

Indian Experience with *syngo* SWI at 3T MAGNETOM Trio, A Tim System

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***syngo* SWI in cerebrovascular diseases evaluation:**

Susceptibility-weighted imaging (SWI) evaluates cerebrovascular disease well and detects the hemorrhage with greater sensitivity. The majority of lacunar infarcts are also well evaluated with *syngo* SWI as in the case of Biswanger's disease.

***syngo* SWI in trauma evaluation:**

Detecting the most subtle bleeding, for example in brain trauma patients, *syngo* SWI detects diffuse axonal injuries (DAI) in children* with much more sensitivity than conventional gradient echo imaging. Fast additional diagnostic information

is possible in just a few minutes with SWI and iPAT (integrated Parallel Acquisition Techniques). Prognosis of comatose patients can be better predicted by correlating Glasgow coma scores and SWI images.

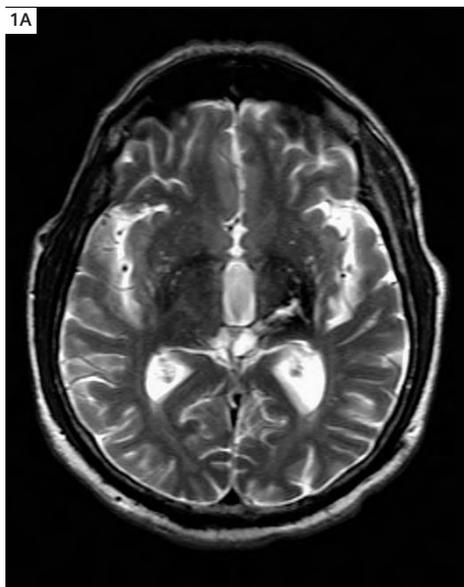
*The safety of imaging children under the age of two has not been established.

***syngo* SWI in superficial Hemosiderosis diagnosis:**

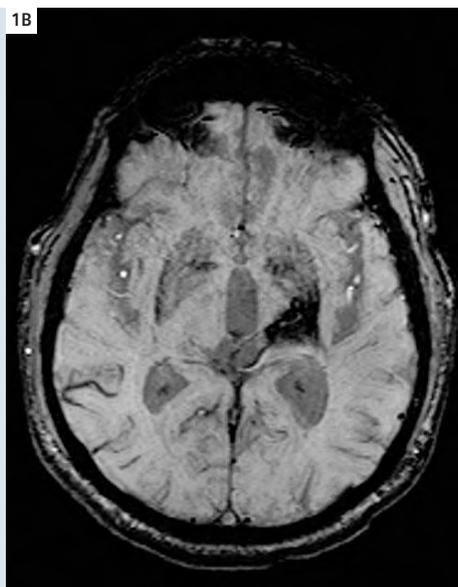
syngo SWI is helpful to identify iron and mineralization deposition in diseases such as Hemosiderosis, Alzheimer, etc.

***syngo* SWI in venous tumor and malformation diagnosis:**

SWI evaluates the smallest intracranial vascular malformations for better diagnosis. *syngo* SWI detects the low velocity blood flow seen in venous malformation with greater sensitivity. All other techniques are suboptimal in the evaluation of these malformed vessels with multidirectional flow and low velocity. Understanding the angiographic behavior of tumors by depicting draining veins. SWI can detect the venous vasculature as well as hemorrhage within the brain tumors, not well appreciated on conventional MR images.



1A T2-weighted image



1B *syngo* SWI

Case 1: Cerebrovascular disease

Known case of hypertension with diabetic nephropathy on treatment. History of right hemiparesis secondary to left intracranial hemorrhage in 2002. Recent onset of right sided weakness with loss of consciousness over the last 15 days. An ill-defined gliotic lesion involving the left periventricular white matter, posterior limb of internal capsule, dorsomedullary thalamus and crus cerebri on T2-weighted FLAIR coronal images with evidence of a rim of T2 hypointensity. On the *syngo* SWI image, there is exaggerated hypointensity along this lesion suggestive of hemosiderin due to previous hemorrhage.

Case 2: Biswanger's disease

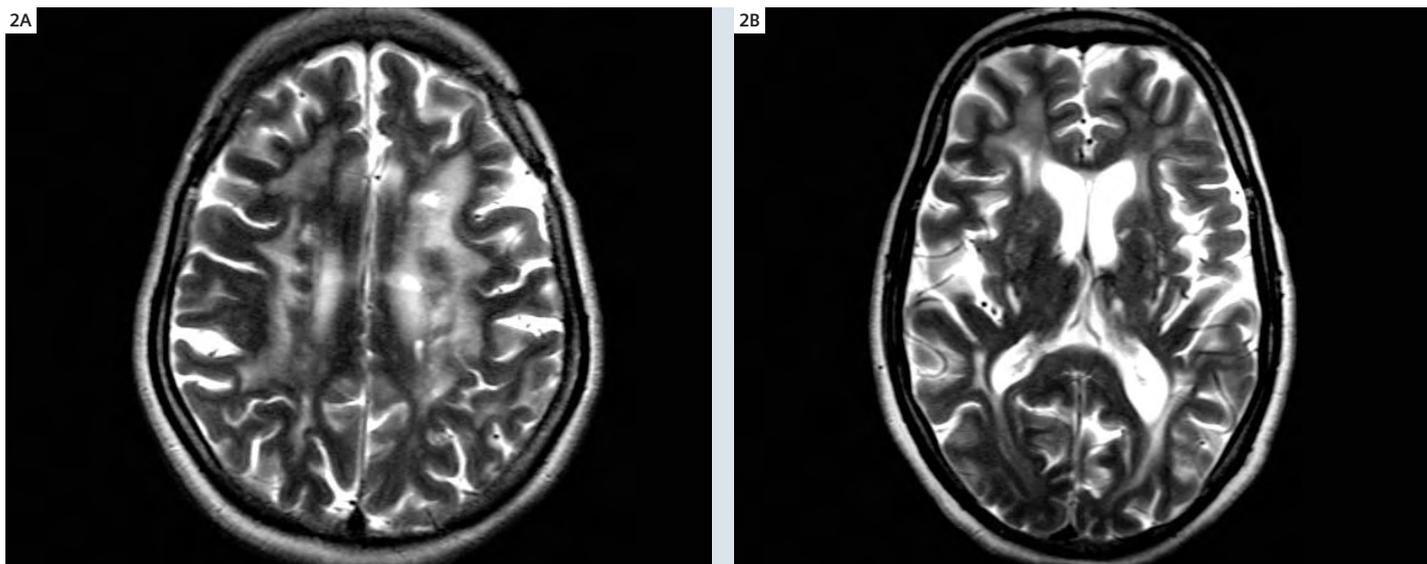
Biswanger's disease is a subcortical demyelinating syndrome resulting from multiple infarcts affecting the white substance and consecutive to a history of arterial hypertension or cerebrovascular accidents. It is accompanied by neurological signs and motor problems.

Clinical profile: Young hypertensive patient with known history of right hemiparesis four years ago presents now with residual weakness.

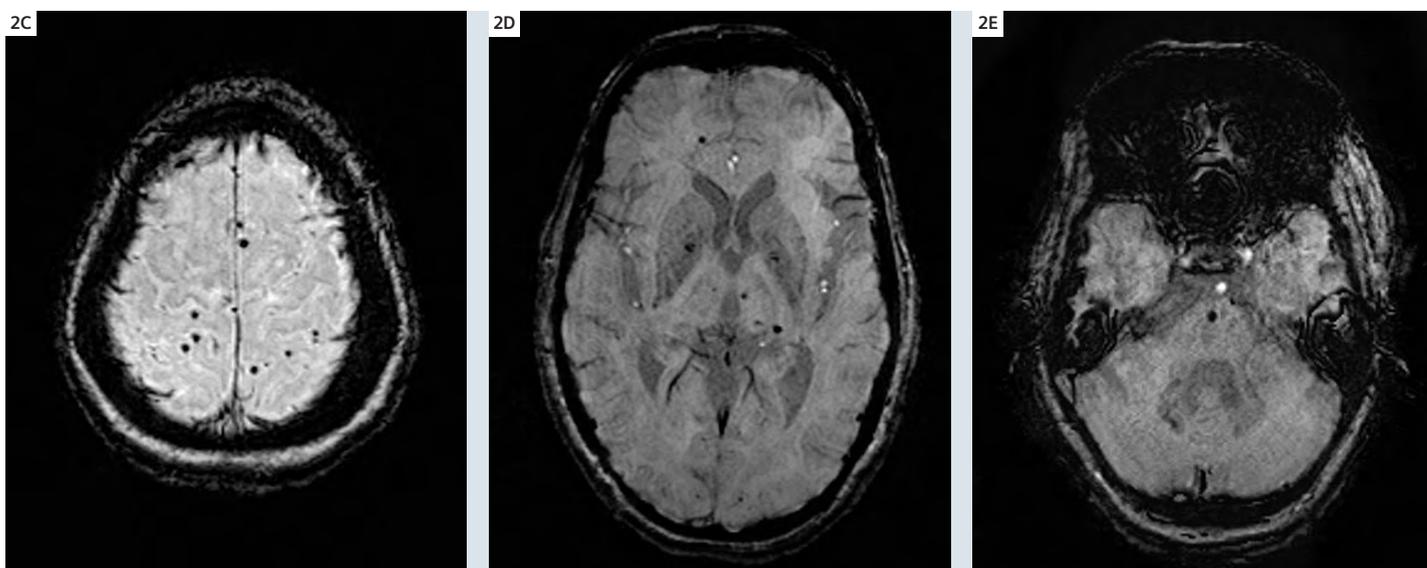
syngo SWI axial images reveal multiple petichial hemosiderin deposits in bilateral fronto-temporo-parietal cortical grey mat-

