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Meeting abstract

1053 Assessment of complex peripheral vascular malformations with highly time-resolved 3D contrast-enhanced MR angiography and single phase high-spatial resolution 3D contrast-enhanced MRA at 3.0 Tesla

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Introduction

Over the past few years, contrast enhanced MR angiography (CE-MRA) techniques have emerged as non-invasive and safe alternative imaging approaches for comprehensive imaging of upper and lower extremity vascular malformations. Due to its high-spatial resolution, single-phase CE-MRA is desirable for evaluation of the anatomical extent and morphological details of these lesions. However, this technique is limited in providing functional and dynamic information of vascular malformations. Rapid dynamic viewing is necessary for appropriate visualization of arteries from veins in lesions with fast flow such as peripheral arteriovenous malformations (AVMs). Time resolved MRA provides dynamic information which are complementary to conventional MRA by showing the flow dynamics of these disorders, demonstrating feeding arteries or draining veins, and differentiating a slow from high flow lesion.

Purpose

To investigate the utility of low dose TR-MRA in evaluation of complex vascular malformations of the extremities, and to compare the results with conventional contrast-enhanced MRA (CE-MRA)

Methods

15 consecutive patients (6 males, 9 females, age range 14–47) underwent time-resloved 3D contrast-enhanced MRA, and single phase high spatial resolution 3D MRA at 3.0 T(Trio, Siemens) for known or suspected upper and lower extremity vascular malformations. Two readers evaluated the overall image quality (4-point scale), artifacts, and findings on each dataset. Wilcoxon Rank Sum test, and kappa co-efficient were used for image quality and inter-observer variability assessment.

Results

Both readers graded the median overall image quality as excellent for both datasets (good inter-observer agreement). Reader 1(2) graded 5(4) TR-MRA datasets as having mild motion artifacts. A total of 19 vascular malformations were confidently diagnosed by both readersn on each dataset including eleven lower extremity (4 AVMs, 8 venous hemangiomas, 1 venous dysplasia), and 6 upper extremity venous hemangiomas. Each reader demonstrated additional dynamic information on TR-MRA in all 15 patients (100%) including AVM/hemangioma hemodynamics (4, highh flow, 15 slow flow). TR-MRA was able to separate dominant feeding and draining vessels in all high flow AVMs compared to CE-MRA. Reader 1(2) detected arterial feeders and draining veins in 4(4) and 8(9) lesions, respectively, on TR-MRA, and in

8(7) and 14(14) lesions on CE-MRA datasets (excellent inter-observer agreement). Anatomical details including evaluation of the full extent of the malformations (19 lesions), muscle involvement (15 lesions), bone involvement (2 lesions), subcutaneous involvement (15 lesions), and filling defects within vessels (12 lesions) were better demonstrated on CE-MRA.

Conclusion

Time-resolved MR angiography provides unique dynamic and functional information combined with morphological features for assessment of complex peripheral vascular malformations. Due to limited spatial resolution, this technique should be considered as complementary or supplementary to high spatial resolution MRA.