PURPOSE: To prospectively test the hypothesis that subsecond-temporal-resolution four-dimensional (4D) contrast material-enhanced magnetic resonance (MR) angiography at 3.0 T enables the same Spetzler-Martin classification (nidus size, venous drainage, eloquence) of cerebral arteriovenous malformation (AVM) as that at digital subtraction angiography (DSA). MATERIALS AND METHODS: Institutional ethics committee approval and written informed consent were obtained. In a prospective intraindividual comparative study, 18 consecutive patients with cerebral AVM (nine men, nine women; mean age, 41.9 years +/- 14.0 [standard deviation]; range, 23-69 years) were examined with 4D contrast-enhanced MR angiography and DSA. Four-dimensional contrast-enhanced MR angiography combined randomly segmented central k-space ordering, keyhole imaging, sensitivity encoding, and half-Fourier imaging, which yielded a total acceleration factor of 60. Fifty dynamic scans were obtained every 608 msec at an acquired spatial resolution of 1.1 x 1.4 x 1.1 mm. Four-dimensional contrast-enhanced MR angiograms were independently reviewed by one neuroradiologist and one neurosurgeon according to Spetzler-Martin classification, overall diagnostic quality, and level of
confidence. Kendall W coefficients of concordance (K) were computed to compare reader assessment of image quality, level of confidence, and Spetzler-Martin classification by using 4D contrast-enhanced MR angiography and to compare Spetzler-Martin classification as determined with DSA with that at 4D contrast-enhanced MR angiography. RESULTS: Spetzler-Martin classification of cerebral AVM at 4D contrast-enhanced MR angiography and at DSA matched in 18 of 18 patients for both readers, which yielded 100% interobserver agreement (K = 1). Image quality of 4D contrast-enhanced MR angiography was judged to be at least adequate for diagnosis in all patients by both readers. In three of 18 patients, DSA depicted additional arterial feeders of cerebral AVM. CONCLUSION: Subsecond-temporal-resolution 4D contrast-enhanced MR angiography at 3.0 T had 100% agreement with DSA with regard to Spetzler-Martin classification of cerebral AVM.

SUPPLEMENTAL MATERIAL: radiology.rsna.jnl.org/cgi/content/full/2453061684/DC1.