

Utilization and Impact of Reduced Left Ventricular Ejection Fraction Donors on Outcomes of Heart Transplantation

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INTRODUCTION

Heart transplants (HT) have long been a life-saving intervention for individuals with end-stage heart disease. One critical factor in this context is the donor's left ventricular ejection fraction (LVEF). Donor hearts with reduced LVEF have historically been associated with worse post-transplant results. The landscape of heart transplantation has been evolving, with increasing utilization of ex-vivo technologies designed to assess and potentially improve the function of marginal donor organs. Despite these advancements, it remains uncertain how these changes in practice have affected the utilization and outcomes of heart transplants involving donors with LVEF <50%.

METHODS

The United Network for Organ Sharing (UNOS) database was utilized to identify adult (≥ 18 years old) HT recipients between January 2010 and December 2022. Recipients were categorized into two groups based on donor LVEF: LVEF < 50% recipients and LVEF ≥ 50% recipients.

The Mann-Kendall trend test was utilized to ascertain the statistical significance of the trend in transplants using donor LVEF < 50% over the study period. Pearson correlation was employed to examine the relationship between the annual center volume and the mean center LVEF. Kaplan-Meier analysis was used to estimate survival probability of LVEF < 50% recipients at 30-days, 1-year, and 5-years. Multivariable Cox regression models were built to measure the effect of donor LVEF on HT recipient mortality at these time intervals.

