Exploring Volume-Outcome Association in ECMO Bridge to Heart Transplantation

Objectives: Since the UNOS policy change in 2018, the volume of orthotopic heart transplant (OHT) patients bridged with extracorporeal membrane oxygenation (ECMO) has increased significantly; however, its impact on outcomes remains unclear. We investigated the relationship between center OHT volume and ECMO-bridged patient outcomes using a national database.

Methods: The UNOS Thoracic STAR File was queried for adult OHT patients receiving veno-arterial (VA) ECMO support at the time of transplant between January 1, 2011, and November 30th, 2020. Centers were stratified into high (HVC) and low volume centers (LVC) based on a cutoff of ≥ or < 20 OHTs per year.

Results: Two hundred eleven patients (66.8%) from HVCs and 105 (33.2%) patients from LVCs met inclusion criteria. While the increase in the number of ECMO-bridged OHT patients following the 2018 UNOS allocation policy change was significant over all (p<0.001), this effect was significantly more pronounced among LVCs (p<0.05). There were no significant differences in recipient age (50.0 [31-59] years vs 50.0 [35-58] years), body mass index (27.3 [23.2-30.9] kg/m2 vs 26.3 [23.2-30.0] kg/m2), or immediate pre-transplant hemodynamics between the two cohorts. Recipient creatinine at the time of transplant trended higher at HVCs (1.0 [0.7-1.5] vs 1.0 [0.7-1.4], p=0.06). Concomitant intra-aortic balloon pump (IABP) utilization was nearly three times as high at HVCs (56 [26.5%] vs. 10 [9.5%], p=0.001) at the time of transplant. HVC patients were also more likely to be receiving mechanical ventilation at transplant (70 [30.2%] vs 23 [21.9%], p=0.038). Donor hearts transplanted at HVCs came from older donors (33 years [25-39] vs 28 years [22-35], p=0.003), but there was no difference in rates of Hepatitis C serology, gender mismatch, weight ratio, or ischemic time. Patients at HVCs were on ECMO for fewer days than those at LVCs (5 [3-8] days vs. 7 [4-12] days, p=0.001), but there was no difference in post-transplant survival (p=0.7) (Figure 1), length of stay (22 [15-39] days vs. 20 [14-33] days), stroke prior to discharge (8 [7.6%] vs. 21 [10.0%]), or dialysis prior to discharge (21 [20.0%] vs. 53 [25.1%], p=0.2).

Conclusions: Patients who were bridged to OHT using ECMO tended to require more on-pump days at LVCs. There were no apparent differences in donor selection between centers, suggesting that HVCs may list patients more quickly. Despite support duration differences, complication rates and survival outcomes after OHT remained comparable. Further research is warranted to investigate the relationship between cannulation and listing date, and the role of concomitant IABP-use in this population.

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