Teaching NeuroImages: Usefulness of susceptibility-weighted sequences after traumatic brain injury

Three weeks after severe traumatic brain injury (pedestrian hit by a car) and correction of initial intracranial hypertension, a brain MRI is performed in a 22-year-old woman, who remains in a comatose state (Glasgow Coma Scale at 4, with withdrawal to painful stimuli; abolition of photomotor reflex; persistence of corneal and cough reflexes). Fluid-attenuated inversion recovery and T2*-weighted gradient-echo sequences reveal subtle hyperintensities within the brainstem. On susceptibility-weighted imaging, extensive diffuse axonal injuries are identified in the brainstem, thalami, corpus callosum, and frontal lobes, which explain the clinical state (figure). Susceptibility-weighted imaging is a gradient-echo sequence combining phase and magnitude information.

Extensive microhemorrhage compatible with diffuse axonal injuries along the brainstem, thalami, corpus callosum, and frontal and temporal lobes, which are not visible with classic T2*-weighted gradient-echo sequence (A) but only with susceptibility-weighted MRI (B, arrows).

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highly sensitive in the detection of magnetic field variation, especially generated by hemoglobin degradation products.\textsuperscript{1} It is more accurate in the detection of diffuse axonal injuries after brain injury, which is mandatory, as their presence is correlated to functional and cognitive prognosis.\textsuperscript{2}

**AUTHOR CONTRIBUTIONS**

Thomas Ritzenthaler: drafting/revising the manuscript, analysis or interpretation of data, accepts responsibility for conduct of research and will give final approval, acquisition of data, study supervision. Leila Chamard: analysis or interpretation of data, accepts responsibility for conduct of research and will give final approval, acquisition of data. Frédéric Dailler: drafting/revising the manuscript, accepts responsibility for conduct of research and will give final approval, study supervision.

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**REFERENCES**


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