Neurosciences Quiz

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Subclinical rhythmic electrographic discharges of adults (SREDA)

Case Presentation

A 38-year-old woman refers to an epilepsy center for further diagnostic evaluation. Her medical history is unremarkable and neurological examination is normal. Some months before, she was referred to a neurologist because of an isolated episode of transient loss of consciousness. This episode occurred during a hot summer day, when waking up, and was preceded by malaise, visual disturbance ("spots before the eyes"), light-headedness, and sweating. Her husband, who witnessed the episode, refers that the loss of consciousness and postural tone, associated with tongue biting, had a short duration, and the recovery was complete and spontaneous, with no confusion or headache. The neurologist required an EEG, which was reported as abnormal because of the presence of "epileptiform discharges" occurring during drowsiness (**Figure 1**). A brain MRI was unremarkable. A diagnosis of probable epilepsy was made, and antiepileptic treatment with lamotrigine started. Low-frequency filter (LFF) CT 0.1 sec., high frequency filter (HFF) 50 Hz, sensitivity 7uV/mm, and paper speed 30 mm/second (each vertical bar = 1 second).

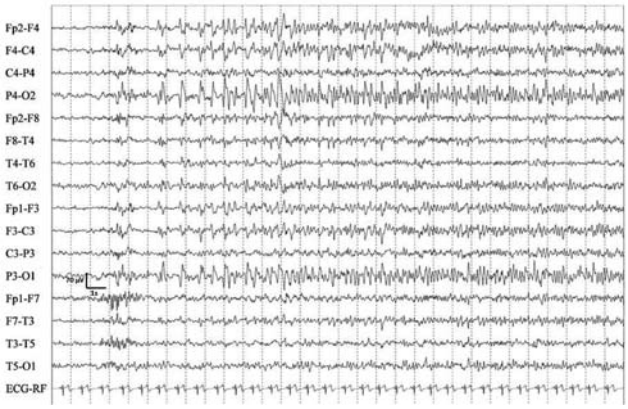

Figure 1 - Patient EEG.

Questions

1. How do you describe the paroxysmal activity?

2. How do you interpret it?

3. How do you differentiate this pattern from "true" epileptiform discharges?

4. What is your final EEG diagnosis?

5. Why are non-epileptic EEG unusual patterns so important during visual analysis of EEGs?

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Answers & Discussion

1. An abrupt onset of monophasic, sharp-contoured theta/delta (3-4 Hz) waveforms, prevalent in amplitude over central and parietal regions that gradually evolve into a sustained rhythmic sinusoidal theta pattern (5-6 Hz). Amplitude is maximal from the onset and remains constant. The average duration of the discharges is 20 seconds. This pattern gradually fades into EEG background activity without post-ictal slowing or changes.

2. The EEG features point to an unusual (benign) pattern, not to a pathological/epileptiform one.

3. Unlike "true" epileptiform discharges, the pattern shown in the figure has no evolution in frequency, morphology, or distribution.

4. This activity may be defined as subclinical rhythmic electrographic discharges of adults (SREDA) because it fulfills typical EEG features of this pattern.[1-3]

5. To alert electroencephalographers against misdiagnosis of epilepsy due to errors in EEG interpretation, such as over-reading an otherwise normal EEG pattern.

The SREDA is an uncommon distinctive rhythmic pattern seen on EEG in subjects older than 50.[1-3] This pattern consists of sharp-contoured or sinusoidal theta waveforms in the theta range (usually 5-7 Hz), which occur in a widespread distribution, often with a maximal expression over the parieto-temporal regions. The activity is usually bilateral, with onset and end that may or may not be abrupt, and usually does not evolve into a different morphology or other frequencies. The average duration of SREDA is usually 40-80 seconds, but it may be less than 10 seconds, or even more than 5 minutes. The SREDA is considered a pattern of uncertain significance, without any correlation with epilepsy,[1-3] although it may resemble epileptiform activity, and is therefore, likely to be misinterpreted as a true epileptiform pattern. As a consequence, it is important to properly recognize this unusual pattern in order to avoid misdiagnosis of epilepsy due to errors in EEG interpretation.

The case presented in this quiz illustrates the serious and common problem of EEG over-interpretation of normal EEG patterns resulting in misdiagnoses of seizures. This may occur especially when the electroencephalographer does not read the EEG blind to patient's history, being therefore influenced and even biased by it (the so-called "history bias"), trying "too hard" to find EEG abnormalities.[4] In this context, normal EEG patterns, such as SREDA, may be erroneously over-read as true epileptiform abnormalities. To reduce such a bias, a relatively blind approach to EEG interpretation has been suggested and recommended,[4-6] provided that the EEG is read by an expert electroencephalographer well aware of the existence and of the EEG features of unusual patterns. A misdiagnosis of epilepsy may have severe consequences: an "abnormal" EEG is too often considered as an irrevocable sentence of epilepsy, leading to an antiepileptic treatment that is not only ineffective, but also expensive, and sometimes harmful for the patient. In conclusion, SREDA is an unusual EEG pattern, which needs to be promptly identified and correctly interpreted in order to avoid misdiagnosis of epilepsy due to errors in EEG interpretation.

References

1. Mushtaq R, Van Cott AC. Benign EEG variants. ***Am J Electroneurodiagnostic Technol*** 2005; 45: 88-101.
2. Niedermeyer E. Abnormal EEG Patterns: Epileptic and Paroxysmal. In: Niedemeyer E, Lopes da Silva F, editors. Electroencephalography: Basic Principles, Clinical Applications, and Related Fields. Baltimore (MD): Williams & Wilkins; 2005. p. 267-268.
3. Blume WT, Holloway GM, Kaibara M, Young GB. Normal EEG. In: Blume WT, Holloway GM, Kaibara M, Young GB, editors. Atlas of Pediatric and Adult Electroencephalography. Philadelphia (PA): Lippincott Williams & Wilkins; 2011. p. 73-74.
4. Benbadis SR. Errors in EEGs and the misdiagnosis of epilepsy: importance, causes, consequences, and proposed remedies. ***Epilepsy Behav*** 2007; 11: 257-262.
5. Brigo F. We should not treat the EEG, but we should read it blind to the patient's history. ***Epilepsy Behav*** 2011; 20: 146.
6. Brigo F. An evidence-based approach to proper diagnostic use of the electroencephalogram for suspected seizures. ***Epilepsy Behav*** 2011; 21: 219-222.