Late responder to cardiac resynchronization therapy with long-standing persistent atrial fibrillation, heart failure and a reduced ejection fraction

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**Introduction**: In a selected patient population with heart failure (HF) and a reduced ejection fraction (EF), cardiac resynchronization therapy (CRT) is effective and can slow down or reverse further progression of the disease. There is conclusive evidence of the beneficial effect of CRT in patients with sinus rhythm, a typical left bundle branch block (LBBB) morphology, and a QRS duration > 120 msec. However, the benefit in patients with conditions other than these is still controversial. On the other hand, the effectiveness of beta-blockers in atrial fibrillation (AF) patients with HF and a reduced EF is unclear.

**Methods**: N/A

**Result**: Case: A 70-year-old male suffered from dilated cardiomyopathy, long-standing persistent AF, diabetes, and renal insufficiency for approximately 10 years, and his HF status was NYHA functional class II. He was admitted for orthopnea with a diagnosis of acute worsening chronic HF. On admission, a decreased SpO2 and bilateral lower leg edema were observed, and pleural effusion were revealed by X-ray. An echocardiogram revealed that the left ventricle (LV) and atrium were markedly dilated (LVDd 65 mm, LVDs 59 mm, LAD 62 mm, LVEDV 138 ml, and LVESV 107 ml). The systolic LV function was severely impaired (LVEF 18%). After admission, his condition was improved to a NYHA functional class III with intensive and sufficient medical treatment. His electrocardiogram revealed AF at a rate between 60 and 100 beats/min with left axis deviation and a QRS duration of 120 msec. Non-sustained ventricular tachycardia (VT) was documented after admission. An ICD implantation for primary prevention was recommended in terms of his LV function. Considering the benefits of a sufficient dose of beta-blockers for VT, we thought that CRT-D would be better than an ICD to avoid RV pacing, which was feared to possibly increase. A response within one year was not evident (he was not a “responder” according to its general definition) after the CRT, however, the dilatation of the left ventricle and atrium were gradually decreased for 2 years after the CRT-D implantation. The changes in the echocardiogram parameters before the CRT and at two years after the CRT were as follows: 1) LVDd 64 to 55 mm 2) LVESV 73 to 39 mm 3) LVEF 35 to 42 % 4) LAD 64 to 58 mm Further, his HF symptoms also gradually improved to NYHA functional class I over the same period. The BNP level and renal function improved (BNP 656 to 160 pg/mL and Cr 1.55 to 1.22 mg/dL, respectively). Thus, a beneficial effect of the CRT was observed and he has never been hospitalized for over 3 years.
Conclusion: We reported a case with long-standing persistent atrial fibrillation and a QRS duration of 120msec, which CRT was effective in during the late phase of the postoperative period.