Diabetes attenuates response to cardiac resynchronization therapy and worsens prognosis in heart failure: results from the Prospective Evaluation of Asian with CRT for Heart Failure study

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Introduction: The association of diabetes with cardiac resynchronization therapy (CRT) response and cardiovascular outcomes in Asian patients with heart failure (HF) are unclear. This study aims to investigate the effects of diabetes on CRT response and cardiovascular outcomes in Asian HF patients.

Methods: Consecutive Asian HF patients receiving CRT were enrolled in the Prospective Evaluation of Asian with CRT for Heart Failure (PEACH) registry from 2011 to 2017. Only patients with paired echocardiograms pre- and post-CRT were included in the study. CRT response and super-response was defined as decrease in end-systolic volume index ≥15% and ≥30%, respectively. Primary endpoint was time to composite of HF-hospitalization and all-cause mortality.

Result: Among 161 patients followed for 3.3±1.5 years (age 6.7±11.2 years, 22% females, mean QRS duration 154.3±22.4ms, 83% left bundle branch block), 84 (52%) were CRT responders and 57 (35%) were super-responders. Responders were more likely non-diabetic (Responders: 62% non-diabetic vs 43% diabetic, \(p=0.01\); Super-responders: 46% non-diabetic vs 26% diabetic, \(p=0.008\)). Of 82 (51%) patients with diabetes (mean HbA1c 8.0±2.1%, mean duration 7.6±4.6 years), 35 (43%) achieved CRT-response, of which 32 (91% of diabetic responders) were super-responders. Diabetic patients were more likely to have ischaemic heart disease (80% vs 59%, \(p=0.004\)), chronic kidney disease (60 vs 28%, \(p=0.001\)), retinopathy (11% vs 0%, \(p=0.002\)) and peripheral vascular disease (15% vs 1%, \(p=0.002\)). However, LV dimensions and LVMI were similar in the presence or absence of diabetes. Diabetic patients were at least 56% less likely to achieve reverse remodelling with CRT (CRT response: AOR 0.44, 95% C.I. 0.20-0.98; Super-response: AOR 0.42, 95% C.I. 0.18-0.97). Diabetic non-responders had a higher baseline HbA1c than diabetic responders (8.5±2.3% vs 7.4±1.6%, \(p=0.02\), and a larger proportion in the highest quartile of lead separation (38% vs 14%). However, insulin use (23% vs 38%, \(p=0.14\)), duration of diabetes (7.7±4.2 vs 7.5±5.0 years, \(p=0.69\)) and mean LVMI (154.1±42.9 vs 150.3±48.5, \(p=0.43\)) did not differ between diabetic responders and diabetic non-responders respectively. The extent of CRT-response correlates with higher event-free survival (CRT response: AHR 0.5, 95% C.I. 0.30-0.81; super-response: AHR 0.27, 95% C.I. 0.14-0.52).

Conclusion: The extent of reverse remodelling post CRT is the strongest predictor of event free survival. However, diabetes is detrimental to the CRT recipient by attenuating reverse remodelling, inducing end organ dysfunction and is independently associated with worsened clinical outcomes among Asian HF patients.