Subependymal nodular heterotopia

Introduction

Malformations of cortical development, or cortical cerebral dysgenesis, form a heterogeneous group of disorders commonly associated with epilepsy, sometimes with learning disability but sometimes with normal cognition. These neuronal migration disorders may come to light incidentally when magnetic resonance (MR) brain imaging is performed for other reasons.

Discussion

Malformations of cortical development may be classified as:

- Band heterotopia (double cortex)
- Neuronal heterotopia (individual misplaced neurones)
- Nodular heterotopia, in which nodules of grey matter are placed ectopically within white matter.

Nodular heterotopia may be subdivided into subependymal (which subsumes periventricular heterotopia, as in this case) and subcortical (Raymond et al, 1994). A familial variant of periventricular heterotopia or bilateral nodular periventricular heterotopia has also been described. This is an X-linked dominant disorder manifesting in affected females with epilepsy and prenatally lethal in hemizygous males, in which contiguous symmetrical nodular heterotopia lines the lateral ventricles. Cognitive levels may range from mild retardation to normal. This condition is associated with mutations (missense or distal truncations, the former causing milder consequences) in the filamin 1 (FLN1) gene (Moro et al, 2002).

Simple nodular heterotopia, in which there are periventricular nodules only, is characterized clinically by normal intelligence and infrequent seizures, usually partial, whereas nodular heterotopia plus other cortical or cerebral malformations is associated with learning disability and frequent refractory seizures (d'Orsi et al, 2004). Surgery may be helpful for seizure control in this latter group if a predominant seizure focus can be identified; this may or may not include the nodular heterotopia (Aghakhani et al, 2005). Accurate localization of the focal epileptic generator is the key to good surgical outcome. BJHM

Aghakhani Y, Kinay D, Gotman J et al (2005) The role of periventricular nodular heterotopia in epileptogenesis. *Brain* **128:** 641–51

d'Orsi G, Tinuper P, Bisulli F et al (2004) Clinical features and long term outcome of epilepsy in periventricular nodular heterotopia. Simple compared with plus forms. *J Neurol Neurosurg Psychiatry* **75:** 873–8

Moro F, Carrozzo R, Veggiotti P et al (2002) Familial periventricular heterotopia: missense and distal truncating mutations of the FLN1 gene. *Neurology* **58:** 916–21

Raymond AA, Fish DR, Stevens JM, Sisodiya SS, Alsanjari N, Shorvon SD (1994) Subependymal heterotopia: a distinct neuronal migration disorder associated with epilepsy. *J Neurol Neurosurg Psychiatry* **57:** 1195–202

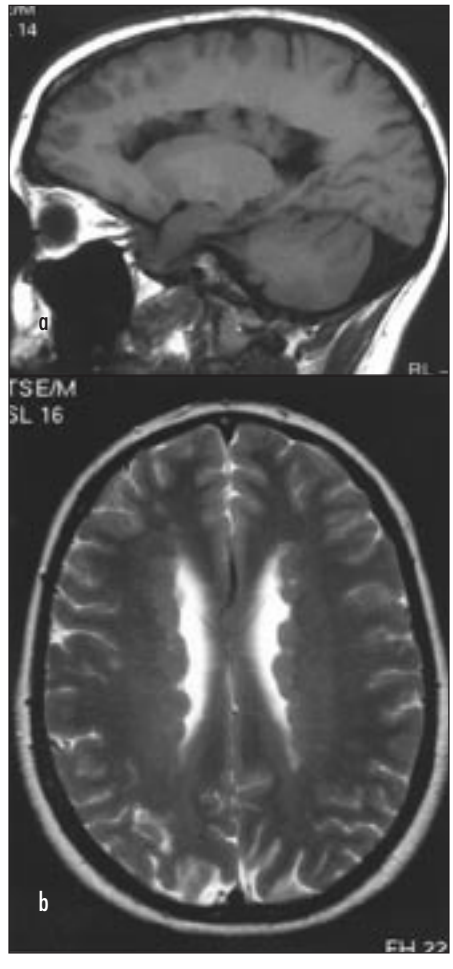
Case Report

A 29-year-old woman complained of episodic dizziness with a feeling of unsteadiness. She was referred to the ear, nose and throat clinic. Examination was normal and a pure tone audiogram was within normal limits. Although her symptoms improved with vestibular rehabilitation exercises, they did not resolve entirely and so magnetic resonance (MR) imaging of the brain was requested. Imaging changes (*Figure 1a*) prompted an urgent referral to the neurology clinic.

In her past medical history, the patient had developed seizures at the age of 5 years, initially brief 'absences' (eye blinking, head nodding, mouth twitching) with very occasional generalized tonic-clonic seizures. She was the product of a normal full-term vaginal delivery, with normal developmental milestones. There was no family history of seizure disorder. Formal testing at the age of 7 years showed that she was of average intellectual ability and above average ability on the arithmetic subtest. An electroencephalogram showed right temporal slow and sharp wave features. A diagnosis of 'idiopathic' temporal lobe epilepsy was made and she was commenced on carbamazepine with reduction in seizure frequency. A computed tomography brain scan performed at the age of 13 years after a further generalized seizure was reported to show a large cerebellar cistern but was otherwise normal. Family history was negative for seizure disorder. Her neurological examination was normal.

MR brain imaging (*Figure 1b*) showed multiple bilateral subependymal nodules of grey matter, lining both lateral ventricles, appearances diagnostic of subependymal nodular heterotopia. No other cerebral or cortical malformation was seen.

Figure 1. Magnetic resonance brain imaging: (a) sagittal T1-weighted and (b) axial T2-weighted images showing contiguous periventricular nodules of ectopic grey matter, characteristic of subependymal nodular heterotopia.



Dr AJ Larner *is Consultant Neurologist, Walton Centre for Neurology and Neurosurgery, Liverpool L9 7LJ*