Todd’s or Bravais’) Phenomenon
- 9.2 Non-Lateralising Phenomena
  - 9.2.1 Impaired Cognition
  - 9.2.2 Anterograde Amnesia
  - 9.2.3 Retrograde Amnesia
  - 9.2.4 Psychosis
How accurate is our clinical diagnosis based on history taking?
“Medicine is a science of uncertainty and an art of probability”

Sir William Osler

(1849-1919)
Accuracy of Seizure Diagnosis

- In 26% of the patients who were referred because of intractable epilepsy to a tertiary center, another diagnosis was made often based upon long-term EEG-video monitoring
  - Smith D, Defalla BA, Chadwick DW. The misdiagnosis of epilepsy and the management of refractory epilepsy in a specialist clinic. QJM 1999;92:15–23

- A misdiagnosis rate of epilepsy of 23% found in a population-based study in the United Kingdom, whereas in another 12% of patients the diagnosis proved to be disputable
Accuracy of Seizure Diagnosis

- Major concern was also raised in UK after reviewing the medical records of 214 children with epilepsy from the practice of one English pediatrician. >1/3 children diagnosed as having epilepsy were thought not to have epilepsy, and <1/3 probably over-treated
  - White C. Rate of misdiagnosis of childhood epilepsy “may not be unusual.” *BMJ* 2003;326:355.

- Similar rates of misdiagnosis were found among generalist pediatricians with an interest in neurology
  - White C. Rate of misdiagnosis of childhood epilepsy “may not be unusual.” *BMJ* 2003;326:355.
Seizure Identification by Clinical Description in Temporal Lobe Epilepsy

How accurate are we?

C. Deacon, S. Wiebe, W. T. Blume, R. S. McLachlan, G. B. Young, and S. Matijevic

NEUROLOGY 2003;61:1686-1689
Seizure Identification by Clinical Description in Temporal Lobe Epilepsy
Deacon, NEUROLOGY 2003

Results:

- Of 357 clinically different events, 175 (49%) were reproduced in the epilepsy monitoring unit.
- Only 10 events were misidentified by history as being a seizure or not, resulting in an overall clinical accuracy of 94%.
- Epileptologists’ sensitivity for seizure identification was 96% (95% CI 92, 98%) but specificity was only 50% (95% CI 22, 79%).
- Accuracy for complex partial seizures and generalized seizures was higher than for simple partial seizures (SPS).
- Misidentification occurred only with SPS and nonepileptic events.
- Agreement beyond chance among epileptologists was good.
Seizure Identification by Clinical Description in Temporal Lobe Epilepsy
Deacon, NEUROLOGY 2003

- **Conclusion:**
  - In this selected group of patients with temporal lobe epilepsy, seizure identification by clinical history is highly accurate.
  - Epileptologists rarely miss seizures (high sensitivity) but more often overcall nonepileptic events as seizures (low specificity).
Does the primary literature provide support for clinical signs used to distinguish psychogenic nonepileptic seizures from epileptic seizures?

Andreja Avbersek and Sanjay Sisodiya

*J Neurol Neurosurg Psychiatry* 2010 81: 719-725
doi: 10.1136/jnnp.2009.197996
Does the primary literature provide support for clinical signs used to distinguish psychogenic nonepileptic seizures from epilepsy seizures?

Andreja Avbersek,¹,²,⁴ Sanjay Sisodiya¹,²,³

<table>
<thead>
<tr>
<th>Sign that favour PNES</th>
<th>Evidence from primary studies</th>
<th>Sensitivity (%) for PNES</th>
<th>Specificity (%) for PNES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long duration</td>
<td>Good</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Fluctuating course</td>
<td>Good</td>
<td>69 (events)</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td></td>
<td>47–88 (patients)</td>
<td>96–100</td>
</tr>
<tr>
<td>Asynchronous movements</td>
<td>Good (frontal-lobe partial seizures excluded)</td>
<td>44–96 (events)</td>
<td>93–96</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9–56 (patients)</td>
<td>93–100</td>
</tr>
<tr>
<td>Pelvic thrusting</td>
<td>Good (frontal-lobe partial seizures excluded)</td>
<td>1–31 (events)</td>
<td>96–100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.4–44 (patients)</td>
<td>92–100</td>
</tr>
<tr>
<td>Side-to-side head or body movement</td>
<td>Good (convulsive events only)</td>
<td>25–63 (events)</td>
<td>96–100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15–36 (patients)</td>
<td>92–100</td>
</tr>
<tr>
<td>Closed eyes</td>
<td>Good</td>
<td>34–88 (events)</td>
<td>74–100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>52–96 (patients)</td>
<td>97</td>
</tr>
<tr>
<td>Ictal crying</td>
<td>Good</td>
<td>13–14 (events)</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.7–37 (patients)</td>
<td>100</td>
</tr>
<tr>
<td>Memory recall</td>
<td>Good</td>
<td>63 (events)</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td></td>
<td>77–88 (patients)</td>
<td>90</td>
</tr>
</tbody>
</table>

Does the primary literature provide support for clinical signs used to distinguish psychogenic nonepileptic seizures from epileptic seizures?

