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SLEEP MEDICINE PEARLS

A 7-Year-Old Boy with Intractable Seizures and Snoring

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The patient is a 7-year old with history of Lennox-Gastaut syndrome (LGS) and autism spectrum disorder associated with 22q21.3 deletion of unknown significance. He presented for evaluation of mild snoring. He was diagnosed with LGS at 2 years of age. He has multiple seizure types (tonic, atonic, generalized tonic-clonic and absence) as frequently as 20–30 times per day. His medications included levetiracetam 900 mg BID (55 mg/kg/day), valproate 625 mg BID (40 mg/kg/day), clobazam 20 mg BID, topiramate 100 mg BID (6 mg/kg/day), melatonin 3.5 mg QHS glycopyrrolate 1,200 mcg TID, and multivitamins in addition to ranitidine 105 mg BID and albuterol as needed.

Review of systems (ROS) was positive for eczema, gastroesophageal reflux, snoring, and daytime sleepiness. ROS was negative for shortness of breath, witnessed apnea, or wheezing. On physical examination his weight was 32.6 kg (99th percentile) and his height was 118.2 cm (20th percentile). He appeared alert and awake. The airway was Mallampati type IV, tonsil size was 1+. He had generalized hypotonia with normal reflexes. The cardiopulmonary exam was normal.

Diagnostic polysomnogram (PSG) revealed a total sleep time (TST) of 497 minutes (**Figure 1**); sleep efficiency was 99%; sleep latency was 0.5 minutes. The apnea-hypopnea index (AHI) was 0.8. There was no hypoxemia or hypercapnia. Fast, high amplitude waves were seen during NREM sleep as depicted in **Figure 2**.

QUESTION: What are these frequent high amplitude fast frequency waves?

Figure 1—5-minute epoch showing 4 episodes of repetitive fast activity every 2–3 minutes.

