Asymmetric interhemispheric fiber tracts in patients with hemimegalencephaly on diffusion tensor MRI

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Objective. - The internal structures of cerebral white matter in patients with hemimegalencephaly (HMG) have not yet been investigated except for one which evaluated aberrant fibers. We examined interhemispheric fiber tracts (FTs) passing through the corpus callosum by magnetic resonance (MR) diffusion tensor imaging (DTI).

Methods. - MR studies including DTI were performed in 9 consecutive patients with HMG and 11 patients with West syndrome as disease controls. The interhemispheric FTs passing through the corpus callosum were evaluated in 6 regional geometric subdivisions (Fig 1) each of the 9 HMG and 11 West syndrome patients (54 and 66 subregions, respectively), and the distributions and volume differences between affected and unaffected hemispheres were compared in all subjects.

Results. - In patients with HMG, interhemispheric FTs were symmetrically distributed in 27 of 54 corpus callosum subregions (50%). However, the FTs were distributed to different areas in the same lobes in 22 subregions (40%)(Fig 2), and to different lobes in 5 subregions (9%)(Fig 3). FT volumes were symmetric in 35 subregions (65%), while FT volumes on the affected side were greater (Fig 3) and less (Fig 2) than those on the unaffected side in 14 (26%) and 5 subregions (9%), respectively. However, in West syndrome patients, interhemispheric FTs showed symmetric distribution and volume in all regions.

Conclusions. - Asymmetrical interhemispheric FTs were often observed in patients with HMG, and DTI was useful for elucidating the white matter internal structures.