Neurosciences Quiz

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Rhythmic temporal theta bursts of drowsiness: psychomotor variant pattern

Case Presentation

A 10-year-old Saudi girl presented to the out patient department with history of 2 staring episodes. The first was at the age of 8 years. She was sitting having breakfast, and her mother noticed that she was not responding to her call. She had a blank stare that continued for one minute. There was no eye flickering or up rolling. No motor or sensory manifestations were seen. The second attack was 3 months later. She had an occipital headache for 30 minutes then she had the same staring episode. She was unaware of the episodes, and she denied any aura. There was no history of nausea or vomiting. Her developmental history was normal. On examination, she was fully conscious and oriented with normal higher mental function. The cranial nerves were intact, with normal tone, power, and deep tendon reflexes. Gait and coordination were normal, and a sensory exam was normal. An EEG at that time showed a background rhythm consisting of well-organized and well-developed activity of 9-10 Hz, bilaterally synchronous, and symmetrical. There were frequent epileptic discharges in the form of spikes at C3 and Cz. The discharges never became generalized. Hyperventilation was performed well and produced nothing significant. Photic stimulation produced fair driving without any significant asymmetry. An MRI of the brain was normal. She was started on Keppra, and has been seizure free since then. Two subsequent EEGs carried out at 6-month intervals were reported as normal.

Questions

1. What is the background?

2. What is the distribution and frequency of the paroxysmal activity? What is the possible generator?

3. What is your diagnosis?

4. Is it an electrographic seizure of temporal lobe origin? If not, why not?

5. Why is this pattern called a psychomotor variant?

6. The pattern is seen in (choose the best answer): **a**) A newborn baby with intra-ventricular hemorrhage/ leukomalacia. **b**) Ictal onset of partial complex seizure. **c**) Mainly in younger or middle aged adults in relaxed awake and drowsiness. **d**) Patients with symptomatic generalized epilepsy, such as Lennox Gastaut syndrome.

7. What are the mimickers of this pattern?

8. What is its clinical significance?

9. Do epileptic patients develop rhythmic temporal theta bursts of drowsiness (RMTD)?

10. Why are non-epileptic EEG variants so important during visual analysis of EEG records?

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On recent EEG, a 30 minute record showed 33 runs of RMTD activity in the bitemporal regions synchronously and/or asynchronously with right sided preponderance. Three of 12 seconds epochs are shown below (**Figures 1-3**).

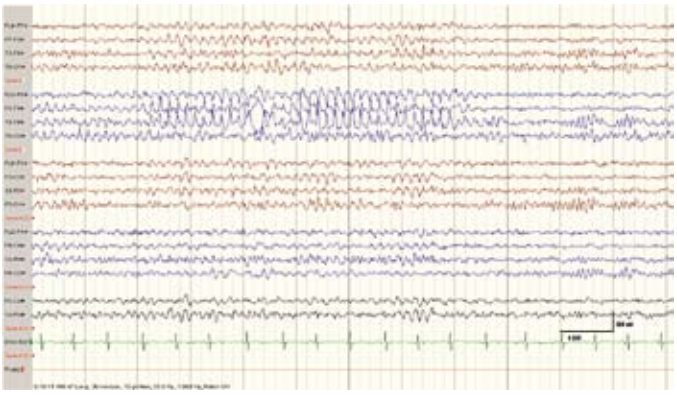

Figure 1 - Shows symmetrical background with a short run of a paroxysmal pattern on the right temporal derivation with some volume conduction on the contra-lateral side.

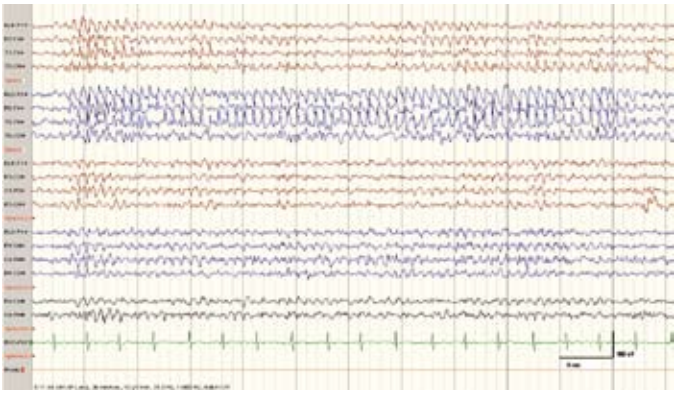

Figure 2 - Shows symmetrical background with more than 10 second runs of a paroxysmal pattern on both temporal derivations with higher amplitude on the right. Note the serrated tops of the waves and relatively lower amplitudes at the onset and offset of the paroxysm.

