Visualization of hypoxemic coronary perfusion despite full retrograde extracorporeal circulatory life support

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A 69-year old male with dilated cardiomyopathy without coronary artery disease underwent cardiopulmonary resuscitation and femoral extracorporeal life support (ECLS). There was no left ventricular ejection at the time of computed tomography (CT) imaging. These CT images (Figs 1 and 2) illustrate the well-known phenomenon of hypoxemic coronary perfusion despite full retrograde ECLS.

Figure 1: CT angiography of the chest illustrating the aforementioned phenomenon of incomplete coronary perfusion during retrograde ECLS: contrast agent was injected through a central venous catheter placed in the right jugular vein. A CT scan was performed after haemodynamic stabilization of the patient. At this time, flow of the ECLS was 3.8 l/min with a corresponding static arterial blood pressure of 69 mmHg and a central venous pressure of 6 mmHg. Under these conditions, there is no visible contrast agent in the left ventricle of the non-ejecting heart. Despite full retrograde flow provided by the veno-arterial ECLS, the aortic root is not completely filled with the contrast agent.

Figure 2: CT angiography of the chest: pericardial drains and osteosynthetic material are visible after preceding sternotomy. Emergency surgery was necessary after an attempt to place a left ventricular probe of a cardiac resynchronization device, causing a left ventricular laceration with an acute pericardial tamponade and subsequent resuscitation. ECLS implantation was followed by immediate transfer to the operating room. No left ventricular ejection at the time of imaging. Note: despite full ECLS support with retrograde arterial flow, hypoxemic blood without the contrast agent pours from the left ventricle into the aortic root and the left coronary artery.