RESPONSE TO THE LETTER TO THE EDITOR

We Appreciate the Thoughtful Comments from Drs. Glazier and Kaki Regarding our Review on Cardiac Arrest in the Cardiac Catheterization Laboratory

We provided two separate suggested algorithms for choosing the percutaneous mechanical circulatory support (pMCS) to two different patient populations. The algorithm commented on relates to the patient who has already had cardiac arrest. We based this upon the published translational research, clinical data, and our practice experience.

With regard to the hemodynamic consequences of the Impella compared to ECMO, the three references [1-3] quoted by Drs. Glazier and Kaki discussed the hemodynamics in the beating heart and not during cardiac arrest. In fact, the quoted article “Clinical Expert Consensus Statement on the Use of Percutaneous Mechanical Circulatory Support Devices in Cardiovascular Care” (reference 1, page E168), ECMO was the only recommended pMCS for “recurrent, refractory ventricular arrhythmias”. When comparing the hemodynamics in head-to-head fashion during ventricular fibrillation in the porcine study, ECMO clearly provided superior mean arterial pressure [4]. While published data for the Impella device during cardiac arrest is sparse, ECMO use for this indication is well known [5-7] and is also the only pMCS to be recommended by the AHA and European Resuscitation Council for this indication.

When comparing the major vascular complications, the patient populations discussed are vastly different. The patients in the CHEER trials are the sickest of the sick having suffered refractory cardiac arrest requiring indwelling cannulas for an average of 2 days while the the PROTECT II trials enrolled patients undergoing nonemergent PCI with an average Impella time of 2 hours [8, 9]. With the feasibility of using smaller arterial access for ECMO, it’d be difficult to envision a 15F ECMO cannula having significantly more complications than the 14F Impella sheath in similar patient populations.

The logistic considerations brought up by Drs. Grazier and Kaki with ECMO cannulation are valid although advancements in techniques and technology will make this pMCS more feasible at many institutions. The time to initiation of ECMO is a concern in the past but with large bore access expertise of many contemporary operators, this is less of an issue. In a recent published study of cardiac arrest patients being brought directly to the cath lab for ECMO and revascularization, the average time to initiation of ECMO was 6 minutes [7]. ECMO is conceivably easier to institute during cardiac arrest because it does not require crossing the aortic valve (can be done without fluoroscopy at all). While many Impella insertions are straightforward, the aortic valve during cardiac arrest is closed requiring the operator to time the valve crossing with active chest compression. Full ECMO support requires a perfusionist but evolving technologies such as the TandemLife can be managed without a perfusionist. This system utilizes the TandemHeart pump with an oxygenator allowing up to 4 L/min of flow from the right atrium to descending aorta.

In summary, ECMO use during cardiac arrest has drastically more data than Impella and is our preferred pMCS for refractory cardiac arrest in the cath lab. However, physician preference and institutional constraints play important roles in determining the pMCS of choice in this difficult clinical dilemma.

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