A multicentric observational study of patients affected by advanced heart failure with implantable cardioverter defibrillator and left ventricular assist devices


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Background: Left ventricular assist device (LVAD) implantation is increasingly used in patients with end-stage heart failure. Most patients already have an implantable defibrillator (ICD) at the time of L-VAD implantation. Studies on this patient population are limited by the small sample size and the short duration of follow-up.

Purpose: The aim of this study was to retrospectively describe the real-world management of patients implanted with both ICD and LVAD. The main objective was to evaluate the incidence and predictors of appropriate and inappropriate therapies of the ICD and the incidence and predictors of ICD related complications.

Methods: 212 patients were enrolled in four Centers in the period between July 2006 and November 2020. The inclusion criteria were age > 18 years, advanced heart failure, patients with ICD and concomitant or subsequent continuous flow LVAD implantation. ICD therapy was defined as antitachycardia pacing therapy or shock.

The data available at the last visit with a median follow up of 21 months were analyzed.

Outcome predictors were assessed by univariate logistic regression and the variables of interest included in a multivariate model.

Results: The rate of appropriate ICD therapies was 29.7%, while the incidence of inappropriate therapies was 10.4%; in the multivariate analysis the presence of a zone therapy with low detection rate (VT zone with median detection rate of 164.5 bpm) was found to be an independent predictor of the composite of appropriate and inappropriate therapies (OR = 19.05; CI = 2.19-165.21; p = 0.007). Interference between ICD and LVAD occurred in 7.5% of cases; the incidence of infectious complications related to the ICD was 7.1% and bleeding complications of 5.2%; in the multivariate analysis, ICD generator replacement was an independent predictor of total complications related to the ICD (interference, infectious and bleeding; OR = 4.45; IC = 1.60-12.36; p = 0.004). 103 patients had CRT defibrillator (48.6%). At follow up there was no statistically significant difference in the incidence of appropriate therapies between those who had CRT-on (n=74) and those who had CRT-off (n=29; p = 0.61).

Conclusions: Patients with LVAD implanted with an ICD experience a high rate of appropriate and inappropriate ICD therapies. An active VT zone at low heart rate was found to be an independent predictor of ICD therapies. Of more, ICD generator replacement was found to be an independent predictor of total complications related to the ICD. Our findings suggest the importance of tailoring device programming in order to minimize the incidence of ICD therapies, thus sparing the need for generator replacement in this population.