Prognostic value of QRS duration and ejection fraction: going back to the roots

Commentary on

Incidence of mortality in 1,040 patients with coronary heart disease or hypertensive heart disease with normal and abnormal left ventricular ejection fraction and with normal and abnormal QRS duration

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Recent developments in cardiac imaging and biological markers have attracted intense interest within the cardiology community. Improvements in speed of measurement, image quality, reliability, and range of applications have evolved to the point where costly cardiac imaging and new biomarkers are increasingly seen as clinical tools on a daily basis. Nevertheless, simple and widely available parameters such as QRS duration and left ventricular (LV) dimensions and ejection fraction (EF) have been shown to be among the most powerful predictors of survival after acute myocardial infarction [1, 2], in chronic heart failure (HF) [3-5] and among people free of overt cardiovascular disease [6, 7].

Left or right bundle branch block occurs in up to 47% of HF patients and left is more common than right bundle branch block. Patients with HF and QRS prolongation have higher all-cause mortality and possibly a higher incidence of sudden cardiac death than those with narrow QRS complexes [8, 9]. Notably, in patients with HF, an inverse correlation exists between QRS prolongation and LVEF [10, 11]. In a study of nearly 3,500 patients with HF, Shenkman et al. [12] found a stepwise increase in the prevalence of systolic LV dysfunction as QRS complex duration increased progressively above 120 ms. Another study, conducted in 343 patients with HF, reported LVEF of 41, 36, 29, and 25% in patients with QRS durations of ≤100, 100 to 119, 120 to 149, and ≥150 ms, respectively [10]. These observations in patients with HF are in keeping with the findings of Murkofsky et al. [13], who analyzed 226 patients (without typical bundle branch block, pacemaker, or stated HF) referred for radionuclide exercise ventriculography. The study indicated a high likelihood of an abnormal LVEF ≤45% with a QRS ≥0.10 s. Although sensitivity was not very high, specificity rose for each 0.01-s increase in QRS duration so that it reached 99% with a QRS increment from 0.10 to 0.12 s [13].

In this issue of the *Journal* Lai et al. [14] evaluated the relationship between abnormal QRS duration (≥120 s) on the resting ECG and LVEF (<50%) by 2-dimensional echocardiography and long-term mortality among 1,040 patients with coronary heart disease or hypertensive heart disease with left ventricular hypertrophy. At a mean follow-up of 17±10 months the authors demonstrated an increased risk for all-cause mortality among patients with abnormal LVEF or abnormal QRS duration, or both. This is the first study that has found a consistent proportionality between two surrogate endpoints, such as abnormal EF and QRS duration, and the subsequent change in long-term mortality among patients at high risk for cardiovascular events.

In accordance with these data, Silverman et al. [8] reported that QRS prolongation had a different prognostic value in patients with chronic HF with non-ischaemic vs. ischaemic cardiomyopathy. They found that a prolonged QRS carried a significantly worse prognosis only in patients with non-ischaemic cardiomyopathy. These results are at variance with the observations of Iuliano et al. [15], who found no significant difference (median follow-up, 45 months) in mortality or sudden death in patients with non-ischaemic cardiomyopathy and QRS ≥0.12 vs. QRS <0.12 s. However, Iuliano et al. [15] reported a significantly higher all-cause and sudden-death mortality rate in patients with ischaemic cardiomyopathy and a longer QRS duration. Comparing the groups with QRS ≥0.12 vs. QRS <0.12 s (median follow-up, 45 months), the mortality was 51 vs. 34% and the sudden death rate was 25 vs. 17%, respectively [15].

Therefore, the findings of Lai et al. confirm that QRS duration and LVEF might have important clinical implications for assessing long-term prognosis and consequent management in patients at risk. In addition, they suggest once more that simple diagnostic tools such as ECG and 2-D echocardiography may provide rapid, reliable, and cost-effective information for identifying patients at higher risk for subsequent cardiovascular events in daily practice.

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