

EVIDENCE FOR FUNCTIONAL IMPAIRMENT BUT NOT STRUCTURAL DISEASE IN BENIGN ROLANDIC EPILEPSY

Is Rolandic Epilepsy Associated with Abnormal Findings on Cranial MRI? Boxerman JL, Hawash K, Bali B, Clarke T, Rogg J, Pal DK. *Epilepsy Res.* 2007;75(2-3):180-185. Rolandic epilepsy (RE) is designated an idiopathic epilepsy syndrome, and hence no lesional abnormalities are expected on MRI exam. Recent reports suggest that MRI abnormalities are not only common, but may be specific for temporal lobe epilepsy, and lateralized to the side of EEG discharges. However, no controlled study has been performed to test the hypothesis of association between MRI abnormalities and Rolandic epilepsy. We performed an unmatched case-control study to test the hypothesis of association between MRI abnormalities and Rolandic epilepsy, using 25 typical RE cases and 25 children with migraine. Two independent examiners rated the MRIs for abnormalities. Examiners were blinded to the study hypothesis and identity of case and control exams. Fifty-two percent of RE exams contained at least one abnormality: peri/hippocampal abnormality (one case), non-localized congenital malformation (seven cases), subcortical parenchymal hyperintensities (two cases), periventricular parenchymal hyperintensities (one case), dilated perivascular spaces (six cases). There was no difference between the number or type of abnormalities in cases and controls. No type of abnormality lateralized to the hemisphere from which the EEG spikes emanated. The odds ratio of association between MRI abnormalities and RE was 0.87, 95% CI: 0.18-4.33 after adjusting for potential demographic and technical factors. We conclude that routine cranial MRI abnormalities are common in RE, but no more common than in controls, and not specific for RE.

Memory and Phonological Awareness in Children with Benign Rolandic Epilepsy Compared to a Matched Control Group. Northcott E, Connolly AM, Berroya A, McIntyre J, Christie J, Taylor A, Bleasel AF, Lawson JA, Bye AM. *Epilepsy Res.* 2007;75(1):57-62. **PURPOSE:** In a previous study we demonstrated children with Benign Rolandic Epilepsy have normal intelligence and language ability. However, difficulties in verbal and visual memory and aspects of phonological awareness were found compared to normative data. To address the methodological limitations related to the use of normative data, we compared the same cohort of children with Benign Rolandic Epilepsy to a matched control group. **METHOD:** Controls ($n = 40$) matched on age and gender to the Benign Rolandic Epilepsy cohort underwent neuropsychological assessment. The life functioning of the control group was assessed using a modified version of the Quality of Life in Childhood Epilepsy Questionnaire (QOLCE). **RESULTS:** The study confirmed the previous findings of memory and phonological awareness difficulties. In addition, the children with Benign Rolandic

Epilepsy had significantly lower IQ scores than the matched control group. Paired sample *t*-tests showed that on 8 of 11 QOLCE scales, children with Benign Rolandic Epilepsy were rated by parents as having poorer life functioning compared to matched controls, including lower parental ratings on the subscales of memory and language. **DISCUSSION:** Benign Rolandic Epilepsy has an excellent seizure prognosis, but this study further emphasizes potential cognitive difficulties. Using an age and gender matched control group, the previous findings of memory and phonological awareness difficulties were validated. These problems in cognition were also identified by parents of children with Benign Rolandic Epilepsy as problematic and impacting upon the child's quality of life.

COMMENTARY

Benign rolandic epilepsy (BRE), also called benign childhood epilepsy with centrotemporal spikes, is the prototype of an idiopathic localization-related epilepsy. It has wide-ranging clinical and biological importance because: (1) it is the most common idiopathic localization-related epilepsy, (2) it is a focal epilepsy that is transient, resolving by 14 years of age, (3) the epileptic focus is in the motor and language area, and (4) it presents the paradox of typically having frequent interictal epileptiform discharges despite infrequent seizures.