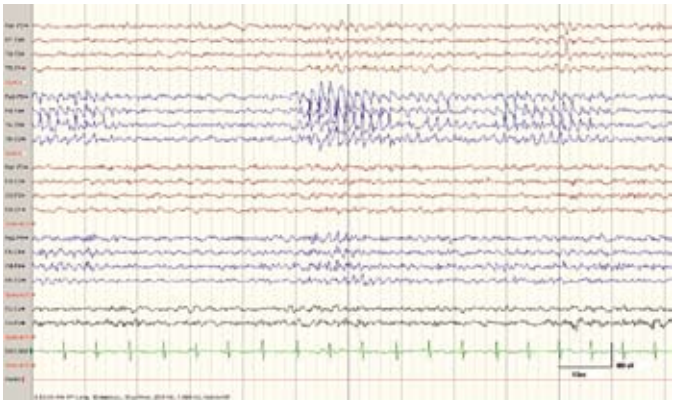

Figure 3 - Patient is in a drowsy state. The EEG shows symmetrical low voltage theta background with short runs of paroxysmal patterns on the right temporal derivation with some volume conduction on the contra-lateral side, and frequent fragmentation of the rhythmic temporal discharges.

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Answers

1. The background consists of well-organized and well-developed activity of 9-10 Hz.

2. The bursts occur on the temporal region maximal amplitude at the mid-temporal electrodes. The frequency is at 6 Hz. The possible generator is the inferior temporal area evidenced by EEG and magneto-encephalographic study.

3. Rhythmic temporal theta bursts of drowsiness is also known as rhythmic mid-temporal theta discharges or psychomotor variant pattern.

4. No, because it is a monomorphic or monorhythmic pattern and it does evolve into other frequencies or waveforms.

5. This rhythmic pattern is seen over the temporal region and resembles psychomotor or temporal lobe seizure discharges.

6. **c**)

7. The mimickers are: slow alpha variant pattern, midline theta rhythm, frontal arousal rhythm and the subclinical rhythmic electrographic theta discharges in adults.

8. There is no clinical significance. The pattern is very much seen in healthy non-epileptic subjects.

9. Most of the studies conclude that RMTD is non-epileptogenic, however, its association in epileptic patients is not unlikely. It has been seen that patients with partial seizure showed resumption of RMTD in the sick cortex with the remission of seizures.

10. To alert electroencephalographers against misdiagnosis of normal EEG variants and unnecessary use of anti-epileptic drugs. Remember, under-reading of an EEG is better than over-reading.

Discussion

The RMTD was initially named the psychomotor variant pattern by Gibbs et al in 1948[1] because of its occurrence in the temporal region and its rhythmic nature. The characteristic features of RMTD are of a burst of rhythmic, sharply contoured waves with notched or flat-topped morphology ranging in frequency from 5-7 Hz. It occurs in the temporal regions, unilaterally or independently over the 2 hemispheres with shifting emphasis from side to side.[2] In our EEG records, the background was 10 Hz (**Figure 1**) and RMTD had a frequency of 6 Hz with a monomorphic appearance, and without evolution to other frequency or waveforms, however, seen mostly asynchronous on the right mid-temporal regions (**Figure 2**). The pattern occurs mainly in younger or middle aged adults, and is also seen in children (**Figure 1**) and adolescents during drowsiness (**Figure 3**). The generator of this pattern is located in the inferior temporal region as studied by current dipole modeling.[3] The RMTD is considered to be a non-specific finding on the EEG, and is thought to be a physiologic rhythm during the transitional stage between wakefulness and deep sleep.[4] Despite its strong paroxysmal appearance in EEG, as seen in **Figure 2**, in our record, the RMTD had no relevance with regards to seizures or other neurological symptoms.[5]

References

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