3T phased array MRI improves focal epilepsy evaluations

Knake et al. compared experienced, unblinded review of 3T PA-MRI studies to reports of standard 1.5T epilepsy MRI studies. 3T PA-MRI yielded additional diagnostic information in 48% and motivated clinical management change in 37.5%. New lesions were identified in 65% of normal 1.5T studies.

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3D hippocampal anatomy predicts surgical outcome in TLE

In drug-resistant TLE, Lin et al. found that patients who were not seizure free after epilepsy surgery had greater preoperative bilateral region-specific hippocampal atrophy vs seizure-free patients.

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Higher resolution MRI and image modeling for predicting surgical outcome in partial epilepsy

Commentary by Fernando Cendes, MD, PhD

Epilepsy affects 1 to 2% of the population and partial epilepsies account for approximately 40% of all epilepsies in adults. Of these, up to 30% may be resistant to medical treatment with antiepileptic drugs (AEDs). In the past, physicians, including many neurologists, have considered epilepsy surgery the treatment of last resort for patients with partial epilepsies. The average duration of surgically treatable epilepsy among young and middle-aged adults referred for epilepsy surgery at major epilepsy centers was once almost 20 years. Although further trials are needed, surgery ought to be considered in patients with partial epilepsy who fail two AEDs.[1] Defining the cause of the epilepsy and localization of the seizure generator are essential for surgical planning and prognosis.

Knake et al. showed that the use of phased array surface coil at 3 Tesla MRI analyzed by experienced epileptologists detected unrecognized lesions in 65% of previously MRI-negative patients and provided additional information in almost half of patients with temporal lobe epilepsy (TLE) and frontal lobe epilepsy. This important study shows that proper identification of abnormal tissue, which may otherwise be unrecognized, is crucial for identifying a potential epileptic focus, and thereby increases the likelihood of a better surgical outcome,[2,3] and, as a corollary, for identifying whether such abnormalities are widespread, and thus less amenable to surgical treatment.

Lin et al. showed that new computational methods, using three-dimensional surface meshes to model hippocampal anatomy, allowed the identification of region-specific hippocampal volume differences in patients with TLE who became seizure free after surgery. These regions of atrophy are not easily detected by routine MRI and may indicate areas of increased epileptogenesis.

Additional questions arise. Should general neurologists be arranging for their patients to receive these sophisticated acquisition and post-processing MRI techniques? While there is still no standard approach, all patients with refractory partial epilepsy, particularly those with "normal" routine MRI, should be referred to a dedicated MRI center and images should be reviewed by physicians experienced in the evaluation of patients with epilepsy.[2,3] Might these tests point the way to more restricted surgical approaches, a lesionectomy? Would such procedures be better tolerated and equally efficacious? More studies are needed to address these questions, but as our imaging becomes more refined, so will our ability to ask and answer more complex and subtle questions about the management of medically resistant partial epilepsy. This may be the greatest argument in favor of promoting newer imaging techniques.

References

1. Trevathan E, Gilliam F. Lost years: delayed referral for surgically treatable epilepsy. Neurology 2003;61:432–433.
2. Ruggieri PM, Najm I, Bronen R, et al. Neuroimaging of the cortical dysplasias. Neurology 2004;62(suppl 3):S27–S29.
3. von Oertzen J, Urbach H, Jungbluth S, et al. Standard magnetic resonance imaging is inadequate for patients with refractory focal epilepsy. J Neurol Neurosurg Psychiatry 2002;73:643–647.

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