Reverse electrical remodeling of the native conduction system after cardiac resynchronization therapy

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Introduction: Cardiac resynchronization therapy (CRT) induces structural reverse remodeling of left ventricle (LV). However, limited data exists on electrical remodeling of native conduction system and its clinical significance, especially, changes in PR interval. Additionally, maintenance of a relatively short PR interval (< 220ms) is critical for the application of automated optimization algorithm of some CRT devices.

Methods: Surface 12-lead ECG and echocardiographic data (baseline and the last follow-up) were assessed in 97 consecutive CRT recipients (65±7 years old; male, 60%) with sinus rhythm and a long-term follow-up (>1 year). Relative decrease in LV end systolic volume was measured to define CRT-responder (≥15%) and super-responder (≥30%).

Result: Over a mean follow-up duration of 37.3±20.8 months, LV ejection fraction significantly increased (24±6% to 39±15%, p<0.001) and 70% of patients were responders. Intrinsic QRS duration (measured during CRT-Off) decreased among responders, but increased among non-responders with a significant difference by responder status (-11±41ms versus +10±11ms, p<0.001). However, intrinsic PR interval (measured during CRT-Off) did not show significant change from baseline value even in responders (213ms to 214ms, p=NS) or super-responders (190ms to 189ms, p=NS). There was only a slight increase in its value among non-responders (203±34ms to 217±44ms, p=NS). Of 24 patients with baseline PR>220ms, 6 (25%) showed follow-up intrinsic PR≤220ms.

Conclusion: LV volume and QRS duration reduced markedly with CRT response. However, there was no significant change in PR interval irrespective of CRT responsiveness, even in super-responders. CRT may be associated only with intraventricular, but not with atrioventricular conduction system remodeling.