Small left ventricular size predicts implantable cardioverter defibrillator therapy in long-term observation of patients with left ventricular assist device for non-ischemic cardiomyopathy

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Background: The number of patients who received left ventricular assisted device (LVAD) implantation because of end-stage heart failure has been increasing. In those patients, ventricular arrhythmias (VAs) occur commonly, and electrical storm (ES) and shock therapies by implantable cardioverter-defibrillator (ICD) are considered to increase mortality. Although it is important to identify patients with higher risk of VA events, there have been limited data reporting the risk of VAs in LVAD patients during long-term follow up, especially in non-ischemic cardiomyopathy (NICM).

Purpose: We sought to clarify the predictors of ICD therapies in LVAD patients diagnosed as NICM during long-term follow up.

Methods: We retrospectively analyzed non-ischemic heart failure patients whom a continuous flow LVAD was implanted as a bridge to transplantation therapy from July 2011 to February 2019. ICD programming was generally set as follows; one zone setting (VF zone with maximum shocks) for primary prevention or two zone setting (VF with maximum shocks and VT with ATPs and shocks) for secondary prevention. ICD settings were generally unchanged after LVAD implantation. Clinical and echocardiographic data were collected before and 3 months after LVAD implantation. Device interrogation was performed every 4 - 6 months at out-patient clinic. Patients were followed until May 2019.

Results: A total of 25 patients were included in the study. The mean age was 49 years, 88% were men. They majority of patients (52%) were diagnosed as idiopathic dilated cardiomyopathy. During the median follow up duration of 889 days (IQR 546 – 2070), 27 appropriate shock events occurred in 7 patients and 154 appropriate ATP-only events in 10 patients. The group with appropriate ICD event (11 patients, 44%) had significantly smaller LVDd (65.2 ± 4.0 vs. 79.4 ± 3.5 mm; p = 0.01) and higher LVEF (26.2 ± 1.6 vs. 20.5 ± 1.4 %; p = 0.02) before LVAD implantation. When patients were divided into 2 groups based on the median value (70.0 mm) of LVDd before LVAD implantation (pre LVDd), patients with smaller pre LVDd (≤ 70mm) had significantly higher rate of appropriate ICD treatment than those with larger pre LVDd (> 70 mm) (Log-rank p < 0.01). In univariate cox regression analysis, pre LVDd was negatively associated with appropriate ICD therapy (hazard ratio 0.94, 95% confidence interval 0.88 - 0.99; p = 0.02).

Conclusion: Smaller LVDd before LVAD implantation might be a possible predictor of appropriate ICD treatment in patients with NICM.

Abstract Figure.