

## Clinical Imaging

# Warning regarding thrombosis-in-transit across the patent foramen ovale associated with pulmonary embolism: ultrasonographic imaging analysis

A 55-year-old man (body mass index, 58) was transported to our emergency room for dyspnea. Cardiac ultrasonography (Fig. 1A) was carried out, and a high-intensity mass lying across the foramen ovale was displayed. The edge of the mass was going back and forth between the left ventricle and atrium (Video S1). There was no deep vein thrombosis on contrast-enhanced computed tomography. The patient was diagnosed as having pulmonary embolism and thromboembolism-in-transit across a patent foramen ovale. A massive thrombus was found to be moving to the left atrium, which indicated a very critical state, and open thrombectomy was performed. Transesophageal echocardiography during surgery also displayed a thrombus trapped in the foramen ovale (Fig. 1B), and a giant thrombus, 20 cm long, was removed (Fig. 1C).

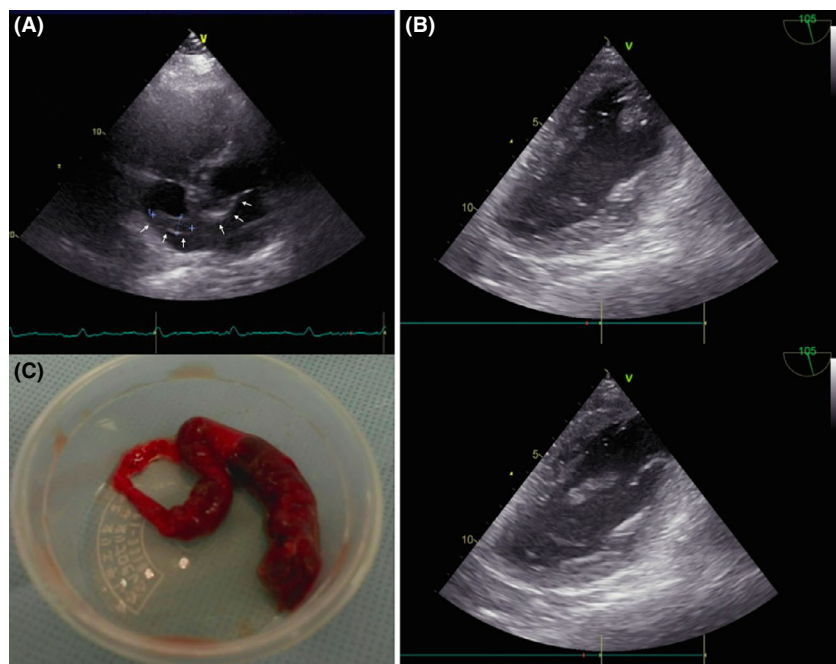
Patent foramen ovale has a high prevalence of 20–30% of all people.<sup>1</sup> Patent foramen ovale combined with a pulmonary embolism could cause a thrombus to readily pass through and serious arterial embolism because of a right–left shunt caused by the increased pulmonary arterial pressure.<sup>2</sup>

Contrast-enhanced computed tomography is useful for diagnosing pulmonary embolism but not for foramen ovale thrombi. Therefore, cardiac ultrasonographic observation of the atrial septum is important to avoid overlooking foramen ovale thrombi.

## DISCLOSURE

Approval of the research protocol: N/A.

Informed consent: N/A.





**Fig. 1.** A, Transthoracic echocardiography of a 55-year-old man displaying a thrombus spanning the atrial septum. The thrombus moved to the left atrium side over time. B, Transesophageal echocardiogram during surgery also showed the thrombus trapped in the foramen ovale. The end of the thrombus was going back and forth between the left ventricle and atrium. C, The 20-cm thrombus removed by surgery.

Registry and the registration no. of the study/trial: N/A.

Animal studies: N/A.

Conflict of interest: N/A.

Kentaro Morinaga,<sup>1</sup>  Jun Oda,<sup>1</sup>  Jun Yamashita,<sup>2</sup>  
Hiroki Nakano,<sup>2</sup> Hitoshi Ogino,<sup>3</sup> and Satoshi Takahashi<sup>3</sup>  
<sup>1</sup>*Department of Emergency, and Critical Care Medicine,*  
<sup>2</sup>*Department of Cardiology, and* <sup>3</sup>*Department of*  
*Cardiovascular Surgery, Tokyo Medical University, Tokyo,*  
*Japan*  
*E-mail: ke\_mori@tokyo-med.ac.jp*

2 Lu C, Li J, Wang W, Gong K, Zhao L, Fu X. Large thrombus-in-transit within a patent foramen ovale in a patient with pulmonary embolism: a case report. *J. Int. Med. Res.* 2018; 46: 4332–7.

## SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

**Video S1.** The edge of the mass is going back and forth between the left ventricle and atrium.

## REFERENCES

1 Ellensen VS, Saeed S, Geisner T, Haaverstad R. Management of thromboembolism-in-transit with pulmonary embolism. *Echo Res. Pract.* 2017; 4: K47–51.