ter, subcortical and deep white matter, basal ganglia, thalami, cruscerebri, pons and cerebellar white matter.

These findings are suggestive of Biswanger's disease. Multiple lacunar infarcts with extensive patchial hemorrhages are seen.



2A, B T2-weighted images.



2C-E *syngo* SWI images showing Biswanger's disease.

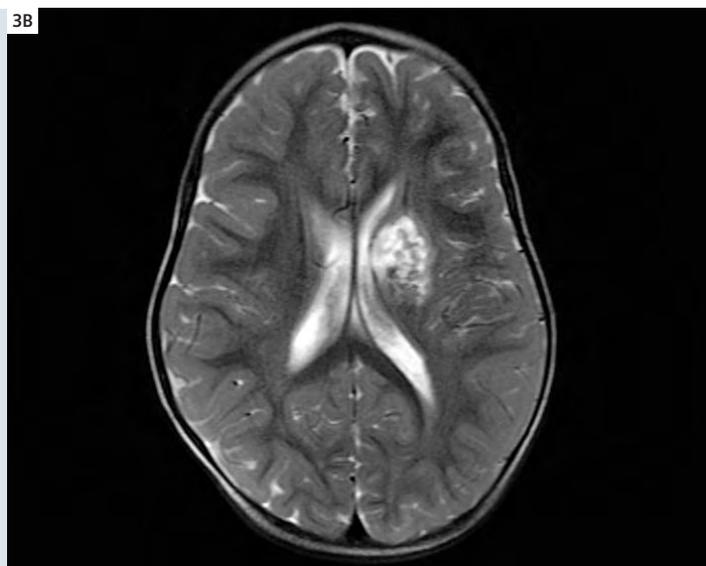
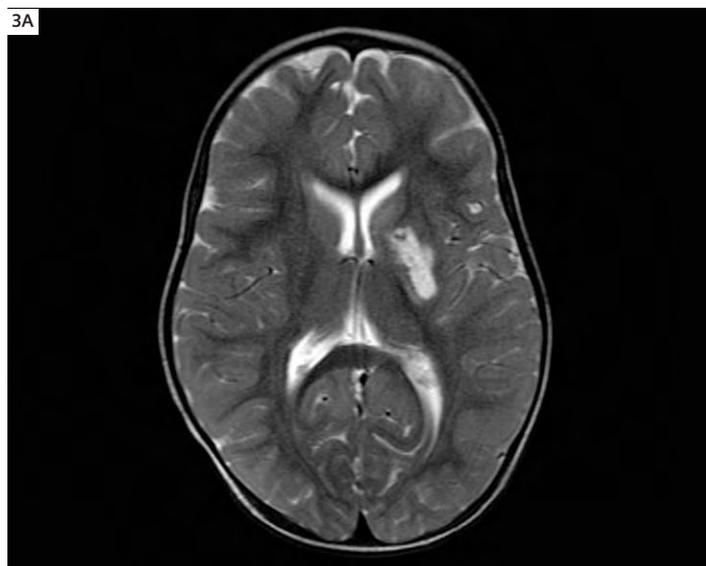
Case 3: Trauma