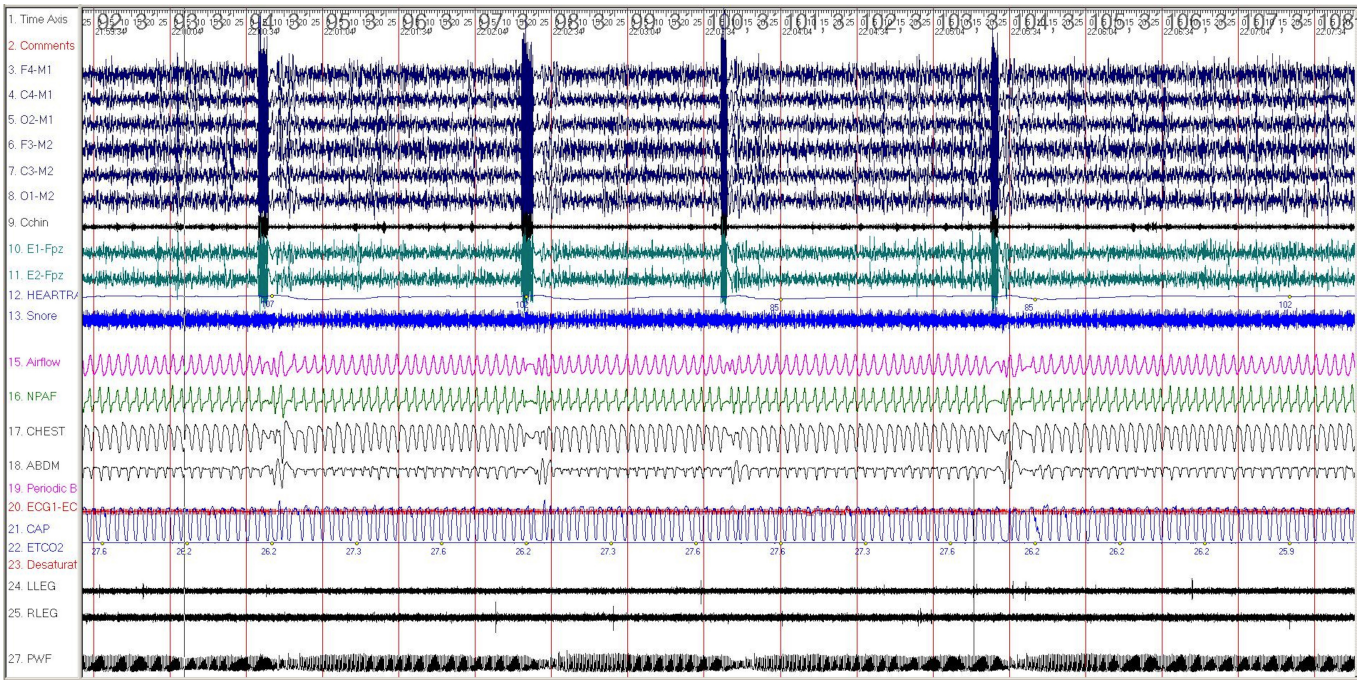
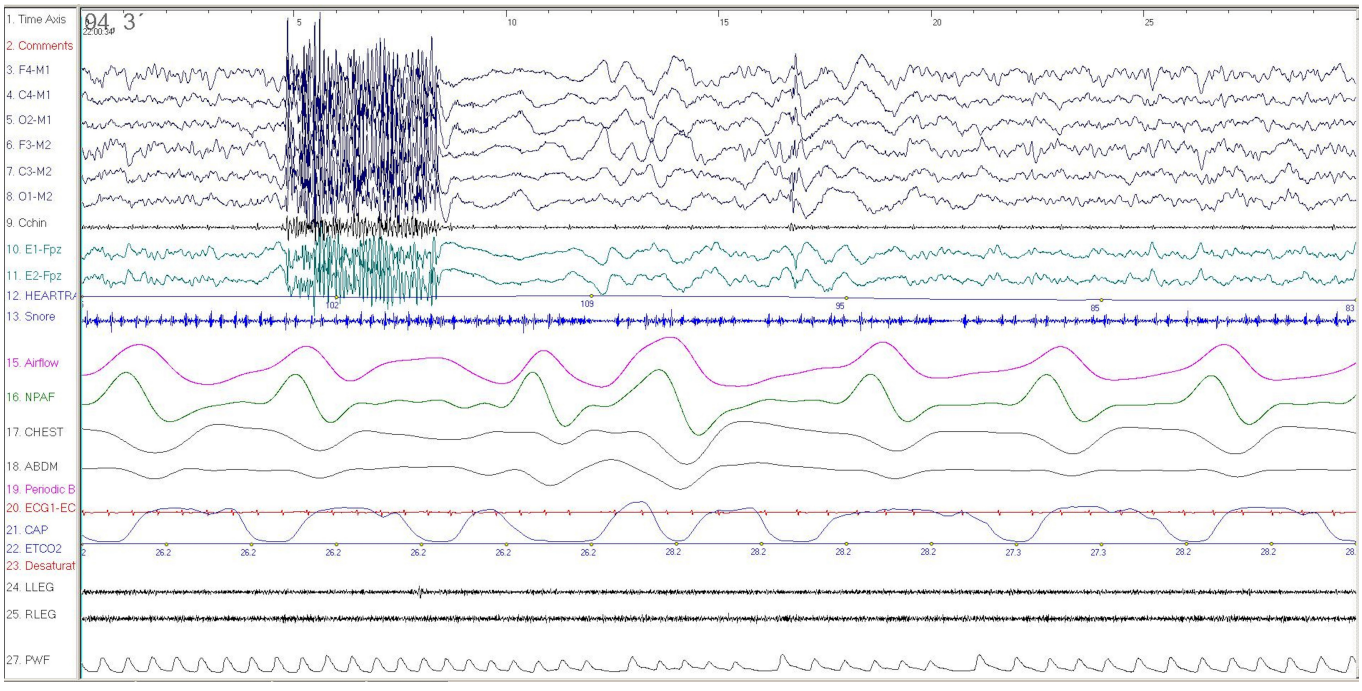


Figure 2—30-s epoch shows high amplitude fast activity on all EEG leads followed by slow waves.



ANSWER: The discharges are examples of "generalized paroxysmal fast activity" (GPFA) commonly seen in patients with LGS.

DISCUSSION

LGS is a type of severe childhood epilepsy characterized by multiple different types of seizures including tonic, tonic-clonic, atypical absence, and atonic seizures.[1] The onset of LGS is typically before the age of 8 years, with peak onset age between 3 and 5 years. LGS is seen in up to 10% of children with epilepsy. LGS is considered an epileptic encephalopathy, as it is associated with significant cognitive impairment.[2]

The interictal EEG of patients with LGS shows frequent runs of 1.5–2.5 Hz diffuse slow spike-and-wave (SSW) activity, and intermittent bursts of generalized paroxysmal fast activity (GPFA). GPFA, initially described only in patients with LGS, consists of bursts of generalized rhythmic discharges, (with a frequency 8–26 Hz, usually lasting 2–50 seconds, and with an amplitude of 100–200 microvolts), appearing almost exclusively during NREM sleep.[3] **Figure 3** shows GPFA in our patient in a 10-second epoch.

