We believe these and other issues that have been raised speak to the need for additional educational resources and efforts for individuals interested in using and evaluating hemodynamic effects in the PV domain. On the basis of information provided in the paper, additional information that has been graciously shared by the authors, and the methodological concerns summarized in the preceding text, the experimental data presented by Weil et al. (1) concerning ICP are not compelling and we believe are not valid.

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Ventricular Unloading in Porcine Models

We read with great interest the paper by Weil et al. (1) addressing left ventricular unloading in a porcine model of acute ischemic left ventricular dysfunction. The study addresses a highly relevant problem of unloading an acutely failing left ventricle and the need of understanding and choosing the optimal percutaneous mechanical support system. Pressure-volume (PV) analysis was used to compare the left ventricular hemodynamic effects of 2 available percutaneous mechanical circulatory support systems: the Impella CP and the TandemHeart. The study suggested a more effective unloading using TandemHeart compared with the Impella CP.

However, the shapes of the PV loops presented by Weil et al. (1) during Impella support raise serious concerns of whether the Impella device was used correctly in their study. Looking at Figure 3 in the paper, PV loops during Impella support are rectangular. However, when you have devices continuously pumping blood out of the left ventricle throughout the cardiac cycle, the PV loops should be triangular. In the same figure, a fluoroscopic image shows the Impella device apparently with both the outlet and inlet port located within the ventricular cavity. With such a deep and inappropriate placement of the device, no flow will be delivered by the device into the aorta. With only 7 animals in their study, even 1 improper placement of the device could have great impact on their results.

The authors concluded that the TandemHeart reduced the native cardiac output more than the Impella CP although it is not mentioned how they calculated the native cardiac output. Total cardiac output derived from a pulmonary artery catheter (right ventricular output) was similar between the devices, and only minor differences in device flow were reported (Impella CP 3.3 ± 0.1 l/min vs. 3.6 ± 0.1 l/min). We assume the authors calculated native cardiac output using the PV catheter-derived volumes in the left ventricle, and this further raises concerns about the placement of the Impella device and the integrity of the PV loop recordings. We believe the authors need to explain this in greater detail because the presented data raise serious concerns and thus we question the validity of their study.

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