Length of Time on Left Ventricular Assist Device Prior to Heart Transplant: Does it Affect Outcome?

Nikolova, Jignesh Patel, MD, PhD, Michelle Kittleson, MD, PhD, Lawrence Czer, MD, Ryan Levine, BS, Sadia Dimbil, BS, David Chang, MD, Evan Kransdorf, MD, PhD, Joshua Chung, MD, **Rayshma Sharoff, BS**, and Jon Kobashigawa, MD.

Cedars-Sinai Heart SMIDT Institute, Los Angeles, CA

Abstract

Background: Patients (pts) with end-stage heart failure may require a left ventricular assist device (LVAD). These devices over time cause an intense inflammatory reaction leading to mediastinal scar formation. It has been suggested that length of time on LVAD correlates with perioperative bleeding and significant hemodynamic compromise due to this intense scarring. It has also been suggested that a short time (<3months) on an LVAD results in less bleeding as scarring has not settled. We assessed whether time on an LVAD affects outcome (morbidity and mortality) during and after HTx.

Methods: Between 2010-16 we evaluated 59 LVAD pts bridged to HTx and assessed time on LVAD until HTx. Pts were divided into 3 groups: <3months, 3months-1year, and >1year on LVAD prior to HTx. Perioperative endpoints examined included the number of blood products (total packed red blood cells [pRBCs], fresh frozen plasma [FFP], cryoprecipitate, and platelets) and total ischemic time. Post-operative endpoints included 30-day and 1-year survival, freedom from moderate-severe primary graft dysfunction (PGD); 1-year freedom from cardiac allograft vasculopathy (CAV) as defined by stenosis ≥ 30% by angiography; 1-year freedom from non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new onset heart failure, coronary intervention, defibrillator or pacemaker implant, stroke); and 1-year freedom from acute cellular rejection (ACR) and antibody-mediated rejection (AMR).

Results: There was no difference in total ischemic time, the amount of pRBCs, FFP, cryoprecipitate, and platelets used intraoperatively among the groups. There was no significant difference in 30-day and 1-year survival, freedom from PGD, and 1-year freedom from CAV, NF-MACE, ACR and AMR among the groups.

Conclusion: Contrary to belief, length of time on LVAD does not appear to affect morbidity/mortality in the perioperative and post heart transplant period. Specifically, shorter and longer time on LVAD have similar outcome.

Background

- Patients (pts) with end-stage heart failure may require a left ventricular assist device (LVAD).
- These devices over time cause an intense inflammatory reaction leading to mediastinal scar formation.
- It has been suggested that length of time on LVAD correlates with perioperative bleeding and significant hemodynamic compromise due to this intense scarring.
- It has also been suggested that a short time (< 3months) on an LVAD results in less bleeding as scarring has not settled.

Purpose

- We sought to assess whether time on an LVAD affects outcome (morbidity and mortality) during and after HTx.

Methods

- Between 2010-16 we evaluated 59 LVAD pts bridged to HTx and assessed time on LVAD until HTx.
- Pts were divided into 3 groups: < 3months, 3months-1year, and >1year on LVAD prior to HTx.
- Perioperative endpoints examined included the number of blood products (total packed red blood cells [pRBCs], fresh frozen plasma [FFP], cryoprecipitate, and platelets) and total ischemic time.
- Post-operative endpoints included:
  - 30-day survival
  - 1-year survival
  - Freedom from moderate-severe primary graft dysfunction (PGD)
  - 1-year freedom from cardiac allograft vasculopathy (CAV) as defined by stenosis ≥ 30% by angiography
  - 1-year freedom from non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new onset heart failure, coronary intervention defibrillator or pacemaker implant, stroke)
  - 1-year freedom from acute cellular rejection (ACR)
  - 1-year freedom from antibody-mediated rejection (AMR)

Demographics

Demographic	LVAD < 3 months (n=16)	LVAD 3mo-1Yr (n=25)	LVAD ≥ 1 Year (n=18)	P-Value
Length of MCS Support, Mean ± SD	45.7 ± 21.6	221.4 ± 76.9	732.3 ± 437.8	<.001
Age at Implant, Mean ± SD	50.4 ± 13.4	55.1 ± 12.4	49.1 ± 11.9	0.201
BMI, Mean ± SD	25.9 ± 4.4	28.8 ± 5.5	28.1 ± 6.4	0.249
Device Indication, %				
BTT	100	90	81.8	0.175
DT	0	10	18.2	
Intermacs Profile, %				
Intermacs 1	23.5	13.3	22.7	0.596
Intermacs 2	23.5	36.7	13.6	
Intermacs 3	35.3	26.7	31.8	
Intermacs >=4	17.6	23.3	31.8	
Pre-implant Diabetes, %	17.6	16.7	13.6	0.934
Pre-implant Stroke, %	5.9	3.3	9.1	0.68
Pre-implant Pulmonary Hypertension, %	29.4	10	9.1	0.131
Pre-implant Chronic Renal Disease, %	17.6	20	22.7	0.925

Outcomes

Endpoints	LVAD < 3 months (n=16)	LVAD 3mo-1Yr (n=25)	LVAD ≥ 1 Year (n=18)	P-value
Total Ischemic Time, Mean ± SD	161.9 ± 78.3	142.5 ± 50.7	154.6 ± 82.5	0.680
Cryoprecipitate, Mean ± SD	5.9 ± 6.5	8.6 ± 10.5	6.6 ± 8.8	0.688
Platelets, Mean ± SD	2.8 ± 1.2	2.6 ± 1	2.5 ± 1.3	0.769
Fresh Frozen Plasma, Mean ± SD	7.9 ± 3.6	8.8 ± 3.1	8.8 ± 6.2	0.791
Packed Red Blood Cells, Mean ± SD	6.2 ± 4	7.4 ± 4.2	7.6 ± 6.3	0.722
30-Day Survival	100.0%	96.0%	100.0%	0.507
1-Year Survival	93.8%	96.0%	100.0%	0.589
Freedom from Moderate-Severe PGD	87.5%	96.0%	83.3%	0.380
1-Year Freedom from CAV	100.0%	88.0%	94.4%	0.302
1-Year Freedom from NF-MACE	100.0%	100.0%	88.9%	0.103
1-Year Freedom from Acute-Cellular Rejection	100.0%	100.0%	94.4%	0.338
1-Year Freedom from Antibody-Mediated Rejection	100.0%	100.0%	100.0%	1.000

Results Summary

- There was no difference in total ischemic time, the amount of pRBCs, FFP, cryoprecipitate, and platelets used intraoperatively among the groups.
- There was no significant difference in 30-day and 1-year survival, freedom from PGD, and 1-year freedom from CAV, NF-MACE, ACR and AMR among the groups.

Conclusion

- Contrary to belief, length of time on LVAD does not appear to affect morbidity/mortality in the perioperative and post heart transplant period.
- Specifically, shorter and longer time on LVAD have similar outcome.

Author Disclosures

A. Nikolova: None. J. Patel: G; C; Alexion, Pfizer, Alnylam. O; C; Therakos. **M. Kittleson:** None. **L. Czer:** G; C; St. Jude Medical. **R. Levine:** None. **S. Dimbil:** None. **D. Chang:** G; C; Mesoblast, Amgen. S; C; Abbott Laboratories, AbbVie, Repligen. **E. Kransdorf:** None. **J. Chung:** None. **J. Kobashigawa:** G; C; CareDx, Sanofi, CSL Behring.