

Localizing and lateralizing manifestations of seizure semiology



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Semiology is a keystone of epilepsy diagnosis

2 times

Symptomatic diagnosis

: Two or more unprovoked Szs

Semiology is a keystone of epilepsy diagnosis

• Diagnosis of Epilepsy is based on thorough history

- ✓ Requires 2 unprovoked seizures.
- ✓ EEG and MRI are important but only supportive evidences.
- ✓ Semiology is essential in epilepsy diagnosis, classification, and basement of appropriate treatment.

Semiology?: a branch of linguistics concerned with signs and symptoms.

International Classification of Seizures

ILAE Seizure Classification 1981

I. Partial Seizures

1. Simple partial Sz

- with
 - motor signs, sensory symptoms
 - autonomic symptoms & signs, psychic symptoms

2. Complex partial Sz

- simple partial onset f/b impairment of consciousness (IOC)
- IOC at onset:
 - IOC only,
 - IOC and automatisms

3. Partial Sz evolving into secondarily GTCS

II. Generalized Seizures

- | | | |
|--------------------------|------------|--------------|
| 1. (clonic) tonic-clonic | 2. absence | 3. myoclonic |
| 4. tonic | 5. atonic | 6. clonic |

III. Unclassified

Semiological Seizure Classification (Lüders et al., 1998)

❖ Aura

Somatosensory	visual	auditory
gustatory	olfactory	autonomic
abdominal	psychic	

❖ Autonomic Sz (documentation of autonomic dysfunction)

❖ Dialeptic Sz (predominant Sx is altered consciousness)

typical dialeptic Sz (consistent with typical absence Sz)

❖ Motor Sz

simple motor: - myoclonic, - tonic, - clonic, - spasm
 - tonic-clonic, - versive

complex motor: - hypermotor, - gelastic, - automotor

❖ Special Sz (Szs difficult to classify into one of above 4 types)

atonic	astatic	hypomotor
akinetic	negative	aphasic

Glossary of Descriptive Terminology for Ictal Semiology (Blume et al. Epilepsia 2001)

Epilepsia, 42(9):1212-1218, 2001
Blackwell Science, Inc.
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ILAE Commission Report

Glossary of Descriptive Terminology for Ictal Semiology: Report of the ILAE Task Force on Classification and Terminology

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

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Glossary of Descriptive Terminology for Ictal Semiology (Blume et al. Epilepsia 2001)

1.0 MOTOR

1.1 ELEMENTARY MOTOR

- 1.1.1 TONIC
- 1.1.1.1 EPILEPTIC SPASM
- 1.1.1.2 POSTURAL
- 1.1.1.2.1 VERSIVE
- 1.1.1.2.2 DYSTONIC
- 1.1.2 MYOCLONIC
- 1.1.2.1 NEGATIVE MYOCLONIC
- 1.1.2.2 CLONIC
- 1.1.2.2.1 JACKSONIAN MARCH
- 1.1.3 TONIC-CLONIC
- 1.1.3.1 GENERALIZED TONIC-CLONIC SEIZURE
- 1.1.4 ATONIC
- 1.1.5 ASTATIC
- 1.1.6 SYNCHRONOUS

1.2 AUTOMATISM

- 1.2.1 ORALIMENTARY
- 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 DACRYSTIC
- 1.2.11 VOCAL
- 1.2.12 VERBAL
- 1.2.13 SPONTANEOUS
- 1.2.14 INTERACTIVE

Descriptive Terminology for G. Seizure (Blume, 2001)

Epileptic spasm (formerly infantile spasm)

- sudden flexion, extension, flexion-extension of predominantly prox. muscles (longer than myoclonus, ~1s). Limited forms: grimacing, head nodding...

Myoclonic seizure

- sudden, brief (<100 ms) involuntary single or multiple contractions of muscle or muscle group.

Tonic seizure

- sustained muscle contraction lasting a few seconds to min.

Atonic seizure

- sudden loss or diminution of muscle tone without apparent preceding myoclonus or tonic event lasting 1-2 s.

Astatic seizure

- loss of erect posture that results from an atonic, myoclonic, or tonic mechanism (synonym: drop attack).

Revised Classification of E. Seizures (ILAE, 2010)

Classification of Seizures

Generalized seizures: Szs originating and rapidly engaging bilaterally distributed networks

Tonic-clonic (in any combination)

Absence

Typical

Atypical

Absence with special features

Myoclonic absence

Eyelid myoclonia

Myoclonic

Myoclonic

Myoclonic atonic

Myoclonic tonic

Clonic

Tonic

Atonic

Focal seizures: Szs originating within networks limited to one hemisphere

Unknown

Epileptic spasms

I. Seizures in Generalized Epilepsy

Cases

2. Seizures in Focal Epilepsy

Revised Classification of E. Seizures (ILAE, 2010)

Focal seizures: Szs originating within networks limited to one hemisphere

Descriptors of focal seizures according to degree of impairment during seizure

1. Without impairment of consciousness or awareness

With observable motor or autonomic components. This roughly corresponds to the concept of "simple partial seizure".

"Focal motor" and "autonomic" are terms that may adequately convey this concept depending on the seizure manifestations.

Involving subjective sensory or psychic phenomena only. This corresponds to the concept of an aura, a term endorsed in the 2001 Glossary.

2. With impairment of consciousness or awareness.

This roughly corresponds to the concept of complex partial seizure. 'Dyscognitive' is a term that has been proposed for this concept (Blume et al., 2001).

3. Evolving to a bilateral, convulsive seizure (involving tonic, clonic, or tonic and clonic components).

This expression replaces the term "secondarily generalized seizure."

Lateralizing/localizing Features of Auras

❖ Auras

- Sensory auras
- Painful auras
- Peri-ictal headache
- Auditory auras
- Visual auras
- Ipsilateral ictal piloerection
- Ictal urinary urge
- Orgasmic auras

❖ Sites

- Contra. PSA, SSA, SSMA; 89%
- Contra. SSA > PSA; 80%
- Ipsila. TLE (<50%), CN 5 involve?
- Sup. temporal gyrus: bilateral in 80%
- Contra. occipital or temporal, 100%
- Ipsila. amyg./insula/hypothalamus/AC
- non-dominant T; opecula; mesial F
- non-dominant or right T (>70%)

Lateralizing/localizing Features of seizures

❖ Szs

- Early Head Turning (ipsiversion)
- Late Forced Version
- Late ipsiversion at the end of a generalized seizure
- Unilateral clonic activity
- Unilateral tonic activity
- Asymmetric tonic limb posturing
- Unilateral dystonic posturing
- Todd's paralysis
- Ictal speech
- Ictal dys-/aphasia

❖ Sites

- Ipsila. non-forced, natural
- Contra. ~100%
- Ipsila. ~100%
- M/C lateralizing sign, contra. 83%
- Contralateral, NTLE, 89%
- 'Fig. 4', just before 2nd GTC, 90%
- Contra. 90~100%
- Contra. 93%
- Non-dominant, 83%
- Dominant, 100%

Lateralizing/localizing Features of seizures

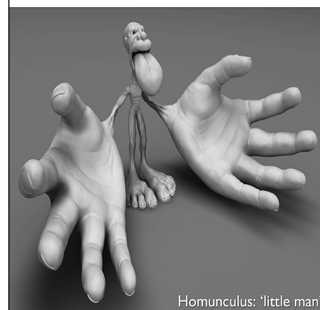
❖ Szs

- Unilateral automatisms and contralateral dystonic posturing
- Ictal spitting
- Ictal drinking
- Ictal vomiting (or retching)
- Unilateral ictal eye blinking
- Post-ictal nose wiping
- Ictal piloerection