1.5-year-old girl* experienced a fall 10 days back. After 2 days she presented with complaints of upper limb and lower limb weakness. Past history significant for stay in NICU for 15 days for suspected meningitis. O/E tone normal to decreased on right UL and LL. Power > three on R limbs. No

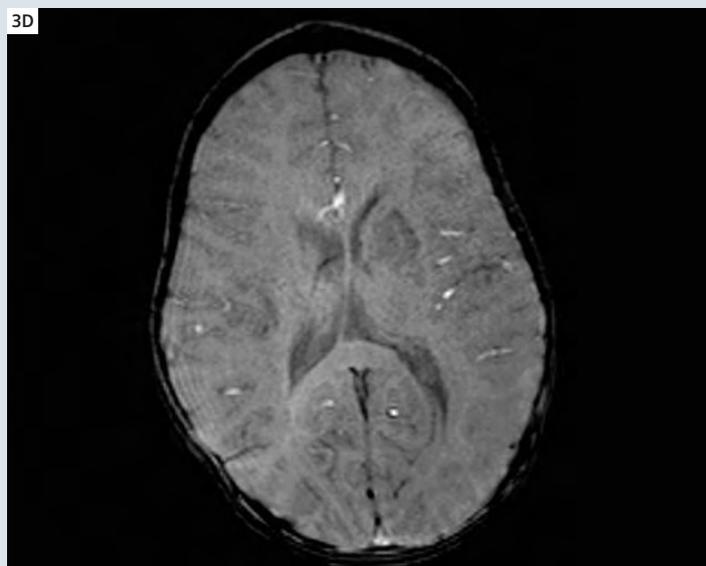
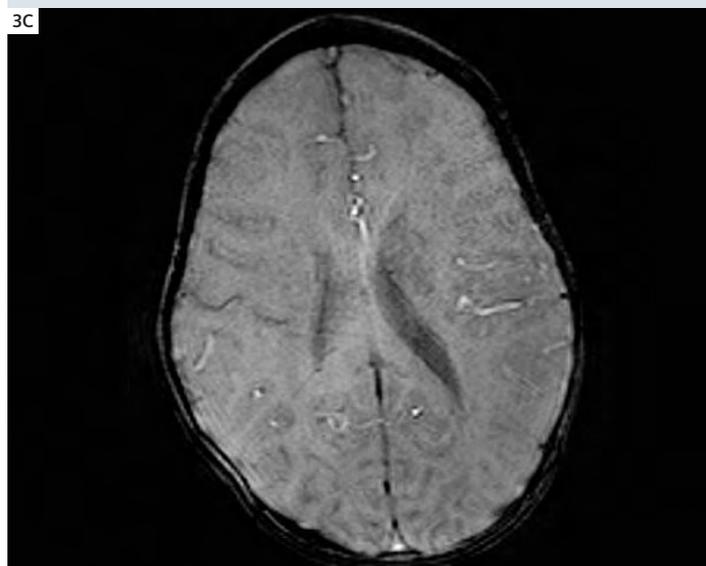
signs of meningeal irritation at present. Left putamen and caudate nucleus lesion (hypo to hyperintense – heterogenous) on T2-weighted images probably represents contusion with evidence of small hemorrhage rather than a large infarct because a very minimal hypointensity

is seen within this lesion on the SWI images. Left capsular and crus cerebri lesions are probably secondary to axonal injury.

*The safety of imaging children under the age of two has not been established.



3A,B T2-weighted images showing trauma lesions.

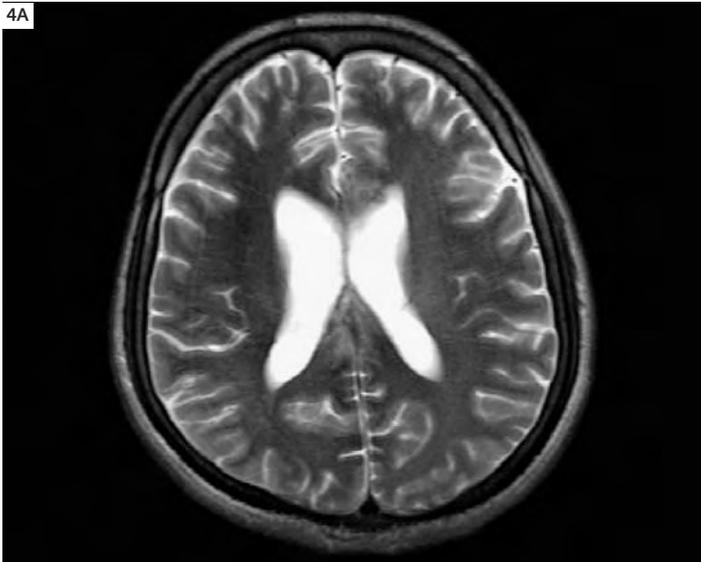


3C,D syngo SWI images showing hemorrhage.