Andreja Avbersek,¹,²,⁴ Sanjay Sisodiya¹,²,³

<table>
<thead>
<tr>
<th>Signs that favour ES</th>
<th>Evidence from primary studies</th>
<th>Sensitivity for ES</th>
<th>Specificity for ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occurrence from sleep</td>
<td>Good</td>
<td>31–59 (events)</td>
<td>100</td>
</tr>
<tr>
<td>Postictal confusion</td>
<td>Good</td>
<td>61–100 (events)</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>67 (patients)</td>
<td>84</td>
</tr>
<tr>
<td>Stertorous breathing</td>
<td>Good (convulsive events only)</td>
<td>61–91 (events)</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other signs</th>
<th>Evidence from primary studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradual onset</td>
<td>Insufficient</td>
</tr>
<tr>
<td>Non-stereotyped events</td>
<td>Insufficient</td>
</tr>
<tr>
<td>Flailing or thrashing movements</td>
<td>Insufficient</td>
</tr>
<tr>
<td>Opisthotonus, ‘arc en cercle’</td>
<td>Insufficient</td>
</tr>
<tr>
<td>Tongue biting</td>
<td>Insufficient</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>Insufficient</td>
</tr>
</tbody>
</table>

Interview accuracy in partial epilepsy

Ana Gabriela Besocke *, Juan Ignacio Rojas, Stella Maris Valiensi, Edgardo Cristiano, María del Carmen Garcia

Neurology Department, Hospital Italiano de Buenos Aires, Buenos Aires, Argentina
### Accuracy of semiological signs.

<table>
<thead>
<tr>
<th>Accuracy &gt;85%</th>
<th>Accuracy 66–84%</th>
<th>Accuracy &lt;65%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complex automatisms</td>
<td>Oculocephalic version/</td>
<td>Limb automatisms</td>
</tr>
<tr>
<td></td>
<td>lateralization</td>
<td></td>
</tr>
<tr>
<td>Autonomic alterations</td>
<td>Dystonic posturing</td>
<td></td>
</tr>
<tr>
<td>Negative motor signs</td>
<td>Oromasticatory automatisms</td>
<td></td>
</tr>
<tr>
<td>Tonic asymmetric postures</td>
<td>Clonic activity</td>
<td></td>
</tr>
<tr>
<td>Language disturbances</td>
<td>Tonic activity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loss of consciousness</td>
<td></td>
</tr>
</tbody>
</table>
Is it possible to accurately differentiate neurocardiogenic syncope from epilepsy?

Dmitry Duplyakov¹, Galina Golovina², Svetlana Garkina¹, Natalia Lyukshina³

¹Cardiology Department, Samara Regional Cardiology Center, Samara, Russia
²Cardiology Department, VAZ Medical Center, Togliatti, Russia
³Neurology Department, Children’s Multifield Hospital No. 1, Togliatti, Russia

Abstract
Global cerebral hypoperfusion resulting in syncope, and asynchronous discharge of cerebral neurons leading to seizure, are two major mechanisms of transient loss of consciousness. They both have a lot in common in clinical and historical settings, although with a high prevalence of incorrect diagnosis, even by well-trained staff. The aim of this review was to try to combine data from both a cardiologist’s and a neurologist’s perspective (history taking, special questionnaires, serum prolactin, EEG, CT/MRI, tilt-testing, loop recorders). (Cardiol J 2010; 17, 4: 420–427)

Key words: syncope, epilepsy, differential diagnosis
Table 1. Syncope vs seizures: general differences (adapted from [15, 19–21]).

