Use of 3D-TEE and cerebral oximetry monitor in optimizing complex redo ascending aorta repair

Scott Licata, M.D., Kevin Lee, M.D., James Taylor, M.D., Harold Fernandez, M.D., Igor Izrailtyan, M.D., Ph.D.
Stony Brook University Hospital, Stony Brook, NY, USA.

**Case Report**

A 72-year-old female post aortic repair, aortic valve replacement, and subsequent cardiac pacemaker insertion eight years ago presented with three weeks of anterior chest pain and one day of severe radiating back pain and dyspnea. She was taken to the operating room for a repair of a new ascending aorta pseudoaneurysm. In the operating room, 3D-TEE showed a previously unknown aortopulmonary artery fistula (APAF). Additionally, once on full-body circulatory arrest, the left-sided cerebral oximetry signal declined critically despite continual cerebral perfusion through the right axillary artery. This required clamping of the left common carotid (LCCA) and subclavian artery, and ultimately LCCA cannulation with additional perfusion. After bilateral perfusion was achieved cerebral oximetry returned to baseline values. She was under circulatory arrest with hypothermia protocol for a total of 106 minutes. She was extubated on Post-operative day one without evidence of neurologic sequelae. On post-operative day four she was found unresponsive, a CT scan showed a massive right-sided sub-dural hemorrhage which despite attempted operative evacuation and ligation proved fatal.

**Discussion**

Neurocognitive dysfunction is common after cardiac surgery with rates approaching 30-50%. Given the complexity of the surgery and the need for circulatory arrest cerebral oximetry proved a useful tool for monitoring and trending cerebral perfusion and detecting unknown hypoperfusion. Cerebral oximeters work by emitting pulsed near-infrared light which is able to penetrate the skull and detect returning photons. Absolute value of less than 55% is felt to indicate a high risk for ischemia regardless of baseline values. Additionally, patients with cerebral oxygen saturations of less than 40% for greater than 10 minutes may have an increased risk of neurocognitive dysfunction.

Given the challenge of mentally visualizing a 3D image from 2D ultrasound, particularly with complex cardiac anatomy, 3D TEE provides an alluring alternative. It is advantageous in that it affords the ability to view the lesion in different planes thus not just detect the diameter of the defect. This was essential in this case as the patient’s anatomy was complicated by multiple intrathoracic procedures.

**References**


