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Reliability of single breath hold three-dimensional cine kat-ARC for the assessment of biventricular dimensions and function

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Purpose:

To assess the accuracy and reproducibility of 3D-cine k-adaptative-t-autocalibrating reconstruction for cartesian sampling (3D cine kat-ARC) for quantification of biventricular volumes, ejection fraction and LV mass in clinical practice.

Materials and Methods: 74 patients underwent cardiac magnetic resonance for clinical indications.. In the whole population 3D cine kat-ARC and 2D cine bSSFP images were acquired on short axis view. Subsequently, the population was divided in three subgroups (dilated, hypetrophic, other phenotypes).

Two experienced observers performed analysis of volumes, biventricular function and left ventricular mass using an off-line workstation.

Statistical analysis was performed using Student"s t-test, linear regression and Bland-Altman plot, correlation coefficient η2 and the intra-class correlation coefficient (ICC). A cut-off value of $p < 0.05$ was considered statistically significant.

Results: Biventricular volumes, function and left ventricular mass evaluated with 3D cine kat-ARC sequences did not show any significant difference compared to 2D bSSFP sequences in the overall population ($p > 0.05$). Bland-Altman analysis showed good agreement between the two sequences as well as linear regression ($r \geq 0.82$). Subgroup analysis showed a statistically significant difference ($p = 0.04$) for left ventricular ejection fraction (LVEF) in patients with a dilated phenotype; showing a minimum overestimation tendency for 3D cine kat ARC (2D cine bSSFP LVEF = 46.44 ± 15.83% vs 3D cine kat-ARC LVEF = 48.36 ± 16.50%).

Conclusions: 3D cine kat-ARC 3D sequences allow an accurate evaluation of biventricular volumes and function in a single breath hold.