

Current Literature

In Clinical Science



The Relationship Between Nocturnal Discharges and Language Dysfunction in Rolandic Epilepsy: Treat the Child, Not the Adage

Reading Performance in Children With Rolandic Epilepsy Correlates With Nocturnal Epileptiform Activity, but Not With Epileptiform Activity While Awake.

Ebus SCM, Overvliet GM, Arends JBAM, Aldenkamp AP. *Epilepsy Behav* 2011;22:518–522.

OBJECTIVE: An association between language impairment and rolandic epilepsy is frequently reported. This impairment could be correlated with the amount of nocturnal epileptiform activity. **METHODS:** We retrospectively analyzed 26 children with rolandic epilepsy and/or rolandic spikes. All had undergone a 24-hour EEG and neuropsychological assessment within 2 weeks. Reading performance (reading words and sentences) and intelligence were measured. **RESULTS:** There was a significant negative correlation between amount of nocturnal epileptiform activity and reading sentences $R = -0.525$ ($P = 0.008$). There was a trend in this correlation for reading words $R = -0.398$ ($P = 0.054$). We found a negative correlation between amount of nocturnal epileptiform activity and Verbal IQ ($R = -0.51$ $P = 0.08$). No correlation was found between reading performance or Verbal IQ and amount of diurnal epileptiform activity. **CONCLUSIONS:** Reading performance is impaired in children with rolandic epilepsy and is correlated with the amount of nocturnal epileptiform activity.

Commentary

One of the most commonly cited “principles” of childhood epilepsy management is the concept of “treating the child, not the EEG.” The implied meaning is that treatment decisions should be made with the idea that the benefit of treatment should be greater than the potential adverse effects or that it is the overall quality of life that should be considered, not a diagnostic feature. However, there are some commonly accepted exceptions to this “rule” such as absence seizures as part of the childhood absence epilepsy syndrome, electrical status epilepticus during sleep (ESES), and hypsarhythmia associated with epileptic spasms. The implication is that epileptiform abnormalities (spikes, sharp waves, electrographic seizures) are different than diagnostic features such as age of onset, sex, or etiology and different from a comorbidity such as attentional and behavioral problems. Rather, the implication is that the electrical abnormality is *causal* to an associated problem. The problems discussed include inducing more seizures (kindling), doing brain damage (excitotoxicity), and inducing a cognitive or behavioral decline or both (epileptic encephalopathy).

Impairments of the various domains of language can be considered a specific subset of the epileptic encephalopathies. The evidence that seizures and epileptiform discharges have

a negative impact on language function, with an emphasis on rolandic epilepsy (RE), was recently the subject of a comprehensive review (1). It should be noted that the Landau-Kleffner syndrome (LKS) and ESES are also raised as examples of epilepsy syndromes that have epileptiform discharges while asleep and language/cognitive features as part of the syndrome definition.

The most relevant literature can be approached from at least two perspectives. The frequency of interictal, nocturnal epileptiform discharges in children with language impairment who do not have epilepsy has been reported to range from 13 to 94 percent (1), with the large variance likely explained by the specific language impairments, duration of EEG (routine with sleep versus prolonged), and degree of intellectual disability. The frequencies of nocturnal discharges reported are clearly elevated beyond general population numbers when compared with controls performed in some of the studies. Another approach is to consider the occurrence of language impairments in children with RE. This is set against the backdrop of the label “benign” applied to RE that was formerly considered a defining feature implying age-related resolution, few seizures, pharmaco-responsiveness, and lack of neurocognitive comorbidities. It has been clearly demonstrated that children with RE are subject to several types of language impairments, including problems with reading expression and comprehension, spelling, sound/phonologic, and vocabulary (2–7). These recent studies are methodologically sound with appropriate control populations.

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The link between nocturnal discharges and language impairment has recently been provided by Ebus et al. in a study in which a well-defined population of 26 children (6–12 years old, IQ >70, no comorbid neurologic or MRI abnormalities) with seizures and EEG findings consistent with RE were studied. Approximately 75% had less than one seizure per 2-month period, and 65% were treated with a single antiepileptic drug (AED). The amount of epileptiform activity in the first sleep cycle of a 24-hour ambulatory EEG was put into the following categories: none, <1%, 1 to 10%, 10 to 50%, or 50 to 85%. Reading performance was measured by standardized Dutch tests of reading words and sentences. It was found that the extent of EEG abnormalities and language testing scores were significantly correlated (more discharges, lower language test scores) with a moderate degree of association (Spearman, $R = -0.525$, $p = 0.008$). Furthermore, a lower verbal IQ (WISC-RN, WISCIII) was associated with increased amounts of nocturnal epileptiform discharges. In contrast, there was no relationship between language measures and baseline seizure frequency, use of AEDs, or association with discharges in the awake state.

Thus, the relationship between nocturnal epileptiform discharges and language dysfunction in RE has become increasingly difficult to deny. The question now is what, if anything, to do about it? Should an attempt be made to decrease the nocturnal discharges, and if the answer is “yes,” then to what degree? Also, “yes” implies the requirement of repeating the EEG and language testing to determine the effect of therapy. An overnight EEG study may not be required as the frequency of discharges noted during a routine EEG with sleep onset compares favorably to recording all stages of sleep (8). Although the frequency of nocturnal epileptiform discharges was not the primary outcome measure, a small number of studies have suggested that AEDs may improve language function in RE with use of valproic acid (9) and levetiracetam (10). However, one study demonstrated a decrease in central temporal discharges and language skills with the use of sulthiame (11).

There is now significant evidence that the nocturnal interictal discharges, which are a defining feature of RE, may have a direct relationship to the language impairment found in many children with this common epilepsy syndrome. An alternative hypothesis is that the discharges are a manifestation of an underlying process that gives rise to the electrical and functional abnormalities. Further studies that carefully examine the functional consequences of epileptiform discharges in RE and the response to treatment are required. We should consider adding RE to the list of exceptions to the adage “Treat the child, not the EEG.” It may be that the EEG should be thought of as a part of

the child that provides a unique window into functional activity of the brain and not simply a contributory laboratory finding.

by Jeffrey R. Buchhalter, MD, PhD

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