The usual spike and wave complex typically characteristic of epileptiform discharges, is postulated to have both an excitatory (spike) component and an inhibitory (slow) component. GPFA have been postulated to originate secondary to a breakdown of the inhibitory component of the spike-wave discharge which is mediated by GABA.[3]

Although GPFA should remain an important diagnostic feature of LGS, there are case reports that clearly demonstrate that these high frequency waves could represent an electrographic variant in some generalized epilepsies with atypical features and better outcomes compared to LGS.[4] Asymmetric GPFA has also been seen in intractable localization-related epilepsy.[3]

Our patient did not have sleep-disordered breathing. He was referred back to neurology for continuing management of his seizures. A subsequent overnight video EEG showed no clear waking background, multifocal and generalized spike wave activity including slow spike-wave discharges at 2–2.5 Hz, with frequent runs of GPFA during sleep, one of which was associated with a clinical-electrographic seizure (head drop).

SLEEP MEDICINE PEARLS

1. Lennox-Gastaut Syndrome (LGS) is a type of severe childhood epilepsy characterized by multiple different types of seizures and significant cognitive impairment.
2. The interictal EEG in LGS commonly shows intermittent bursts of GPFA particularly during NREM sleep.
3. GPFA during NREM sleep is not considered pathognomonic for LGS, as it may be seen with generalized epilepsy with atypical features as well as intractable localization related epilepsy in an asymmetric distribution.

CITATION

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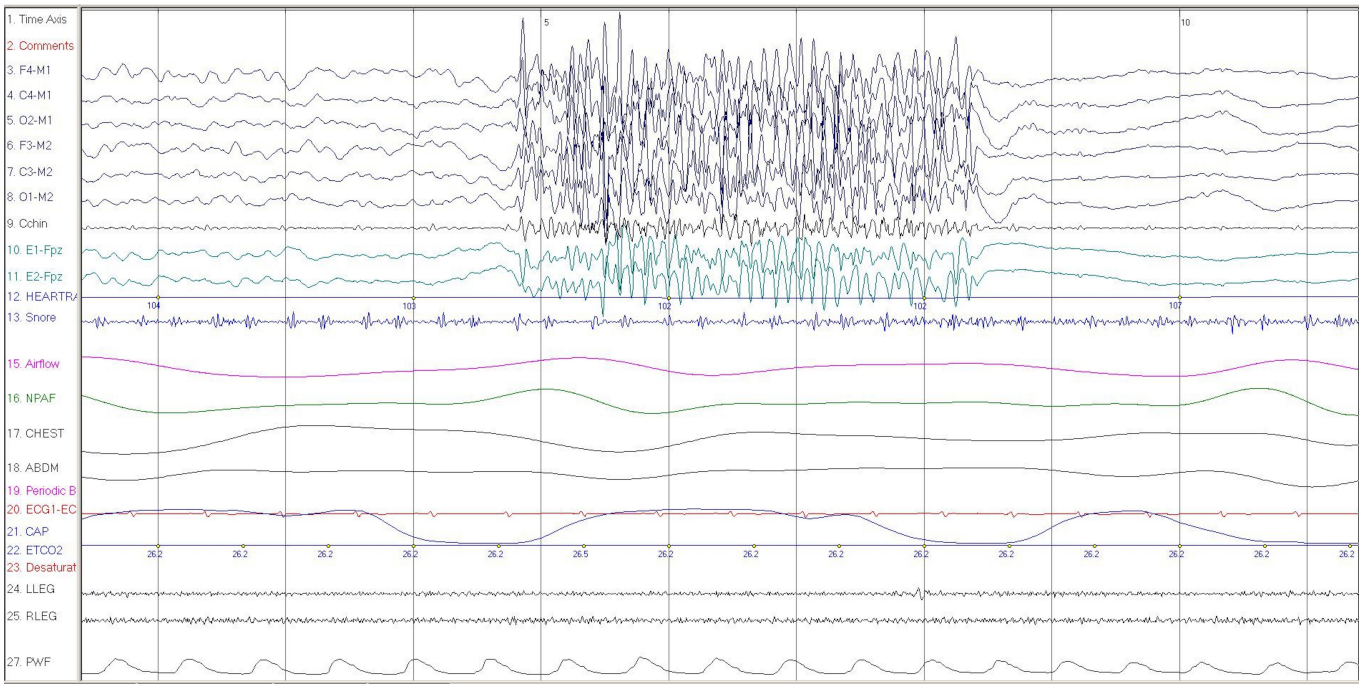
Figure 3—A 10-s epoch shows a 3.5-s burst of GPFA of approximately 16 Hz.



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DISCLOSURE STATEMENT

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