Combined Heart and Kidney Transplantation – Is There a Protective Effect Against Cardiac Allograft Vasculopathy by Intravascular Ultrasound?

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Abstract

Background: Combined organ transplants have been associated with less acute and chronic post-transplant rejection than isolated organ transplants, suggesting an altered immune response to the multi-organ allograft milieu. The incidence of combined heart and kidney transplantation (HKTx) has significantly increased over the last few years. Whether the addition of kidney transplantation has a protective immune effect against developing cardiac allograft vasculopathy (CAV) has not been fully investigated. We evaluated the incidence of CAV in HKTx recipients at our single center.

Methods: Between 2010-2016, we assessed 23 HKTx patients (pts) and 224 isolated heart transplant (HTx) pts in the first-year post-transplant. Pts underwent first-year intravascular ultrasound (IVUS) at 4-6 weeks (baseline) and at 12 months. The change in maximal intimal thickness (MIT) was obtained in all pts to evaluate for early post-transplant CAV. Diagnosis of CAV was based on a ≥ 0.5 mm increase in maximal intimal thickness (MIT) from baseline in any matched site. Clinical outcomes such as 1-year survival, 1-year freedom from non-fatal major cardiac events (NF-MACE: myocardial infarction, new onset heart failure, coronary intervention, defibrillator or pacemaker implant, stroke), 1-year freedom from any-treated rejection, acute cellular rejection and antibody-mediated rejection were also examined.

Results: There was no significant difference in the proportion of HKTx vs HTx pts with ΔMIT ≥ 0.5 mm in the first-year post-transplant. The mean baseline MIT, 1-year MIT, and change in MIT was equivalent between the two groups. There was no significant difference in 1-year survival, 1-year freedom from NF-MACE, and 1-year freedom from rejection between the two groups.

Conclusion: There is no difference in CAV progression at 1-year post-transplant between isolated HTx pts and dual HKTx pts. Further investigation is warranted to confirm these results.

Background

- Combined organ transplants have been associated with less acute and chronic post-transplant rejection than isolated organ transplants, suggesting an altered immune response to the multi-organ allograft milieu.
- The incidence of combined heart and kidney transplantation (HKTx) has significantly increased over the last few years.
- Whether the addition of kidney transplantation has a protective immune effect against developing cardiac allograft vasculopathy (CAV) has not been fully investigated.

Purpose

- To assess the incidence of CAV by IVUS in HKTx recipients at our single center.

Methods

- Between 2010-2016, we assessed 23 HKTx patients (pts) and 224 isolated heart transplant (HTx) pts in the first-year post-transplant
- Pts underwent first-year intravascular ultrasound (IVUS) at 4-6 weeks (baseline) and at 12 months
- The change in maximal intimal thickness (MIT) was obtained in all pts to evaluate for early post-transplant CAV
- Diagnosis of CAV was based on a ≥ 0.5 mm increase in maximal intimal thickness (MIT) from baseline in any matched site
- Endpoints included:
  - 1-year survival
  - 1-year freedom from non-fatal major cardiac events (NF-MACE: myocardial infarction, new onset heart failure, coronary intervention, defibrillator or pacemaker implant, stroke)
  - 1-year freedom from any-treated rejection
  - 1-year freedom from acute cellular rejection
  - 1-year freedom from antibody-mediated rejection

Demographics

Demographics	HKTx (n=23)	HTx (n=224)	P-Value
Mean Recipient Age, Years ± SD	58.8 ± 10.4	56.4 ± 13.6	0.411
Mean Donor Age, Years ± SD	39.7 ± 12.2	34.2 ± 13.7	0.061
Body Mass Index, Mean ± SD	24.3 ± 5.1	25.2 ± 4.4	0.349
Female (%)	26.1%	28.6%	0.801
Previous Pregnancy in Females (%)	50.0%	81.0%	0.08
Ischemic Time, Mean Mins ± SD	155.8 ± 54.3	161.7 ± 57.1	0.638
Primary Reason for Transplant, Underlying Diagnosis of Coronary Artery Disease (%)	65.0%	34.1%	0.006
Status 1 at Transplant (%)	82.6%	75.4%	0.443
Cytomegalovirus Mismatch (%)	27.3%	28.8%	0.882
Diabetes Mellitus (%)	26.1%	23.7%	0.795
Treated Hypertension (%)	78.6%	47.0%	0.022
Insertion of Mechanical Circulatory Support Device (%)	26.1%	22.3%	0.681
Prior Blood Transfusion (%)	76.2%	41.5%	0.002
Pre-Transplant PRA ≥ 10% (%)	30.4%	29.9%	0.958
Pre-Transplant Creatinine, Mean ± SD	3.2 ± 1.9	1.2 ± 0.4	<.001

Outcomes

Endpoints	HKTx (n=23)	HTx (n=224)	P-Value
Mean Baseline MIT (mm) ± SD	0.4 ± 0.4	0.3 ± 0.4	0.255
Mean 1-Year MIT (mm) ± SD	0.6 ± 0.4	0.6 ± 0.5	1.000
Mean Δ MIT (mm) ± SD	0.2 ± 0.3	0.3 ± 0.4	0.245
Δ MIT ≥ 0.5 mm, %	13.0% (3/23)	25.5% (57/224)	0.305
1-Year Survival	100.0%	100.0%	1.000
1-Year Freedom from NF-MACE	100.0%	96.0%	0.330
1-Year Freedom from Any-Treated Rejection	82.6%	88.8%	0.330
1-Year Freedom from Acute Cellular Rejection	100.0%	94.2%	0.239
1-Year Freedom from Antibody-Mediated Rejection	91.3%	97.8%	0.078

Results Summary

- There was no significant difference in the proportion of HKTx vs HTx pts with ΔMIT ≥ 0.5 mm in the first-year post-transplant
- The mean baseline MIT, 1-year MIT, and change in MIT was similar between the two groups
- There was no significant difference in 1-year survival, 1-year freedom from NF-MACE, and 1-year freedom from rejection between the two groups

Conclusion

- Combined heart and kidney transplant does not appear to provide a protective effect on CAV development (by IVUS).
- Further investigation is warranted to confirm these results

Author Disclosures

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