Localizing value of ictal SPECT is comparable to MRI and EEG in children with focal cortical dysplasia.

Abstract

PURPOSE: To assess the predictive value of ictal single-photon emission computed tomography (SPECT) for outcome after excisional epilepsy surgery in a large population of children with focal cortical dysplasia (FCD).

METHODS: One hundred seventy-three ictal SPECT studies in 106 children with histologically proven FCD were retrospectively analyzed. The extent and location of ictal hyperperfusion and completeness of surgical removal were assessed. Completeness of resection of epileptogenic regions defined by ictal SPECT, electroencephalography (EEG), and magnetic resonance imaging (MRI) were compared and correlated with postoperative seizure outcome. In addition, subcortical activation of the cerebellum, basal ganglia, and thalamus were analyzed.

KEY FINDINGS: The extent of hyperperfusion was focal or lobar in 58%, whereas multilobar activations occurred in only 32%; hemispheric or bilateral findings were rare. Favorable postsurgical seizure outcome was achieved in 67% patients with nonlocalized SPECT findings, 45% with nonresected ictal hyperperfusion, 36% with partially resected ictal hyperperfusion, and 86% when the zone of ictal hyperperfusion was completely resected (p = 0.000198). The favorable postsurgical outcome after complete removal of the SPECT hyperperfusion zone
surpassed the 75% rate of seizure freedom in patients with removal of MRI/EEG-defined epileptogenic region. A similar predictive value of ictal SPECT for seizure outcome was found in nonoperated patients and subjects who were undergoing reoperation. Subcortical activation conferred no predictive value. SIGNIFICANCE: Ictal SPECT helps to define the epileptogenic zone in a high proportion of children with FCD undergoing surgical evaluation. Complete removal of both SPECT and MRI/EEG-defined regions is a strong predictor of surgical success and has important implications for surgical planning.

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