RESULTS

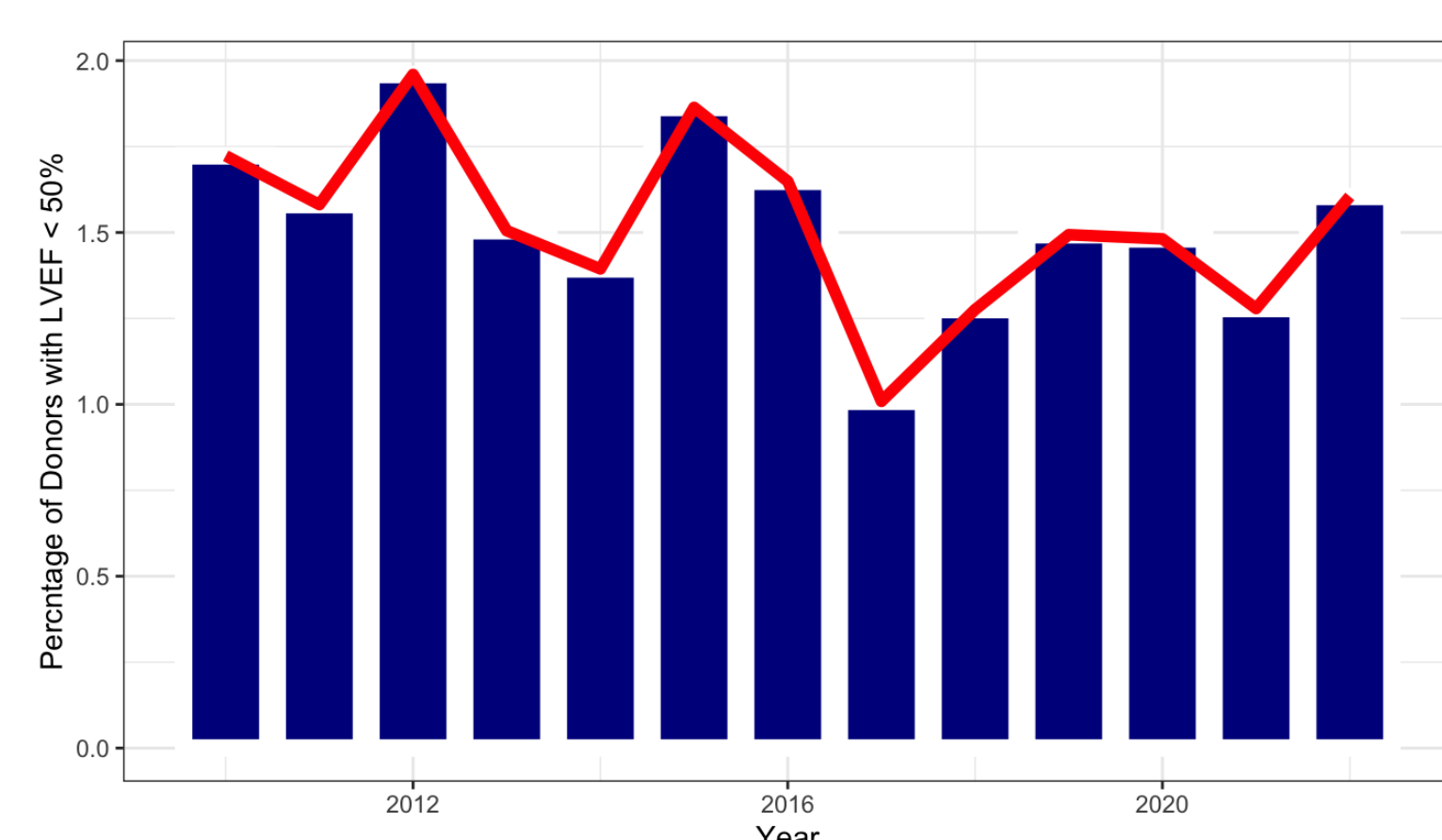


Figure 1. Total number of transplants by year of transplant and percentage of donors with LVEF < 50%.

RESULTS

Study Cohort

30,677 recipients in 119 centers were included

- 461 (1.5%) recipients had donor LVEF <50%
- The proportion of donor LVEF < 50% recipients remained stable (1.72% in 2010 to 1.60% in 2022 (P=0.127))

