

### 3D TOF MRA and CE-MRA in the follow-up of GDC-treated intracranial aneurysms

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**Introduction:** The aim of this study was to evaluate three-dimensional time-of-flight magnetic resonance angiography (3D TOF MRA) and contrast enhanced magnetic resonance angiography (CE-MRA) in the follow-up of intracranial aneurysms treated with Guglielmi detachable coils (GDC).

**Material and methods:** 3D TOF MRA and CE-MRA were performed in 25 patients (30 aneurysms) referred for DSA in the follow-up after GDC-treated aneurysms. MRA and DSA were performed within 24 hours. The 3D TOF MRA sequence was repeated immediately after the CE-MRA sequence, with remaining gadolinium in the vasculature. The MRA investigation was performed on a 1.5 T scanner using the head coil. No parallel imaging was applied. The 3D TOF MRA was performed with axial orientation and a cranial saturation slab. Scan time was 5 min, with TR/TE/flip angle of 35 ms/ 2.4 ms/ 25° and a measured voxel size of 0.7x0.8x1 mm (0.56 mm<sup>3</sup>). The CE-MRA scan was made with coronal slice orientation, after i v administration of 40 ml of Gadolinium DTPA-BMA at rate of 2 ml/s, using fluoroscopical triggering and randomly segmented central k-space view order. The scan time was 37 s, with TR/TE/flip angle of 6.3 ms/ 2.2 ms/ 35° and a measured voxel size of 0.9x 1x1 mm (0.9 mm<sup>3</sup>). Assessments of aneurysm patency from the MRA and DSA investigations were made blinded with regard to the other modality.

**Results:** There was residual aneurysm filling in 15/30 aneurysms on DSA. Residual filling was observed with 3D TOF MRA in all of these, and with CE-MRA in 13/15 cases. In addition, 3D TOF MRA and CE-MRA both showed three cases with residual filling that was not seen on DSA. The 3D TOF MRA after gadolinium administration visualized one more aneurysm with (minimal) residual patency, but showed otherwise the same results as unenhanced 3D TOF MRA.

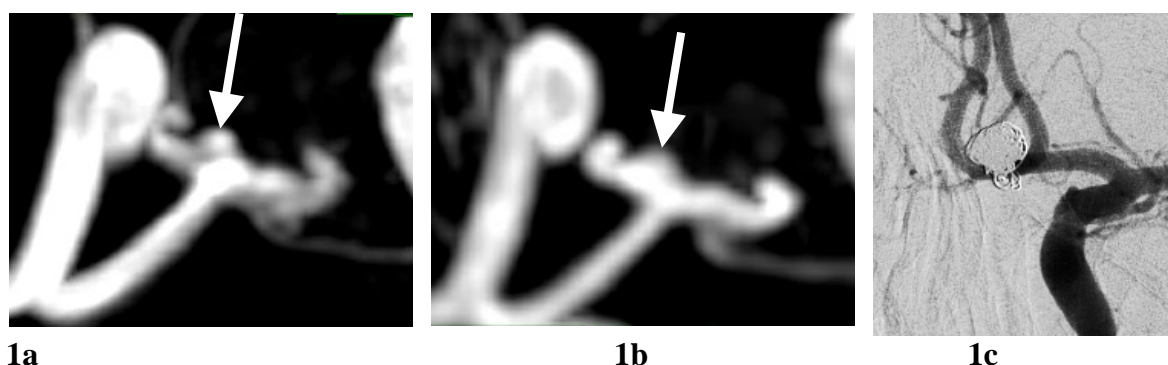


Figure 1. Maximum intensity projections of 3D TOF MRA (a) and CE-MRA (b) show residual patency (arrows) in a previously GDC-treated anterior communicating artery aneurysm that is not evident on the corresponding DSA image (c).

**Conclusion:** 3D TOF MRA and CE-MRA are reliable, non-invasive alternatives to DSA in the follow-up after GDC treatment of intracranial aneurysms. 3D TOF MRA seems to be at least as sensitive as CE-MRA for the detection of residual aneurysms. 3D TOF MRA after Gd administration offers no clear advantage over unenhanced TOF MRA. Residual aneurysm patency may be better appreciated with MRA than with DSA in some cases.