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Letters

TO THE EDITOR

Feasibility of Early Mechanical Support During Mechanical Reperfusion of Acute Myocardial Infarct Cardiogenic Shock

Mechanical reperfusion for acute myocardial infarction cardiogenic shock (AMICS) has a class I A indication in both the American and European guidelines (1). Unfortunately, over the past 20 years, little progress has been made in improving outcomes since the pivotal SHOCK (Should We Emergently Revascularize Occluded Coronaries for Cardiogenic Shock) trial was conducted (2). The recent Food and Drug Administration approval of the Impella (Abiomed, Danvers, Massachusetts), a percutaneous micro-axial flow mechanical circulatory support (MCS) device, has provided powerful, readily available hemodynamic support during reperfusion therapy of AMICS. Five centers in the metro Detroit area (St. Joseph Mercy Pontiac, William Beaumont Royal Oak, William Beaumont Troy, Henry Ford Detroit, and the Detroit Medical Center) have performed a pilot feasibility analysis to determine whether early routine use of MCS with Impella is possible and to see whether impact on outcomes could be tracked. Between July 1, 2016, and September 26, 2016, the centers agreed to treat all patients with AMICS in a similar, mutually agreed protocol. To date, 15 patients have been treated. The goal of therapy is to initiate hemodynamic support as soon as possible after catheterization laboratory arrival.

The U.S. Pella investigators have shown that outcomes are improved when MCS is initiated before reperfusion (3). For this reason, PCI was performed after MCS was initiated. Cardiogenic shock was defined similarly to the SHOCK trial (4).

Mean age was 68.6 years (44 to 87 years), 60% were male, and 64% were diabetic. Qualifying systolic blood pressure was 80.8 ± 11.7 mm Hg, with an admission lactate of 5.4 ± 3.7. 73% of patients required support with inotropes or intra-aortic balloon pump before intervention. Two patients required active cardiopulmonary resuscitation during Impella placement before reperfusion. The time from admission to initiation of hemodynamic support was 61 min. Reperfusion was successful in all patients, and Thrombolysis In Myocardial Infarction (TIMI) flow grade III was present in 86% of patients after percutaneous coronary intervention (PCI). Cardiac power output (CPO) was 0.57 pre-support and 0.96 post-support ($p < 0.0001$). All patients left the catheterization laboratory with a CPO ≥0.6 W (5). Hospital survival was 80%.

Although only preliminary, initial experience suggests that rapid door-to-support times are feasible. This approach results in the rapid reversal of the shock state in most patients, allowing operators to obtain TIMI flow grade III rates comparable to those in patients with non-shock ST-segment elevation MI and may improve survival. Given these encouraging pilot data, a large formal quality initiative entitled the Detroit Cardiogenic Shock Initiative has been launched.

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Very Late Scaffold Thrombosis in Absorb BVS

Association With DAPT Termination?

The Absorb bioresorbable scaffold (BVS) (Abbott Vascular, Santa Clara, California) is a new, promising treatment option for coronary artery disease to overcome some limitations of metallic drug-eluting stents (DES) (1). Recently, concerns were raised regarding the occurrence of very late scaffold thrombosis (VLScT) in patients treated with BVS (2). The ABSORB II randomized controlled trial (RCT) reported 6 cases of VLScT among 335 patients at 3-year follow-up. None of these patients was using dual antiplatelet therapy (DAPT) at the time of VLScT (3). Two-year results from the ABSORB Japan RCT described 4 cases of VLScT; 2 of these patients had discontinued DAPT (4). These findings prompted us to locally investigate the occurrence of this very late thrombotic event and its potential relationship to DAPT termination.

In our daily practice at 3 regional centers, we have also encountered cases of VLScT after discontinuation of DAPT. At 18 months, 3 of the 4 VLScT cases from a cohort of 685 patients receiving BVS seemed to be closely related to DAPT discontinuation. These thrombotic events occurred within 35 days following DAPT termination. Our findings, in combination with those from ABSORB II and ABSORB Japan RCT, are disturbing, and we believe need the attention of the medical community.

A 60-year-old woman with dyslipidemia, hypertension, and history of percutaneous coronary intervention (PCI), presented with stable angina pectoris. Angiography revealed single-vessel disease of the RCA. Treatment consisted of pre-dilatation, implantation of 3 overlapping BVS, and post-dilatation. The patient used aspirin and clopidogrel for 369 days. Ten days later, she presented with ST-segment elevation myocardial infarction (STEMI) with visible thrombus on angiography, which was treated with thrombectomy, drug-eluting balloon, and abciximab.

A 63-year-old man without cardiac risk factors was admitted with a STEMI due to an occluded mid-left anterior descending coronary artery. After thrombectomy, he underwent primary PCI with 2 overlapping BVS and post-dilatation. Ticagrelor was stopped at day 381, and 35 days thereafter, he presented with STEMI due to VLScT. Intravascular imaging revealed frank thrombus and minimal malapposition. Thrombectomy, stenting with everolimus-eluting stent, and post-dilatation were performed.

A 50-year-old woman with positive family history for CAD and a current smoker was admitted to the hospital with a STEMI. After thrombectomy and pre-dilatation, she underwent PCI of the RCA with 1 BVS. Post-procedural optical coherence tomography (OCT) revealed malapposition and therefore, post-dilatation with a 4.0-mm balloon was performed reducing, but unfortunately not eliminating, malapposition. At day 449, then 20 days after prasugrel discontinuation, she returned with a Q-wave STEMI due to angiographically and OCT-proven ScT and malapposition. Treatment consisted of repeat PCI with thrombectomy, balloon angioplasty, and glycoprotein IIb/IIIa inhibitor.

These cases are reported to draw attention to a problem that seems to be emerging: VLScT. In our cohort and in the ABSORB II trial, no VLScT occurred among patients continued on DAPT for a longer period of time. On the basis of this experience and previous publications (4), we encourage prolongation of DAPT beyond 12 months after implantation of BVS—as has been demonstrated to be efficient for high-risk DES-treated patients with a low bleeding risk (5). A DAPT score ≥2 seems optimal for current DES, whereas an increased risk of ischemic events for first-generation DES would warrant an additional point; and this could theoretically also apply for first-generation BVS. Extending DAPT even longer, to 30 months as investigated by the DAPT study in DES patients, will cover the majority of the period before the resorption process of BVS is completed. More data and dedicated studies are needed to confirm this recommendation. We believe that considering the inherent difference between BVS and metallic stents, specific DAPT recommendations are warranted for patients receiving BVS.

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