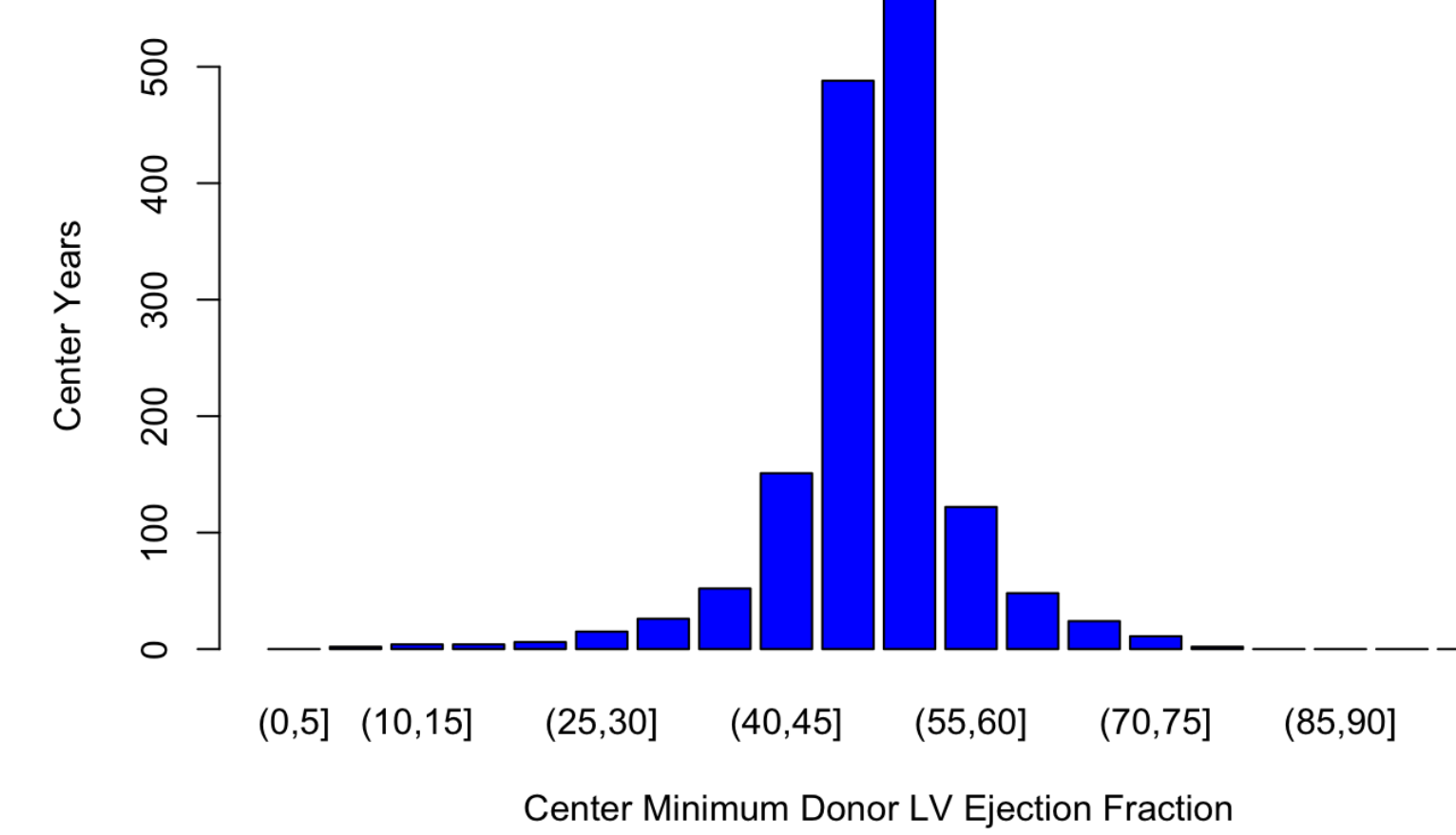


Figure 2. Center Average Donor LVEF

Mean donor LVEF at the recipient center-level was 61.62% ± 5.8%

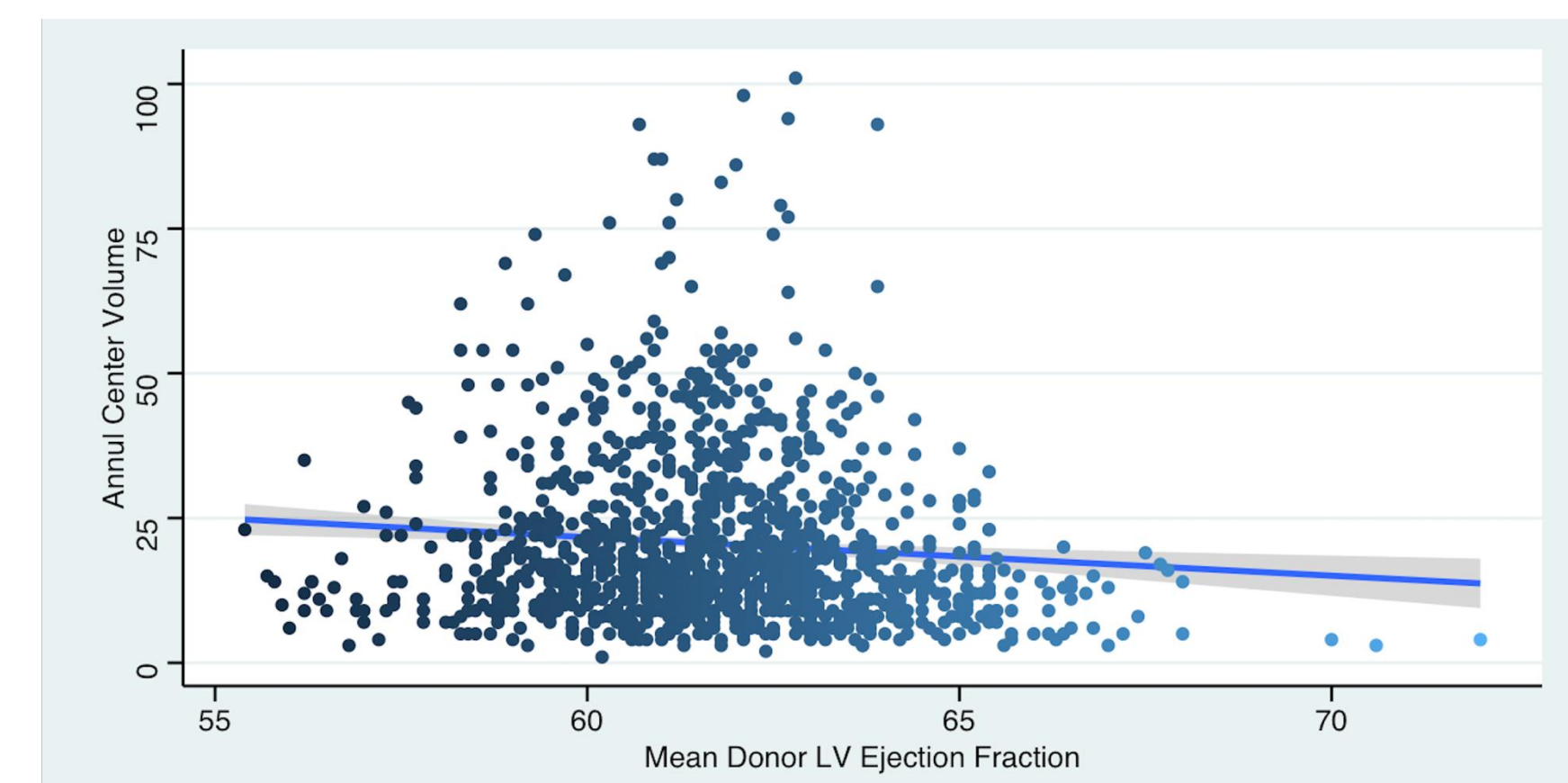


Figure 3. Correlation between mean center LVEF and center volume (Cor = -0.09, P = 0.001)

Mean recipient center donor LVEF was negatively correlated with center volume (Cor = -0.09, P = 0.001)