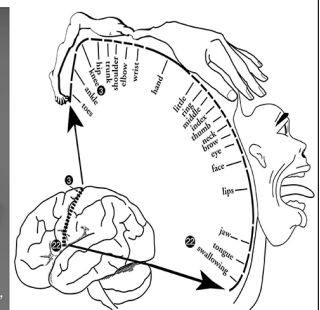
❖ Sites

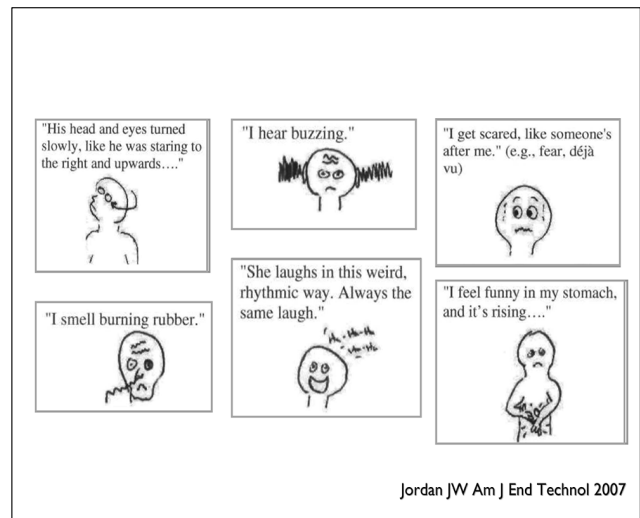
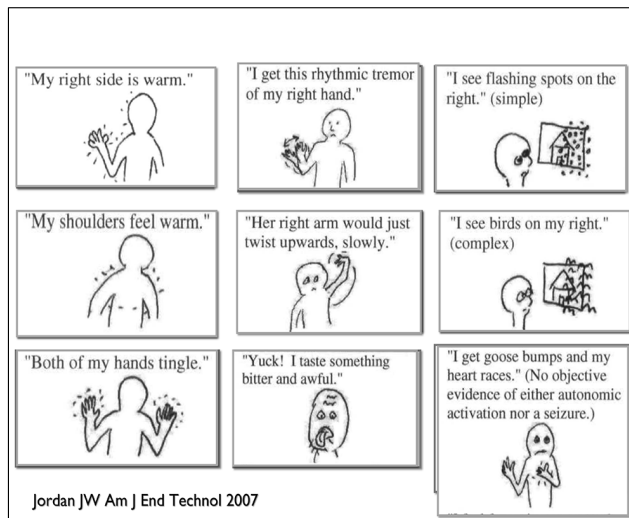
- Unilateral MTLE, ~100%
- ~ 85%, non-dominant
- ~ 80%, non-dominant
- ~ 80%, non-dominant
- Ipsila. ~ 90%
- Ipsila. ~ 90%
- Ipsila. Temporal

Homunculus



Homunculus: 'little man'





Mesial Temporal Lobe Seizures

1.62191 1.62191 1.62191 1.62191

The most common seizure type, like 'dreamy state' slowly and calm.

- Slower evolution than FLE, and common "motionless stare"
- Aura is common
 - : epigastric (M/C), affective (fear), experiential (déjà-vu), autonomic, olfactory-gustatory (rare).
- Automotor Sz in common
 - : ~70% had oroalimentary automatism, ipsilateral hand automatism
- Contralateral dystonic posturing, frequent autonomic features
- Prominent post-ictal confusion

Cases

Neocortical Temporal Lobe Seizures

1.62191 1.62191 1.62191 1.62191

More common motor phenomenon than MTLE.

- Aura is dependent to adjacent spreading region
 - : auditory aura, vertiginous aura, complex visual aura is typical.
- CPS
 - : automatism is not prominent at the onset of seizure
 - early clonic motor involvement, especially facial
 - frequent 2nd GTCS
 - contralateral dystonic posturing is less than MTLE
- Prominent post-ictal confusion

Case

Mesial vs. Lateral Temporal Lobe Epilepsy

	Mesial TLE	Lateral TLE
Epigastric auras, fear and early orolimentary automatisms	Predominate	Rare
Non-specific auras, early focal motor, somatosensory, visual or auditory symptoms	Rare	Predominate
Contralateral hand dystonia	Common	Rarer
Early clonic activity following automatisms	Rare	Common
GTCs	Infrequent	Frequent
History of febrile seizures	Predominate	Rare
Interictal EEG	anterior T spikes or SVVs	Middle or posterior T spikes or SVs
MRI	Hippocampal sclerosis	Neocortical lesions

Panayiotopoulos, 2005

Frontal Lobe Seizures

LLOUGSI LODG 261XNLE2

Typically, briefer, more frequent, and more vigorous motor phenomena, compared with TLE.

