Practical Use of Effective Left-ventricular Pacing Algorithm in Patients with Cardiac Resynchronization Therapy

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Introduction: Cardiac resynchronization therapy (CRT) is required to ensure delivery of a high percentage of ventricular pacing and capture of a significant portion of left ventricular (LV) myocardium. Recently, effective CRT with an automatic electrogram (EGM)-based algorithm enabled us to quantify the percentage of effective LV pacing by detection of QS/QS-r morphology on the unipolar LV EGM. The purpose of this study was to evaluate the correlation between the percentage of LV pacing recorded by 24-hour Holter monitoring (%Holter pacing) and that of effective LV capture by effective CRT (%e-CRT pacing).

Methods: We retrospectively analyzed 19 patients, including 3 patients with atrial fibrillation, who had undergone implantation of a cardiac resynchronization therapy defibrillator (Claria; Medtronic, USA) between February 2018 and January 2019. The %Holter pacing was calculated by visually assessing QRS morphology. The %e-CRT pacing was extracted from each device during hospitalization. Data collection was performed within 5 days after device implantation. The %Holter pacing and %e-CRT pacing in each patient were plotted and compared.

Result: A scatterplot of %e-CRT pacing vs. %Holter pacing in the 19 patients is shown in the figure. A total of 17 patients (89.5%) showed a %e-CRT pacing higher than 90%. The average of %e-CRT pacing was not significantly different from that of %Holter pacing (96.3 ± 2.4 vs. 97.0 ± 3.3%; \( p = 0.15 \), paired t test) with correlation coefficient \( r = 0.82 \). The remaining 2 patients had a relatively low %e-CRT pacing (46.4% and 51.9%, respectively); the former had pseudofusion beats due to atrial fibrillation tachycardia, and the latter variable conduction delay in the His-Purkinje system.

Conclusion: The effective CRT algorithm revealed delivery of a high percentage of effective LV pacing, which had a good correlation with the percentage of LV pacing recorded by 24-hour Holter monitoring.