Physician - Heart Failure, Transplantation and Mechanical Support Systems

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The Journey of Intracorporeal Left Ventricular Assist Devices in Pediatric Patients: From HVAD to Heartmate 3

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Objective: This study aimed to compare the outcomes of HVAD (Heartware Ventricular Assist Device) and HeartMate 3 (HM3) used as a bridge to transplantation in end-stage heart failure.

Methods: This retrospective study included 34 patients under 18 years of age who underwent HVAD (n=22; 13 females, 9 males; mean age: 12.7 years) or HM3 (n=12; 8 females, 4 males; mean age: 12.9 years) implantation at a single center between 2012 and 2024. Kaplan-Meier analysis was conducted to assess survival.

Results: There were no significant differences between the HVAD and HM3 groups in terms of age (p=0.78), weight (44.3 *vs.* 37.7 kg, p=0.25), height (155.6 *vs.* 151.5 cm, p= 0.49), body surface area (1.92 *vs.* 1.76 m^2, p=0.29), and sex (p=0.66). The mean cardiopulmonary bypass time was higher in the HM3 group (59 *vs.* 78.5 min, p<0.05). The average support duration was 899 days. Postoperative complications showed no statistically significant differences in infection (n=5 *vs.* n=2, p=0.68) and cerebrovascular accidents (n=4 *vs.* n=0, p=0.11) between the HVAD and HM3 groups, while pump thrombosis showed a statistically significant difference (n=8 *vs.* n=0, p<0.05). During the five-year follow-up, nine patients underwent heart transplantation, 17 patients were on device follow-up, and eight patients died (seven patients with HVAD and 1 patient with HM3; p=0.12).

Conclusion: HeartMate 3 represents an outstanding option for pediatric patients due to its low complication rates and high survival rates. Further research is needed to develop an intracorporeal device suitable for implantation in neonates and infants.

Keywords: HeartMate 3, HM3, HVAD, Left ventricular assist device, pediatric left ventricular assist device.