Model for End-Stage Liver Disease (MELD) Stratification Identifies Two Distinct Cohorts of Arrhythmogenic Right Ventricular Cardiomyopathy Patients Undergoing Transplantation

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INTRODUCTION

➢ Arrhythmogenic right ventricular cardiomyopathy (ARVC) is an inherited cardiomyopathy with autosomal dominant inheritance and variable penetrance. In ~40-60% of probands, ARVC-related mutations in desmosomal genes (*PKP2*, *DSP*, *DSG2*, *DSC2*, *JUP*) and in non-desmosomal genes (*TMEM43*, *PLN*) can be identified.[1,2]

➢ Clinically, ARVC is characterized by ventricular arrhythmias, sudden cardiac death, right ventricular dysfunction and failure, and biventricular dysfunction and failure. Epidemiologic studies performed using the 2010 Revised Task for Criteria for ARVC[3] suggest there is an increasing number of ARVC patients developing heart failure.[2] Orthotopic heart transplantation (OHT) is the only life-saving therapy for ARVC patients with end-stage heart failure.

➢ Limited data exist to risk stratify patients with end-stage arrhythmogenic right ventricular cardiomyopathy (ARVC). While the Model for End-Stage Liver Disease (MELD) is used to rank cirrhotic patients by 30-day mortality, this score may have wider applications.

➢ We hypothesized that severe cardiomyopathy would impact MELD determinants, and therefore sought to evaluate characteristics of ARVC heart transplant recipients as stratified by MELD.

METHODS

❖ We performed a retrospective analysis of 14 consecutive patients in the Penn ARVC Transplant Database.

❖ Thirteen patients underwent either OHT or OHT-OLT between May 2011 and August 2017. Demographics, pre-transplant clinical characteristics, and survival data were collected.

❖ A MELD of 15 was used for stratification. This value was selected based on the commonly accepted threshold indication for OLT in cirrhosis.

❖ Descriptive statistics were calculated as medians and interquartile ranges (IQRs). Wilcoxon rank-sum test and Fisher's exact test were used for hypothesis testing, as indicated.

RESULTS

▪ Patients with a MELD ≥ 15 had a significantly later age of diagnosis as compared to those with a MELD < 15 (55.0 years vs. 22.0 years, p = 0.04).

▪ Time from ARVC diagnosis to transplant listing was also significantly shorter in the MELD ≥ 15 group (56.6 months vs. 154.8 months, p = 0.04).

▪ There were no significant differences in transplant type, sex, BMI, transplant status, survival, or duration of post-transplant follow-up.

REFERENCES & ACKNOWLEDGMENTS

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ARVC CHARACTERISTICS BY MELD

Factor	MELD <15	MELD ≥15	p-value
N	5	8	
Age at Diagnosis, median (IQR)	22.0 (21.0, 46.0)	55.0 (49.5, 58.5)	0.04
Age at Listing, median (IQR)	55.0 (37.0, 58.0)	59.5 (55.0, 61.0)	0.24
Transplant Type			1.00
Heart	4 (80%)	5 (62%)	
Heart-Liver	1 (20%)	3 (38%)	
Sex			1.00
Female	1 (20%)	3 (38%)	
Male	4 (80%)	5 (62%)	
BMI, median (IQR)	26.4 (22.2, 33.5)	26.4 (20.9, 27.6)	0.71
Creatinine, median (IQR)	1.1 (1.0, 1.2)	1.3 (1.2, 1.8)	0.09
T. bilirubin, median (IQR)	1.1 (0.9, 1.4)	1.6 (0.9, 2.4)	0.22
INR, median (IQR)	1.5 (1.5, 1.6)	2.0 (1.5, 2.7)	0.56
Sodium, median (IQR)	138.0 (137.0, 138.0)	136.0 (128.0, 138.0)	0.16
SVR, median (IQR)	1325.0 (1255.0, 1860.0)	1964.5 (1264.0, 3008.0)	0.36
Transplant Status			0.74
1A	1 (20%)	0 (0%)	
1B	1 (20%)	3 (38%)	
1B by exception	2 (40%)	4 (50%)	
2	1 (20%)	1 (12%)	
Diagnosis to Listing (months), median (IQR)	153.5 (128.2, 273.4)	53.1 (31.5, 90.8)	0.04
Diagnosis to Transplant (months), median (IQR)	154.8 (130.9, 292.9)	56.6 (49.2, 88.3)	0.09
Time on Wait List (days), median (IQR)	81.0 (39.0, 136.0)	113.5 (45.5, 187.0)	0.77
Survival?			1.00
No	0 (0%)	1 (12%)	
Yes	5 (100%)	7 (88%)	
Post Transplant Follow-up (years), median (IQR)	4.3 (2.1, 5.0)	2.1 (1.8, 5.4)	0.37

CONCLUSIONS

▪ Using MELD to stratify patients with ARVC requiring OHT, we identified two cohorts that differed significantly in age of diagnosis and time from diagnosis to transplant listing.

▪ This could suggest two distinct phenotypes of ARVC presentation, one that may require more expeditious transplant evaluation and listing.

▪ Future directions include evaluating serial invasive hemodynamic and noninvasive imaging data from the two groups to assess whether the presence of a Fontan-type circulation or other quantitative imaging markers of right ventricular dysfunction are associated with the MELD score and outcomes.