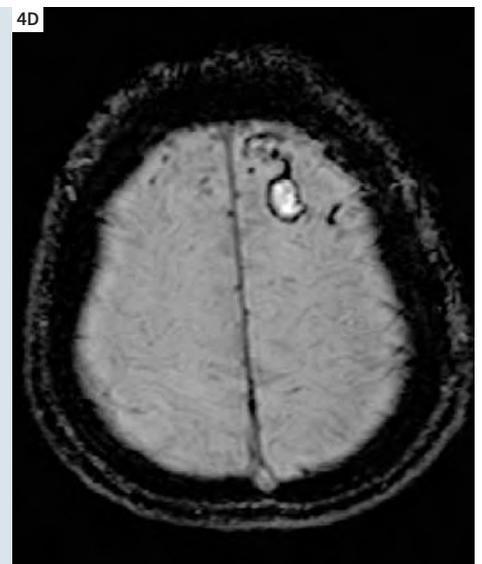
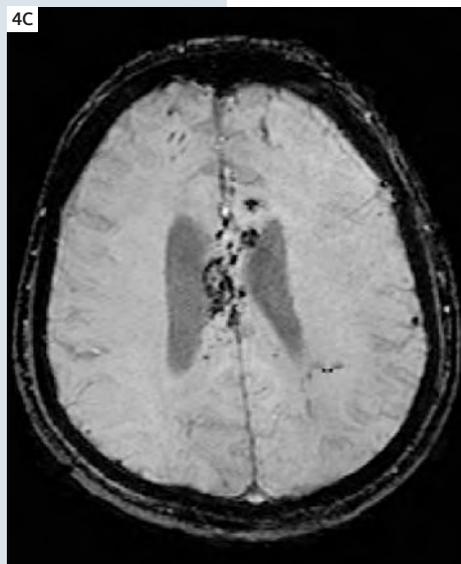
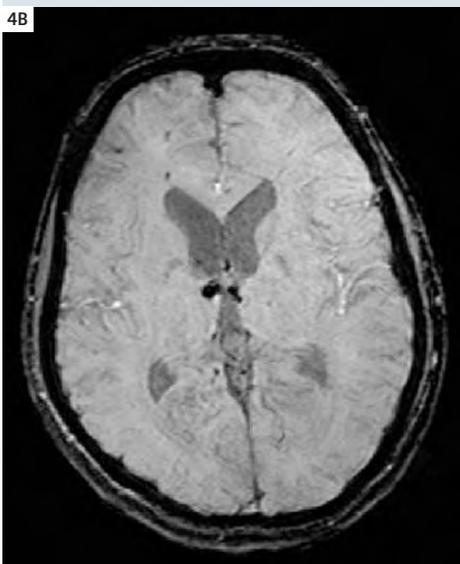
Case 4: Diffuse axonal injury

Multifocal petechial hemorrhages in bifrontal cortical and subcortical region, corpus callosum, callosamarginal fibres, bilateral ventral thalami and temporo –

parietal periventricular white matter on SWI images represent hemorrhage secondary to diffuse axonal injury with shear-stress strain.



4A T2-weighted image.



4B-D syngo SWI of Diffuse Axonal Injury.