Primary Outcomes

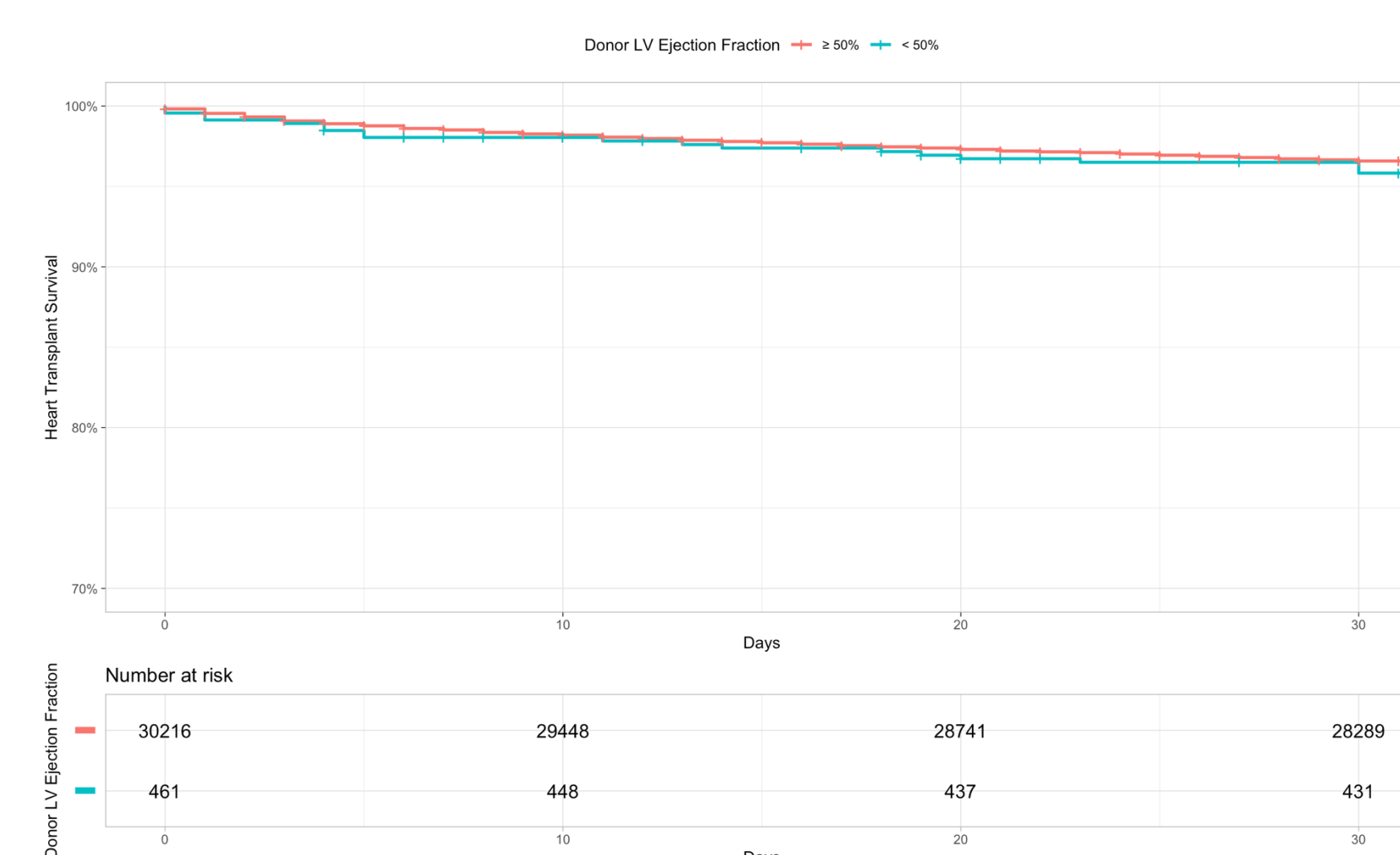


Figure 4. Unadjusted 30 Day HT Survival Rates: LVEF < 50%: 95.8% vs LVEF ≥ 50%: 96.6%, log-rank p= 0.380

