Outcomes of Isolated Heart Transplantation in Patients with Reduced Renal Function Not Meeting New Eligibility Criteria for Simultaneous Heart-Kidney Transplantation

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INTRODUCTION

New eligibility guidelines were implemented for simultaneous heart-kidney transplantation (SHKT) which includes a requirement for dialysis-dependence or an estimated glomerular filtration rate (eGFR) of <30 mL/min.

This study evaluated outcomes of isolated heart transplantation (HT) for patients with eGFR of 30-44 mL/min who would not be eligible for SHKT.

METHODS

Adult recipients who underwent isolated HT with eGFR 30-44 mL/min from 2010-2023 were identified using the United Network for Organ Sharing (UNOS) database. Patients with pre-transplant dialysis were excluded from the analysis. **The CKD-EPI 2021 equation was used to calculate eGFR.**

The primary outcome was post-HT 1-year mortality.

Multivariable Cox proportional hazard regression modeling was used to identify significant risk factors for 1-year mortality. The maximally selected rank statistics were performed to identify optimal thresholds for continuous variables associated with the primary outcome. Patients were stratified by the number of risk factors and Kaplan-Meier analysis was used to compare survival.

STUDY COHORT

A total of 5,182 non-dialysis patients with an eGFR of 30-44 mL/min undergoing isolated HT during the study period

RESULTS

**7 risk factors** were identified as significantly associated with 1-year post-HT mortality:
- eGFR ≤35.22 ml/min/1.73m^2
- BMI >28.47 kg/m^2
- Bilirubin ≥ 1.78 mg/dL
- Cold ischemic time ≥4.03 hours
- heart failure etiology (congenital heart disease, hypertrophic/restrictive cardiomyopathy, ischemic cardiomyopathy)
- Pre-transplant mechanical ventilation
- Female donor

Risk factors	HR (confidence interval)	p value
eGFR, ml/min/1.73m^2	1.21 (1.01 – 1.46)	0.039
Body mass index (BMI), kg/m^2	1.04 (1.02 – 1.06)	<0.001
Cold ischemic time, hours	1.16 (1.08 – 1.24)	<0.001
Total bilirubin, mg/dl	1.06 (1.04 – 1.08)	<0.001
Heart failure etiology		
Congenital heart disease	2.43 (1.79 – 3.31)	<0.001
Hypertrophic/restrictive cardiomyopathy	1.51 (1.11 – 2.06)	0.008
Ischemic cardiomyopathy	1.42 (1.18 – 1.71)	<0.001
pre-transplant mechanical ventilation	2.17 (1.32 – 3.58)	0.002
Female donor	1.25 (1/05 – 1.49)	0.011

Table: Multivariable models with significant risk factors impacting on post-transplant 1-year mortality.

