Age-Related Risk Of Adverse Events After Left Ventricular Assist Device Implantation: A Device-Specific Comparison

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Abstract

Purpose: Age-related incidence of complications during Left Ventricular Assist Device (LVAD) support has not been studied in a device-specific manner. Optimizing the choice of device for any given patient still remains unsettled. Our aim is to examine the relationship between age of the patient and subsequent risk of LVAD-related complications.

Methods: From February 2007 to May 2017, 369 patients underwent primary LVAD implantation at our Clinic; 294 were male (80%), 236 received the device as destination therapy (64%), and etiology of heart failure was ischemic cardiomyopathy in 169 patients (46%). Devices implanted included HeartMate II in 81%, HeartWare in 19%. Effect of implant age on subsequent risk of adverse events while on support was evaluated in a continuous nonlinear manner using restricted cubic splines. Adverse events examined included bleeding (hemorrhagic stroke, gastrointestinal), thromboembolic, and infections.

Results: There were 25 early deaths (6.8%) and follow-up was available in all 344 early survivors. The median length of support was 1.4 years (maximum 8.8 years) for a total of 732 patient-years of support. There was no significant age-related difference between devices for hemorrhagic stroke (p=0.76), gastrointestinal bleeding (p=0.21), embolic stroke (p=0.28), driveline infection (p=0.75), or pump pocket infection (p=0.46). However, there was a significant age-related difference in thromboembolic events stratified by device (HeartMate II > HeartWare HVAD, p=0.016) (Figure 1).

Conclusions: A significant age-related, device-specific difference in thromboembolic events was noted in our study. Optimizing patient outcomes following LVAD implantation relies heavily on interaction between patient- and device-related factors (age studied herein). Findings such as these will inevitably aid in preoperative counseling and ultimate device selection to tailor the appropriate pump to the patient undergoing implant.

Study Aim

To determine the relationship between age of the patient at the time of LVAD implantation and subsequent risk of LVAD-related adverse events
How a specific device could influence risk of adverse events depending on age at implant?

Methods

- Feb 2007 - May 2017: 369 patients underwent primary LVAD implantation
- 294 patients were male (80%)
- 236 patients received the device as destination therapy (64%)
- Etiology of heart failure: ischemic cardiomyopathy in 169 patients (46%)
- Devices implanted: HeartMate II 81%, HeartWare 19%
- Effect of implant age on subsequent risk of adverse events while on support was evaluated in a continuous nonlinear manner using restricted cubic splines
- Adverse events examined: bleeding (hemorrhagic stroke, gastrointestinal), thromboembolic, driveline infections (DLI), pump pocket infections (PPI)