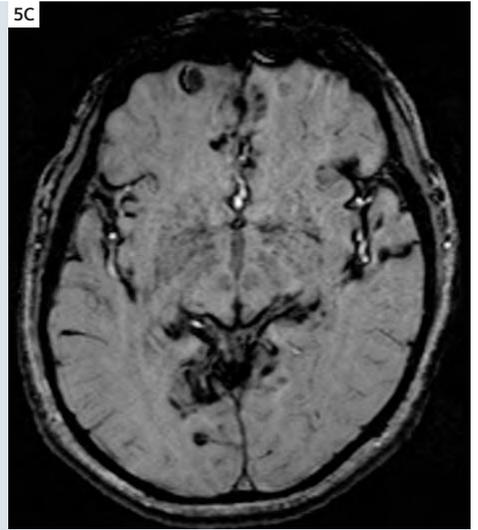
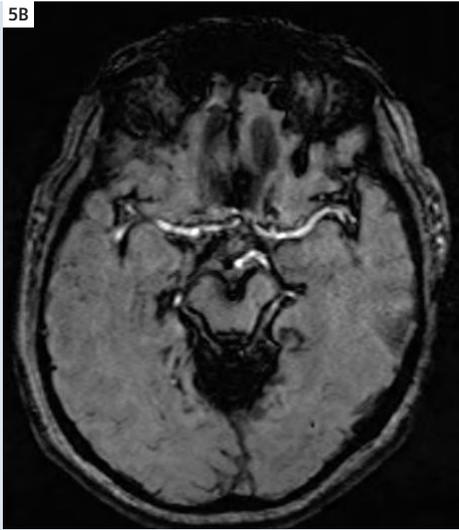
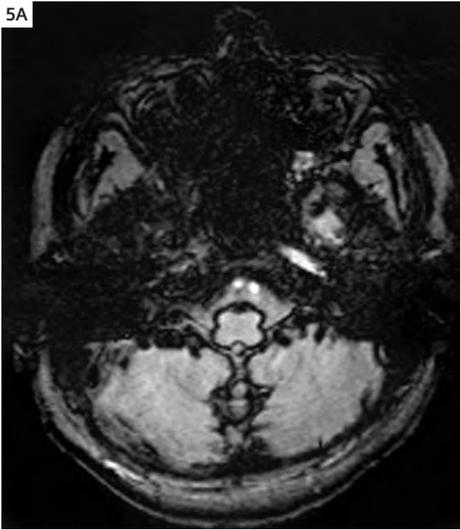
Case 5: Superficial Siderosis

Superficial Siderosis (SS) of the central nervous system is an uncommon disease characterized by accumulation of hemosiderin in the meninges, brain surface, spinal cord and cranial nerves. The deposition of hemosiderin, which may be cytotoxic to underlying tissue, results from chronic bleeding into the subarachnoid space. In many cases, the precise source of bleeding is not identified. The

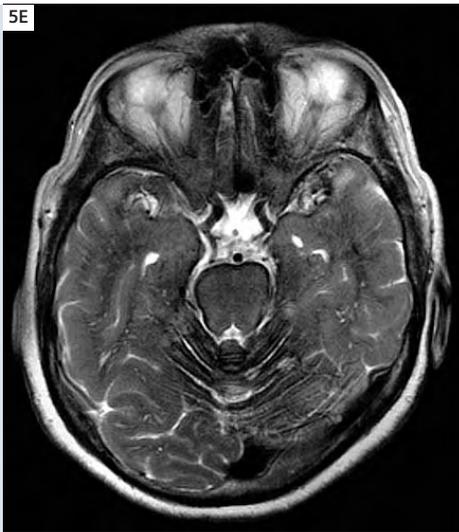
most common clinical presentation is one of progressive sensorineural hearing loss and ataxia, as was seen in this patient. Superficial siderosis should be considered in the differential diagnosis of progressive sensorineural hearing loss and/or ataxia because (1) it is easily diagnosed by MRI, which has high sensitivity for detecting heme products, (2) it is a potentially treatable condition, if a cause of bleeding can

be identified, and (3) diagnosis of SS may avoid unnecessary searches for other causes of hearing loss and ataxia.

Clinical profile: 60-year-old female complains of Tinnitus and deafness (R > L). Known complaints of hypertension for 8 years. Diffuse hypointensity along the surface of brainstem, prepontine cistern, ambient cistern, CP angle cistern, bilateral



5A-C syngo SWI Showing Superficial Siderosis.



