

T1-weighted Black-Blood Carotid Plaque Imaging Using Variable Flip-Angle 3D Turbo Spin-Echo: Comparison with 2D Turbo Spin Echo and 3D Turbo Field Echo Sequences

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Abstract : Purpose: To compare a T1-weighted, three-dimensional variable-flip-angle (3D-VRFA) turbo spin-echo (TSE) sequence with both a two-dimensional (2D)-TSE double inversion recovery (DIR) sequence and a 3D turbo field-echo (3D-TFE) DIR sequence in magnetic resonance black-blood carotid plaque imaging. Materials and Methods: Fifteen patients underwent black-blood plaque imaging including pulse-triggered axial T1-weighted (T1W) 2D-TSE, pulse-triggered sagittal 3D-TFE, and non-triggered coronal T1W 3D-VRFA sequences. The imaging quality of each sequence was visually graded on a three-point score. The signal ratio of the carotid plaque to the arterial lumen (RPL), and that of the carotid plaque to the adjacent muscle (RPM) was calculated in each sequence. Results: The score for the 3D-TFE was lower than that of 3D-VRFA. Although no significant differences were observed between the scores of the 2D-TSE and 3D-VRFA sequences, the 3D-VRFA allowed visualization of arteries in arbitrary orientations, as well as small plaque compositions such as ulcerations and calcifications not visualized on 2D-TSE. The RPL was highest on 2D-TSE, whereas the RPM was highest on 3D-VRFA. Conclusions: 3D-VRFA is a promising technique for the diagnosis of carotid plaques.

Key words : Carotid plaque, Magnetic resonance imaging, Turbo spin-echo, Variable flip-angle