Intensive Care Med (2019) 45:1649–1650
https://doi.org/10.1007/s00134-019-05639-5

IMAGING IN INTENSIVE CARE MEDICINE

Bubble study from the upper limb? Watch out for Eustachius!

Sean Cai[1*], Damian Ratano[2] and Ghislaine Douflé[2,3]

A 47-year-old man admitted to intensive care unit (ICU) for acute respiratory distress syndrome remained severely hypoxemic despite mechanical ventilation and proning. Under transesophageal echocardiography (TEE) guidance, a bubble study was performed through an upper-body venous access to rule out a patent foramen ovale (PFO). However, a large Eustachian valve (Fig. 1a and video 1) prevented the bubbles from reaching the inter-atrial septum (IAS) (Fig. 1b and video 2). Colour Doppler did not show flow through the IAS (Fig. 1c and video 3).

The Eustachian valve (EV) is an embryonic remnant that directs oxygenated venous blood from the inferior vena cava (IVC) to the foramen ovale (FO) in utero. Persistence of large EV may cause a differential flow pattern in the right atrium that significantly lowers the sensitivity of contrast echocardiography to assess for PFOs when contrast is injected via upper limbs. In comparison, femoral venous injection of contrast improves sensitivity, and is safe. In our case, an increase in end-expiratory pressure improved the patient's oxygenation, which advocated against a PFO. Hence, we elected not to repeat the bubble study from a lower limb access. However, physicians may consider lower limb injection of contrast in case of strong suspicion of PFO that may change patient management.

*Correspondence: sean.cai@mail.utoronto.ca
[1] Department of Medicine, University of Toronto, Toronto, ON, Canada
Full author information is available at the end of the article

Springer

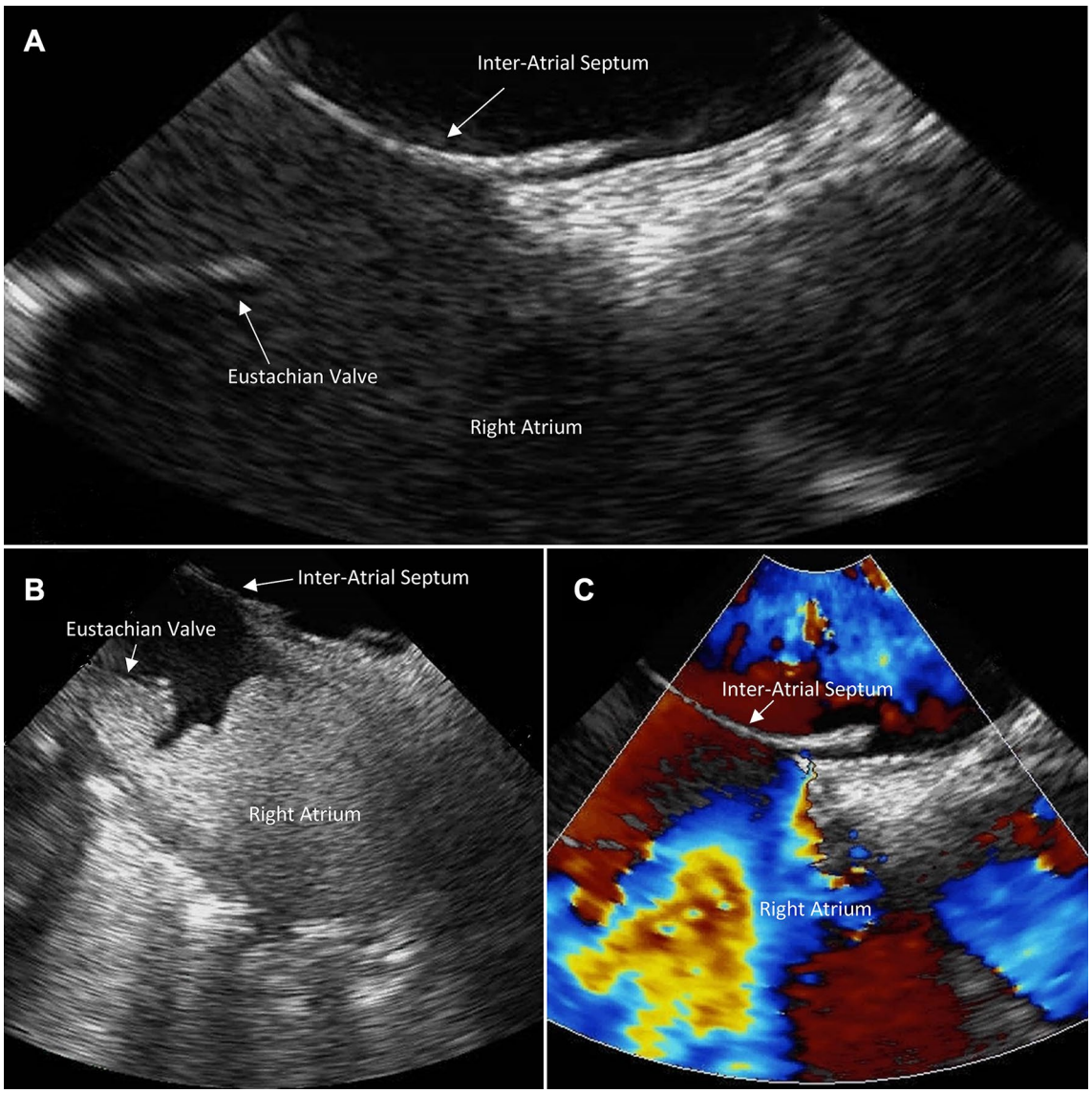

Fig. 1 Bubble study under transesophageal echocardiogram showed a large Eustachian valve that prevented bubbles from reaching the inter-atrial septum

Electronic supplementary material
The online version of this article (https://doi.org/10.1007/s00134-019-05639-5) contains supplementary material, which is available to authorized users.

Author details
[1] Department of Medicine, University of Toronto, Toronto, ON, Canada. [2] Interdepartmental Division of Critical Care Medicine, Toronto General Hospital, University Health Network, University of Toronto, 200 Elizabeth Street, Toronto, ON, Canada. [3] Department of Anesthesia, Toronto General Hospital, University Health Network, 200 Elizabeth Street, Toronto, ON, Canada.

Compliance with ethical standards

Conflicts of interest
Authors have no disclosures to declare.

Publisher's Note

Received: 1 May 2019 Accepted: 4 May 2019
Published online: 15 May 2019