P6314

Left- versus Bi-Ventricular Assist Device-mediated anti-HLA alloantibody induction in bridge-to-transplantation patients

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Background: Presence of anti-Human Leukocyte Antigen (anti-HLA) alloantibodies (allosensitization) in a heart transplantation candidate impedes the chance of finding a compatible transplant. Left Ventricular Assist Devices (LVADs) have been shown to induce allosensitization.
Purpose: The purpose of this study is to characterize anti-HLA allosensitization in adult patients receiving left (LVAD) versus biventricular- (BiVAD) assist devices as bridge to transplantation (BTT).
Methods: This study retrospectively assessed anti-HLA antibody induction in all adult patients who have received either LVAD or BiVAD as BTT at our institution. Anti-HLA alloantibody screening was performed before, and at multiple time-points after VAD implantation. Anti-HLA antibody detection was performed with a cytotoxic panel-reactive antibody (PRA) method until 2003, enzyme-linked immunoassay (ELISA) method from 2003 to 2005 and SAB assays on the Luminex platform from 2005 to 2017. Sensitization was defined either as PRA $>$10%, or as peak anti-HLA antibody mean fluorescence intensity (MFI) values of more than 1000. Baseline characteristics and sensitization in the two patient groups were evaluated using descriptive statistics.
Results: Between 2003 and 2018, 154 patients were placed on VAD support at our institution as BTT. Sensitization data were available for 130 patients. Fifty five (36.6%) patients were supported with an LVAD (median age, 48 years, 26% female) and 95 (63.4%) with a BiVAD (median age, 45 years, 28% female). Twenty-five (45.4%) of the LVAD and 49 (51.2%) of the BiVAD patients were eventually transplanted (p=0.47) with an average time to transplantation 588 and 562 days respectively. Fifteen (27.2%) LVAD and 35 (36.8%) BiVAD patients died before transplantation (p=0.23) with an average time on VAD support before death 269 and 302 days respectively. Evidence of sensitization pre-VAD was found in 17.1% of the LVAD and 12.5% of the BiVAD patients (p=0.53); these percentages rose to 40.0% (p=0.001) and 43.7% (p=0.0001) respectively at 2 to 12 months post-VAD implantation. However, the post-VAD allosensitization status was not statistically different between the LVAD and the BiVAD group. Among the 25 LVAD patients who were transplanted 7 (30.4%) were sensitized immediately before transplantation, compared to 22 (46.8%) out of 49 BiVAD patients (p=0.16).
Conclusion: Both LVADs and BiVADs are a factor of de novo anti-HLA antibody development in adult patients after implantation. Sensitization pattern does not seem to differ between LVAD and BiVAD patients. Additionally, patients supported by LVAD or BiVAD have similar chances of finding a suitable donor heart.