IMPACT OF TANDEM HEART PERCUTANEOUS LEFT VENTRICULAR ASSIST DEVICE ON INVASIVE HEMODYNAMICS

i2 Oral Contributions
Georgia World Congress Center, Room B315
Sunday, March 14, 2010, 5:30 p.m.-5:42 p.m.

Session Title: New Technologies
Abstract Category: PCI - Complex Patients
Presentation Number: 2904-10

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Background: Stabilization and support of hemodynamic status is a critical function of percutaneous left ventricular assist devices (pLVAD). We report on-device and post-device invasive hemodynamics over an extended period in patients undergoing Tandem Heart supported high-risk percutaneous coronary intervention (PCI).

Methods: 64 consecutive patients, who underwent pLVAD supported high-risk PCI at Mayo Clinic from 12/2004 through 07/2009, formed the study population. All were evaluated and deemed ineligible for surgery due to multiple co-morbidities and a very high operative risk. Of the 64 patients, 3 refused use of their records for research and 7 had missing data. Thus 54 patients with a complete set of invasive hemodynamics measurements by right heart catheterization were included in the analysis. Hemodynamic measurements were obtained at 3 time points - baseline (T1), on-device steady state (T2), and up to 6 hours after discontinuation of pLVAD i.e., post-device phase (T3).

Results: Of the 54 patients who underwent pLVAD placement for high-risk PCI, 29% had pre-procedural shock; 79% had depressed left ventricular ejection fraction (LVEF), with a median LVEF of 20%; 45% had an intra-aortic balloon pump; 62% underwent left main stenting; 62% multi-vessel stenting; and 41% rotational atherectomy. Invasive hemodynamic pressures at T1, T2 and T3 were (mean ± SD) - right atrium (16.5 ± 7.5, 10.7 ± 7.2, 9.7 ± 5.9; p = 0.0007); pulmonary artery systolic (44.6 ± 15.1, 36.3 ± 10.6, 37.8 ± 10.6; p = 0.04); and pulmonary artery diastolic (24.7 ± 12.5, 17.5 ± 6.9, 18.7 ± 7.1; p = 0.02). The cardiac output at T1, T2 and T3 was 4.7 ± 1.4, 5.8 ± 1.3, 5.7 ± 1.1 (p = 0.03), respectively. The predicted mortality was 13% by STS and 33% by logistic Euroscore. The actual 30 day and 6 month survival was 90% and 87% respectively.

Conclusion: In hemodynamically compromised inoperable patients undergoing high-risk PCI, Tandem Heart pLVAD leads to significant improvement of on-device hemodynamics and this beneficial effect is sustained in the immediate period after device discontinuation. This robust hemodynamic support likely plays an important role in the higher than predicted post-PCI survival in this high risk population.