

SURGERY

Neuroimaging in epilepsy: MRI evaluation in refractory complex partial seizures

Zainal Muttaqin MD PhD

Medical Faculty, Diponegoro University, Semarang, Indonesia

Objective: A 0.5 Tesla Magnetic Resonance Imaging (MRI) unit was installed recently in our institution. The objective of this study was to evaluate its diagnostic yield for epilepsy. The results of MRI examinations performed during 2002-20004 on 100 intractable partial epilepsy, mostly temporal lobe epilepsy.

Methods: MRI scan was performed using 0.5 Tesla (Tomikon, Bruker, France) unit. Temporal lobe was evaluated with oblique coronal, and horizontal thin slice, using T2 and FLAIR sequences. Hippocampal sclerosis was diagnosed based on atrophy and/or increased signal on T2 or FLAIR image. Contrast enhanced, T1 image was done for cases suspected as having tumor lesions.

Results: Hippocampal sclerosis (HS) was seen in 59 cases (59%), angioma in 6, tumor in 5, malformation of cortical development (MCD) and hemiatrophy in 4 each, arachnoid cyst in one, and normal MRI in 21 patients. The angiomas were arteriovenous malformation in 3, cavernoma in 2, and venous angioma in one. The tumors were dysembryoplastic neuroepithelial tumor and grade II astrocytoma in 2 each, and pleomorphic xanthoastrocytoma in one. The MCD were focal cortical dysplasia in 2, hemispheric cortical heterotopia and polymicrogyria in one each.

Discussion: Complex partial seizures (CPS) with epileptic foci mostly located at the medial temporal lobe forms the largest portion of intractable epilepsy cases, and this group gains most from surgery.¹ The high degree of specificity of unilateral HS to indicate correctly the epileptic side of the temporal lobe has been confirmed^{1,2}, so that MR identification of the presence of HS is highly informative, and more than 90% of patients with unilateral MRI-identified HS and concordant epileptiform discharges experience an excellent operative outcome.^{1,2} Visual MRI will allow detection of almost 90% of MTS cases³, while volumetric studies (MR Volumetry) may provide objective and quantitative evidence for the presence of subtle unilateral atrophy, or bilateral symmetric atrophy.⁴ Other important structural lesions related to intractable CPS are malformation of cortical development (MCD), mixed neuroglial tumors, and occult vascular malformations or cavernoma. MRI has been confirmed to be a reliable and accurate indicator of foreign-tissue pathology, and its sensitivity reaches 100% for tumor lesion and vascular malformations⁵, particularly cavernoma, since these lesions may not be visualized on angiography and on computed tomography or CT.

Conclusion: Even with 0.5 Tesla MRI, HS and other lesional pathologies were detected in 79/100 or 79% cases of intractable partial epilepsy in Semarang, Indonesia. With excellent results of epilepsy surgery, and the poor prognosis of intractable epilepsy, it is justified to perform MRI to all intractable partial epilepsy patients.

References

1. Jackson GD. Visual analysis in mesial temporal sclerosis. In: Cascino GD, Jack CR Jr, eds: Neuroimaging in epilepsy: principles and practice. Boston: Butterworth-Heinemann 1996: 73-110
2. Cascino GD, Jack CR, Parisi JE, et al: Magnetic resonance imaging-based hippocampal volumetric studies in temporal lobe epilepsy: pathological correlation. *Ann Neurol* 1991; 30: 31-6.
3. Jack CR Jr, Sharbrough FW, Cascino GD, Hirschorn KA, O'Brien PC, Marsh WR. MRI-based hippocampal volumetry: Correlation with outcome after temporal lobectomy. *Ann Neurol* 1992; 31: 138-46.
4. Spencer SS, McCarthy G, Spencer DD: Diagnosis of medial temporal lobe seizure onset: relative specificity and sensitivity of quantitative MRI. *Neurology* 1993; 43: 2117-24.
5. Britton J, Cascino GD, Sharbrough FW, et al. Low-grade glial neoplasm and intractable partial epilepsy: efficacy of surgical treatment. *Epilepsia* 1994; 35: 1130-5.