Unplanned HM3 Heart Failure-Related Hospitalizations: Reclassifying Post-Discharge Right Ventricular Failure

Cleveland Clinic
Cleveland, Ohio

VK Randhawa MD PhD[1], EG Soltesz MD MPH[2], Q Wang MS[3], KE Wolski MPH[3], MZY Tong MD MBA[2], S Unai MD[2], T Buda MSN RN[1], RC Starling MD MPH[1], WHW Tang MD[1], and JD Estep MD[1]

[1]Department of Cardiovascular Medicine, [2]Thoracic and Cardiovascular Surgery, Kaufman Center for Heart Failure, Heart and Vascular Institute; and [3]C5 Research, Cleveland Clinic, 9500 Euclid Avenue, Cleveland, OH, 44195

ABSTRACT

Introduction and Aim: Heart failure-related hospitalization (HFH) after continuous-flow left ventricular assist device (CF-LVAD) implant remains prevalent. Our primary aim was to better elucidate the extent of HFH in patients supported by HM3 resulting from predominant right (RHFS) versus left (LHFS) HF syndrome. We also re-classified INTERMACS-defined RHF by the underlying HFS phenotype.

Methods: Retrospective data were extracted on patients with HFH post-HM3 implant at our institution (January 2017-May 2019) for demographics, hemodynamics by echocardiogram and/or right heart catheterization, and detailed physical exam findings. Data from each HFH were used to categorize the underlying HFS phenotypes (Table 2). HFH is defined as re-hospitalization post-index implant with a fluid overload syndrome and use of parenteral diuretics. INTERMACS RHF is defined by elevated right atrial pressure requiring the use of varying degrees of right ventricular support, including the sole use of parenteral diuretics. Descriptive statistics are reported.

Results: One hundred forty-three patients defined the HM3 study cohort. Twenty-three patients (mean age 57.7 ± 11.2 years) had HFH (16.1% prevalence), with a median time to first HFH of 65.6 days post-implant. HFH was due to LHFS in 11 patients (47.8%; 2 LHFS and 9 BiV HFS) and predominant RHFS in 12 patients (52.2%). Twenty-one patients met criteria for INTERMACS-defined RHF (14.7% prevalence). By categorical phenotyping, an elevated pulmonary capillary wedge pressure (PCWP) >15 mm Hg was noted in 42.9% of these cases.

Conclusions: BiV HFS and predominant RHFS account for most HFH post-HM3 implant. LHFS account for nearly half of the post-discharge INTERMACS-defined RHF re-hospitalizations. Further examination of the predictors and underlying causes of partial LV unloading, and the implications on long-term outcomes including survival and functional capacity is warranted.

OBJECTIVES

- To elucidate the extent of heart failure hospitalizations (HFH) in patients with HM3 support from predominant right (RHFS) vs left (LHFS) HF syndrome

- To explore the INTERMACS-defined RHF by its underlying HFS phenotype

RESULTS

Table 1. Baseline Characteristics of HM3 Cohort with Heart Failure-Related Hospitalizations

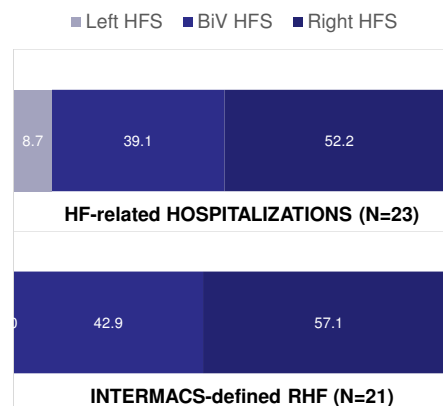| CHARACTERISTIC	Value (N=23)	CHARACTERISTIC	Value (N=23)
Age (years)	57.7 ± 11.2	Body Mass Index (kg/m^2)	27.5 ± 5.1
Female Gender, n (%)	6 (26.1%)	Ischemic Cardiomyopathy, n (%)	13 (56.5%)
Race, n (%)		**Intermacs Status, n (%)**	
Caucasian	16 (69.6%)	Level 1+2	7 (33.4%)
African American	5 (21.7%)	Level 3	8 (38.1%)
Other	2 (8.6%)	Level ≥4	6 (28.6%)
Device Type, n (%)		**Device Indication, n (%)**	
Centrifugal	23 (100%)	Bridge to Transplant	10 (43.5%)
		Destination Therapy	13 (56.5%)

Table 2. Defining Predominant Heart Failure Syndrome Phenotypes

Heart Failure Syndrome (HFS) Phenotype
Predominant Left HFS (PCWP >15 mm Hg* and RAP ≤12 mm Hg* or absence of the following: JVD >12 mm Hg, ascites and edema)
BiV HFS (PCWP >15 mm Hg* and RAP >12 mm Hg* and/or presence of at least one of the following: JVD >12 mm Hg, ascites or edema)
Predominant Right HFS (PCWP ≤ 15 mm Hg* and RAP >12 mm Hg* or presence of at least one of the following: JVD >12 mm Hg, ascites or edema)

Based on available hemodynamics derived by invasive RHC or by echocardiogram.

Figure 1. Heart Failure-Related Hospitalizations Categorized by Predominant HFS Phenotypes on CF-LVAD Support

Legend: ■ Left HFS ■ BiV HFS ■ Right HFS

HF-related HOSPITALIZATIONS (N=23): 8.7 | 39.1 | 52.2

INTERMACS-defined RHF (N=21): 42.9 | 57.1

- **The prevalence of HFH was 16.1% (due to LHFS in 47.8% and RHFS in 52.2%), with a median time to first event of 65.6 days post-HM3 implant.**

- **The prevalence of INTERMACS-defined RHF was 14.7%; however, an elevated PCWP >15 mm Hg was noted in 42.9% of these cases.**

METHODS

- Retrospective review at Cleveland Clinic (IRB approved) of 143 adults ≥18y with HM3 implant from January 2017-May 2019 for demographics, hemodynamics by echocardiogram and/or right heart catheterization (RHC), and detailed physical exam findings

- HFS phenotypes are as defined (Table 2)

- HFH defined as re-hospitalization post-index implant with a fluid overload syndrome and use of parenteral diuretics.

- INTERMACS RHF is defined as elevated right atrial pressure (RAP) requiring the use of varying degrees of right ventricular support, including the sole use of parenteral diuretics

- Descriptive statistics are reported

CONCLUSIONS

- BiV HFS and predominant RHFS account for most HFH post-HM3 implant.

- LHFS account for nearly half of the post-discharge INTERMACS-defined RHF re-hospitalizations.

- Future analysis of the predictors and underlying causes of partial LV unloading (LHFS) and the implications on long-term outcomes including survival and functional capacity is warranted.

REFERENCES

1. Kirklin JK, et al. Eighth annual INTERMACS report: special focus on framing the impact of adverse events. J Heart Lung Transplant. 2017; 36: 1080-1086.
2. Imamura T, et al. Optimal hemodynamics during left ventricular assist device support are associated with reduced readmission rates. Circ Heart Fail. 2019 Feb; 12 (2): e005094.
3. Imamura T, et al. Decoupling between diastolic pulmonary artery pressure and pulmonary capillary wedge pressure as a prognostic factor after continuous flow ventricular assist device implantation. Circ Heart Fail. 2017; 10: e003882.
4. Shah P, et al. Unrecognized left heart failure in LVAD recipients: the role of routine invasive hemodynamic testing. ASAIO J. 2018; 64: 183-190.

Cal4Posters™