



Out of the Ice Age: Preservation of Cardiac Allografts with a Reusable 10°C Cooler

Objective: Static cold storage with ice at 0-4°C has been the mainstay of cardiac donor preservation. There has been renewed interest in preservation temperature, and early preclinical data suggests that organ storage at 10°C may be beneficial. We tested this hypothesis by using a static hypothermic storage device initially designed for lung preservation to preserve and transport cardiac allografts.

Methods: 15 cardiac allografts were recovered according to our standard brain death and normothermic regional perfusion (donation after circulatory death) protocols between July 2023 and October 2023 and transported using commercially available static storage cooler designed to sustain ambient temperature at 10°C. Results were compared to a 3:1 historical control cohort (10/2022-7/2023). Patients were excluded for the following: combined heart liver transplant, previous heart transplant, congenital heart disease, or allograft injury on recovery.

Results: Among the 10°C cohort, the mean preservation temperature was 8.87°C. The mean preservation time was 218 +/- 113 min in the 10°C cohort vs 210 +/- 72 min in the ice cohort (p=0.85). Forty percent (N=6) of the 10°C group had ischemic times > 240 minutes, compared to thirty-three percent (N=15) in the ice group (p= 0.75). Donor hearts in the 10°C group showed a trend towards lower peak post-operative lactate level (7.7 v 11.5, p=0.07). There was no difference in inotrope scores at 72 hours (p=0.6). There was a significantly shorter hospital LOS in the 10°C group (13+/- 5 days vs 19 +/- 19 days p= 0.005). There was a strong, non-significant, trend towards less severe PGD requiring ECMO in the 10°C group (0% vs 13.3%, p=0.32). Within the 10°C cohort, there was no difference in performance of the allografts with >240 min ischemic times vs < 240 min ischemic times regarding lactate, cardiac index, and inotropes scores at ICU arrival and 24 hours (Figure 1).

Conclusions: This is the first-in-human experience of static heart preservation with a reusable 10°C cooler. Postoperative allograft function was excellent, notably among those with extended ischemic times. Static preservation using this device is safe and may offer an inexpensive platform for extended heart preservation in both DBD and DCD donors. This study is limited by sample size, and further investigation is needed to assess the potential benefits of 10°C storage.

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Figure 1- Sub-group analysis of allograft function based on ischemic time in the 10°C cohort

Median ± IQR	Standard ischemic time (<240min; N=9)	Prolonged ischemic time (≥240min; N=6)	p-value
Lactate, ICU arrival (mmol/L)	4.5 ± 3.7	6.3 ± 12.055	0.7756
CI, ICU arrival (L/min/m ²)	2.8 ± 0.815	3.16 ± 1.12	0.2843
CI, 24h (L/min/m ²)	2.79 ± 2.075	3.5 ± 0.645	0.2354
VIS, ICU arrival	19.66 ± 8.63	19.06 ± 15.74	0.9546
VIS, 24h	11.24 ± 9.965	13.3 ± 11.452	0.3884

CI= Cardiac Index; VIS= Vasoactive-Inotrope Score