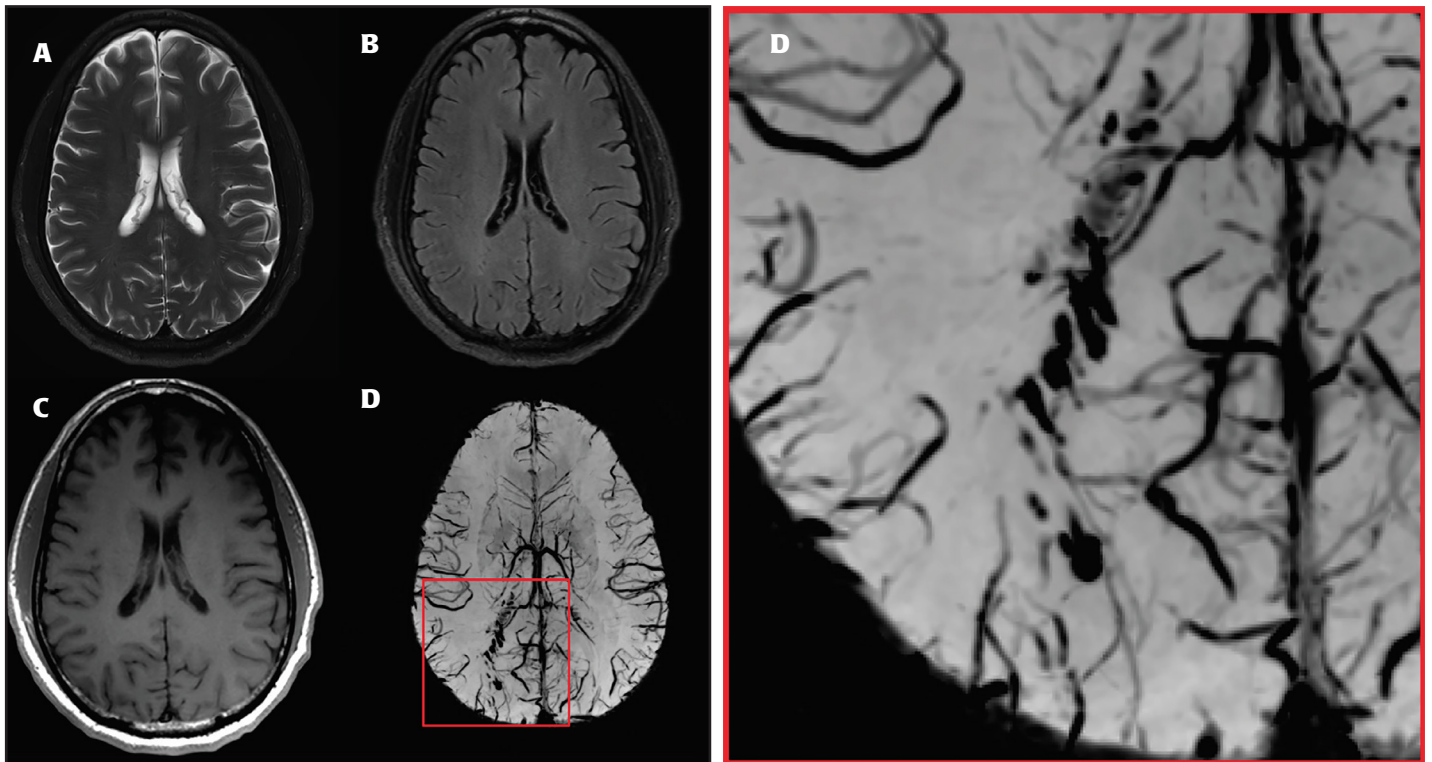


MR CLINICAL CASE STUDY

MR Brain: Enhanced Flow-Sensitive Black Blood

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Toshiba Medical's eFSBB complements a routine brain exam with the ability to demonstrate small foci of hemosiderin, likely reflecting sequela of traumatic axonal injury in the setting of recent concussion.

History

This is a 60-year-old man with continued headaches three months after sustaining a concussion.

Imaging Findings

The brain appears essentially normal on the conventional sequences (A, B, C). However, the enhanced Flow-Sensitive Black Blood (eFSBB) sequence clearly shows small foci of susceptibility hypointensity reflecting hemosiderin deposition within the right parietal white matter (D). These hemosiderin deposits seen on the eFSBB raise the possibility of traumatic axonal injury.

Discussion

The enhanced Flow-Sensitive Black Blood (FSBB) technique utilizes motion probing gradients (MPGs) in a 3D Field Echo (FE) sequence to generate image contrast from both T2* susceptibility effects as well as intra-voxel incoherent motion dephasing effects. In other words, FSBB sequence builds upon the typical susceptibility contrast in T2*-weighted

FE sequences by adding MPGs to generate additional signal dephasing in slow flowing vessels, enhancing depiction of the vessels. The sequence further enhances vessel depiction by applying a COSine algorithm¹ during post processing to enhance the contrast between blood vessels or microhemorrhages and background tissue.

Conclusion

In this case, the eFSBB technique allowed for detection of subtle traumatic axonal injury in this patient with continuing, unexplained symptoms after concussion. The finding was not visible on other conventional sequences. While there is no cure for axonal injury, this diagnosis allowed the managing neurologist to discontinue other lines of investigation into the etiology of the headache and confidently counsel and reassure the patient.

References

1. Kimura et al. Phase Enhancement for Time-of-Flight and Flow-Sensitive Black Blood MR Angiography. *Magn. Reson. Med.* 66:437-447 (2011).