Charles D. Collard, M.D., Editor

Images in Anesthesiology: Proper Positioning of an Impella 2.5 and CP Heart Pump

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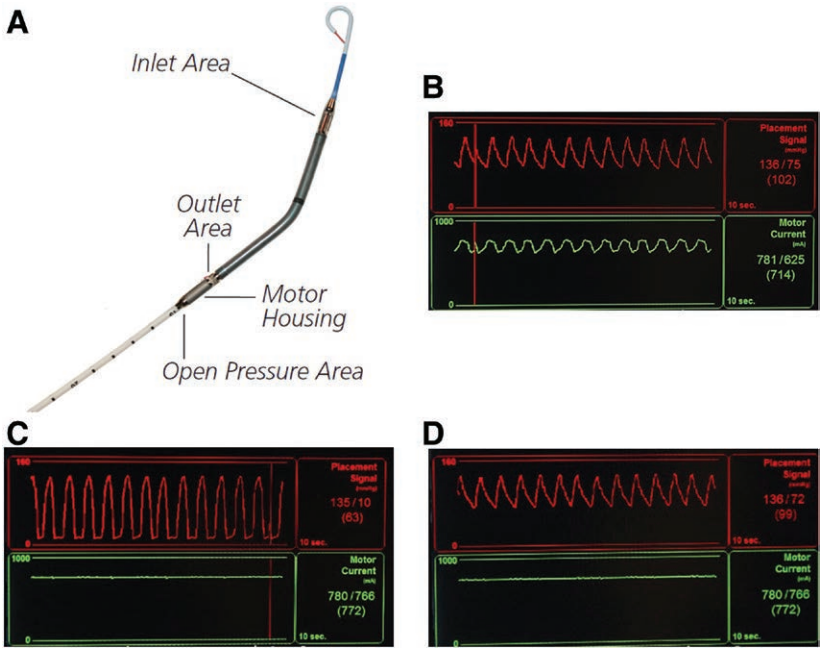

THE Impella microaxial heart pump (Abiomed, USA) is approved for temporary left ventricular support to increase cardiac output and decrease myocardial oxygen demand.[1–3] Inserted percutaneously through the femoral or axillary artery, the Impella catheter (fig. A) sits in the mid-left vetricular space, with its inlet area approximately 3.5 cm below the aortic annulus and its outlet area in the ascending aorta. Proper positioning of the Impella 2.5 and Impella CP can be verified by two waveforms called the placement signal (*red*) and motor current (*green*). The placement signal displays pressure (in millimeters mercury) throughout the cardiac cycle generated from an open pressure area. The motor current (in milliamps) displays the energy intake of the motor, which normally pulsates due to the pressure gradient between the ventricular inlet and the aortic outlet areas.

Both the motor current and placement signal help verify proper positioning, because improper positioning may result in a loss of mechanical support. To do this, the controller software evaluates the waveform characteristics. When correctly positioned, the placement signal is aortic and the motor current is pulsatile (fig. B). If the catheter is fully in the ventricle, the placement signal is ventricular and the motor current is flattened (fig. C). If the controller detects an aortic signal and flattened motor current (fig. D), the Impella may be improperly positioned, either as being fully in the aorta or where both its inlet and outlet areas are in the ventricle, although its open pressure area is still in the aorta. A similar pattern may also result from a loss in the pressure gradient between the aorta and left ventricle (*e.g.*, worsening cardiogenic shock), although this would more likely result in a significant dampening, not complete flattening, of the motor current.

Competing Interests

The authors declare no competing interests.

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