

Poster presentation

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Comparison of contrast enhanced magnetic resonance angiography (CE-MRA) and non contrast enhanced MRA for imaging of the carotid arteries

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Introduction

Since the introduction of contrast enhanced MRA this technique is regarded as the standard of reference for imaging of almost all vascular territories with MRI. However, a few years ago a direct link between the application of Gadolinium (Gd) containing contrast agents and the development of a disease call nephrogenic systemic fibrosis (NSF) was discovered. Due to this fact the need for a non contrast enhanced technique for imaging arterial and venous vessels with MRI experiences a renaissance.

Purpose

To evaluate image quality and diagnostic accuracy of a non contrast enhanced magnetic resonance angiography (MRA) technique for imaging of the carotid arteries compared to standard contrast enhanced (CE) MRA.

Methods

32 consecutive patients (62 ± 16 y, 13 m/19 f) with s/o acute brain ischemia referred for carotid MRA were enrolled in the study. All MR exams were performed on a 3.0 T system (Magnetom Verio, Siemens Healthcare) and patients underwent both, CE-MRA (3D T1 Flash, 12 ml standard 0.5 molar contrast agent) and non-CE-MRA (ECG gated TrueFISP). Both techniques featured a spatial resolution of $0.9 \times 0.9 \times 0.9$ mm³, acquisition time was 0:18 min for CE-MRA and heart rate dependent approximately 5:00 min for non-CE-MRA. Image quality was rated in terms of delineation of the vessel lumen, signal

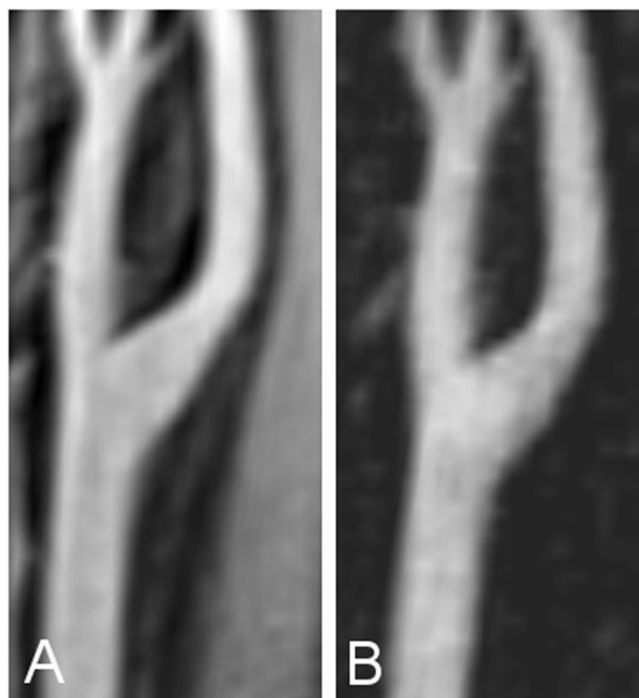


Figure 1

intensity within the vessel and diagnostic confidence by two readers on a 4 point scale whereas 4 stands for best score. Accuracy of quantitative measurements was evaluated by assessing the cross-sectional vessel area at three predefined levels identical for both techniques in the area of the carotid bifurcation.

Results

All patients finished the exam including both techniques for carotid MRA. Mean score for image quality in terms of vessel lumen delineation was 3.55 for CE-MRA and 3.06 for non-CE-MRA. In terms of signal intensity and diagnostic confidence CE-MRA featured a mean score of 3.39 and 3.68 compared to 2.9 and 3.1 of non-CE-MRA respectively. Measurement of the vessel lumen showed no significant differences for both techniques ($p = 0.16 - 0.41$ for three different levels, Figure 1: Example of a non CE MRA (A) and a CE MRA (B) exam of the carotid bifurcation. Qualitative image quality reading as well as quantitative lumen evaluation delivered no significantly different results).

Conclusion

Non-CE-MRA can serve as an alternative for CE-MRA without a significantly different image quality or diagnostic accuracy. This is especially interesting in patients with an impaired renal function to reduce the risk of NSF. However, the significantly longer acquisition time is still a drawback.

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