RESULTS

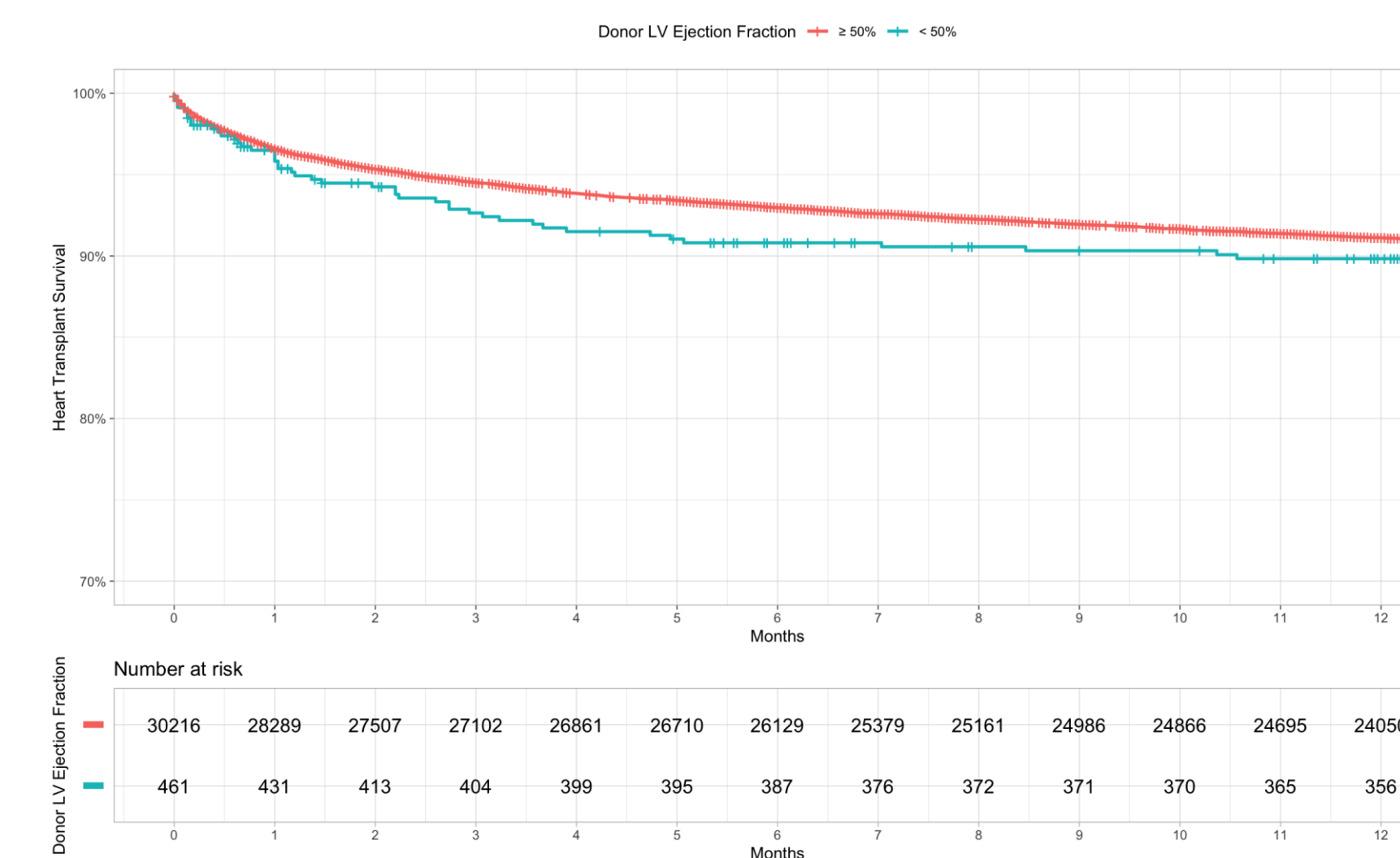


Figure 5. Unadjusted 1 Year HT Survival Rates: LVEF < 50%: 89.8% vs LVEF ≥ 50%: 91.1%, log-rank p= 0.320

