



Smidt Heart Institute

Pre-Heart Transplant Glomerular Filtration Rate and Outcome

Fardad Esmailian, MD, Dominic Emerson, MD, Dominick Megna, MD, Danny Ramzy, MD, PhD, Ryah Levine, BS, and Jon A. Kobashigawa, MD

Cedars Sinai Smidt Heart Institute, Los Angeles, CA

Abstract

Background: Heart transplantation remains the optimal treatment for end-stage heart failure. Renal insufficiency has long been considered a significant risk factor for post-heart transplant morbidity and mortality. The International Society of Heart and Lung Transplantation has suggested glomerular filtration rate (GFR) cutoffs of <40mL/min and <30mL/min in 2006 and 2016 respectively. We sought to assess our transplant patients with respect to baseline pre-transplant GFR.

Methods: Between 2010 and 2018 we assessed 534 heart transplant patients and divided them based on the GFR directly before transplant. Groups were divided into GFR<30 (n=53), GFR 30-60 (n=299) and GFR>60 (n=182). All combined heart-kidney transplantations were excluded from this study. Endpoints included 1 and 5 year survival, freedom from the development of CAV (as defined by stenosis ≥ 30% by angiography), non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new congestive heart failure, percutaneous coronary intervention, implantable cardioverter defibrillator/pacemaker implant, stroke), any treated rejection (ATR), acute cellular rejection (ACR), antibody-mediated rejection (AMR).

Results: There is no overall significant difference between the groups in terms of 1,3 or 5 year survival, 1-year freedom from CAV, NFMACE and all rejection. However, the GFR<30 group had a significantly lower 5-year survival than the GFR>60 group, 73.6% vs. 86.8%. GFR did not greatly improve at 1-year post-transplant for any group.

Conclusion: Heart transplantation in patients with pre-transplant GFR <30 appears to have acceptable 1-year outcomes. However, these patients have worse long-term survival and should be considered for combined heart-kidney transplant.

Background

- Heart transplantation remains the optimal treatment for end-stage heart failure.
- Renal insufficiency has long been considered a significant risk factor for post-heart transplant morbidity and mortality.
- The International Society of Heart and Lung Transplantation has suggested glomerular filtration rate (GFR) cutoffs of <40mL/min and <30mL/min in 2006 and 2016 respectively. We sought to assess our transplant patients with respect to baseline pre-transplant GFR.

Purpose

To assess whether baseline pre-transplant GFR impacts outcomes after heart transplantation

Methods

- Between 2010 and 2018 we assessed 534 heart transplant patients and divided them based on the GFR directly before transplant.
- Groups were divided into GFR<30 (n=53), GFR 30-60 (n=299) and GFR>60 (n=182).
- All combined heart-kidney transplantations were excluded from this study.
- Endpoints included:
 - 1 and 5-year survival
 - 1 and 5-year freedom from the development of cardiac allograft vasculopathy (CAV, stenosis ≥ 30% by angiography)
 - 1 and 5-year freedom from non-fatal major adverse cardiac events (NF-MACE: myocardial infarction, new congestive heart failure, percutaneous coronary intervention, implantable cardioverter defibrillator/pacemaker implant, stroke)
 - 1-year-freedom from any treated rejection (ATR), acute cellular rejection (ACR), and antibody-mediated rejection (AMR)
 - GFR at 1-year

Author Disclosures

F Esmailian has received research grants from TransMedics Inc and is a consultant for Biom Up SA. D Ramzy has received honoraria from Abiomed, Cardiac Assist Inc, Medtronic Vascular Inc, and Zoll Services LLC and is a consultant/speaker for Abbott Laboratories, Baxter Healthcare, and Intuitive Surgical Inc. J Kobashigawa has received research grants and/or honoraria from CareDx, Inc., Sanofi-Genzyme, CSL-Behring and One Lambda Inc. and is part of the advisory board for TransMedics. D Emerson, D Megna, and R Levine have no financial relationships to disclose.

Demographics

Demographics	GFR <30 (n=53)	GFR 30-60 (n=299)	GFR >60 (n=182)	P-value
Mean Recipient Age, Years ± SD	59.5 ± 11.1	57.6 ± 12.2	50.5 ± 12.8	<0.001
Mean Donor Age, Years ± SD	37.4 ± 14.0	35.6 ± 13.1	33.6 ± 12.7	0.109
BMI, Mean ± SD	26.1 ± 4.3	25.7 ± 4.4	24.3 ± 4.4	0.001
Female (%)	9.4%	14.0%	59.3%	<0.001
Previous Pregnancy in Females (%)	60.0%	81.0%	71.3%	0.380
Ischemic Time, Mean Mins ± SD	187.0 ± 51.0	173.2 ± 53.4	168.2 ± 62.5	0.111
Primary Reason For Transplant, Underlying Diagnosis of CAD (%)	41.5%	37.6%	23.8%	0.003
Status 1 at Transplant (%)	75.0%	78.7%	80.0%	0.888
Cytomegalovirus Mismatch (%)	33.3%	23.0%	19.8%	0.126
Diabetes Mellitus (%)	35.8%	32.8%	21.4%	0.016
Treated Hypertension (%)	69.2%	55.4%	40.9%	<0.001
Insertion of Mechanical Circulatory Support Device (%)	15.1%	30.8%	24.7%	0.040
Prior Blood Transfusion (%)	35.8%	39.7%	41.0%	0.797
Pre-Transplant PRA ≥ 10% (%)	37.7%	27.5%	40.7%	0.009
Pre-Transplant Creatinine, Mean ± SD	2.3 ± 0.9	1.3 ± 0.3	0.9 ± 0.2	<0.001
ATG Induction Therapy (%)	88.7%	42.3%	37.9%	<0.001

Outcomes

Endpoints	GFR <30 (n=53)	GFR 30-60 (n=299)	GFR >60 (n=182)	P-value
1-Year Survival	88.7%	90.3%	91.8%	0.749
5-Year Survival	73.6%*	82.9%	86.8%	0.112
1-Year Freedom from CAV	94.3%	93.6%	94.0%	0.962
5-Year Freedom from CAV	81.1%	86.3%	87.9%	0.532
1-Year Freedom from NF-MACE	86.8%	87.6%	89.0%	0.840
5-Year Freedom from NF-MACE	71.7%	79.9%	81.9%	0.247
1-Year Freedom from ATR	88.7%	86.6%	85.7%	0.845
1-Year Freedom from ACR	92.5%	94.6%	91.8%	0.495
1-Year Freedom from AMR	94.3%	96.7%	95.6%	0.682
GFR at 1-Year	36.4 ± 14.9	49.8 ± 21.2	82.6 ± 34.6	<0.001

*: P-value of 0.038 between GFR <30 and GFR >60 groups

Results Summary

- There is no overall significant difference between the groups in terms of 1 or 5 year survival, 1-year freedom from CAV, NFMACE and all rejection.
- However, the GFR<30 group had a significantly lower 5-year survival than the GFR>60 group, 73.6% vs. 86.8%.
- GFR did not greatly improve at 1-year post- transplant for any group.

Conclusion

- Heart transplantation in patients with pre-transplant GFR <30 appears to have acceptable 1-year outcomes.
- However, these patients have worse long-term survival and should be considered for combined heart-kidney transplant.