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Optimized multiparametric analysis of cardiac dyssynchrony: machine learning and prediction of response to cardiac resynchronization therapy based on the apical 4-chamber view

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Topic(s):
Echocardiography: Technology

Citation:
Aims. We hypothesized that a multiparametric evaluation, based on the combination of electrocardiographic and echocardiographic parameters, could enhance the appraisal of the likelihood of reverse remodeling and prognosis of favorable clinical evolution after cardiac resynchronization therapy (CRT). Also, we sought to test the respective value of automatically extracted parameters from left ventricular (LV) strain curves recorded in apical 4-chamber view as compared to the other echocardiographic views.

Methods and results;
This is a machine learning study based on a dataset of 161 patients who were treated by CRT according to current ESC-guidelines. The longitudinal strain curves of the 6 LV-segments of the left ventricle were plot for the three different apical views. Several features as times or integrals were extracted as previously published. These features were classified by importance using the out-of-bag method(fig1). Half of the most important features come from the 4-chamber view and a third from the 2-chamber view. The correlation between the most important features was studied to determine the relationship between them. Almost all the features from the 2-chamber and apical long-axis views are correlated with others and generally with one acquired from the 4-chamber view.

Conclusion: The high number of important features indicate the relevance of the 4-chamber as unique view for applying machine learning approaches on strain curves. Optimizing selection of patients for CRT should be possible just on the dataset coming from one apical 4-chamber view.
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