Determinants and differences of delay in cardiac resynchronization therapy

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Background: Cardiac resynchronization therapy (CRT) is recommended for the treatment of heart failure (HF) patients with reduced ejection fraction and left bundle branch block (LBBB) but is still largely underused which may further deteriorate the HF condition. Studying the impact and factors related to delays in CRT with or without an Implantable cardioverter defibrillator (ICD) is fundamental to enhance CRT implementation in clinical practice.

Methods: We used a central ECG database together with National patient registries to identify LBBB patients with a QRS duration of more than 150 ms and estimated a class I indication for CRT based on a registered diagnosis of HF and ejection fraction < 35% (baseline date). We compared patient characteristics in those with CRT-D, CRT without defibrillator (CRT-P) and patients with an indication but without CRT. Factors associated with CRT-P or CRT-D were analyzed as well as factors related to delay in CRT utilization. Outcome parameters were HF hospitalization and combined total and CV mortality and the impact of the delay in CRT utilization on outcome was analysed.

Results: Of 5359 patients with LBBB and QRS > 150 ms, 1268 (24%) developed a class I indication for CRT. Of these 31% received a CRT-P, 36% CRT-D and 33% were not implanted. Independent predictors for CRT-P were age > 75 years and for CRT-D ischemic heart failure aetiology, hypertension and male sex. Patients with CRT-D had similar HF hospitalization rate (hazard ratio (HR): 0.95, 95% (CI) 0.80-1.14) as patients with CRT-P. In contrast, patients indicated but not implanted with CRT had a significantly higher prevalence of HF hospitalization (HR: 1.65, CI 1.39-1.96). A delay in CRT use > 365 days (161 patients) from indication (baseline) was associated with increased risk of overall mortality and cardiovascular mortality compared to CRT implantation < 30 days from the indication (HR: 1.64, CI 1.05-2.55 and HR: 1.87, CI 1.10-3.18). Age > 75 years, male sex, paroxysmal atrial fibrillation, diabetes and ischemic heart disease were associated with significant delay in CRT use (>365 days).

Conclusion: In a large real-world setting, delay in CRT implantation was common and associated with increased mortality. The findings suggest a need for new methods to find and treat HF patients with an indication for CRT.