Creative use of assist devices for biventricular support

Winstead K, Arora H, Kumar P
Unc , Chapel Hill , NC, USA

Introduction: The TandemHeart (Cardiac Assist Inc, Pittsburgh, PA) is a non-pulsatile centrifugal percutaneous ventricular assist device (pVAD) designed to function as a left ventricular assist device (LVAD). TandemHeart (TH) has also been placed during open procedures when patients fail to wean from cardiopulmonary bypass (CPB). We describe an interesting use of the TH as a right ventricular assist device (RVAD) in conjunction with an Impella (Abiomed Inc, Danvers, MA) as the LVAD.

Case Presentation: A 63 year-old female with mitral valve insufficiency secondary to rheumatic fever presented 5 days status post mitral valve replacement (MVR) as a transfer from another institution. Following the MVR, she was unable to be weaned off CPB due to severe biventricular dysfunction. Thus, an intraaortic balloon pump, an Impella as LVAD, and a TH as RVAD were placed. On arrival to our institution, the patient was emergently taken to the operating room for worsening hemodynamics and acid-base status despite massive inotropic and vasopressor support. In the unloaded state after going on CPB, transesophageal echocardiography (TEE) revealed severe global hypokinesis and severe septal akinesis. The TH and Impella were removed; a Centrimag BiVAD was placed. The patient was weaned off CPB and transferred to the ICU on nitric oxide, multiple inotropes and vasopressors.

The next morning, the patient had a declining neurological exam, with only pupillary response to light. She developed a GI bleed and laboratory values consistent with DIC. The family chose to withdraw care; the patient became asystolic and expired.

Discussion: TH was primarily designed as a "bridge to recovery" pVAD for left ventricular support. However, there are few reported cases where TH was used as an RVAD bridge to recovery or to transplant. One involved a patient with TH LVAD while awaiting a more permanent LVAD. During placement of this LVAD, the patient had poor RV function and could not be weaned from CPB. Thus, the existing TH was converted to an RVAD while the chest was open. The TH RVAD remained in place for several days until right heart function improved.2 Two other case reports involve patients with RV infarcts who developed cardiogenic shock. The TH was used as a percutaneous RVAD bridge to recovery in these patients. Both had successful outcomes when the device was removed 2-3 days after placement.3, 4 The case presented above involved failure to wean from CPB due to biventricular failure. The referring surgeons used TH for RV support and an Impella for LV support. This is an unusual and apparently unreported combination of biventricular support. This strategy provided the patient with an initial bridge to recovery until she reached an institution with the capability of placing a BiVAD. Although the BiVAD provided adequate circulatory support, the patient went into septic shock and DIC that resulted in her demise. This case presents an interesting therapeutic option that remains uncommonly used in such difficult situations.

References: