

Neurosciences Quiz

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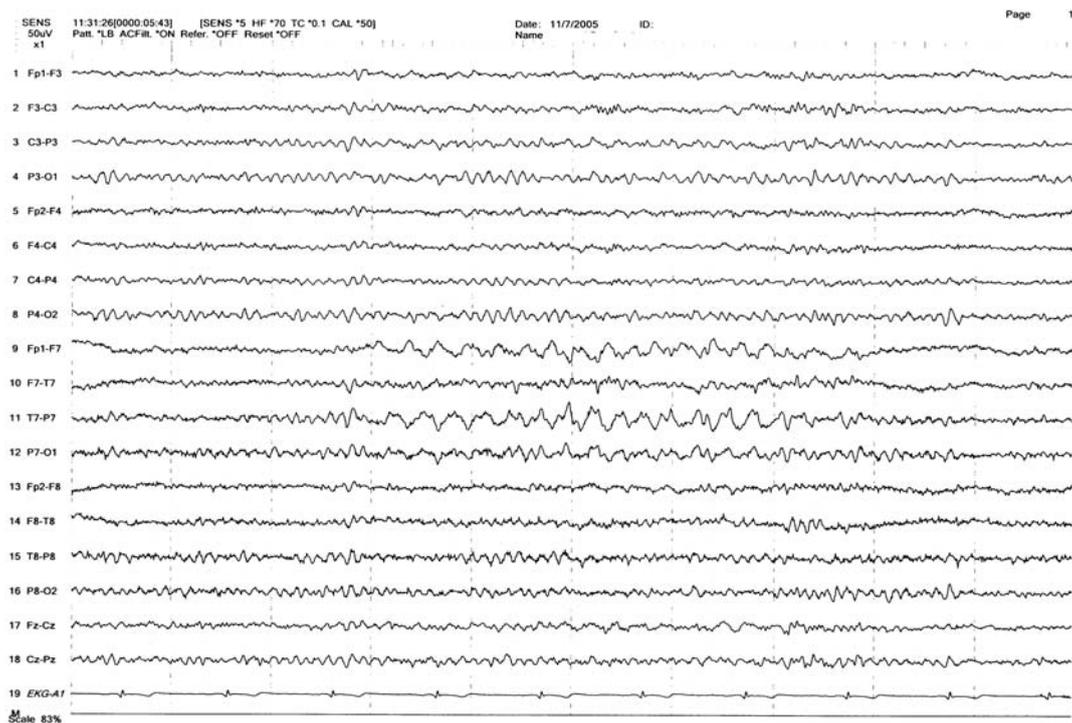
A distinctive EEG pattern

Instructional Objectives

Given a fundamental knowledge of EEG, after studying this quiz the reader should be able to:

1. Apply criteria to identify a distinctive EEG pattern, and
2. Understand its clinical significance.

Before reading the clinical history, carefully examine this EEG segment in a 46-year-old (TC, 0.1 second; HFF, 70 Hz).



Question 1: How would you describe this EEG pattern?

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Brief Clinical History

A 46-year-old man had recurrent episodes of brief loss of awareness, associated with a blank stare (a previous EEG had shown left temporal spikes).

Question 2: If the remainder of the EEG had similar intermittent patterns, what would be your clinical impression?

Assuming that you are familiar with benign EEG variants and nonepileptiform EEG abnormalities, you should be able to answer this question:

Question 3: Which one of the following is an epileptiform EEG pattern (suggests increased risk for seizures)?

- A) 14 and 6 Hz positive bursts (14 and 6 Hz positive spikes)
- B) 6 Hz spike and wave (phantom spike and wave)
- C) Wicket spike
- D) TIRDA (Temporal Intermittent Rhythmic Delta Activity)
- E) FIRDA (Frontal Intermittent Rhythmic Delta Activity)

Answers

1. Left (anterior-mid) temporal, rhythmic, 3 - 4 Hz delta activity.
2. TIRDA (Temporal, intermittent, rhythmic, delta activity) is an interictal epileptiform abnormality that has the same clinical significance as sharp waves or spikes, and suggests increased risk for partial seizures.
3. D (A, B, and C are benign EEG variants, E is a nonepileptiform EEG abnormality).

Discussion

The significance of focal delta activity depends upon whether it is continuous or intermittent, and whether the waveforms are polymorphic (irregular, with variable frequencies and amplitudes) or regular. *Continuous, polymorphic* focal delta slowing usually indicates a focal structural lesion.¹ Such lesions are present in two-thirds of adults with continuous focal polymorphic delta activity.² *Intermittent, polymorphic* focal delta activity reflects nonspecific focal neuronal dysfunction, and is not necessarily epileptiform. By contrast, TIRDA (Temporal Intermittent *Rhythmic* Delta Activity) is a distinct epileptiform EEG pattern.³⁻⁶ TIRDA is an interictal, and not an ictal abnormality. It occurs in only 0.3% of all recordings obtained in a general EEG laboratory, for all indications and disorders.⁷ However, TIRDA occurs in up to 35% of EEGs in patients with a clinical diagnosis of complex partial seizures.⁸ Reiher et al, initially described TIRDA in the 1987 Meeting of the American EEG Society, but his paper was not published until 1989.⁸ The authors considered TIRDA as an accurate indicator of partial seizures. Their patient population consisted of 115 consecutive patients with complex partial seizures, without identification of the EEG focus. No patient exhibited clinical seizure activity during runs of TIRDA. Between seizures, TIRDA generally occurred ipsilateral to a unilateral temporal spike focus, and was present in 34 of 127 (27%) awake recordings, and 45 of 127 (35%) of sleep recordings in patients with partial epilepsy. It usually occurred as trains of 50-100 microvolt, sinusoidal or saw-toothed 1-4 Hz activity, recorded predominantly from anterior temporal regions. TIRDA often occurred in association with anterior temporal spikes or sharp waves, particularly during sleep; this was observed in 43 out of 45 EEGs. It was present as an isolated abnormality in 2 sleep, and 12 awake recordings.⁸ Normand et al,⁷ confirmed the above findings in 1995. Of 12,198 EEG recordings performed at the Mayo Clinic, 33 records from 27 patients (18 women and 9 men; mean age, 41.5 years) showed TIRDA. All the patients were diagnosed as having

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clinical seizures, and complex partial epilepsy was well documented in 23 of the patients who demonstrated focal temporal sharp waves or spikes. Four patients had TIRDA but no other epileptiform activity, although 3 earlier EEGs in 3 of these patients did contain spikes or sharp waves. Although TIRDA may be seen in extratemporal lobe epilepsy, in the vast majority of cases, TIRDA correlates with temporal lobe epilepsy (TLE); mesial TLE being much more likely than lateral TLE.^{9,10} In summary, TIRDA strongly suggests focal, localization related, epilepsy (most likely originating from the temporal lobe). It only occurs infrequently in extratemporal lobe epilepsy.⁹

Teaching Points

1. TIRDA should be identifiable as intermittent, rhythmic, delta activity focal to a temporal lobe.
2. Interictal TIRDA is a strong indicator of focal (most likely mesial temporal lobe) epilepsy.

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