<table>
<thead>
<tr>
<th></th>
<th>Syncope</th>
<th>Seizures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triggers</td>
<td>Frequent</td>
<td>Rare</td>
</tr>
<tr>
<td>Preceding symptoms</td>
<td>Nausea, visual blurring, epigastric sensation, heat, headache, tinnitus</td>
<td>Sensorial, psychic, somatosensory ‘auras’ or motor phenomena</td>
</tr>
<tr>
<td>Position</td>
<td>Usually while standing or sitting; supine very rare</td>
<td>Any</td>
</tr>
<tr>
<td>Blanks</td>
<td>‘Fading away’ in young patients or abrupt loss in elderly persons</td>
<td>Abrupt loss</td>
</tr>
<tr>
<td>Fall</td>
<td>Slow, flaccid</td>
<td>Fast, tonic</td>
</tr>
<tr>
<td>Skin color</td>
<td>Pale</td>
<td>Sometimes acrocyanosis</td>
</tr>
<tr>
<td>Eye deviation</td>
<td>Transient upward or lateral deviation</td>
<td>Sustained lateral deviation</td>
</tr>
<tr>
<td>Incontinence</td>
<td>Common</td>
<td>Common</td>
</tr>
<tr>
<td>Tongue bite</td>
<td>Uncommon; localization: on the tip of the tongue</td>
<td>Common; localization: on the side of the tongue</td>
</tr>
<tr>
<td>Convulsions</td>
<td>Lasts few seconds, arrhythmic, multifocal or generalized</td>
<td>May last few minutes, rhythmic, generalized</td>
</tr>
<tr>
<td>Duration</td>
<td>3–30 s</td>
<td>Depends on the type of seizures: up to 5 min for GTCS and shorter for others</td>
</tr>
<tr>
<td>Postictal period</td>
<td>Somnolence, headache (no longer than 2 h in most cases)</td>
<td>Confusion, somnolence, headache</td>
</tr>
</tbody>
</table>

GTCS — generalized tonic-clonic seizure
Historical criteria that distinguish syncope from seizures


### Questionnaire and Scoring System for Symptoms Pertaining to Loss of Consciousness

*Sheldon R et al 2002*

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wake with tongue cutting?</td>
<td>2</td>
</tr>
<tr>
<td>Déjà vu or jamais vu?</td>
<td>1</td>
</tr>
<tr>
<td>Emotional stress associated with loss of consciousness?</td>
<td>1</td>
</tr>
<tr>
<td>Head turning during a spell</td>
<td>1</td>
</tr>
<tr>
<td>Unresponsive, unusual posture, limb movement, or amnesia of spells?</td>
<td>1</td>
</tr>
<tr>
<td>Confusion after a spell</td>
<td>1</td>
</tr>
<tr>
<td>Lightheaded spells</td>
<td>-2</td>
</tr>
<tr>
<td>Sweating before spell</td>
<td>-2</td>
</tr>
<tr>
<td>Spell associated with prolonged sitting or standing</td>
<td>-2</td>
</tr>
</tbody>
</table>

**If point score is 1 the likelihood is seizure or if <1 the likelihood is syncope.**
Elderly patients with epileptic seizures: in-patient observational study of two French community hospitals.

Massengo SA, Ondze B, Bastard J, Guiziou C, Velmans N, Rajabally YA

Seizure. 2011 Apr;20(3):231-9
Four-year retrospective observational study of 104 consecutive elderly patients with the diagnosis of ES, in 2 French community hospitals.

- Most ESs were partial (n=50; 48.07%) but generalized ESs were also clinically frequent (n=41; 39.42%)
- Brain imaging was highly contributive for the diagnosis of partial ESs by demonstrating causative focal structural lesions
Elderly Patients with ES
Massengo et al 2011

- Various **diagnostic** problems were identified.
  - Inter-observer agreement between neurologists and non-neurologists based on clinical judgement was only "fair" (kappa coefficient: 0.28; 95% CI; p=0.002)
  - ESs were initially misdiagnosed in 28 patients (26.92%)
  - The misdiagnosis rate was higher among non-neurologists (n=25; 89.28%) as compared to neurologists (n=8; 28.57%) (p<0.0001)
  - The presence of focal neurological abnormalities was an important **diagnostic** indicator of a positive diagnosis of ES
Guidelines for Epidemiologic Studies on Epilepsy

“Diagnosis of Epilepsy is essentially clinical, based on a bonafide history of epileptic seizures.”

“Diagnosis should be confirmed by a health professional with expertise in epilepsy, using available medical history, seizure description, and neurologic examination.”
Can seizure semiology be used to diagnose type of epilepsy?
Diagnosis of Epilepsy Type Based on Seizure Semiology

- Focal vs Generalized Epilepsy
- Frontal vs Temporal vs other Focal Epilepsy
Starring Episodes
Absence or Partial Seizures?

