A diagnostic odyssey: detection of an unusual anterior papillary muscle of the tricuspid valve

Patric Biaggi*, Matthias Greutmann, Andrew Crean, Melitta Mezody, and Harry Rakowski

Division of Cardiology, Toronto General Hospital, University Health Network, Peter Munk Cardiac Program, University of Toronto, G3-546, 200 Elisabeth Street, Toronto ON M5G 2C4, Canada

Received 30 July 2009; accepted after revision 4 December 2009; online publish-ahead-of-print 6 January 2010

A routine chest X-ray in a 78-year-old female patient suggested a retained vascular catheter in the right ventricle (RV). On transthoracic echocardiography, a prominent linear echo was found in the RV and the patient was referred for cardiac computed tomography and magnetic resonance imaging. Although neither of these tests showed evidence of a retained foreign body in the RV, they could not clarify the nature of the linear structure within the RV cavity. Finally, transesophageal echocardiography, using a matrix array three-dimensional probe solved the mystery: the linear structure in question within the RV was a large papillary muscle with attachments to the anterior leaflet of the tricuspid valve and an unusual origin from the interventricular septum.

Keywords
Right ventricle • Anterior papillary muscle • Three-dimensional transesophageal echocardiography

A 78-year-old obese woman with a history of abdominal and bilateral shoulder surgery had an unusual finding on a routine chest X-ray. A linear structure projecting over the right ventricle (RV) raised the suspicion of a retained part of a vascular catheter within the right heart. She was referred to our centre for a diagnostic work-up. The two-dimensional surface echocardiogram (TTE) showed a linear structure within the RV, with some views suggesting a lumen and thus a retained catheter (Figure 1, see Supplementary data online, Movie S1). Further investigations with chest computed tomography (CT) and cardiac magnetic resonance imaging (MR, Figure 2, see Supplementary data online, Movie S2) could rule out a retained catheter within her heart, but were unable to properly clarify the nature of the linear structure seen on TTE. Therefore, the patient was sent back to our institution for transesophageal echocardiography (TEE). The repeat TTE suggested that the structure was attached to the interventricular septum. Using three-dimensional matrix array TEE (3D MTEE, X7-2t probe, Philips Ultrasound), the linear structure within the right heart was identified as a large papillary muscle attaching to the anterior tricuspid leaflet, with an unusual origin from the interventricular septum (Figures 3 and 4; see Supplementary data online, Movies S3 and S4). After clarifying the benign nature of her unusual appearance on TTE and chest X-ray, the patient was reassured that her finding was benign.

This case is of interest for three reasons: (i) a single large papillary muscle attaching to the anterior tricuspid leaflet and originating from the interventricular septum is a rare finding. A literature search did not reveal reports discussing a similar case. Smaller papillary muscles originating from the septomarginal trabeculation inserting either in the septal or anterior tricuspid leaflet have been described, the most well known being the muscle of Lancisi.1 Smaller papillary muscles would need to be differentiated from aberrant tendinous chords, known to be a potential cause of severe tricuspid regurgitation.2 (ii) This case illustrates how the spatial and temporal resolution of TEE may be higher compared with CT or MR, especially for small and mobile intracardiac structures. (iii) As previously described, the latest 3D MTEE technology offers an easy and instant way of visualizing intracardiac structures and anatomical relations even more accurately than 2D TEE.3,4 Our case adds to the spectrum of clinical use of 3D TEE.

Supplementary data
Supplementary data are available at European Journal of Echocardiography online.

Conflict of interest: none declared.
**Figure 1** Transthoracic echocardiogram, apical view. The arrow points to the linear structure within the right ventricle. RV, right ventricle; LV, left ventricle.

**Figure 2** Magnetic resonance image: single frame from a steady-state free precession image in four-chamber orientation. The arrow points to the structure in question within the right ventricle. RV, right ventricle; LV, left ventricle; IVS, interventricular septum.
**Figure 3** Transesophageal three-dimensional echocardiogram, full volume in mid-esophageal view, after cropping. The structure within the right ventricle can be identified as anterior papillary muscle with an unusual origin from the interventricular septum. APM, anterior papillary muscle; RV, right ventricle; LV, left ventricle; TV, tricuspid valve.

**Figure 4** Transesophageal three-dimensional echocardiogram, transgastric view, full volume acquisition, after cropping. ‘Modified four-chamber view’ seen from inferior. APM, anterior papillary muscle; RV, right ventricle; LV, left ventricle; IVS, interventricular septum; RA, right atrium; LA, left atrium.
References


