

CLINICAL IMAGE

Successful use of plain subcostal transthoracic echocardiography in VV-ECMO cannula repositioning

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Case

A previously healthy 62-year-old male with recently diagnosed rapidly progressive pulmonary fibrosis was hospitalised and accepted for lung transplantation. During admission his pulmonary function critically deteriorated due to an intercurrent pneumonia which necessitated additional respiratory support. In order to avoid physical deconditioning inherent to invasive mechanical ventilation and analgesedation, the patient was not intubated. Instead it was decided to follow an awake extra corporal membrane oxygenation (ECMO) strategy, which is increasingly being used as a bridge to lung transplant and allows active participation of the patient, including physical therapy and training.^[1] He was put on veno-venous ECMO (VV-ECMO) using a single site double lumen cannula (Avalon Elite®) in the right jugular vein.^[2] During daily care, the VV-ECMO flow suddenly dropped from 4.3 litres per minute to 2.7 litres per minute. This was followed by a significant desaturation in oxygen levels from 99% to around 75%. The patient became unresponsive and to avoid possible aspiration of stomach contents, transoesophageal echocardiography was deemed too

dangerous. Transthoracic echocardiography only produced good subcostal views, due to the patient's supine position.

Figure 1A shows a subcostal view. The right atrium (RA in red), right ventricle (RV in red), left atrium (LA in red), and left ventricle (LV in red) are indicated as well as the tricuspid valve in blue and the liver and the diaphragm. The cannula position (white arrow) is in front of the right atrium passing from the superior caval vein to the inferior caval vein during the initial echo images. The ECMO flow is indicated by the yellow arrow. *Figure 1B* shows the same image with colour Doppler in which the VV-ECMO cannula is retracted and turned directing the flow towards the inferior caval vein. *Figure 1C* shows the cannula after slight twisting and pushing it somewhat deeper in the right jugular vein with colour Doppler signal aimed more towards the tricuspid valve (red arrow). *Figure 1D* shows the ECMO colour Doppler signal directed towards the tricuspid annulus and across after further repositioning (red arrow). The images are an example of so-called re-circulation.^[3] A situation in which part of the ECMO flow from the exit cannula containing oxygen rich blood is being directed towards the entry cannula and thus re-circulates within the ECMO circuit. This was caused by the shift in cannula position due to daily care. In the process the patient is being deprived of oxygen rich blood. This together with the decrease in flow caused the sudden deterioration in oxygen saturation.

After repositioning of the VV-ECMO cannula, using only subcostal views due to patient and technique related circumstances, flow of the VV-ECMO circuit normalised completely and the patient recovered. He was transferred to a designated lung transplantation centre in order to receive a lung transplantation.

Plain subcostal transthoracic echocardiography can be successfully used in double lumen Avalon cannula repositioning in VV-ECMO when placed in the right internal jugular vein.

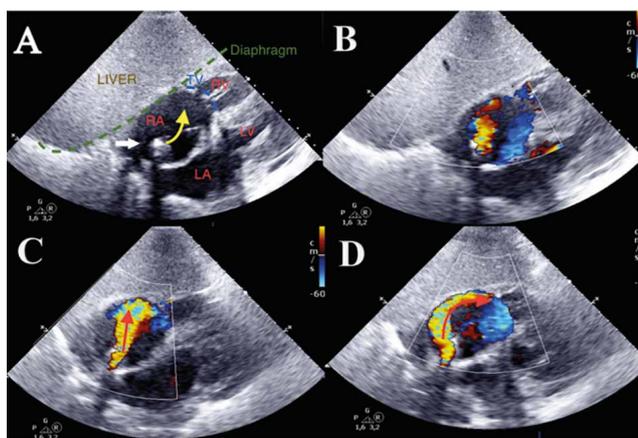


Figure 1. Subcostal trans thoracic echocardiography images.

Disclosures

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