

Time resolved contrast-enhanced carotid and cerebral 3D MR-Angiography with echo-sharing and GRAPPA

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Purpose

The aim was to improve temporal resolution of the CE-MR-Angiography by evaluating a new time-resolved 3D CE-MRA combining parallel acquisition technique (GRAPPA) and echo-sharing technique for the supraaortic and cerebral vessels.

Materials and Methods

14 patients (4 with cerebral AV-malformation, 4 with cerebral AV-malformation as follow-up study after treatment, 2 with suspected stenosis of the basilar and vertebral artery respectively, 2 with extracranial carotid stenosis, 1 with a cerebral metastasis and 1 with meningioma) were examined using a new time-resolved ce-MRA technique. The examinations were done on a 1.5T system (Avanto, Siemens AG, Erlangen) using a 12-channel head-coil and a 4-channel neck-coil. The combination of parallel acquisition-technique (GRAPPA 3) and echo-sharing (TREAT 3-5-7) allowed a temporal resolution of less than 1sec. Following automatic injection (flow rate 2ml/sec) of 0.1mmol/kg Dotarem® 3D-GE datasets were collected. The MR-datasets were evaluated and compared with conventional catheter angiography (DSA).

Results and Discussion

Temporal resolution was sufficient to evaluate nidus delineation, arterial supply and early-draining veins in correlation with DSA in the patients with not treated cranial AVM and in those after treatment there were no early-draining veins seen and the nidus was no longer visible. In the patients with suspected basilar and vertebral stenosis respectively time-resolved digital subtracted MRA showed a vertebral occlusion and a proximal basilar occlusion respectively with retrograde filling of the basilar artery. In the patient with meningioma visualisation of the feeding arterial branches was possible with good correlation to DSA. In the patients with extracranial carotid stenosis a delayed perfusion of the ipsilateral hemisphere could be seen.

Conclusion

This technique is an alternative imaging technique for patients with intracranial AVM or with intracranial tumor in order to visualize the artery supply before treatment. Patients with intracranial vessel stenosis or occlusion as well as patients with treated intracranial AVM in follow-up studies might profit the most.