Patients were then stratified based on the number of risk factors:
- 521 (10.05%) with 0 risk factors
- 1,609 (31.04%) with 1 risk factor
- 1,785 (33.44%) with 2 risk factors
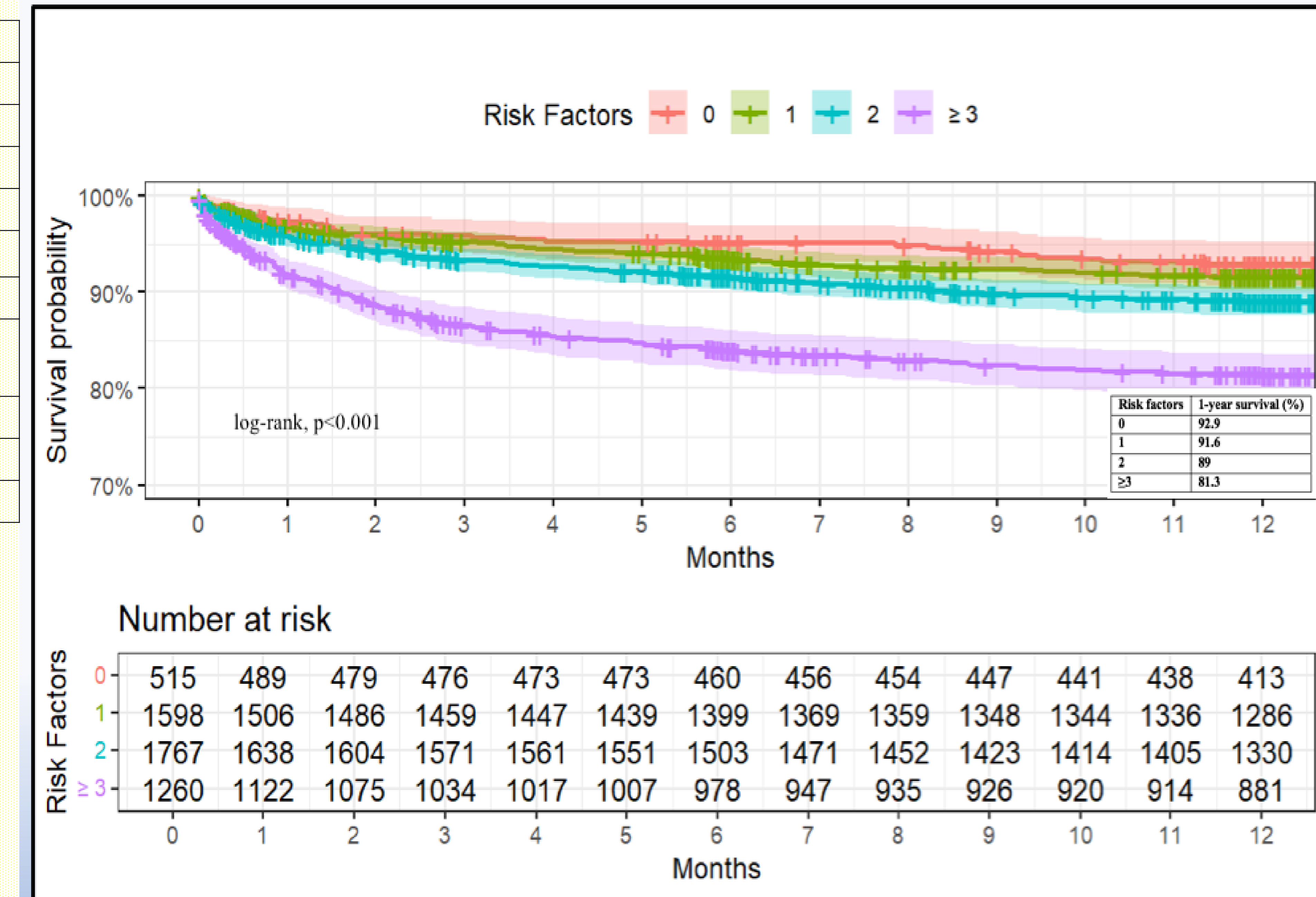- 1,267 (24.45%) with 3 or more risk factors
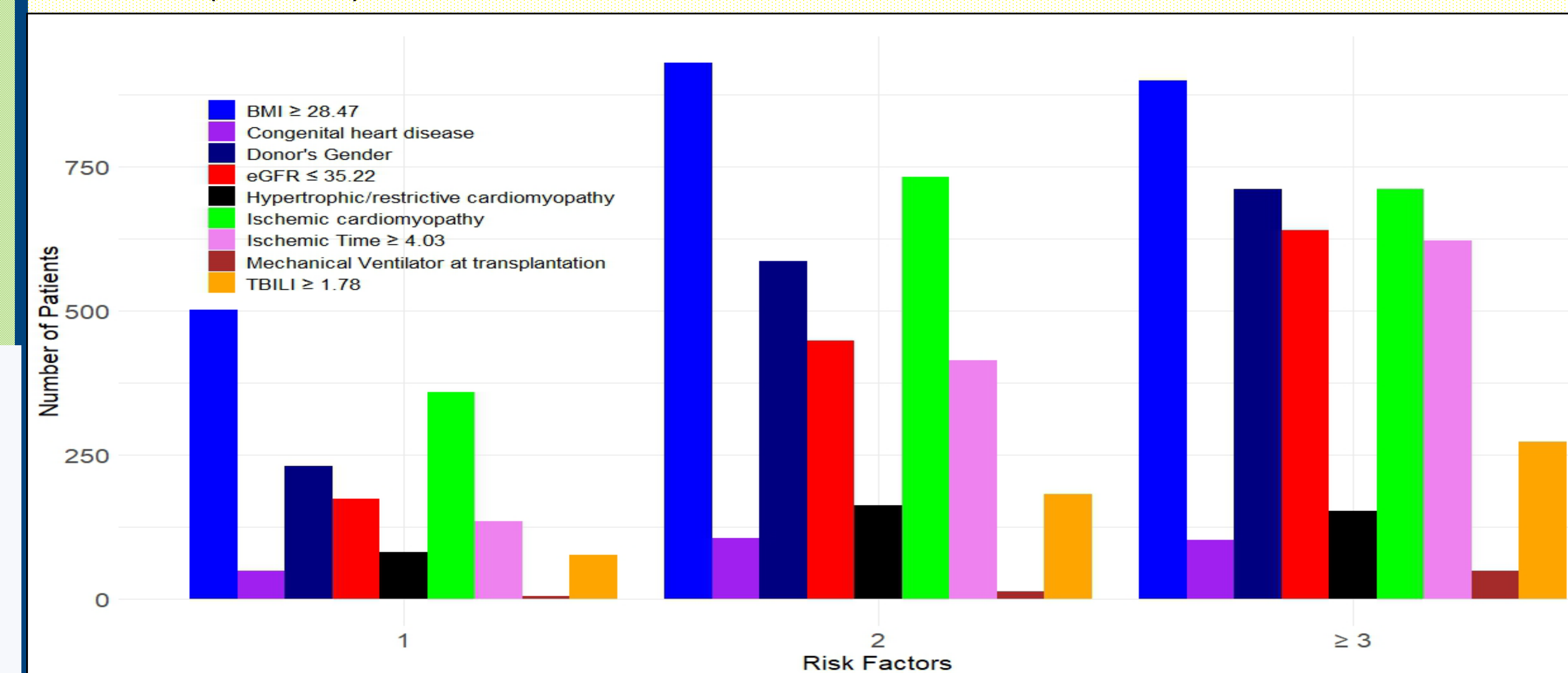
Overall Survival

