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BEST POSTERS AWARDS

USE OF A CARDIAC ELECTROCARDIOGRAPHY AND TRANSTHORACIC ECHOCARDIOGRAPHY DATABASE TO REDEFINE ECG CRITERIA FOR LEFT VENTRICULAR HYPERTROPHY (THE CREATED-LVH STUDY)

ACC Poster Contributions
Ernest N. Morial Convention Center, Hall F
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Session Title: ACC.11 Best Poster Award Competition
Abstract Category: 30. ECG/Ambulatory Monitoring Signal Averaging
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Background: The ECG is an inexpensive and ubiquitous bedside screening tool whose utility rests upon the validity of criteria used to interpret it. Criteria for the detection of left ventricular hypertrophy (LVH) are known to be insensitive and may be inaccurate. To address this issue, we created an automated computer database of paired ECG and 2D-echocardiographic (2DE) data. We hypothesized that our dataset would allow for the creation of new, evidence-based ECG criteria for LVH with superior sensitivity and specificity to those currently in use.

Methods: Subjects in sinus rhythm with a 12-lead ECG and 2DE within a 6 month period were included. Approximately 900 measurements per ECG, including QRS sizes and durations were collected. Matched 2DE data, including left ventricular mass index (LVMI), were also automatically collected. Using recursive partitioning to relate ECG measurements to LVMI, decision trees were constructed to identify ECG variables predictive of LVH (defined as LVMI ≥ 95 g/m2 for women and ≥ 115 g/m2 for men). Sensitivity, specificity and receiver operating characteristics were computed.

Results: Data from 10 006 subjects (4304 females and 5702 males) were analyzed, both as a group and then separately for each sex. Decision trees revealed that S-wave area in lead V3 (obtained simply by multiplying S-wave voltage by its duration), as predictive of LVH. Overall, an S-wave area of ≥1836 μV·s had a sensitivity of 40% and a specificity of 86% for the ECG detection of LVH. For males, the sensitivity and specificity of an S-wave area of ≥ 2087 μV·s were 41% and 88% respectively. For females, using an S-wave area of ≥1602 μV·s, the sensitivity and specificity were 37% and 89% for LVH detection. ROC curves revealed optimum S-wave area cut points for females of ≥ 1084 μV·s (sensitivity 56.5%, specificity 70%) and of ≥ 1673 μV·s for males (sensitivity 53.2%, specificity 78.1%).

Conclusions: S-wave area in lead V3 alone is predictive of LVH, with sensitivity greater than that of most (more complex) criteria currently available. This study represents the largest study to date aimed at re-defining the ECG criteria for LVH. The use of this novel ECG criterion may allow for improved bedside ECG detection of LVH.