Meeting abstract

1089 Can cardiovascular MRI prove or disprove ECG's ability to diagnose right ventricular hypertrophy?

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Introduction
Multiple electrocardiographic (EKG) criteria exist for diagnosis of right ventricular hypertrophy (RVH) but the optimum criterion is not known.

Hypothesis
We hypothesize that categorization of RVH by cardiovascular MRI (CMR) will demonstrate the clinical utility of each known EKG criteria for RVH.

Methods
Patients (32, M = 10, F = 22) with varying degrees of chronic pulmonary hypertension had conventional 12 lead EKG and CMR performed simultaneously. Processing of 3D RV volumes and mass were performed on MASS plus software: 13 pts had RVH based on 3D RV mass index (RVMI) 2 SD above mean (27.5 gm/m^2, based on historical controls). The EKG was analyzed by an expert electrocardiographer blinded to the CMR data. Three criteria for RVH were assessed; 1) R/S ratio in V_1 >1 with R > 0.5 mV, 2) S in V_5 or $V_6 \geq 0.7$ mV and 3) QRS axis $\geq +90°$. The EKG data were compared with CMR data utilizing ROC curves and stepwise linear regression modeling.

Results
The mean RVMI was 28.41 ± 21.56. By CMR criteria, the R/S ratio in $V_1 > 1$ with R > 0.5 mV showed sensitivity of 38%, specificity of 90%, when the threshold was increased to R > 0.9 mV the sensitivity decreased to 23%, but specificity improved to 100%. Similarly the QRS axis $\geq +90°$ showed sensitivity of 46% and specificity 80% when threshold was increased to $\geq +110°$, the sensitivity was 31% and specificity 85%. S in V_5 or $V_6 \geq 0.7$ mV criteria for RVH showed sensitivity 38% and specificity 80%. Stepwise linear regression of the 3 EKG criteria showed that only S in V_5 or $V_6 \geq 0.7$ mV was predictive of RVMI (r = 0.615, p < 0.001). Since, similar EKG changes can occur in RV dilatation, we performed a secondary analysis: comparing the mean RV end diastolic volume index (RVEDVI) with the EKG criteria. This regression analysis for the 3 EKG criteria was again only significant for S in V_5 or $V_6 \geq 0.7$ mV (r = 0.53, p < 0.01).

Conclusion
Significant trust is placed on the EKG diagnosis of RVH or RV dilatation based on the published criteria. Our data clearly demonstrate that when compared to CMR gold standard, all traditionally used EKG criteria for RVH lack sensitivity and that the EKG criteria of S in V_5 or $V_6 \geq 0.7$ mV is perhaps the most predictive for RVH.