Activation Procedures, Part III

Sleep

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Spontaneous sleep and sleep deprivation are both potent activators of epileptiform (spikes and/or sharp waves) activity. With a relaxed approach by the technologist and a comfortable recording environment, the patient may drift into spontaneous sleep. If spontaneous sleep is not achieved, an EEG with sleep deprivation is frequently ordered after a normal awake EEG or an awake EEG with inconclusive findings such as ill-defined transients. The duration of the sleep deprivation will vary according to the patient's age. Adults are often kept awake all night or restricted to four hours of sleep along with abstinence from caffeinated beverages. Infants and toddlers have the EEG scheduled around their naptime. Older children are usually kept up until midnight and awaken at 4AM with the EEG scheduled early in the day.

Sedation for sleep is rarely necessary if proper sleep deprivation and scheduling are used. Follow your healthcare facility's policies and procedures regarding sedation. Anesthesiologists, nursing, or anesthesia personnel with appropriate qualifications must be present to administer sedation. Please see ASET's Electroneurodiagnostic Technologists Administering Sedation policy at www.aset.org under Best Practices.

Sleep, whether obtained spontaneously, by sleep deprivation, or by sedation, elicits both generalized and focal epileptiform discharges with focal discharges being elicited most frequently *(see spike at C3 in Fig. 1)*. Any patient with suspected seizures should have an EEG that includes stage 1 and stage 2 sleep. Sleep deprivation alone is activating and epileptiform discharges often appear even when the patient is awake and increase as the patient drifts into sleep.

The technologist must be alert for the EEG changes seen with drowsiness and light sleep. Delay hyperventilation and photic stimulation until the end of the recording if the patient drifts to sleep at the onset. Performing hyperventilation early in the recording may help to relax the anxious patient and to obtain sleep. When performing a portable EEG, inform nursing staff, visitors, and roommates that you need quiet to obtain a sleep tracing.

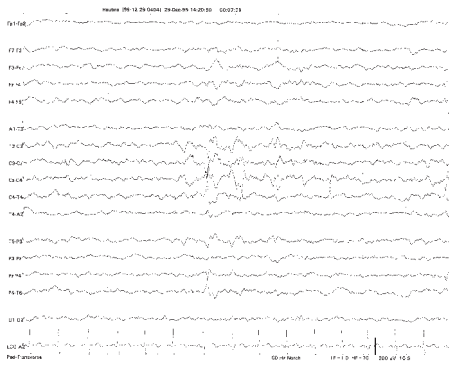

Figure 1

If the patient is drowsy or asleep during most of the EEG, it is imperative for you to fully alert the patient at some point during the EEG. Otherwise, the patient's drowsy background, which could be at 6 to 7 hertz, may be interpreted as her awake background. The EEG report will state that the patient had a slow background when the patient was never fully alerted to assess an awake, eyes closed background.

Many of the normal variants appear during stage 1 and stage 2 sleep. 14 and 6 hertz positive spikes, rhythmic midtemporal discharges (RMTD), 6 hertz phantom spike and wave, benign epileptiform transients of sleep (BETS), and wickets are all "brought out" by stage 1 and stage 2 sleep.

Benign rolandic epilepsy, also known as benign epilepsy with centrotemporal spikes and benign epilepsy of childhood with central-midtemporal spikes (BECTS), occurs in 16% to 24% of children with epilepsy. In up to one-third of these patients the spikes are seen only during sleep. Sleep enhances the central-midtemporal discharges *(see Fig. 2)*. The epileptiform discharges seen with benign rolandic epilepsy occur either as isolated discharges or as runs of repetitive spikes

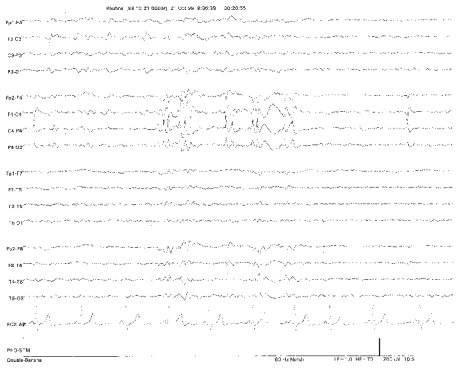

Figure 2

with the runs being more common during sleep. The epileptiform discharges are of higher voltage and have more extensive fields during sleep. After arousal the epileptiform discharges attenuate and may completely disappear. The awake EEG background activity is normal. So it is essential to record stage 1 and stage 2 sleep in a child with nocturnal seizures to search for benign rolandic epilepsy.

Landau-Kleffner syndrome is characterized by acquired aphasia and with epileptiform activity on the EEG. Epileptiform discharges can be variable in both location and amount. In the early stages of the syndrome, epileptiform discharges may be limited to sleep. Spike wave activity that is almost continuous during slow wave sleep has been seen in patients with Landau-Kleffner syndrome. This activity resembles the continuous spikes and waves during slow sleep (CSWS) pattern. A full night's sleep study is often performed on children suspected of Landau-Kleffner syndrome to obtain the deeper, slow wave stages of sleep.

Frontal intermittent rhythmic delta activity (FIRDA) is dependent on the patient's arousal level. FIRDA can be seen in the fully alert patient or below stage 1 but is not seen in both in the same patient. FIRDA seen in the fully alert patient will disappear as the patient becomes drowsy. FIRDA seen in the sleeping patient will disappear when arousal and eye opening occurs.

Waking records, especially in young children, may be obscured by muscle and movement artifact. As the patient drifts off to sleep the artifacts disappear and the symmetry and synchrony of the EEG can be evaluated. ●

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