

MR phlebography with a blood pool contrast agent in patients with peripheral arterial occlusive disease

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Purpose:

To prospectively assess MR phlebography findings as determined during the steady state phase of peripheral contrast enhanced MR angiography with a blood pool contrast agent in patients referred for peripheral arterial occlusive disease.

Introduction:

Contrast enhanced MR angiography of peripheral vessels is routinely used in the diagnostic workup of patients with peripheral arterial occlusive disease¹. The introduction of an intravascular contrast agent allows for image acquisition during a longer time frame with high T1 relaxivity offering the opportunity to yield high resolution images of both peripheral arteries and veins^{2,3}. The aim of our study was to prospectively assess MR phlebography findings acquired during the steady state phase of a blood pool contrast agent in patients referred for peripheral arterial occlusive disease.

Methods:

139 patients with suspected or known peripheral arterial disease were examined with Gadofosveset Trisodium (Vasovist, Bayer Schering Pharma, Berlin, Germany; 0.03 mmol/kg body weight at a flow rate of 1.2 ml/sec.) on a 1.5 Tesla whole body MRI (Achieva, Philips Medical Systems, Best, NL). In addition 43/139 of the patients were scheduled for surgery (coronary bypass (6/43) or distal origin bypass (37/43)). First pass MRA images were acquired with effective voxel sizes of 0.88 x 0.88 x 1.5 mm³ (upper legs) and 0.88 x 0.88 x 1.1 mm³ (lower legs) respectively. MR phlebography images were acquired in the steady state phase with effective voxel sizes of 0.88 x 0.88 x 0.99 mm³ (upper legs) and 0.52 x 0.52 x 0.49 mm³ (lower legs) respectively. MR phlebography was assessed by two radiologists in consensus in order to identify incidental venous disease and to determine suitable veins for bypass graft surgery. In all cases color duplex sonography, performed by an independent third radiologist, served as the standard of reference. All investigators were blinded for the results of each other modality.

Results:

In 46/139 patients MR phlebography revealed additional information (33 %), all of which were confirmed by color duplex sonography. Incidental deep vein thrombosis was found in 3/139 patients (2 %), varicosis was present in 42/139 patients (30 %) and an arteriovenous fistula in the lower leg was diagnosed in 1/139 patients (0.7 %). MR phlebography allowed for mapping of veins suitable for bypass surgery in all 43/43 patients (100 %).

Conclusion:

As an add-on to peripheral CE MRA MR phlebography with a blood pool contrast agent allowed for identification of incidental but relevant venous disease. The combination of CE MRA and MR phlebography of the upper and lower legs appears to be a promising clinical application for blood pool contrast agents to determine concomitant arterial and venous disease.

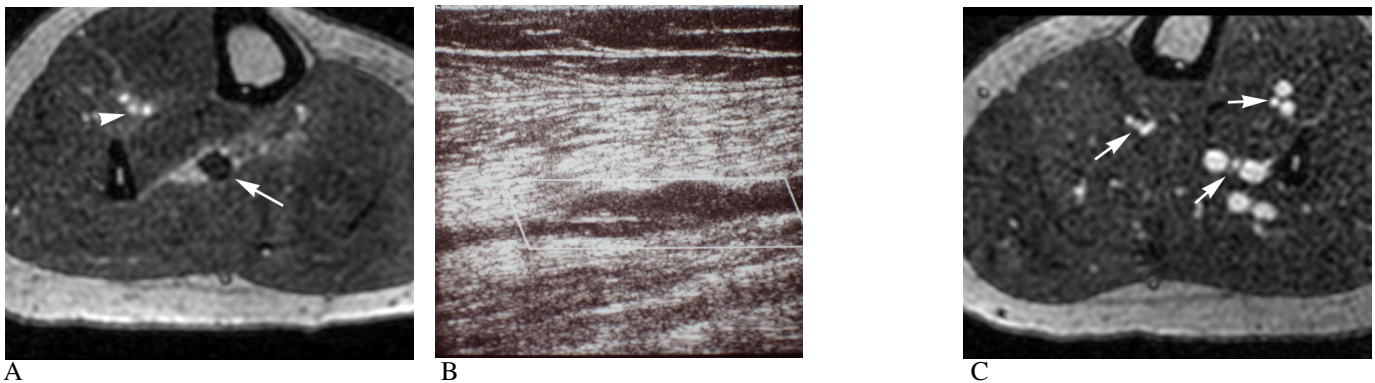


Fig.1 (A) Axial multiplanar reformat (MPR) of high resolution steady state images of the right lower leg in a 43-year old female patient referred for peripheral artery disease: Deep vein thrombosis in the fibular vein group (arrow), fibular and posterior tibial arteries are occluded, the anterior tibial artery (arrowhead) and veins show no disease. (B) Fibular vein thrombosis was confirmed by color duplex sonography. (C) In the left lower leg of the same patient all arteries (arrows) and veins present normally.

References:

- 1 Lenhart M et al., *Rofo* 2002; 174:1289-1295.
- 2 Grist TM et al., *Radiology* 1998; 207:539-544.
- 3 Rapp JH et al., *Radiology* 2005; 236:71-78.