Results/1

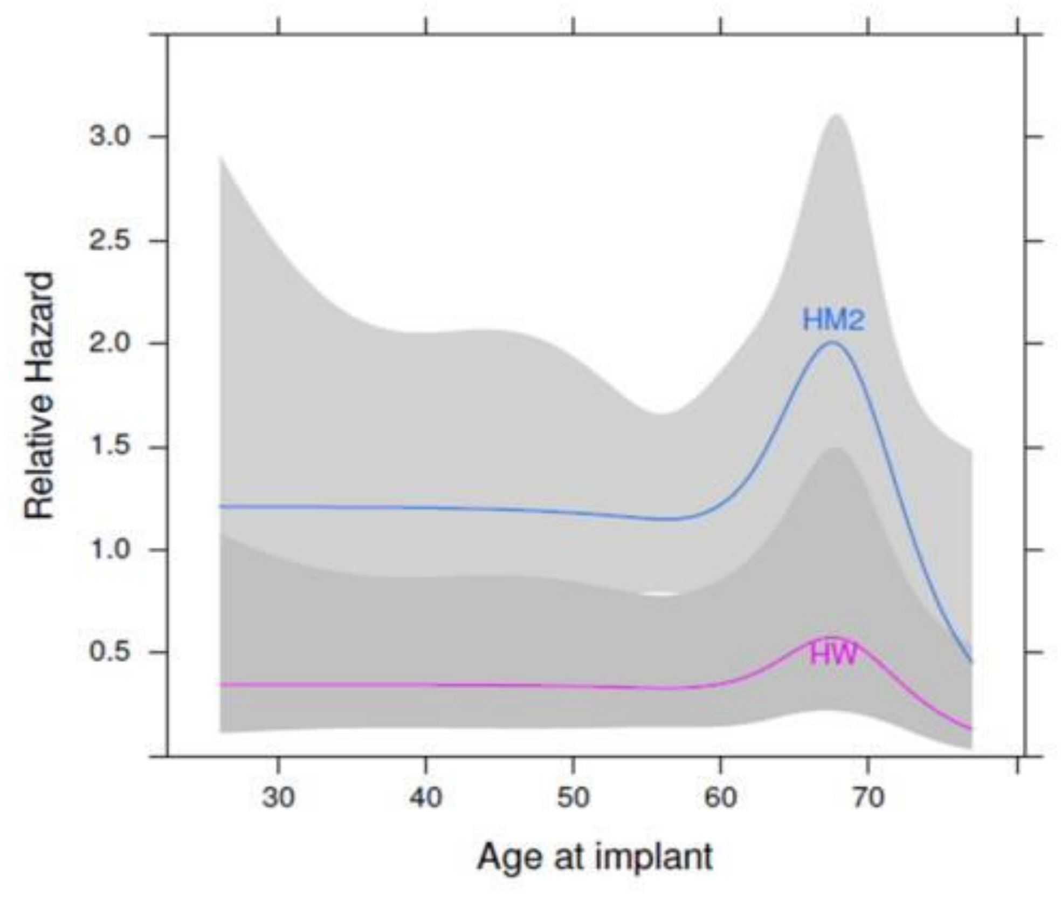
	HMII	HW	p-value
Survival at 1 year*	85%	82%	0.96
Survival at 3 year*	61%	65%	
Survival at 5 year*	49%	35%	
RH Head Bleeding			0.76
RH Ischemic Stroke			0.28
RH Thrombo-Embolic Events			0.016
RH Gastro-Intestinal Bleeding			0.21
RH Driveline Infections			0.75
RH Pump Pocket Infections			0.46

* *Stulak et al. Adverse events in contemporary continuous-flow left ventricular assist devices: A multi-institutional comparison shows significant differences. JTCVS 2016;151:177-89.*

Results/2

- 25 early deaths (6.8%)
- Follow-up available in all 344 early survivors
- Median length of support:1.4 years (maximum 8.8 years) for a total of 732 patient-years of support
- No significant age-related difference between devices for hemorrhagic stroke (p=0.76), GI bleeding (p=0.21), embolic stroke (p=0.28), DLI (p=0.75), PPI (p=0.46)
- Significant age-related difference in TE events stratified by device (p=0.016)

Figure 1: RH of TE events over age by device



Discussion

- **Purpose of the Study:**
No data yet available about a possible relationship between adverse events and age at implant, stratifying by device
With this type of analysis, clinicians could better understand which device could be the best solution in potentially each single patient
- **Risk of AEs by Age at Implant and Device:**
Higher risk of GI bleeding in patients older than 60 yr (p<0.0001), but even in patients with a particularly high risk of bleeding, we may indifferently use either HMII or HW
Older patients with higher risk of CVA and/or thrombosis: preferable to implant HW rather than HMII
- **Type of LVAD May Matter:**
Young patients: same outcomes regardless LVAD, with similar risk of AEs
Old patients: choice of LVAD is harder

Conclusions

- Significant age-related, device-specific difference in thromboembolic events was noted in our study
- Optimizing patient outcomes following LVAD implantation relies heavily on interaction between patient- and device-related factors
- Findings such as these will inevitably aid in preoperative counseling and ultimate device selection to tailor the appropriate pump to the patient undergoing implant

Disclosure

No financial disclosures, no conflict of interests