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Visual Diagnosis

White Cerebellum Sign: A Poor Prognostic Sign

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Patient description

This 10-year-old boy with tuberous sclerosis developed prolonged seizures despite taking antiepileptic drugs. He presented with active seizures and a Glasgow Coma Scale score of E1V1M4. His pupils were bilaterally nonreactive and dilated, and no doll's eye response was present. Seizures were controlled with lorazepam and fosphenytoin. Despite mechanical ventilation and supportive care in the intensive care unit, his clinical condition deteriorated and he died 36 hours after admission. Computed tomography (CT) shortly after admission showed a “white cerebellum” with hypodense cortical gray matter and subcortical white matter (Figure).

Discussion

An anoxic or ischemic insult to brain causes a variety of neuropathological changes, including neuronal necrosis, marmoration of basal ganglia and thalami, watershed infarcts, and periventricular leucomalacia.[1] The “white cerebellum” sign, “reversal sign” or “dense cerebellum sign” indicates diffuse decrease in density of the supratentorial brain parenchyma, with relatively increased attenuation of the thalami, brainstem, and cerebellum.[1] Nonenhanced CT finding of reversal sign probably represents a diffuse, anoxic, or ischemic cerebral injury.

The white cerebellum sign has been documented with severe head trauma, birth asphyxia, child abuse, drowning, status epilepticus, bacterial meningitis, encephalitis, and post–cardiac arrest hypoxia.[2] The pathogenesis of the reversal sign is not fully understood; it could be due to the preferential flow to the posterior circulation or raised intracranial pressure with partial venous obstruction resulting in distension of deep medullary veins, and could be followed by transtentorial herniation partially relieving the increased intracranial pressure.[1,3] Finally, it may lead to increased perfusion of the central structures. Alternative explanations for the “reversal sign” include preserved brain tissue, petechial hemorrhage, and mineralized neurons for high-density areas on CT, and severe edema and/or tissue destruction for low-density areas on CT.[1] The reversal sign, when present, is a poor prognostic indicator.

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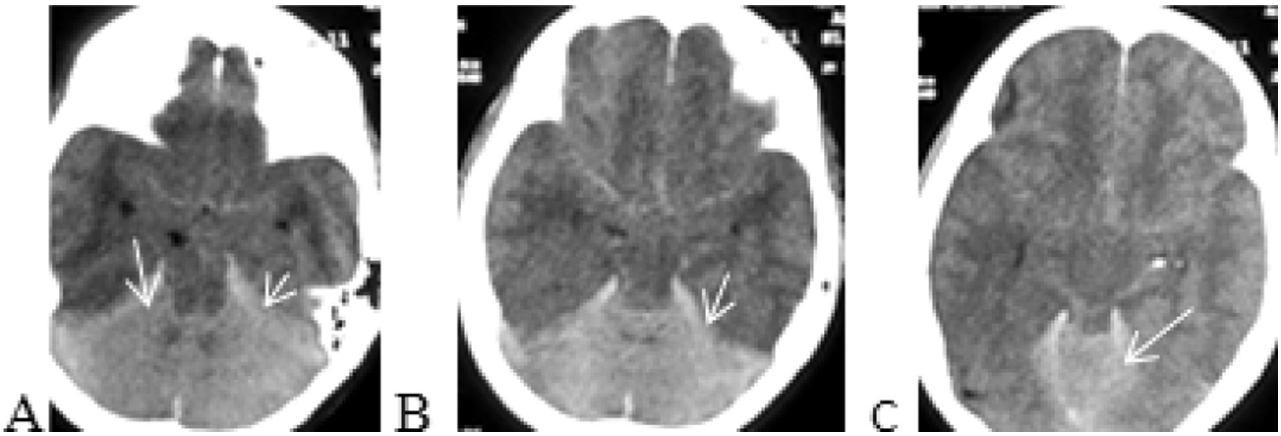

FIGURE. Nonenhanced computed tomographic images (A–C) showing hyperdense cerebellum (arrows) and hypodense supratentorial structures with poor gray-white differentiation and cerebral edema.