Feasibility of High-resolution MR Imaging for the Diagnosis of Arterial Dissection Involving the Intracranial Vertebrobasilar System

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PURPOSE: Arterial dissection is a significant cause of stroke in younger patients. A safe and feasible tool for early diagnosis is needed to prevent neurologic sequelae. This study aimed to evaluate the feasibility of high resolution (HR) MRI to diagnose arterial dissection involving the intracranial vertebrobasilar system.

METHODS: We retrospectively reviewed 43 patients who underwent HR-MR imaging between March 2012 and March 2013. The intracranial vertebrobasilar system was tentatively diagnosed clinically and radiologically. Two neuroradiologists reviewed the HR-MR images (PDWI; T1WI; T2WI; contrast enhanced(CE) T1WI) for indications of dissection; i.e., mural hematoma or a dissection flap. On T2WI, the outer diameter enlargement of the affected vessel presented as steno-occlusive lesions on angiography and was also recorded as a sign of dissection.

RESULTS: Twenty-six dissecting lesions were diagnosed on HR-MR imaging. A mural hematoma was observed in 12/26 (46%) lesions on PDWI, 12/26 (46%) on T2WI, 16/26 (73%) on T1WI, and 20/26 (77%) on CE-T1WI. A dissection flap was seen in 10/26 (38.5%) lesions on PDWI, 18/26 (69%) on T2WI, 17/26 (65%) on T1WI, and 21/22 (95.5%) on CE-T1WI. Outer diameter enlargement was detected in 17/26 (65%) lesions on T2WI.

DISCUSSION: Although conventional angiography is considered the standard diagnosis tool for arterial dissection, direct signs of dissection (i.e., intimal flap or double lumen) are seen in less than 10% of cases. Also, it is an invasive procedure with complications ranging from a minor groin hematoma to severe neurological deficits. Particularly, in the case of dissection, increased arterial pressure from the contrast injection during conventional angiography may aggravate an existing dissection or cause a new infarction due to migration of the thromboembolism. Therefore, non-invasive studies are highly recommended. In our results, mural hematomas were detected in 77% of dissection lesions on T1WI. In contrast, dissection flaps, the most direct evidence of dissection, were observed in 95.5% of lesions on CE-T1WI. Therefore, we propose that dissection flaps are more reliable for the diagnosis of dissections, and CE-T1WI is a requisite modality for intracranial dissection MR. Most patients with dissections demonstrate a complete clinical recovery; however, there is an approximately 10–12% overall risk of death, recurrent TIAs, or stroke. The risk of recurrent spontaneous dissection is also 2% within the first month. Therefore, follow-up imaging may be needed, especially for dissections showing aneurysmal changes. HR-MRI can be useful not only in the initial diagnosis but also for follow up.

CONCLUSION: This study investigated the efficacy of HR-MRI in the diagnosis of intracranial arterial dissection involving the vertebrobasilar system, including PICA dissections. Dissections were well visualized on HR-MR imaging even in patients who presented with only occlusions or stenosis on angiography. In conclusion, HR-MR imaging is likely a useful and non-invasive diagnostic tool for diagnosis of arterial dissection involving the vertebrobasilar system, including PICA dissections.

REFERENCES: