

# Ictal heart rate increase precedes EEG discharge in drug-resistant mesial temporal lobe seizures

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## Abstract

**Objective:** Heart rate (HR) changes, mainly tachycardia, are often observed during seizures originating from the temporal lobe. The aim of this study was to analyze the role of ictal HR changes in localizing both mesial and lateral temporal lobe epilepsy (TLE) in a group of 68

patients. The influence of the gender and the side of epilepsy on HR modulation was also evaluated.

**Methods:** Ictal HR was recorded during prolonged Video-EEG monitoring performed in 68 patients affected by drug-resistant TLE during

a non-invasive pre-surgical protocol. According to the electro-clinical correlation, obtained by video-EEG monitoring, one hundred-thirteen

seizures (n = 113) and one hundred-forty-four auras (n = 144) were identified and included in the study.

Furthermore, the electro-clinical

correlation allowed the classification of all the epileptic events (seizures and auras) as having mesial or lateral origin, based on the temporal

lobe seizure onset zone. Ictal HR was calculated with respect to the R-R waves, and assessed from 15 sec (s) before (T<sub>-15</sub>) to 15 s after (T<sub>+15</sub>)

the time of EEG seizure onset (T<sub>0</sub>).

**Results:** We observed a high incidence (92%) of ictal HR increase in TLE seizures. When the ictal EEG indicated a seizure onset from the

mesial temporal structures, the onset of ictal HR increase preceded by about 5 s the EEG ictal onset (SD = 18.4), whereas the onset of HR

increase coincided with the onset of EEG discharges (SD = 14.8) when the ictal EEG indicated the onset of seizures from the lateral

temporal structures. No significant differences were found between male and female patients; and between right and left TLE.

**Conclusions:** Our findings show that ictal HR increase, preceding the onset of the EEG discharge, is associated with ictal EEG seizure

pattern defining temporal lobe seizures originating from the mesial temporal lobe structures; this association suggests that the HR changes

may be coupled to the functional impairment of neural circuits involved in sympathetic cardiovascular regulation, in the mesial temporal lobe

structures. Further studies investigating the relationship between intracranial EEG monitoring and ECG recording are worthwhile, to confirm

our results and to give further indications on the pathogenesis of ictal HR abnormalities.

**Keywords:** Heart rate; Temporal lobe epilepsy; Presurgical evaluation; Video EEG; Epilepsy surgery