

Low Dose, Contrast-Enhanced MR Angiography of the Lower Extremities at 3.0 Tesla

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Purpose: To assess the feasibility of low-dose CE-MRA of the lower extremities at 3.0 Tesla and to compare the image quality with high-dose and intermediate-dose protocols.

Materials and Methods: A total of forty-five consecutive patients (27 Male, 18 Female; age range 24-88 years) suffering from peripheral vascular disease symptoms, underwent contrast-enhanced lower extremity runoff at 3.0T. Due to ethical issues, each individual was examined only once, receiving either high-dose (~0.3 mmol/kg), intermediate-dose (~0.2 mmol/kg), or low-dose (~0.1 mmol/kg) gadopentetate dimeglumine (Magnevist) using a three-station, dual-injection protocol. For scoring purposes, the whole arterial system below the diaphragm was divided into 34 segments. Having access to all the post-processed MIP images as well as source data, two experienced radiologists, independently and in a blind fashion reviewed the images. All studies were assessed in regards to overall diagnostic image quality and the severity of venous overlay. Visibility and severity of stenosis of each arterial segment was scored, and presence of anastomosing collaterals was documented.

Results: In all dose groups, virtually all arterial segments showed diagnostic image quality (chart 1). No statistically significant difference was found among the three groups pertaining to the vessel definition ($p < 0.01$). No significant difference was detected between the high-dose and intermediate-dose groups; however, surprisingly, the low-dose group had significantly better vessel definition compared to both high- and intermediate-dose groups ($p < 0.01$). All dose groups presented a good visibility of collateral vessels. Although the venous contamination was seen less frequently in the low-dose group (chart 2), the difference was not statistically significant.

Conclusion: The results of our study showed that, taking advantage of the higher SNR at 3.0T, contrast dose for lower extremity MRA can be reduced several fold without any compromise in image quality.

Chart 1: Arterial segment definition in three dose-groups

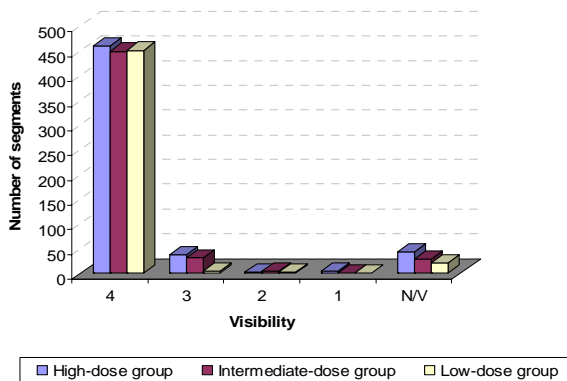


Chart 2: Venous contamination