- Seizure onset
- Aura
- Automatism
- Progression
- Cyanosis
- Motor signs
- Seizure duration
- Seizure frequency
- Hyperventilation
- Sleep activation
- Post-ictal confusion
- Post-ictal sleep
- Postictal dysphasia
Seizure Semiology: Value in Identifying Seizure Origin

Mohammed M.S. Jan, John P. Girvin

Table 2: Differentiating staring due to absence from that of complex partial seizures

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>ABSENCE</th>
<th>COMPLEX PARTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep activation</td>
<td>None</td>
<td>Common</td>
</tr>
<tr>
<td>Hyperventilation</td>
<td>Induces the seizures</td>
<td>No activating effect</td>
</tr>
<tr>
<td>Seizure frequency</td>
<td>Frequent, many per day</td>
<td>Less frequent</td>
</tr>
<tr>
<td>Seizure onset</td>
<td>Abrupt</td>
<td>Slow</td>
</tr>
<tr>
<td>Aura</td>
<td>None</td>
<td>If preceded by a simple partial seizure</td>
</tr>
<tr>
<td>Automatism</td>
<td>Rare</td>
<td>Common</td>
</tr>
<tr>
<td>Progression</td>
<td>Minimal</td>
<td>Evolution of features</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>None</td>
<td>Common</td>
</tr>
<tr>
<td>Motor signs</td>
<td>Rare, or minimal</td>
<td>Common</td>
</tr>
<tr>
<td>Seizure duration</td>
<td>Brief (usually &lt;30 sec)</td>
<td>Minutes</td>
</tr>
<tr>
<td>Postictal confusion or sleep</td>
<td>None</td>
<td>Common</td>
</tr>
<tr>
<td>Postictal dysphasia</td>
<td>None</td>
<td>Common in seizures originating from the dominant hemisphere</td>
</tr>
</tbody>
</table>
Frontal or Temporal Lobe Seizures?

- Sz frequency
- Seizure onset
- Progression
- Initial motionless stare
- Automatism
- Bipedal automatism
- Complex posture
- Hyperkinetic motor signs
- Somatosensory aura
- Speech
- Seizure duration
- Secondarily generalization
- Postictal confusion
- Postictal dysphasia
# Seizure Semiology: Value in Identifying Seizure Origin

Mohammed M.S. Jan, John P. Girvin


## Table 3: Semiology of frontal versus temporal lobe seizures

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>FRONTAL LOBE</th>
<th>TEMPORAL LOBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seizure frequency</td>
<td>Frequent, often daily</td>
<td>Less frequent</td>
</tr>
<tr>
<td>Sleep activation</td>
<td>Characteristic</td>
<td>Less common</td>
</tr>
<tr>
<td>Seizure onset</td>
<td>Abrupt, explosive</td>
<td>Slower</td>
</tr>
<tr>
<td>Progression</td>
<td>Rapid</td>
<td>Slower</td>
</tr>
<tr>
<td>Initial motionless staring</td>
<td>Less common</td>
<td>Common</td>
</tr>
<tr>
<td>Automatisms</td>
<td>Less common</td>
<td>More common and longer</td>
</tr>
<tr>
<td>Bipedal automatism</td>
<td>Characteristic</td>
<td>Rare</td>
</tr>
<tr>
<td>Complex postures</td>
<td>Early, frequent, and prominent</td>
<td>Late, less frequent and less prominent</td>
</tr>
<tr>
<td>Hyperkinetic motor signs</td>
<td>Common</td>
<td>Rare</td>
</tr>
<tr>
<td>Somatosensory symptoms</td>
<td>Common</td>
<td>Rare</td>
</tr>
<tr>
<td>Speech</td>
<td>Loud vocalization (grunting, screaming, moaning)</td>
<td>Verbalization speech in non-dominant seizures</td>
</tr>
<tr>
<td>Seizure duration</td>
<td>Brief</td>
<td>Longer</td>
</tr>
<tr>
<td>Secondary generalization</td>
<td>Common</td>
<td>Less common</td>
</tr>
<tr>
<td>Postictal confusion</td>
<td>Less prominent or short</td>
<td>More prominent and longer</td>
</tr>
<tr>
<td>Postictal dysphasia</td>
<td>Rare, unless it spreads to the dominant temporal lobe</td>
<td>Common in dominant temporal lobe seizures</td>
</tr>
</tbody>
</table>
Caveats of using Semiology in Diagnosing Types of Epilepsy

- Much of the observational data of seizure semiology has been derived from video-EEG monitored patients with intractable epilepsy
  - Patients may have semiologic differences when compared to patients with non-intractable epilepsy
Caveats of using Semiology in Diagnosing Types of Epilepsy

- Some seizures of monitored patients are precipitated by antiepileptic drug withdrawal
  - Seizure duration, intensity and/or likelihood of secondary generalization are increased
  - Rapid generalization can erase the subjective aura from the patient’s memory
Caveats of using Semiology in Diagnosing Types of Epilepsy

- Most of the semiologic features are useful for hemispheric lateralization, whereas few features are helpful for seizure localization


## Lateralizing Ictal & Postictal Semiology with a Specificity >75%


<table>
<thead>
<tr>
<th>Semiology</th>
<th>Hemisphere of EZ</th>
<th>Specificity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unilateral dystonic hand posturing</td>
<td>Contralateral</td>
<td>&gt;99%</td>
<td>45% TLE</td>
</tr>
<tr>
<td>Ictal automatisms with preserved consciousness</td>
<td>Non-dominant</td>
<td>&gt;99%</td>
<td>5% TLE</td>
</tr>
<tr>
<td>Ictal speech</td>
<td>Non-dominant</td>
<td>80%</td>
<td>35% (monitored patients)</td>
</tr>
<tr>
<td>Ictal dysphasia &amp; aphasia</td>
<td>Dominant</td>
<td>&gt;99%</td>
<td>35% (monitored pts)</td>
</tr>
<tr>
<td>Ictal vomiting</td>
<td>Non-dominant</td>
<td>80%</td>
<td>2% (monitored pts)</td>
</tr>
<tr>
<td>Ictal spitting</td>
<td>Non-dominant</td>
<td>75%</td>
<td>0.5% (monitored pts)</td>
</tr>
</tbody>
</table>
Lateralizing Ictal & Postictal Semiology with a Specificity >75%
(From Luders: Textbook of Epilepsy Surgery 2008, 425-431)

<table>
<thead>
<tr>
<th>Semiology</th>
<th>Hemisphere of EZ</th>
<th>Specificity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Localized somatosensory aura</td>
<td>Contralateral</td>
<td>89%</td>
<td>1-10% (epilepsy patients)</td>
</tr>
<tr>
<td>Hemifield visual aura</td>
<td>Contralateral</td>
<td>100%</td>
<td>29% OLE</td>
</tr>
<tr>
<td>Focal tonic / clonic activity</td>
<td>Contralateral</td>
<td>90%</td>
<td>45% FLE</td>
</tr>
<tr>
<td>Forced head version &lt;10sec before GTC</td>
<td>Contralateral</td>
<td>&gt;90%</td>
<td>35% TLE 45% ETLE</td>
</tr>
<tr>
<td>“Figure of 4”</td>
<td>Contralateral</td>
<td>90%</td>
<td>15% TLE 15% ETLE</td>
</tr>
</tbody>
</table>
Lateralizing Ictal & Postictal Semiology with a Specificity >75%

(From Luders: Textbook of Epilepsy Surgery 2008, 425-431)

<table>
<thead>
<tr>
<th>Semiology</th>
<th>Hemisphere of EZ</th>
<th>Specificity</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postictal palsy</td>
<td>Contralateral</td>
<td>&gt;99%</td>
<td>0.5-15% (monitored pts)</td>
</tr>
<tr>
<td>Postictal dysphasia and aphasia</td>
<td>Dominant</td>
<td>80%</td>
<td>35% TLE</td>
</tr>
<tr>
<td>Postictal nose wiping</td>
<td>Ipsilateral</td>
<td>90%</td>
<td>55% TLE</td>
</tr>
<tr>
<td>Unilateral last clonic movement in secondary generalized seizure</td>
<td>Ipsilateral</td>
<td>80%</td>
<td>45-65% TLE</td>
</tr>
</tbody>
</table>
False Localization & Lateralization

- False localization should be suspected if the onset of clinical seizures occurs earlier than the onset of ictal EEG discharge
- A number of false localizations raise the possibility of multifocal epilepsy


Conclusion

- Seizure semiology is the starting point of understanding a seizure disorder and making the diagnosis of epilepsy.
- Seizure history and video recordings made by eye witness should be reviewed carefully to detect as many useful semiologic features as possible.
- Analysis of the development and sequence of multiple semiologic features can identify the seizure initiation and propagation.
- These information should be correlated with EEG and MRI findings.