Long-term outcomes evaluated by device-monitored physical activity in patients with implantable cardiac defibrillator or cardiac resynchronization therapy device

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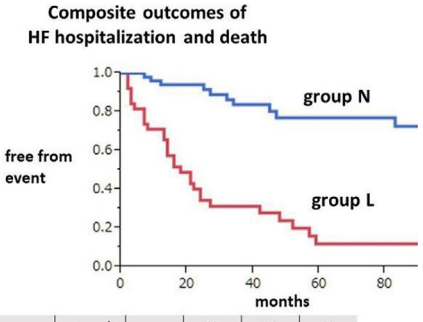
Background: The patients with implantable cardiac defibrillator (ICD) or cardiac resynchronization therapy device (CRT) have high risk of cardiac events, and lower physical activity has been thought to be associated with higher rate of cardiac events. On the other hand, cardiovascular implantable electronic devices can monitor physical activity through a built-in accelerometer. This study aimed to analyze long-term outcomes by device-based monitoring of physical activity in patients with ICD or CRT.

Methods: We retrospectively reviewed 89 patients with ICD/CRT, (56 males, 66.5 years old; ICD 45, CRT-D 42, CRT-P 2) who survived longer than 6 months after implantation in our institution. We analyzed physical activity by devices at 6th month and divided to 2 groups; In Low activity group (group L; n=38), their physical activity (moving time above 70 steps/min walk level) is less than 2 hours/day, and in Normal activity group (group N; n=51), physical activity is more than 2 hours/day. We evaluated their background characteristics in each group, physical activity at 12th month, and composite outcomes of hospitalization due to worsening of heart failure (HF) and death of any cause.

Results: Mean follow-up period was 57.4 months (median 40 months). In group L, they had higher age (71.1 y.o. vs. 63.2 y.o.; p=0.0003), higher rate of low EF (76.3% vs. 54.9%; p=0.035), and lower rate of attendance to outpatient cardiac rehabilitation program (10.5% vs 27.5%; p=0.043) compared with group N. 85.7% of patients in group L stayed in low physical activity at 12th month, and 87.8% of patient in group N stayed in normal physical activity. Composite outcomes of HF hospitalization and death occurred significantly higher in group L (Log-rank p<0.0001; 29.0% vs. 5.9% at 1 year, and 68.7% vs. 16.2% at 3 year: Figure 1) than in group N. Each event, HF hospitalization and death of any cause were shown significantly higher in group L (Log-rank p<0.0001). In group L, mortality rate of patients who could improve their physical activity from 6th month to 12th month was significantly lower than patients who stayed in low physical activity (Log-rank p=0.038).

Conclusions: Lower level of device-monitored physical activity was associated with higher mortality and higher rate of HF hospitalization in patients with ICD or CRT. Most of the patient in lower physical activity could not improve their activity from 6th month to 12th month. Early and continuous intervention is necessary especially for high risk patients such as high age or low EF.



	months		12	36	60
Number at risk	group L	38	27	10	5
	groupN	51	48	30	21
Number of events	group L		11	25	30
	groupN		3	7	9

Figure 1