New insights into the evaluation of broad QRS complexes

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Summary

Although the ECG has been available for over 100 years, its correct interpretation remains challenging. Physicians continue to find patterns that have not yet been fully explored. Particularly in the presence of broad QRS complexes, interpretation of the ECG is sometimes challenging.

The present thesis analyzes and expands the diagnostic possibilities of the ECG in the presence of broad QRS complexes. It provides information regarding the atrioventricular conduction during bundle branch block (BBB), diagnostic characteristics of different premature ventricular complex (PVC) morphologies and offers a new approach for the correct measurement of the QT interval duration in the presence of BBB.

The measurement of the QT interval in the presence of BBB has traditionally been challenging. Since 2014 we have developed and validated a formula to estimate the anticipated QT interval in the absence of broad QRS (Chapter 2). Subtracting 50% of the QRS from the measured QT time leads to the modified QT. The formula was extensively validated in patients with intermittent LBBB (Chapter 3), in patients with a pacemaker (Chapter 4), in heart failure patients with an implantable cardioverter defibrillator (Chapter 5) and in patients with right BBB (Chapter 6).

In part 2, we showed that the prolonged HV interval is not associated with the subsequent development of third degree AV block or with increased mortality (Chapter 7). Based on the present evidence, the need for invasive electrophysiological studies might be overestimated in the current guidelines. The decision for pacemaker implantation should therefore be based on more parameters than just the HV interval in BBB patients. A more tailored approach should be the basis of modern treatment regimens.

Regarding PVC ablation, we showed that the inferior axis, which was considered typical for PVCs from the outflow tract, must also be considered for PVCs arising from the left ventricular inflow tract (Chapter 8). In combination with positive concordance at the precordial leads of the ECG, such PVCs could be effectively ablated from the coronary venous system.

Finally, we described two different entities that lead to an important ECG spot diagnosis. In particular, we could show that PVCs from the moderator band are common for the short-coupled variant of torsade de pointes (Chapter 9). Mapping and ablation at the lateral free right ventricular wall was possible by different mapping systems. Left superior frontal axis, late precordial LBBB-like transition and a coupling interval less than 300 ms offers the spot diagnosis of this life threatening arrhythmia in young people.