What can be inferred from ictal behavioral manifestations in temporal lobe epilepsy patients?

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Disclaimers/conflicts of interest

Paid consultancy and speaker’s honoraria:
UCB, Eisai, Novartis, Sandoz, LivaNova, and Medtronics
• Understanding of the seizure symptomatology (i.e. knowledge of variable ictal phenomena and their potential localizing and lateralizing value) is crucial for **correct history taking** as well as for **visual analysis of epileptic seizures** (observed accidentally at the out-patient departments/neurological wards or intentionally at the video-EEG monitoring units).

• The **precise assessment of ictal semiology** and its chronology (the order of appearance of symptoms during the sz) importantly **increase the quality of the diagnostic conclusion** → better therapy.
Temporal lobe epilepsy

• The most common type of focal epilepsies

• Typical manifestation – focal impaired awareness seizure (previously CPS), rarely focal aware seizure (previously SPS) and occasionally focal to bilateral TCS (previously sGTCS)

• Seizure duration > 30 seconds

• Auras (~90% of patients), postictal confusion, and amnesia for ictal period are common in TLE sz.

• In approx. 1/2 of patients = „behavioral arrest“
Ictal symptoms in TLE

• Autonomic phenomena
• Psychic phenomena
• Motor phenomena (incl. automatisms)

• Other phenomena - dizziness (sz originating from the TPO junction), vaguely described feeling of discomfort (AH complex, rarely lateral temp. neocortex), aphasia (dominant hemisphere), ictal speech (nondominant hemisphere), somatosensory symptoms (rare, mostly affecting both hands, usually of opercular/insular origin), ...
Autonomic phenomena

**Epigastric aura** (rising epigastric sensation), nausea, belching - operculo-insular region, hippocampus, parahipp gyrus, uncinate g, amygdala, GTM, post GTI, TPJ

Ictal retching/vomiting – szs involving (nondominant) opercular reg

**Tachycardia, palpitation**, elevation of blood pressure, flushing, skin pallor, „cephalic aura“ - heat in the head - amygdala, CA, temporal operculum

Irregular breathing – cornu Ammonis

Ictal urinary urge – nondominant temporal lobe

Unilateral piloerection – ipsilateral ? right temporal lobe?

Bilateral or contralateral mydriasis – hipp, amy, temp.operculum
Peri-ictal water drinking - nondominant temporal lobe
Ictal bradycardia and asystole – more frequent in left TLE
Psychic phenomena

- Mnestic troubles
- Cognitive troubles
- Affective troubles
- Hallucinations and illusions (olfactory, gustatory, auditory, and visual)

“Intellectual aura“

(simple, complex)
Intellectual aura

• **Dreamy states** (alteration of the pts perception of time and memory processes)
• **Illusion déjà vu** (already seen), *entendu, vécu*
• **Illusion du jamais vu** (familiar surroundings may look unfamiliar), *entendu, vécu*
• Depersonalization, derealization
• **Experiential phenomena** – create in pts mind experiences, usually from his personal life, that have a compelling immediacy similar or more vivid than those occurring in real life.
• Mental diplopia
Affective troubles - negative

• **Fear** (frequent aura, described as „anxiety, fear or terror, a feeling like I am about to die“. Often it is accompanied by a fearful expression and vegetative sympt.). It reflects *activations of key nodes within large-scale neural network*: Amygdala – anterior cingulate ctx - orbitofrontal ctx – mesial temporal structures
  - 1/ **Mesiotemporal type**
  - 2/ **Temporo-frontal type** (spreading T→F, but also F→T) – uncontrollable terror with hypermotor seizure

• **Agression**
• **Depression**
• **Crying** (dacrystic seizures)
Affective troubles - positive

- **Joy**
- **Pleasure**
- **Laughter** (gelastic seizures)
  1. **Temporal type** - natural, > 30 sek, + loss of consciousness and vegetative signs (temporobasal ctx - amygdala - hippocampus - hypothalamus)
  2. **Frontal type** – unnatural (grimacing), < 30 sek, + motor symptomatology (gyrus cinguli ant.), consciousness can be preserved
- **Ecstasy** (Dostoyevski’s aura)
Motor phenomena I

Automatisms

**Oroalimentary** *(chewing, swallowing, lip smacking, tongue movements, …)* - tend to occur in the early part of the seizure!

*Ictal spitting* – ictal discharges in non-dominant temporal lobe

*Ictal oroalimentary automatisms with preserved consciousness* – unilateral involvement of non-dominant temporal lobe

*Excessive salivation* - temporal operculum

**Hand** (simple discrete or bimanual movements – gestural)
(stereotyped repetitive movements). Gestural automatisms of the legs
(bicycling or pedaling) are late – spreading to mesial frontal ctx

*Unilateral automatisms* – ipsilateral; But RINCH contralateral!

**Ambulatory** *(sitting up, getting out of bed - ipsi, walking, …)*
Motor phenomena II

Dystonic posturing involving the upper limb – contralateral to the ictal discharge

Tonic posturing – contralateral

Unilateral ictal immobility – contralateral (accompanied by automatisms in the opposite extremity)

Nonversive head turning (early sign) – ipsilateral

Head version (forced tonic deviation; late sign) - contralateral

Nose wiping (postictal, ictal) – ipsilateral
Question

1/ Right-sided frontal lobe epilepsy
2/ Left-sided temporal lobe epilepsy
3/ Right-sided temporal lobe epilepsy
4/ Left-sided insular lobe epilepsy
OA automatisms with preserved consciousness
Verbalization
Left-sided arm weakness/hypokinesia
Right-sided hand automatisms
Ictal dysprosody/elevated pitch
Peters et al, Neurology 2011
Left-sided hand dystonic posturing
An epileptic seizure remains a complex multidimensional dynamic event and the analysis of clinical symptoms has to consider the time of appearance of a symptom within the seizure and the duration, i.e., the sequence of symptoms.
Sequence of clinical manifestations in mesial temporal lobe seizures

BEHAVIORAL ARREST

OROALIMENTARY AUTOMATISMS

LOOKING AROUND

WHOLE BODY MOVEMENTS

Two or more symptoms in this sequence were seen in about 77% of FIAS/CPS.
Conclusions

There is no doubt that many clinical seizure characteristics can provide important lateralizing and localizing information.

The clinical semiology must, however, be taken in context with all other findings.

The context and the sequence of ictal signs are more important than a pure catalogue of symptoms!