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Meeting abstract

2126 Saphenous vein graft atherosclerotic plaque quantification utilizing magnetic resonance imaging and multidetector computed tomography: a comparison with intravascular ultrasound

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Introduction

The 10-year patency rate of saphenous vein grafts (SVG) has been reported to be 40%–60%. Atherosclerotic plaque has been implicated in this late stage of vein graft disease. We evaluated SVG plaque quantification by magnetic resonance imaging (MRI) and multidetector computed tomography (MDCT) as compared to intravascular ultrasound (IVUS).

Purpose

To ascertain the feasibility and accuracy of plaque quantification utilizing MRI and MDCT as compared to IVUS.

Methods

Sequential patients (n = 22) undergoing coronary angiography with anginal symptoms and significant saphenous vein graft lesions were enrolled. All patients had IVUS, MDCT (16-detector) and MRI using black-blood T1-weighted imaging (1.5 T) performed. Cross-sectional images from IVUS and MDCT were analysed at 1 mm intervals along the entire length of the lesion. MRI images were obtained and analysed at 5 mm intervals. The sum of the plaque areas on these images gave the lesion volume. The MDCT and MRI images were analysed by two independent investigators. Spearman's correlation and Bland-Altman plots were used where appropriate.

Results

MRI data were analysed for 18 patients (n = 19 lesions) as 3 patients were unable to finish their scans and one patient's scan was degraded by artefact. The mean age of the SVGs was 13.95 years (± 4.41 years). The inter-observer variability as determined by coefficient of variance for assessing plaque volume for MDCT and MRI was 3.6% and 9.9% respectively. The correlation between MDCT and IVUS was better in mean luminal area ($r = 0.87$; $p < 0.001$) than mean vessel wall area ($r = 0.77$; $p < 0.001$). In contrast, MRI and IVUS correlation was better in vessel wall area ($r = 0.77$; $p < 0.001$) than luminal area ($r = 0.59$; $p = 0.008$). Spearman's correlation for plaque volume was better for MRI and IVUS ($r_s = 0.97$; $p < 0.001$) compared to MDCT and IVUS ($r_s = 0.85$; $p < 0.001$). However, Bland-Altman plots (Figure 1) show plaque volumes by MDCT to be closer to IVUS (differences of mean = 186.9 mm^3; SD = 239.1) compared to MRI and IVUS (differences of mean = 437.5 mm^3; SD = 407.9).

Conclusion

Both black-blood MRI and MDCT are able to reliably quantify atherosclerotic plaque in SVGs when compared to IVUS. However, over estimation in plaque volumes is greater in MRI especially with increasing vessel size. The ability to noninvasively assess atherosclerosis in SVGs

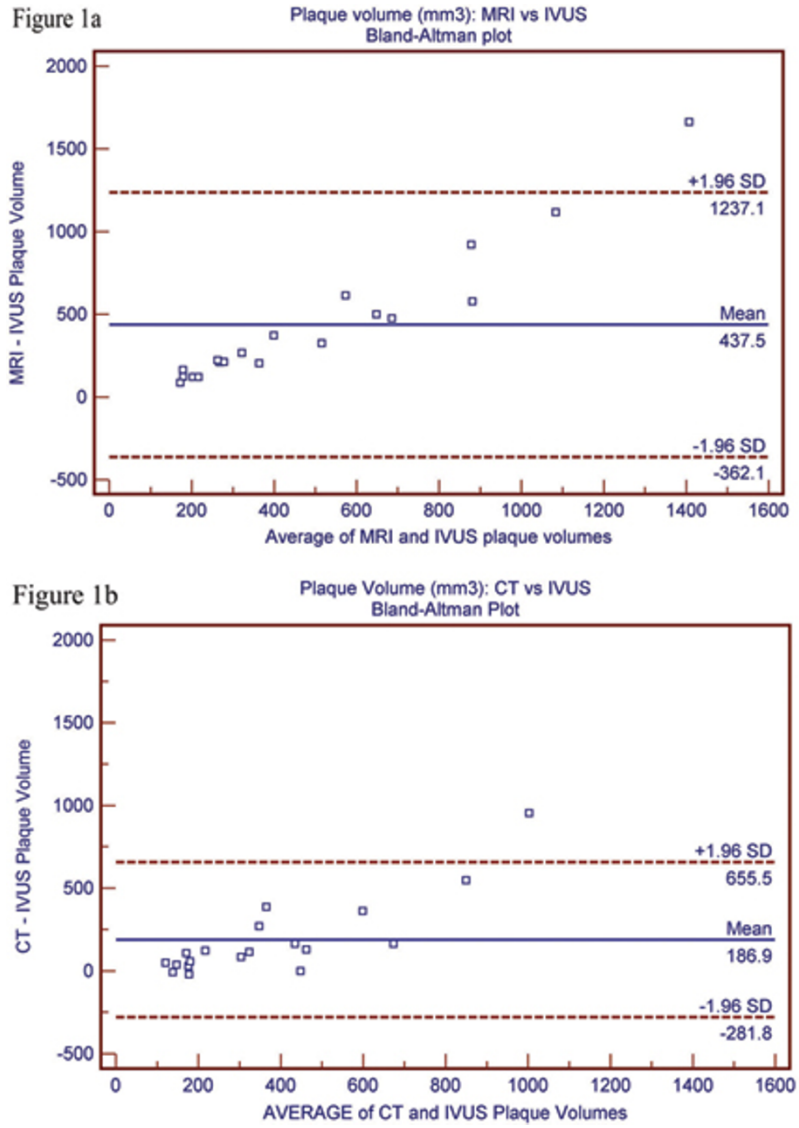

Figure 1
Bland-Altman plots showing plaque volume (mm^3): MRI vs IVUS (1a) and plaque volume (mm^3): CT avs IVUS (1b).

may potentially lead to superior risk prediction for future cardiovascular events.