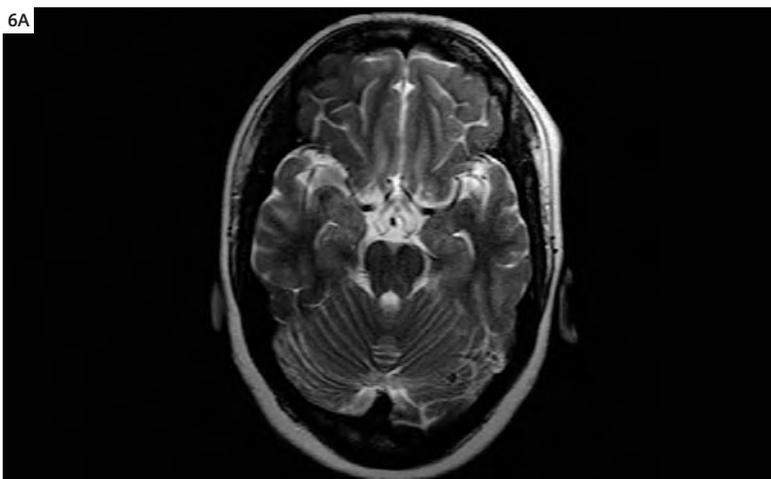
5D-F T2-weighted images of Superficial Siderosis.

cerebellar folia, bilateral sylvian cisterns, bilateral parietal and temporal cortical cerebral sulci on SWI images represent hemosiderin, consistent with Superficial Siderosis. Extension of these lesions along the course of bilateral 7th and 8th cranial nerves may result in decreased hearing and the lesions are more marked on the right side. These lesions appear minimally hypointense on T2-weighted images.

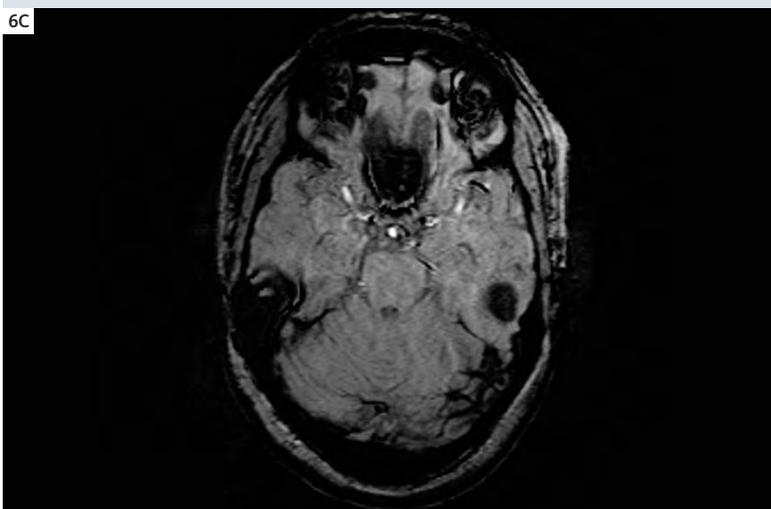
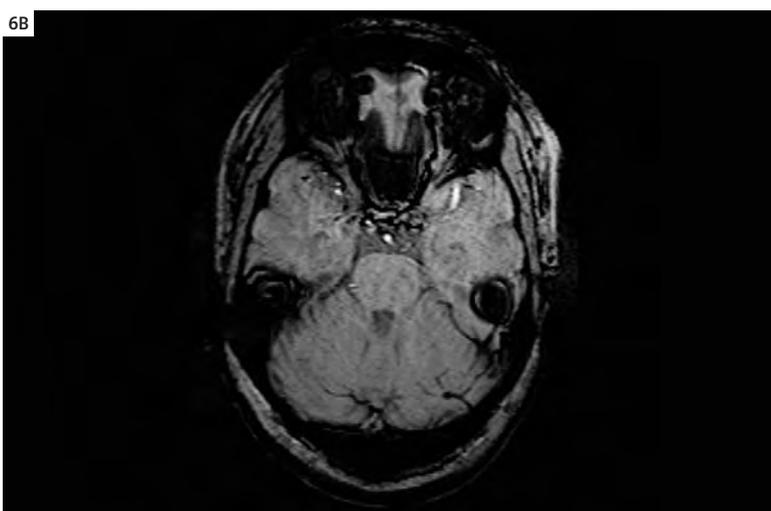
Case 6: Venous angioma

The patient presented with a history of slurring of speech two days ago. No history of motor or sensory weakness.

A focal T2 hypointense nodular lesion in the left cerebellar hemisphere with multiple radiating flow voids adjacent to the lesion, most probably suggestive of venous angioma. There is marked hypointensity in this lesion and adjacent flow void on the *syngo* SWI sequence.



6A T2-weighted image.



6B,C *syngo* SWI showing venous angioma.