

## MRI CHARACTERISTICS OR DIFFERENT QRS MORPHOLOGIES IN PATIENTS REFERRED WITH SUSPECTED HEART FAILURE

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**Introduction** Prolonged QRS duration is an important marker of adverse cardiovascular outcome for patients with heart failure (HF), but the contribution of QRS morphology is unclear. This is important, as QRS duration and morphology are advocated as criteria for the selection of patients for cardiac resynchronisation therapy.

**Methods** Out-patients attending a community HF service between 2000 and 2010 that also underwent cardiac MRI were enrolled. HF was defined as the presence of relevant symptoms and signs and objective evidence of cardiac dysfunction: either a left ventricular ejection fraction (LVEF) <50% or a raised amino-terminal pro-brain natriuretic peptide (NT-proBNP) >125 pg/ml. QRS duration >120 ms was grouped as left (LBBB), right bundle branch block (RBBB) or indeterminate ventricular conduction delay (IVCD) depending on ECG findings.

**Results** Of 878 patients enrolled, 176 (20%) had QRS 120–150 ms and 129 (15%) had QRS >150 ms. The prevalence of LBBB, RBBB and IVCD amongst patients with QRS 120–150 ms was 52%, 24% and 24% respectively and amongst patients with QRS >150 ms was 81%, 16%, 3%. Compared to patients with LBBB, those with RBBB had more evidence of congestion, a higher prevalence of atrial fibrillation (11% vs 25%;  $p<0.005$ ), and higher plasma NTproBNP (1158 (582–2194) vs 2013 (668–3763)ng/l;  $p=0.015$ ). LVEF was similar amongst patients with RBBB, LBBB and IVCD, but patients with RBBB had a more dilated left atrium, a lower right ventricular (RV) ejection fraction and greater RV mass. Patients with IVCD had similar characteristics to patients with RBBB but a shorter QRS duration. During a median follow up of 1302 days (IQ range 742–2253), 271 patients died. Compared with patients who had QRS <120 ms, RBBB (HR 1.7; 95% CI 1.1 to 2.5,  $p=0.011$ ) and IVCD (HR 1.7; 95% CI 1.1 to 2.6,  $p=0.016$ ) were associated with an adverse outcome, but LBBB was not. Restricting analysis only to patients with LVEF <35%, compared to patients who had QRS <120 ms, only QRS 120–150 ms was associated with a higher mortality (HR 1.62, 95% CI 0.99 to 2.65,  $p=0.05$ ). This may reflect high adoption rates of cardiac resynchronisation in patients with QRS >150 ms. Overall, in multivariable Cox regression models, QRS duration or morphology were not independently associated with an adverse outcome.

**Conclusions** In patients with chronic HF with or without a reduced LVEF and QRS>120 ms, RBBB morphology on ECG identifies patients with more severe bi-ventricular dysfunction on cardiac MRI who also have an adverse outcome. Although not independently significant in multi-variable models it is a simple method of identifying patients with other adverse prognostic features.