Case Report

Case report of contrast transesophageal echocardiography to confirm extracorporeal membrane oxygenation (ECMO) catheter position in aortic dissection

Shek Yin Au^, Ka Man Fong^, Sai Kwong Yung, George Wing Yiu Ng

Department of Intensive Care, Queen Elizabeth Hospital, Hong Kong, China

Correspondence to: Shek Yin Au. Department of Intensive Care, Queen Elizabeth Hospital, 30 Gascoigne Road, Kowloon, Hong Kong, China. Email: h0145237@gmail.com.

Abstract: Extracorporeal cardiopulmonary resuscitation (ECPR) is the initiation of veno-arterial extracorporeal membrane oxygenation (VA-ECMO) during resuscitation. As a clinical emergency, ECPR is often initiated with limited background information, especially for those with out of hospital cardiac arrest. The underlying cause of cardiac arrest is often revealed after the VA-ECMO is established. If the original culprit turns out to be aortic dissection, in which peripheral VA-ECMO is relatively contra-indicated, the first question to answer is whether the arterial return catheter is perfusing the true lumen. If not, the high retrograde flow to the false lumen can otherwise result in further progression of the aortic dissection. While aortogram by computer tomography is still considered one of the gold standards to confirm the catheter position, the transport risk for an unstable patient immediately after ECPR is still high. This article suggests a novel bedside method of using microbubble contrast transesophageal echocardiography, injected through the return cannula, to check if the blood flow is directed towards the true or the false lumen. The test result allows the clinicians prompt decision making on whether to change the VA-ECMO configuration or for early VA-ECMO withdrawal. The image of such a diagnostic contrast echocardiography technique is presented in this case report.

Keywords: Extracorporeal membrane oxygenation (ECMO); dissection; contrast echo

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Introduction

This is the first reported case of using microbubbles to confirm extracorporeal membrane oxygenation (ECMO) catheter position in a patient with aortic dissection. We present the following article in accordance with the CARE reporting checklist (available at http://dx.doi.org/10.21037/jeccm-20-166).

Case presentation

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and with the Helsinki Declaration (as revised in 2013). Informed consent was obtained from the patient and his relatives.

The patient was a 27-year-old man presented to the emergency department for hypotension, chest pain and tearing back pain. He developed refractory cardiac arrest with ventricular fibrillation. Extracorporeal cardiopulmonary resuscitation (ECPR) was set up with a 15-Fr arterial catheter set at the left common femoral artery and a 23-Fr venous catheter set at the left femoral

^ ORCID: Shek Yin Au, 0000-0001-8331-2250; Ka Man Fong, 0000-0003-1491-5335.

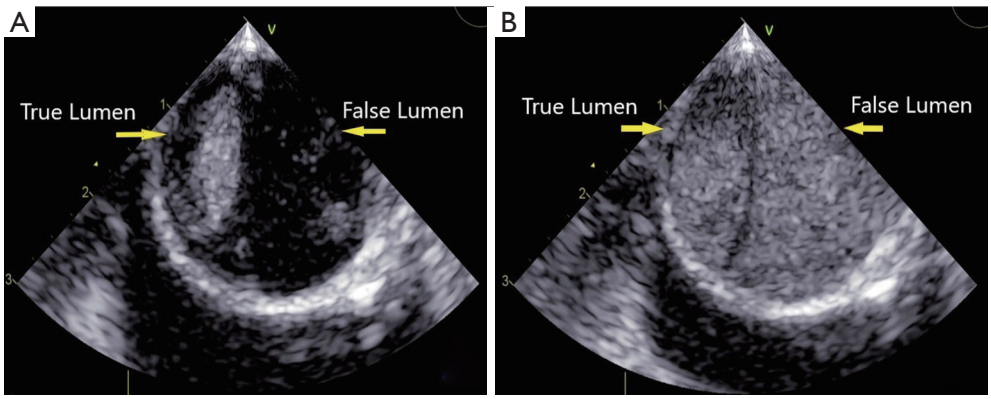
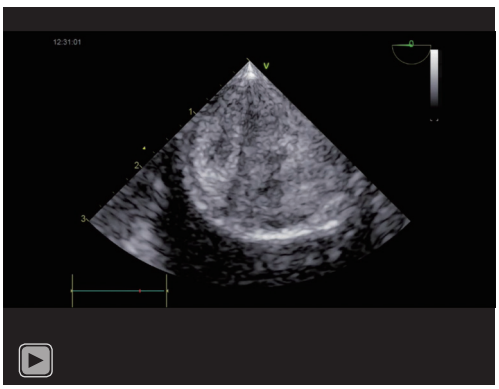


Figure 1 The short axis view of the dissected descending aorta was studied by contrast enhanced transesophageal echocardiography. Upon contrast injection through the extracorporeal membrane oxygenation arterial catheter, the compressed true lumen was enhanced first (A) followed by the false lumen (B).



Video 1 The short axis view of the dissected descending aorta was studied by contrast enhanced transesophageal echocardiography. Upon contrast injection through the extracorporeal membrane oxygenation arterial catheter, the compressed true lumen was enhanced first followed by the false lumen.

vein. Initial work up for causes of arrest showed widened mediastinum in chest radiograph. In view of unstable hemodynamics and high transport risk, transesophageal Echocardiography was performed at the bedside and revealed type A aortic dissection. To confirm whether the arterial ECMO arterial catheter was perfusing the true lumen, 2 mL of microbubble contrast, Sonovue (Bracco Imaging S.p.A), was injected through the side port of the arterial catheter while imaging the descending aorta with transesophageal echocardiography, with mid-esophageal view at zero degree and imaging probe facing posteriorly. The contrast was filling initially the compressed true lumen and then the false lumen, indicating that the ECMO is preferentially perfusing the true lumen but there was communication between the true and the false lumens. Due to the fast blood flow created by the ECMO circuit, the filling of the false lumen through the communication channels was immediate, in just one second, after the true lumen was filled, and the sequential contrast filling of the true and the false lumens was best appreciated with the cine film viewed in slow motion (*Figure 1* and *Video 1*). Computed tomography subsequently confirmed type A aortic dissection from root to bilateral iliac arteries. The patient was managed by aortic root operation, valve and arch replacement and the ECMO support could be terminated subsequently.

Discussion

This bedside contrast transesophageal echocardiography assessment offered a quick novel means to assess if the arterial ECMO catheter was perfusing the true or the false lumen. We have tried this method in one patient only as ECPR initiated in patients with aortic dissection was not that common. In order to prove the efficacy, this technique should be tried in more patients with ECMO and dissection with various perfusing conditions, like those with arterial ECMO catheter perfusing the false lumen, before it can be recommended.

Acknowledgments

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Footnote

Reporting Checklist: The authors have completed the CARE reporting checklist. Available at http://dx.doi.org/10.21037/jeccm-20-166

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/jeccm-20-166). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and with the Helsinki Declaration (as revised in 2013). Informed consent was obtained from the patient and his relatives.

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