Surface-Length Index (SLI): a novel index to predict right ventricle dysfunction by cardiac MRI

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Purpose: Short axis CineMRI has become the gold standard to measure Right Ventricular Ejection Fraction (RVEF). However, it requires a time-consuming manual contouring of the endocardium. Therefore, many examinations do not include complete RV study. We hypothesized that a simple index could be used to detect patients with abnormal RVEF requiring a precise RV study. Two classical RV function indices were tested: 1/ RV fractional area change (FAC) measured in a mid-ventricular short-axis slice and 2/ RV shortening fraction (SF). This formula was derived from the crescentic shell model published in 1989 by Aebischer.

Methods: 400 patients underwent a conventional cardiac MRI with a horizontal long-axis view and a stack of contiguous 8 mm short-axis slices at the basal level, used to determine the optimal value for \( \alpha \) by optimization of the area under ROC curves (Group A) and 340 patients prospectively included to test SLI, FAC and SF capacity to predict a RVEF alteration (<0.5) (Group B).

Results: In group A, the optimal value for \( \alpha \) was 1.3. In group B, SLI, FAC and SF area under the ROC curves were respectively 0.94, 0.87 and 0.81. SLI allowed a better detection of RV dysfunction \((p=0.001)\). With a threshold of 0.50, SLI yielded sensitivity and specificity of 85 and 89%.

Conclusions: Hypertension impacts not only LV mass but especially shape and systolic and diastolic LV function in pts with significant chronic AR.

103

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