A 23-year-old female presented to our institution for refractory epilepsy. Her seizures started when she was 22 years old and they were classified as complex partial seizure (CPS) with secondary generalization. The seizure semiology included typical symptoms of CPS of temporal lobe origin including aura without postural drop at the seizure onset. Then there would be automatism, such as flipping the book pages and lip smacking. The CPS occurred 5–10 times monthly. Routine electroencephalogram was unremarkable. Brain magnetic resonance imaging (MRI) at the time of presentation, with only T1- and T2-weighted axial images, was reported to be normal. She had tried various anticonvulsants without achievement of a seizure-free state including valproate, lamotrigine, oxcarbazepine, topiramate, levetiracetam, and perampanel. Her usual daily activities were considerably affected. At age 29, epilepsy surgery was considered. Brain MRI was repeated with dedicated epilepsy protocol. A tumor of 1.6 cm × 1.5 cm × 1.3 cm was found over the right temporal lobe (Figure 1C). Retrospectively, subtle abnormal signals with obscuration of gray-white differentiation were already present in the initial MRI scan (Figures 1A and 1B). The patient then received partial right temporal lobectomy with preservation of the hippocampal complex. Intraoperative electrocorticogram demonstrated epileptiform discharges over tumor margins prior to resection. Post-resection intraoperative electrocorticogram over the resection margin showed marked reduction in epileptiform discharges. Histology confirmed World Health Organization Grade I pilocytic astrocytoma. After the surgery, she has become seizure-free with monotherapy of levetiracetam.

MRI is the most ideal modality in detecting structural lesions in epilepsy. However, the proper use of this modality with dedicated protocol affects its effectiveness. The 3-T MRI is superior to the 1.5-T MRI for better resolution. Axial slices should be planned along the long hippocampal axis. Axial scan in commissura anterior–commissura posterior angulation in particular for fluid-attenuated inversion recovery (FLAIR) sequence is advocated for more effective results in detection of subtle cortical dysplasia. Coronal slices should be oriented perpendicular to the long hippocampal axis. Three dimensional T1-weighted gradient echo sequence with 1-mm slices and 1-mm voxel can provide optimal gray–white matter differentiation and facilitate assessment of cortical thickness. Coronal slices of 2-mm or 3-mm thickness in FLAIR sequence is useful in detecting abnormalities in the hippocampal complex and also cortical and subcortical signal abnormalities related to focal cortical dysplasia. T2*-weighted gradient-recalled echo or susceptibility weighted imaging should also be included, aiming to detect calcifications, hemorrhage, and occult vascular malformations. Intravenous contrast is usually not

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* Corresponding author. 4th Floor, Professorial Block, Queen Mary Hospital, Pokfulam, Hong Kong SAR, China.

E-mail address: richardcsk@gmail.com (R.S.-k. Chang).
necessary, unless tumor or neurocutaneous syndrome lesions are suspected. The images should be interpreted by experienced radiologists or epileptologists.

The International League Against Epilepsy defines the epilepsy treatment gap as “the difference between the number of people with active epilepsy and the number whose seizures are being appropriately treated.” We here propose that inadequate imaging has contributed to this gap. False negative imaging will direct patients away from surgical treatment, which may offer a chance of cure. If a patient is falsely labeled as nonlesional in low-quality imaging, one will probably be given low priority in epilepsy surgery. This is especially a problem in regions where resources and expertise in epilepsy management are limited. Notably, epilepsy surgery is underutilized in many developing countries including many Asian countries. At present, the facility of MRI is not a rarity. The key lies in how it is used (properly).

References


Figure 1  Serial MRI imaging of the patient. (A) Axial brain MRI T1-weighted image and (B) axial brain MRI T2-weighted at initial workup showing subtle obscuration of the gray–white junction and abnormal hyperintense signal over right temporal lobe, respectively. (C) Coronal postcontrast brain MRI T1-weighted image showing low-grade astrocytoma over right temporal lobe. MRI = magnetic resonance imaging.