3D regional RV function in pulmonary hypertension

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Purpose

Pulmonary hypertension (PH) is a rare and severe disease. Right ventricular (RV) remodelling and function are associated with survival. The unique anatomy and structure of the RV limit 2D analysis, and its regional function has not been studied yet.

- We show the contribution of regional 3D deformation analysis for the study of RV remodelling in patients with PH, as compared to healthy controls.

Results

- 19 patients (59%) were NYHA class III-IV at baseline. Over a mean FU of 49±41days, 5 patients died from cardiopulmonary causes.
- The highest deformation was at the RV lateral and inferior levels.
- Regional motion and deformation and global volume patterns were significantly affected at the RV anterior, lateral, inferior wall, as well as in the trabecular and inlet septum in PH patients.
- Deformation in the first 4 segments was significantly associated with NYHA class and survival. Global area strain >-15% was a significant predictor of death (Hazard Ratio 411e12 [140 – 1.2e27]).

Methods

3D RV echocardiographic sequences from:
- 32 patients with PH (57±21y, 15 male): 19 (group 1) + 8 (group 3) + 5 (group 4)
- 10 healthy controls (38±13y, 6 male)

Myocardial tracking through semi-automatic Tomtec 4D RV-Function 2.0 software. Volumes and ejection fraction directly from the software.

Variables of interest:
- Local deformation (area strain)
- Local motion (radial/circumferential/longitudinal displacement)

Temporal alignment to allow pattern comparisons. Spatial correspondences obtained from the software.

Conclusions

- Segments where RV contraction predominates are determinants of symptoms and survival in PH patients.
- Of high relevance to establish the prognosis of such patients.