The fundamental abnormality in BRE is a focal one—located in the rolandic region. Although it is unlikely, focal structural changes could be the cause of the underlying neurophysiological abnormality; alternately, changes could result from repeated focal seizures there. Therefore, it is reasonable to consider whether there is evidence of focal structural disease. Subtle MRI changes have been reported in other idiopathic epilepsies. For instance, decreased gray matter volume and thalamic atrophy have been reported in juvenile myoclonic epilepsy (1).

The study of structural changes in idiopathic epilepsies is plagued by methodological problems. These difficulties are especially acute in studying children, because less is known about variations of normal MRI and brain structure changes throughout early childhood. Structural abnormalities have been identified in prior case series of BRE patients. However, structural abnormalities are found in approximately 20% of normal children, so it is possible that the rate reported in BRE is no greater than in the normal population. Boxerman and colleagues recently addressed this issue: they performed a hypothesis-driven, case-control MRI study of 25 BRE patients and compared them with 25 controls, composed of pediatric migraine patients. Blinded MRI interpretation by two board certified neuroradiologists identified abnormalities in 53% of the children with BRE, which consisted of only dilated perivascular spaces, a variant of normal, in 30%, leaving 23% with commonly accepted abnormalities. However, they found a similar rate of abnormalities in controls, without detecting trends for greater occurrence of any particular abnormality. Furthermore, the abnormalities identified were primarily of the type that does not cause epilepsy, including posterior fossa cysts and white matter hyperintensi-

ties. This study offers compelling evidence against the presence of conventional MRI abnormalities in BRE.

Boxerman and colleagues did not perform any measurements, such as volumetry or voxel-based morphometry, leaving open the possibility that subtle changes in regional cortical thickness or other mild abnormalities exist in BRE, as has been reported in idiopathic generalized epilepsies. Such findings would not be of clinical importance but would have important biological implications. However, it would be surprising to find any type of structural disease in BRE, as brain structure is considered to be stable after early childhood, while BRE is transient. It also is unlikely that structural changes would develop during BRE and then resolve or that structural changes would persist while the epilepsy resolves.

There has been debate over whether BRE is actually “benign.” In some ways it is quite obviously benign. It is not progressive; the natural history is that seizures universally abate. Seizure frequency is usually low, and children are cognitively normal by routine neurological examination, giving the false appearance that it has a benign impact on patients' lives.

The lack of structural changes in BRE does not preclude the presence of functional changes that might accompany epileptic cortex. Interictal spiking can be so frequent in BRE as to raise a concern that it is impairing cortical function, yet cognition is not obviously impaired on routine neurological examination. This casual observation has been the basis for the argument that BRE does not have a malignant impact on patients' lives. However, there are a growing number of formal psychometric studies identifying mild dysfunction in tests specifically related to language and attention (2,3). These studies have not necessarily demonstrated lower IQ scores, which is probably why cognitive deficits are not detected on routine neurological examination. Many of these studies do not incorporate matched controls, because they use common standardized tests that are expected to identify differences from established norms.

Northcott and colleagues used 40 matched controls instead of standardized norms in a recent study designed to identify mild, but potentially important, impairments in 42 BRE patients. Almost all scores fell in the normal range, but IQ scores from the Wechsler Intelligence Scale for Children, Third Edition were more than 10 points lower for BRE patients than controls, and poorer performance also was evident on tests of memory and language as well as quality-of-life assessment. The

methodology of this study is carefully considered and the results are robust. Thus, it seems likely that BRE is associated with lower IQ and somewhat specific defects in language (e.g., “phonological awareness”), but patients, on average, perform within a normal range and, thus, would not be detectable by routine neurological examination.

Overall, these studies show that there is little evidence that structural brain disease is present in BRE. However, there is evidence that BRE is associated with mild, specific functional cognitive effects. Children with BRE who have difficulties in school or in social functioning should have formal neuropsychometric testing to identify specific problem areas, so specific interventions can be implemented. Although a preliminary study suggests these deficits resolve, further research is needed to determine whether cognitive changes in patients with BRE persist into adulthood or are transient, analogous to the natural history of seizures in this condition (4).

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References

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