

Localization by Semiology

Katie Bullinger, MD/PhD
Assistant Professor
Emory University
Dept of Neurology, Epilepsy Division

Disclosures

- None

Objectives

- Define seizure semiology
- Understand how semiology is useful in localization of seizure onset
- Learn how to distinguish different seizure types base on seizure semiology
- Understanding what to note as a witness to a seizure

Seizure semiology

"the study of signs"

In epilepsy- the study of the signs and symptoms of a seizure

Can be useful in determining focal vs. generalized

Studying semiology important in focal epilepsies which may be amenable to epilepsy surgery

Helps to localize the "symptomotogenic zone" which ultimately aids in localizing the epileptogenic zone

The more these zones overlap = the better the seizure outcome

Seizure semiology

- Historical data from patient and family
- Direct observation
- Review of video monitoring

Seizure semiology

- Initial subjective aura
- Progression of behavioral phenomenon
- Post-ictal phase
- Overall pattern

Witness to a seizure

- Aura
- Responsiveness
- Awareness
- Language
- Motor

Auras

- Often the first ictal symptom
- Perceptual ictal experience that precedes an observable seizure
- Often provides highly localizing information

Auras

- Somatosensory
- Visual
- Auditory
- Olfactory
- Gustatory
- Autonomic
- Experiential

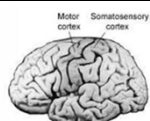
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Somatosensory

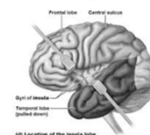
Well localized, spreads relatively slowly

- Parietal lobe (primary somatosensory(S1))



Ill defined, often accompanied by pain,

- Posterior insula- parietal operculum, suppleme area (S2)



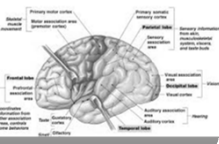
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Visual phenomenon

Simple (flashing lights)

- Primary visual cortex (co



Complex visual (form)

- Association visual cortex (contralateral)

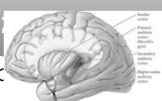
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Auditory

Elementary auditory (bu

- Heschl's gyrus in temporal lob



Complex auditory (voice)

- Temporoparietal junction



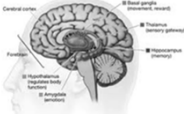
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Olfactory

I smell something burning

- Anterior mesiotemporal, amygdala



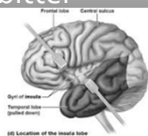
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Gustatory

Yuck! I taste something bitter

- Insula or secondary sensory area



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Autonomic

Nausea/vomiting, goosebumps, heart racing

- Basal frontal, anterior cingulate, insula



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Experiential

Fear

- Amygdala

Deja vu

- Mesial temporal

Autoscopy

- Non dominant parietal



What happens after aura

Lateralizing and localizing signs

- Automatisms
- Behavioral arrest
- Head movements
- Simple/complex motor behaviors

What happens after aura

- Lateralizing and localizing signs
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Automatisms

Oro-alimentary (chewing/swallowing/lip smacking)

- Temporal/frontal lobe

Manual (fumbling, touching, picking)

- Temporal/frontal lobe (anterior cingulate)

What happens after aura

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Behavioral arrest

Blank stare

- Poorly localized, diffuse cortex, bilateral hippocampus

What happens after aura

Lateralizing and localizing signs

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Head movements

Nonforced head turn

- Ipsilateral temporal or frontal lobe

Versive head turn

- Contralateral frontal or temporal

What happens after aura

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Motor behavioral

- Simple motor- clonic/myoclonic
 - Contralateral primary motor cortex
- Tonic /dystonic limb
 - Contralateral hemisphere- temporal, frontal, basal ganglia
- Complex postures (fencer/figure four)
 - SMA
- Hypermotor
 - Frontal/anterior cingulate cortex

Misc signs

- Nose wiping
 - Ipsilateral temporal
- Periictal water drinking
 - Nondominant temporal
- Periictal cough
 - Nonlateralizing temporal
- Ictal spitting
 - Nondominant temporal

Generalized

- GTC
- Myoclonic jerks
- Atonic
- Absence
- Tonic
- Clonic

Psychogenic nonepileptic spells

- Asynchronous limb movement
- Closed eyes during event
- Side to side head movements
- Pelvic thrusting
- Opisthotonos
- Waxing and waning
- Nonphysiologic progression
- Provoked by suggestion
- Non-stereotypic patterns

References

- Alsaadi, T and Marquez, A. (2005) Psychogenic nonepileptic seizures. *Am Fam Physician.* 72:849-56.
- Luders, H. (2008) *Textbook of Epilepsy Surgery.* Informa Healthcare, London.
- Jordan, J (2007). Semiology- Witness to a seizure- what to note and how to report. *Am J END Technol.* 47:262-282.
- Blume WT, Lüders HO, Mizrahi E et al. Glossary of Descriptive Terminology for Ictal Semiology: Report of the ILAE Task Force on Classification and Terminology. *Epilepsia* 2001;42:1212-8
