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Conference Abstract

P.50 Radial Artery Phenotyping in Fibromuscular Dysplasia Through Ultra-High Frequency Ultrasound: A Radiomic Approach

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ABSTRACT

Rationale and Aim: This study is aimed at identifying possible patterns of vascular wall disarray and remodeling in radial arteries of patients with fibromuscular dysplasia (FMD), by means of ultrahigh frequency ultrasound (UHFUS).

Methods: UHFUS scans of the radial arteries and of 30 FMD patients and 30 healthy controls were obtained by VevoMD (70 MHz probe, FUJIFILM, VisualSonics, Toronto, Canada). 10 end-diastolic frames for each subject were analyzed. 74 radiomic features and 4 engineered parameters were extracted: intima-media thickness (IMT) and adventitia thickness (AT), an adjunctive acoustic interface for each layer (IMT and AT triple signal). The extracted parameters were used to train classification models, using Support Vector Machine Linear (SVM), K-Nearest Neighbors (KNN), Logistic Regression, Linear Discriminant Analysis (LDA). The models were then tested on an independent validation population (38 FMD patients and 28 healthy subjects).

Results: IMT (185 ± 46 vs 168 ± 37, p =) and AT (104 ± 34 vs 96 ± 35, p = 0.004) were significantly higher in FMD than in controls. IMT and AT triple signal were also more frequent in FMD than in control images (p < for both). The most accurate classification models were LDA (sensitivity = 0.67, specificity = 0.76, accuracy = 0.71, AUC = 0.71) and Logistic Regression (sensitivity = 0.71, specificity = 0.72, accuracy = 0.71, AUC = 0.71). The models showed and accuracy of about 70% when tested on the validation population.

Conclusions: Wall ultrastructure of radial arteries of FMD patients is extensively altered: IMT and AT are thickened and the first and/or second layer of the arterial wall is splitted, showing a triple signal feature. Radiomic descriptors combined with engineered parameters allow to distinguish between radial images from FMD patients and controls with a 70% accuracy.

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