First Experience With Implantation of a Percutaneous Right Ventricular Impella Right Side Percutaneous Support Device as a Bridge to Recovery in Acute Right Ventricular Infarction Complicated by Cardiogenic Shock in the United States

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We report the first implantation in the United States of a novel percutaneous right ventricular (RV) support device as a bridge to recovery in a patient with RV infarction with cardiogenic shock refractory to standard care.

Figure 1. Acute inferoapical ST-elevation–myocardial infarction (STEMI) treated by intravascular ultrasound-guided primary angioplasty and stenting of the culprit right coronary artery (RCA) occlusion. A, Patient’s presentation EKG demonstrating acute inferoapical STEMI with evidence of prior inferior wall Q waves. B, Acute thrombotic occlusion of the RCA at the site of prior stent deployment. C, Kissing balloon angioplasty of the mid RCA and a very large right ventricular (RV) marginal branch to reopen the RV marginal branch after successful stenting of the proximal and mid RCA. D, Final angiographic appearance of the right coronary and the RV marginal branch.

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A 64-year-old man, with prior inferior wall myocardial infarction treated with percutaneous coronary intervention, presented with late drug-eluting stent thrombosis inferoposterior ST-segment–myocardial infarction complicated by cardiac arrest requiring defibrillation of ventricular tachycardia (Figure 1; Movie I and II in the online-only Data Supplement). Despite revascularization, fluid administration to a central venous pressure of 20 mmHg, dobutamine and vasopressin infusions, and intra-aortic balloon pump counterpulsation, he remained in RV shock (cardiac index of 1.8 L/min per m²). With use of antiplatelet drugs, surgical cannulation for extracorporeal support was deemed an excessive risk.

We obtained emergency permission in advance of approval for the recovery right side percutaneous clinical trial to place a RV percutaneous Impella right side percutaneous support device (Abiomed Inc., Danvers, MA), a novel 23F continuous flow pump generating 5 L/min of cardiac output, as a bridge to RV recovery. The device is placed percutaneously via a 24F peel-away sheath leaving a 11F catheter within the iliofemoral vein (Figure 2; Movie III and IV in the online-only Data Supplement). Within 6 hours, the patient had weaned off vasopressin. At 24 hours, the intra-aortic balloon pump was removed, and by 36 hours dobutamine was terminated. The patient was supported for 6 days, manifesting complete clinical and echocardiographic recovery of RV systolic function at this point (Figure 3; Movie V and VI in the online-only Data Supplement). The device was successfully removed with manual hemostasis.

RV myocardial infarction occurs in up to 50% acute inferoposterior ST-segment–myocardial infarctions, many of whom manifest cardiogenic shock.1,2 Currently, treatment focuses on improving RV and left ventricular preload with fluid, prompt coronary reperfusion, maintenance of atrioventricular synchrony, inotropic support, pulmonary vasodilator therapy to reduce RV afterload, and intra-aortic balloon pump counterpulsation.1,2 Surgically placed temporary RV support devices are available, but infer significant procedural morbidity. Despite this, the prognosis remains poor, and additional approaches to support recovery of RV function are needed.1–4

This case demonstrates the application of a novel percutaneous technology to support RV recovery in patients with RV infarction and cardiogenic shock refractory to standard care.

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Disclosures
None.

References

Key Words: acute myocardial infarction • cardiogenic shock • percutaneous ventricular support device • right ventricular infarction • right ventricular shock
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