- Rapid secondary generalization
- Sudden onset and offset with minimal postictal confusion
- Frequent, brief seizures occurring in clusters
- Nocturnal preponderance
- Vocalization from single humming to shouted expletives
- Complex motor automatisms, sexual automatisms, or bizarre hysteric appearance

Frontal Lobe Seizures

LLOUGSI LODG 261XNLE2

FEATURES	FRONTAL LOBE	TEMPORAL LOBE
Seizure frequency	Frequent, often daily	Less frequent
Sleep activation	Characteristic	Less common
Seizure onset	Absent explosive	Slower
Progression	Rapid	Slower
Initial motionless staring	Less common	Common
Automatisms	Less common	More common and longer
Bipedal automatisms	Characteristic	Rare
Complex postures	Early, frequent, and prominent	Late, less frequent and less prominent
Hyperkinetic motor signs	Common	Rare
Somatosensory symptoms	Common	Rare
Speech	Loud vocalization (grunting, screaming, moaning)	Verbalization: speech in non-dominant seizures
Seizure duration	Brief	Longer
Secondary generalization	Common	Less common
Postictal confusion	Less prominent or short	More prominent and longer
Postictal dysphasia	Rare, unless it spreads to the dominant temporal lobe	Common in dominant temporal lobe seizures

Frontal Lobe Seizures

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1. Focal motor Sz:
unilateral distal limb clonic jerk, with or without Jacksonian March
sometimes evolvent to Epilepsia Partialis Continua (EPC)
2. SMA (supplementary motor Sz):
sudden brief tonic posturing
involve bilateral proximal muscle
'Fencing posture'
No or minimal LOC
frequent vocalization

Frontal Lobe Seizures

LLOUGSI LODG 261XNLE2

3. Frontal lobe complex partial Sz:
Sudden onset of vigorous, bilateral motor automatism
'pedaling or bicycling'
sometimes mistaken as psychogenic
Forced Nature (compared to TLE)
4. Frontal Lobe Absence (or dialeptic) Sz:
brief mental alterations, dialeptic Sz
generalized SWC on EEG, frontal dominant
no confusion

Frontal Lobe Seizures

LLOUGSI LODG 261XNLE2

1. Frontopolar:
Similar to primary generalized seizures.
2. Orbitofrontal:
mimics temporal lobe seizures.
3. Premotor:
Versive Sz with bilateral tonic posturing is commonest
Bipedal automatisms
Fencing posture –SSMA
4. Dominant opercula:
Dysphasic seizure.
5. Rolandic:
Elementary sensory/motor seizure.

Cases

Parietal Lobe Seizures

LSLIGESI FODG 26ISNLE2

1. Aura:

- somatosensory - tingling, a feeling of electricity
- visual - metamorphopsia, shortening, elongation
- aphasic - receptive or conductive language
- others - asomatognosia, vertigo, disorientation in space

2. Clinical feature – variable spread patterns

- Secondary activation of the frontal areas
 - asymmetric tonic posturing of the extremities, unilateral clonic activity, contralateral version, hyperkinetic activity
- Spread to temporal lobe
 - automatism/altered consciousness

Occipital Lobe Seizures

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Visual aura, usually of elementary sensation

Sensation of ocular movement

Nystagmus, eye flutter

Forced eye blinking

Versive head and eye movements

Visual symptoms: positive or negative (even ictal amaurosis) occur in 50-60% of cases

~ The clinical features of occipital lobe complex partial seizures reflect different patterns of ictal propagation.

Cases