

Susceptibility Weighted Imaging in the evaluation of movement disorders

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Purpose

Movement disorders are neurodegenerative disorders associated with abnormalities of brain iron deposition. In this presentation, we aim to describe the role of Susceptibility Weighted Imaging (SWI) in the imaging of patients with movement disorders and differentiating between the various disorders

Outline of content

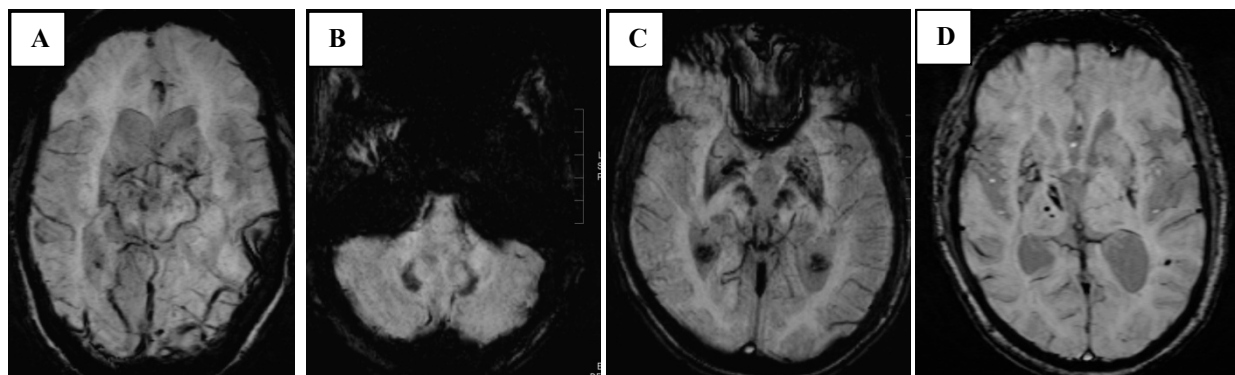
Apart from the standard MRI sequences, SWI is a high resolution fully velocity encoded gradient echo MRI sequence that consists of using both magnitude and phase information. We describe briefly the physics behind this sequence and the post-processing techniques used. The anatomy of the midbrain and basal ganglia in normal subjects on SWI is covered. A number of neurodegenerative disorders are associated with abnormal iron deposition which can be detected due to the susceptibility effects.

Differentiation of Parkinson disease (PD) from atypical Parkinsonian disorders like Multi system atrophy – parkinsonian variant (MSA-P) and Progressive Supranuclear Palsy (PSP) is often difficult clinically. Early diagnosis plays an important role in patient management. Greater hypointensity of red nucleus in PSP differentiates PSP from both PD and MSA-P and the higher putaminal hypointensity score discriminates PSP from PD. Patients with corticobasal degeneration may show unilateral increase in deep grey matter iron deposition. The microbleeds in deep grey matter structures seen on SWI are important in corroborating the diagnosis of vascular parkinsonism.

Neurodegeneration with brain iron deposition (NBIA) is caused by pantothenate kinase 2 deficiency. The mineralization of globus pallidus in NBIA and other hereditary ferritinopathies is well visualized on SWI. Increased iron deposition has been seen in the basal ganglia of manifest Huntingtons disease and also carriers.

Summary

SWI is a powerful tool for detecting brain iron deposition. It is useful in differentiating movement disorders characterized by increased brain iron deposition. Patients with PD, PSP and MSA – P have different patterns of brain mineralization.



- A. Corticobasal degeneration – asymmetric mineralization of the basal ganglia
- B. PSP – extensive mineralization of dentate nuclei
- C. PSP - extensive mineralization of globus pallidus
- D. Vascular parkinsonism – Microbleeds in basal ganglia and right thalamus