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January 2023 Sleep Case of the Month: An Unexpected EEG Abnormality

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A 46-year-old woman was referred because of snoring, observed apnea, and daytime hypersomnolence. Her Epworth Sleepiness Scale was 9 out of 24. She was slightly overweight but otherwise her physical examination was normal. An overnight polysomnography was requested but denied by her insurance company.
What should be ***done at this time***?

1. An at home sleep study
2. ENT referral
3. Reassurance
4. 1 and 3
5. All of the above

Correct!
4. 1 and 3

Many insurance companies will deny an overnight polysomnography (an in-lab sleep study) when an Epworth Sleepiness Scale is below a certain value, usually 10 (1). This was the case here. In order to get some documentation of sleep disordered breathing she had an at home sleep study performed which revealed an apnea-hypopnea index (AHI) of 8 events per hour which is consistent with mild OSA (2). Some might recommend an ENT referral but this is usually unnecessary unless there is a fairly obvious problem. She was reassured but wanted treatment for her daytime hypersomnolence.
What should be ***done at this time***?

1. Treat with an oral appliance
2. Treat with modafinil
3. Treat with CPAP
4. 1 or 3
5. All of the above

Correct!
4. 1 or 3

Treatment for mild obstructive sleep apnea (AHI<15 events/hour) should consider the severity of presenting symptoms and patient preferences. Therapeutic options include:

- No specific treatment except good sleep hygiene and observation for progression of symptoms;
- Sleep position training;
- Weight loss if appropriate;
- Moderate to vigorous physical exercise if appropriate;

- Nasal decongestion if appropriate;
- Avoidance of alcohol and sedating medications or substances at bedtime;
- Oral appliances;
- Positive airway pressure devices;
- Various surgical procedures;
- Avoid alcohol and sedatives;
- Myofunctional therapy (oropharyngeal exercises).

Although patients with mild OSA may not improve with CPAP, there are many exceptions (4). Weight loss of even 10% can improve the AHI (5). Moderate to vigorous exercise has been shown to independently be associated with improvement in OSA (6). Treating nasal congestion, avoidance of alcohol, and good sleep hygiene habits may also be helpful. Positional therapy is reasonable. An oral appliance is also reasonable but can be expensive. Treatment with modafinil is probably not appropriate until other therapies have failed.

Because her AHI was abnormal, her insurance company was willing to pay for CPAP and she opted for that. She was begun on nasal CPAP with variable pressure of 5-15 cm H2O. She returned for her 6-week follow-up appointment but had been switched to a full-face mask because the tech who fitted her CPAP felt she was a "mouth breather". She had faithfully used the CPAP but neither her daytime somnolence nor her AHI had improved.

What should be ***done at this time?***

1. Overnight polysomnography
2. Switch her CPAP to a nasal mask
   Verify her CPAP compliance with a download from her device
3. 1 and 3
4. All of the above

Correct!
4. 1 and 3

Switching masks may help compliance but we know of no data that switching from one mask to another improves symptoms or AHI. Patients who self-report nightly CPAP use often inaccurately assess their compliance with therapy. Before assuming a patient is compliant with therapy, objective documentation is required not only for clinical purposes, but is necessary for insurance reimbursement. Modafinil or another wake promoting agent is indicated only if there is no alternative explanation of her hypersomnolence. Because she had not responded to CPAP, her insurance company was willing to allow an overnight polysomnography (Figure 1).

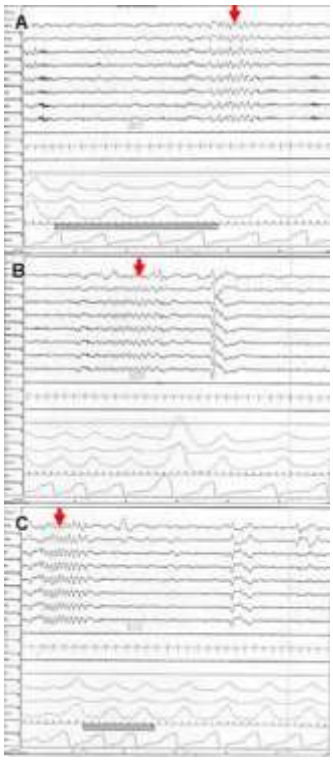

Figure 1. Representative samples of the patient's overnight polysomnography. Areas of interest are indicated by red arrows. To see Figure 1 in an enlarged separate window click here.

Commented [QSF(1]:
Tracings are too small to read

The sleep tech noted no snoring or apneas during the sleep study. Her electroencephalogram while awake was normal.

Which of the following is ***shown in the polysomnography tracings?***

1. Frontal intermittent rhythmic delta activity (FIRDA)
2. Frontal seizure activity
3. Slow eye blink artifact
4. 1 or 3
5. Any of the above

Correct!

4. 1 and 3

Frontal intermittent rhythmic delta activity (FIRDA) was originally described by Cobb in 1945 (4). FIRDA is a rhythmic 2 to 3 Hz delta frequency activity with an amplitude of 50–100 mv that predominates in the bilateral frontal regions of the adult electroencephalogram (EEG) (5). The waves are usually regular with a sinusoidal pattern. FIRDA usually occurs in short bursts lasting 2 to 6 seconds and must be differentiated from slow eye blink artifact. The electrooculogram (EOG) electrodes can aid in the differentiation of the two. FIRDA, unlike eye blink artifact, may have posterior field extension. It is attenuated by alerting or eye opening and accentuated by eye closure, hyperventilation, drowsiness, and stage N1 sleep. It disappears with the onset of Stage N2 sleep but may reappear during REM sleep. In our patient, alerting and eye opening did not reproduce the EEG pattern. No history of seizure activity was obtained and no seizures were observed during the polysomnography while the EEG was being recorded.

What are potential ***causes of FIRDA?***

1. Deep structural abnormalities
2. Increased intracranial pressure
3. Metabolic encephalopathies
4. Toxic encephalopathies
5. Any of the above

Correct!

5. Any of the above

A variety of pathological processes may result in FIRDA, it is a nonspecific finding. In particular, increased intracranial pressure of any cause, tumors, and systemic toxic and metabolic disorders including hyperglycemia, and renal and hepatic failure may be responsible (5). There is no association between FIRDA and seizures. Although the exact pathophysiological significance of FIRDA is uncertain, in otherwise normal individuals a search for underlying pathology should be undertaken (5).

Our patient had negative brain CT and MRI scans. She had no history of diabetes, hyperglycemia, renal disease or hepatic disease. Her daytime hypersomnolence is being managed with good sleep hygiene and strategic napping.

Final diagnosis: overnight polysomnography showing frontal intermittent rhythmic delta activity (FIRDA).

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