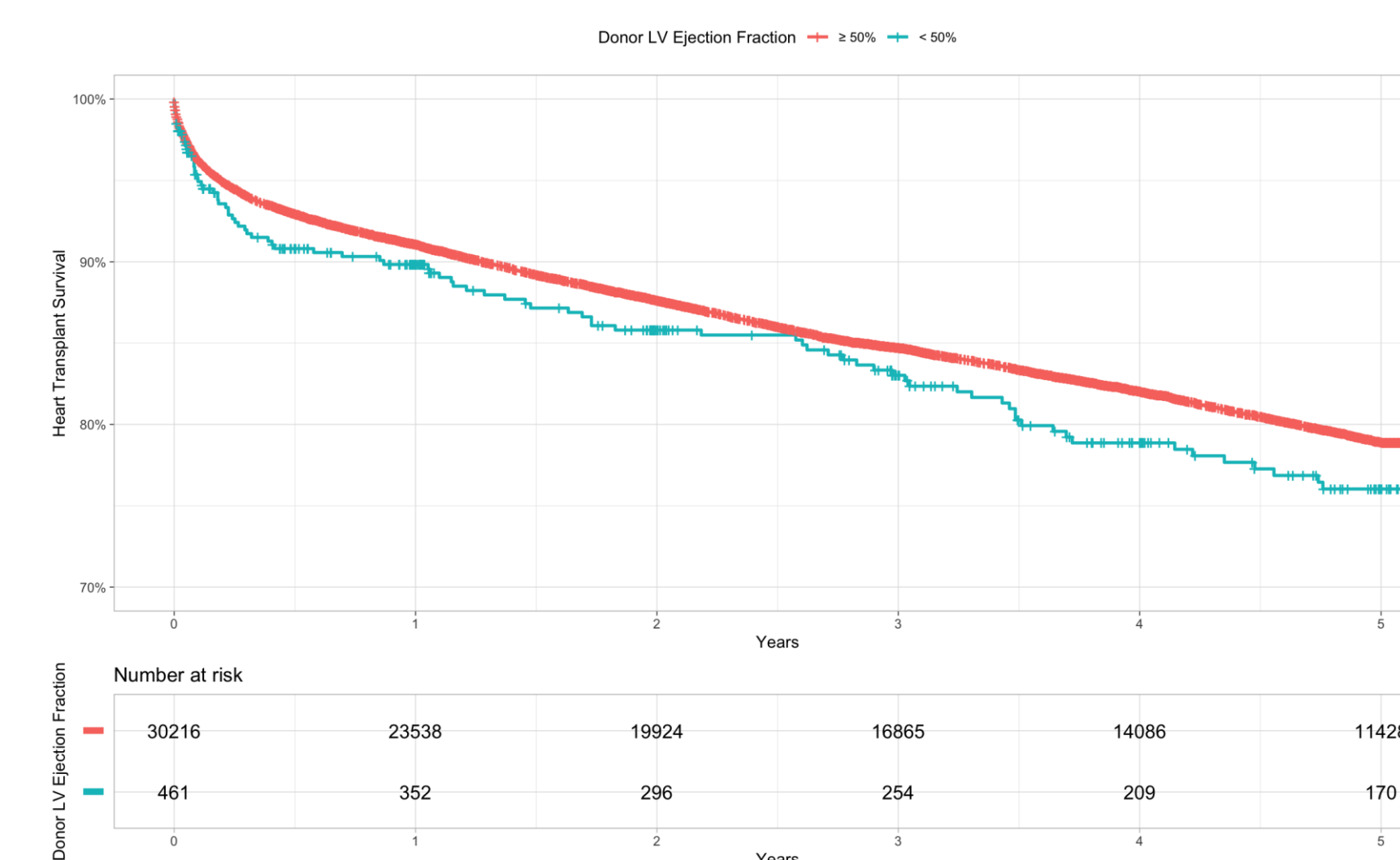


Figure 6. Unadjusted 5 Year HT Survival Rates: LVEF < 50%: 76.0% vs LVEF ≥ 50%: 78.9%, log-rank p= 0.150

Survival of Reduced Donor LVEF Recipients	Hazard Ratios of Mortality	p
30-day	1.38 (0.86-2.20)	p=0.178
1-year	1.38 (1.02-1.86)	p=0.039
5-years	1.17 (0.91-1.49)	p=0.221

Table 1. Risk Adjusted Hazard Ratios of Mortality for Reduced Donor LVEF Recipients

Secondary Outcomes

Recipients of reduced donor LVEF had similar morbidity rates compared to normal LVEF: (acute rejection: 22.8% vs 19.1%, p=0.057), stroke: (2.9% vs 3.2%, p=0.790), acute renal failure: (14.2% vs 12.5%, p=0.308), and need for pacemaker: (2.0% vs 2.6%, p=0.517)

Donor LV Ejection Fraction	≥ 50%	< 50%	p
n	30216	461	
Outcomes			
Acute renal failure dialysis – no. (%)	3765 (12.5)	65 (14.2)	0.308
Stroke – no. (%)	955 (3.2)	13 (2.9)	0.790
Pacemaker – no. (%)	767 (2.6)	9 (2.0)	0.517
Acute rejection – no. (%)	5780 (19.1)	105 (22.8)	0.057
Length of stay (days) – (median [IQR])	15.00 [11.00, 23.00]	16.00 [11.00, 24.00]	0.483

Table 2. Rates of Morbidity in Recipients with reduced and normal LVEF donors

CONCLUSIONS

Despite acceptable outcomes, utilization of donors with LVEF <50% remains very low in the US. With the introduction of newer ex-vivo technology that allows for diagnostic assessment of higher risk organs, this potential donor subset may be targeted for improved practice as a means to augment the limited donor supply.

Crucially, our findings revealed that heart transplant recipients from donors with LVEF < 50% experienced comparable outcomes to recipients from donors with LVEF ≥ 50%. This noteworthy equivalence in post-transplant survival rates suggests that hearts with lower LVEF could indeed be a viable and safe option for transplantation.

Further research is warranted to refine and optimize donor selection criteria, ensuring the safe and effective utilization of such donors while continuing to improve transplantation success rates. This research sparks enthusiasm for future endeavors aimed at harnessing the full potential of advanced ex vivo techniques specifically designed to revitalize donor hearts.

In the evolving landscape of cardiac transplantation, our findings encourage a more thoughtful consideration of donor hearts with LVEF < 50% and underscore the importance of ongoing efforts to enhance heart transplant practices, ultimately benefiting patients with end-stage heart disease.

REFERENCES

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DISCLOSURE

The presenting author has no financial relationships to disclose.