P2628

Predicting cardiac recovery before durable left ventricular assist device implantation in advanced heart failure patients

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Background: Predicting cardiac recovery (CR) in advanced heart failure (HF) patients before left ventricular assist device (LVAD) implantation remains challenging. This study sought to investigate whether CR after LVAD unloading can be predicted by cardiac functional and structural parameters together with clinical characteristics.

Methods: From 2008 to 2016, consecutive advanced chronic HF patients (N=347) supported with durable continuous-flow LVADs were prospectively evaluated. Patients with acute HF etiologies or without adequate post-LVAD follow up (<3 months) were excluded. A great variety of clinical characteristics were evaluated in the remaining 285 subjects. LVAD patients were phenotyped while on support, as CR Responders or Non Responders, based on published predefined echocardiographic criteria. Multivariable logistic regression was used to form the model and the Utah Cardiac Recovery (UCAR) score was created from the regression beta coefficients of the final model.

Results: CR occurred in 13.7% of patients. Univariate analysis showed that responders were more likely to be young, female, non-ischemic cardiomyopathy, with shorter HF symptoms duration and no prior cardiac surgery. They had lower blood urea nitrogen and were more likely to be on temporary mechanical support before LVAD. The multivariable UCAR model (AUC=0.755; p<0.001) predicted CR using 3 clinical parameters – Figure.

Conclusion: Univariate and multivariable predictors of CR include both modifiable and non-modifiable patient characteristics that are known prior to LVAD implantation. The UCAR score can serve as a practical tool for targeted patient selection to implement protocols that facilitate CR in the advanced HF patient subpopulation that is most likely to respond.

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Figure	Multivariable Predictors of Cardiac Recovery and Prognostic Score System				
	No. of patients (N=285)	No. of patients with CR (N=39)	OR (95% CI)	p Value	Score
Female Gender	40 (14.0)	11 (27.5)	3.33 (1.39, 8.00)	0.007	3
Duration of HF					
HF duration ≤9 months	49 (17.2)	15 (38.5)	5.09 (1.50, 17.27)	0.009	4
HF duration 10-36 months	57 (20.0)	11 (28.2)	2.84 (0.82, 9.81)	0.099	3
No prior cardiac surgery	209 (73.3)	35 (89.7)	2.72 (0.90, 8.26)	0.076	2

Values are n (%) unless otherwise indicated.
CI = confidence interval; CR = cardiac recovery; OR = odds ratio

UCAR score ranging 0-9, predicted recovery with: 4.6% (UCAR 0-2), 7.1% (p=0.57, OR=1.59, UCAR 3-4) and 28.6% (p<0.001, OR=8.29, UCAR 5-9)