

Neuroimaging Highlight

Editors: Richard Farb, David Pelz

The “Reversal Sign” Following a Massive Left-Hemispheric Stroke

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Can. J. Neurol. Sci. 2010; 37: 395-396

A 71-year-old man came to the emergency room following acute onset right hemiplegia and global aphasia. The first head computed tomography (CT) scan revealed left hemispheric stroke. The following day, a follow-up head CT scan revealed an attenuated density of the grey matter, when compared to the adjacent white matter, referred to as the “reversal sign”. It is believed that this finding reflects a diffuse anoxic/ischaemic cerebral injury. After discussion with the patient’s family, care

was withdrawn and the patient died a few days later.

The reversal sign seems to be more common in the paediatric than in the adult population. The reversal sign has been described in association with brain hypoxia, head trauma, metabolic factors such as hyperglycaemia, hypothermia, status epilepticus, drowning, and infectious processes. In the paediatric population, child abuse might also be a cause. Regardless of its aetiology, however, the reversal sign correlates with severe brain damage

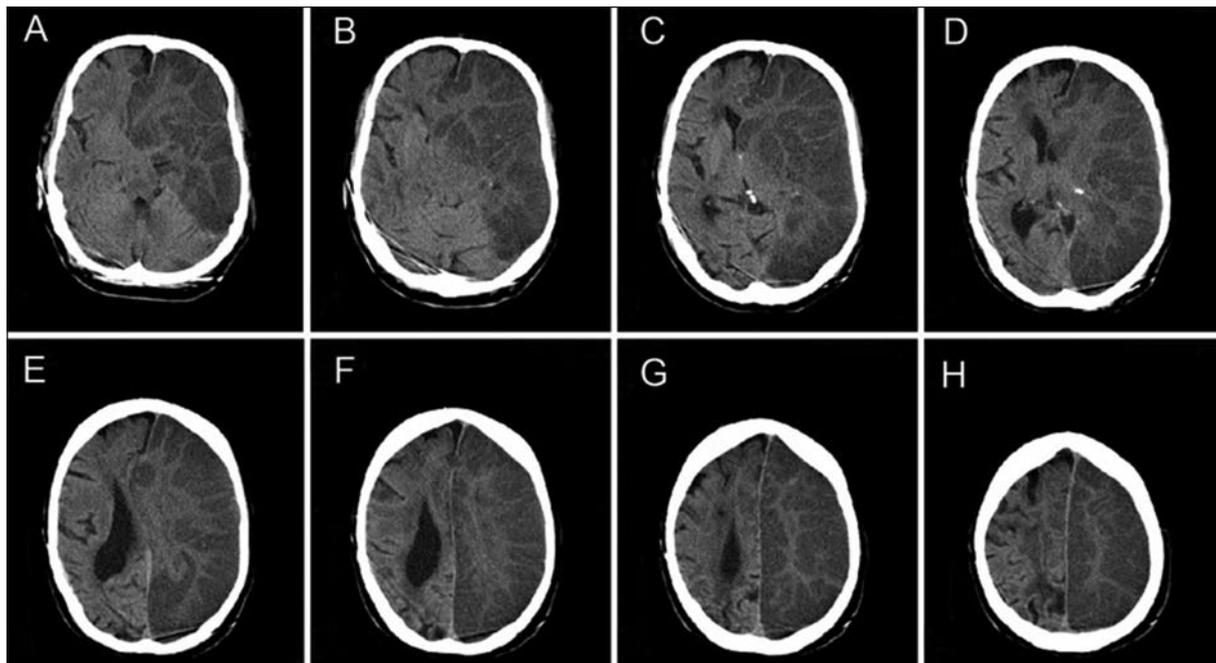


Figure: CT scan of the head illustrating the “reversal sign” across different brain levels in our 71-year-old patient. Images show decreased radiodensity of the left hemispheric cortical and deep grey matter compared to adjacent white matter. Normal grey-white differentiation is maintained throughout most of the right hemisphere. There is associated mass effect, with diffuse left-sided sulcal effacement, midline shift, effacement of the left lateral ventricle, and enlargement of the right lateral ventricle.

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RECEIVED OCTOBER 19, 2009. FINAL REVISIONS SUBMITTED DECEMBER 7, 2009.

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and carries a poor prognosis^{1,2}. In a retrospective series of 20 children with reversal sign, the mortality rate ranged between 35-70%, and all of the surviving children suffered severe, irreversible brain damage³.

The pathophysiology of the reversal sign remains poorly understood. Previous reports have suggested that increased intracranial pressure, leading to impaired cerebral venous outflow and occlusion of the superficial cortical veins, could lead to development of severe oedema and neuronal necrosis in the cortex, hence the term "reverse oedema" sometimes used to refer to the phenomenon⁴. The higher density of the white matter when compared to the surrounding grey matter could be explained by the presence of preserved brain tissue, as well as by petechial haemorrhages and mineralised neurons³.

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