- 30-day survival probability is 95.2%
- 1-year 88.3%

Primary Outcome: One-Year Survival

Post-HT 1-year survival decreased significantly as number of risk factors increased:
- 92.9% for 0 risk factors
- 91.6% for 1 risk factor
- 89% for 2 risk factors
- 81.3% for 3 or more risk factors

Figure: Kaplan-Meier analysis comparing 1-year post-HT survival based on the number of pre-transplant risk factors in patients with eGFR 30-44 mL/min.

Secondary Outcomes	0 N = 521	1 N = 1,609	2 N = 1,785	≥ 3 N = 1,267	p-value
Acute rejection, n (%)	81 (16%)	242 (15%)	284 (16%)	213 (17%)	0.6
Kidney dialysis, n (%)	58 (11%)	201 (12%)	299 (17%)	306 (24%)	<0.001
Length of stay, d, median (IQR)	15 (11, 22)	16 (11, 23)	17 (12, 26)	19 (13, 32)	<0.001
Pacemaker, n (%)	12 (2.3%)	34 (2.1%)	48 (2.7%)	38 (3.0%)	0.5
Stroke, n (%)	16 (3.1%)	52 (3.2%)	83 (4.6%)	63 (5.0%)	0.041

CONCLUSIONS

These data provide a useful guide for risk stratification and patient selection in patients with eGFR 30-44 mL/min being considered for isolated HT.

Acceptable 1-year survival rates can be achieved in those with 2 or fewer risk factors.