



Silence of the Brain (Sudden Unexplained Death in Epilepsy)

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Abstract:

Patients with medically refractory epilepsy have the highest risk for SUDEP (sudden unexpected death in epilepsy); 30%-50% of the patients are found dead in bed, often prone. SUDEP occurred in our case during EEG-video monitoring despite employment of all common protective measures. Intra-ictal cardiac dysrhythmias occurred in this patient suggesting that such may alarm caregivers of imminent SUDEP.

Key words: Arrhythmias, Electroencephalography, Epilepsy, Heart Conduction System.

Introduction

SUDEP is a “sudden, unexpected, witnessed or unwitnessed, non-traumatic and non-drowning death in epilepsy, with or without evidence of a seizure and excluding documented status epilepticus, and in which postmortem examination does not show a toxicological or anatomical cause for death [1]. Application of this definition and monitoring according to SUDEP prevention criteria, such protective measures were performed in all seizure refractory patients in our unit. Common causes for admission to epilepsy monitoring unit in our centre are presurgical evaluation for uncontrolled epilepsy or classification of frequent spells.

Our unit is composed of five epilepsy monitoring separate rooms. Video/auditory EEG (VEEG) with cardiac monitoring is carried out for 24

hours to 7 days depending upon clinical needs of each patient. Two nurses alternated between direct patient care and constant monitoring of VEEG at the nursing station. This arrangement provided consistent patient surveillance. We recorded one witnessed SUDEP in the unit that evaluated about 2500 patients over the ten years existence of our epilepsy monitoring unit.

Case Report

Although this 22-year-old woman was initially monitored as a resective surgery candidate, further recording aimed to distinguish pseudo-seizures from epileptic seizures. VEEG of this patient recorded sudden awakening then turning to a prone position. Bed sheets obscured all limbs and trunk; rhythmic

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trembling of these covers lasted 90 seconds (see further).

Ictal EEG showed a generalized burst of fast activity obscured by muscle artifact underneath which rhythmic activity in the frontal-central region lasting 2 minutes occurred [Fig.1]. This was followed by generalized spike and waves [Fig.2] lasting four minutes. Then diffuse delta appeared without suppression [Fig.3]. The ictal ECG initially showed tachycardia, then complex dysrhythmias and ventricular ectopic beats followed by a systole 8 minute after cerebral silence. Fifteen minute post-ictal EEG showed cerebral silence with ECG abnormality (bigeminy) [Fig.4].

Post hoc review of this event by several neurologists failed to reveal, any definite seizure components: the patient lay prone, her face covered by the pillow. Bed sheets obscured all limbs.

Discussion

SUDEP is extremely rare in young adults, but its incidence increases to 9.3/1000 person-years in epilepsy surgery candidates. Uncontrolled epilepsy

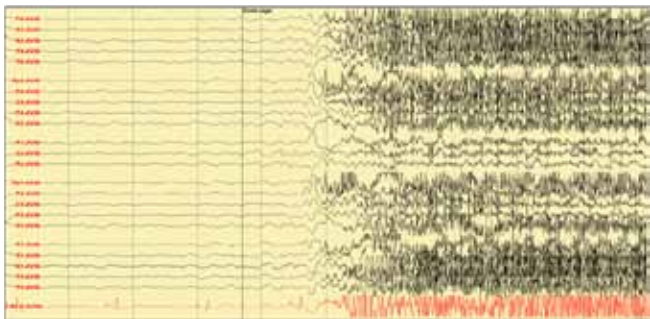


Fig.1: EEG common average montage showed seizure onset with first three seconds sleep background followed by sudden high amplitude rhythmic activity in frontocentral head region intermixed with muscle artifacts. EKG sinus rhythm initially, then chest myoclonic like potential.

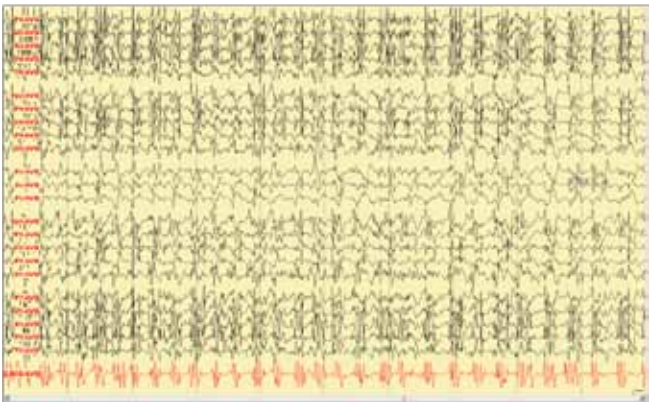


Fig.2: EEG common average montage showed generalize spike and wave discharges. Chest lead intended for ECG showed myoclonic like potential.



Fig.3: EEG showed generalized slowing delta frequency post-ictal 4 minute with complex dysrhythmias.

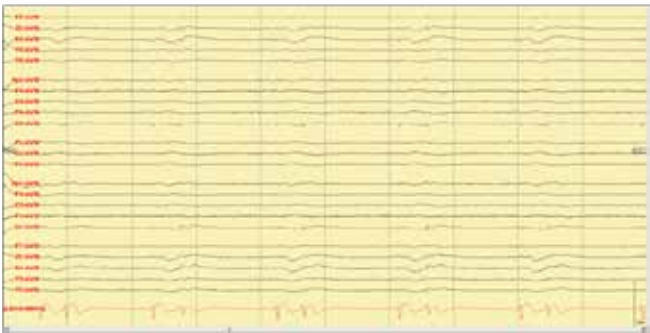


Fig.4: 15 minute postictal EEG showed cerebral silence with ECG abnormality (bigeminy).

appears to be the most highly associated modifiable risk factor for SUDEP. In our case an attenuation of EEG activity preceded the occurrence of terminal cardiac and respiratory arrest, thus suggesting that an electrical cerebral shutdown might play a primary role in the mechanism leading to SUDEP. It has been hypothesized that a primary cause could be an alteration of cerebral blood flow autoregulation leading to a sudden drop of cerebral perfusion and subsequent cessation of electrical activity. Cardiac arrhythmias and respiratory disturbances also have been proposed as likely causes for SUDEP. QTc abnormalities have been associated with increased risk of sudden cardiac death. Moreover, an association between ictal hypoxemia and cardiac repolarization abnormalities has been made [2].

Therefore consistent monitoring of cardiac and respiratory parameters should be considered by all epilepsy centers.

References

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