Correlation of QRS Amplitude with Left Ventricle Geometry and Body Size in Non-ischemic Cardiomyopathy with Left Bundle Branch Block

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Introduction: QRS amplitude in electrocardiogram has been evaluated in normal population based on ethnicity and age and in cardiac hypertrophy, but not in heart failure patients in whom left ventricle (LV) mass may increase. Moreover, ECG voltage, body size and LV size may modulate result of cardiac resynchronization therapy (CRT). Hence, we evaluated the correlation of QRS amplitude with LV geometry and body size in heart failure population with left bundle branch block (LBBB).

Methods: Preoperative QRS amplitudes in 12 leads were retrospectively analyzed in CRT patients with NYHA III/IV, non-ischemic cardiomyopathy, and ‘true’ LBBB defined by Strauss criteria.

Result: 12 lead ECGs were recorded in 184 patients (age 61 ±12 yrs; male 45%; LVEF 19±7%; QRS duration 165 ± 20 ms). QRS voltage in each lead had no correlation with LV mass or end-systolic volume. In aVR, there was negative correlation with end-diastolic diameter (p 0.03, r -0.185) and end-systolic diameter (p 0.001, r -0.273) and positive correlation with relative wall thickness (p 0.002, r 0.261). QRS voltage in lead I and aVL had negative correlation with height (p 0.04, r -0.171, p 0.04, r -0.173). With body mass index, lead I had positive correlation (p 0.003, r 0.245) and V3-V6 had negative correlation (V3 p 0.03, r -0.176, V4 p 0.01, r -0.215, V5 p 0.01, r -0.211, V6 p 0.005, r -0.235).

Conclusion: QRS amplitude did not correlate with left ventricle mass or volume, but showed significant though weak correlation with diameter and body size in some leads. ECG voltage may describe qualities of electrical substrate rather than simply LV or body size. This may be important for CRT.