



Image

The Bubbling Aorta

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Abstract

We are presenting the image of the bubbles in the descending aorta in a patient on VA ECMO.

Keywords

Cavitation; ECMO; Bubbles

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A 23-year-old woman presented to the emergency room at 31 week gestation in acute respiratory failure with evidence of fetal distress. She was intubated, mechanically ventilated and an emergent caesarean section was performed. Echocardiogram revealed generalized hypokinesis with an ejection fraction of 10 % presumed to be due to peripartum cardiomyopathy. She developed resistant cardiogenic shock so was placed on peripheral veno-arterial extracorporeal membrane oxygenation (VA-ECMO) support through cannulation of the femoral vein and femoral artery. Transesophageal echocardiogram revealed air bubbles appearing as bright particles in the descending aorta (figure 1). There were no clinical signs of embolism, the patient remained on ECMO support for a week, and eventually made full recovery.

Bubbles in descending aorta is an unusual echo finding. Return of the oxygenated blood into femoral artery in the conditions of severely compromised forward cardiac output creates retrograde filling of the aorta. If air bubbles get into the bloodstream off ECMO circuit, they will travel retrogradely and cause this appearance. Arterial air embolism is among the complications encountered during VA-ECMO support. Other less common causes include tear in the membrane oxygenator wall or supersaturation of blood with oxygen, forcing oxygen out of solution (therefore post-membrane PO₂ should be kept below 600 mmHg).



Another possible explanation of this phenomenon is cavitation similar to what is typically seen in cardiac chambers in the presence of mechanical prosthetic valves, when local areas of low pressure, created by rapid movements of metallic leaflets, causes rapid formation of vaporous microbubbles. With ECMO, continuous suctioning by the roller pump against insufficient venous return (e.g. after clamping or kinking of the venous circuit), creates excessive negative pressure, which may cause cavitation of dissolved gases. Biological effects of cavitation are uncertain, and they typically do not include embolism.

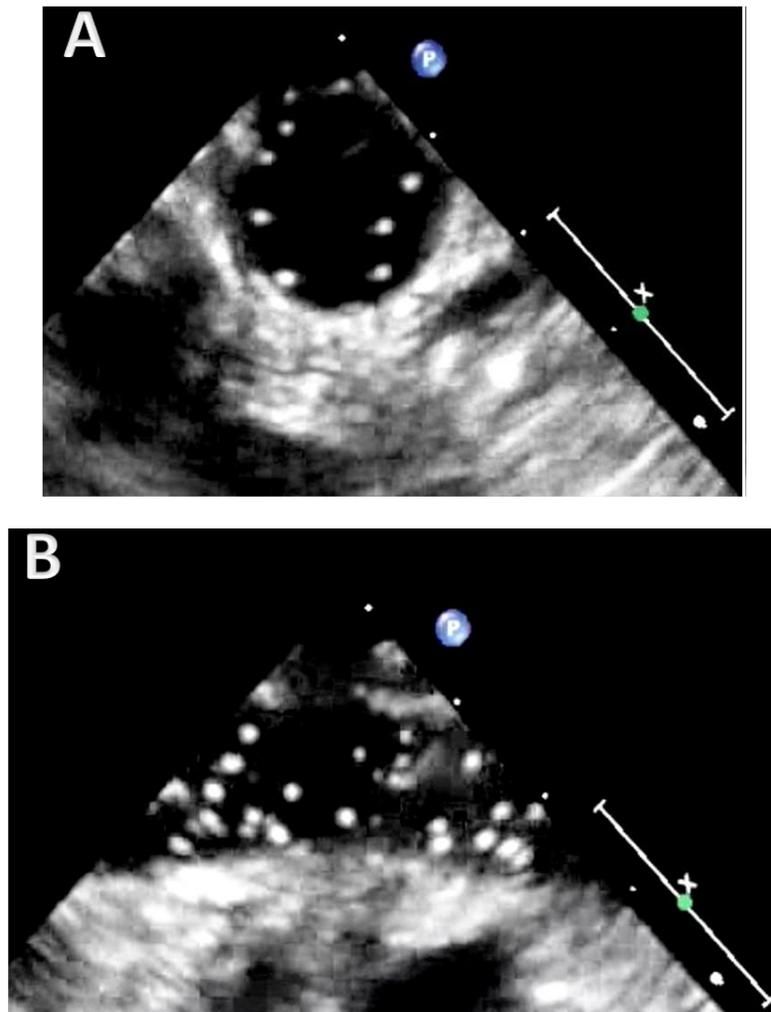


Fig. 1. Transesophageal echocardiogram visualizing the descending aorta through mid esophageal views in short axis at 0 degree (panel a) and long axis at 90 degrees (panel b) showing air bubbles appearing as bright particles.