

# Contrast Echocardiography without Contrast Agent for Display of Intraventricular Mass



Tan Suwatanaviroj, MD, Harald Becher, MD, PhD, Brian Chiu, MD, John Dimitry, MD, John Mullen, MD, Jonathan Choy, MD, FACC, FASE, and Jonathan Windram, MD, *Edmonton, Alberta, Canada*

## INTRODUCTION

Diagnosing and distinguishing different types of cardiac masses can be challenging by echocardiography. Microbubble contrast agents are useful to confirm diagnosis and characterize tumors, which are crucial for therapeutic management. This is the first report that using just the low-mechanical index contrast imaging technique without injection of a contrast agent may be helpful in assessing a cardiac mass.

## CASE PRESENTATION

A 62-year-old woman was referred for transthoracic echocardiography having presented with fatigue and weakness for several weeks prior. The scan revealed a 15 × 20 mm, highly mobile, homogeneous, echogenic mass attached to the mid septal wall of the left ventricle (Figure 1, Video 1). Left ventricular global systolic function was normal, and no regional wall motion abnormality was seen. No signs of left ventricular noncompaction were observed on noncontrast echocardiography. Transesophageal echocardiography confirmed tumor size and attachment. It also demonstrated that the mass was not a papillary muscle. To further assess the mass, cardiac magnetic resonance imaging was arranged, but the findings were nondiagnostic because of motion artifact from the rapidly moving mass. Contrast echocardiography was therefore planned to further assess the nature of the mass.

Before contrast agent administration, very low power (mechanical index 0.07) imaging was performed with transmitted energy similar to what is used for contrast echocardiography, but no contrast was injected in order to cancel signals from myocardial tissue. Interestingly, the unusual bright signal from the mass was displayed on a dark image background (Figure 2, Video 2). One milliliter of diluted Definity (Lantheus Medical Imaging, North Billerica, MA)

From the Mazankowski Alberta Heart Institute, University of Alberta Hospital (T.S., H.B., J.D., J.C., J.W.); and the Department of Laboratory Medicine and Pathology (B.C.) and Department of Surgery (J.M.), Faculty of Medicine and Dentistry, University of Alberta, Edmonton, Alberta, Canada.

Keywords: Papillary fibroelastoma, Contrast echocardiography, Contrast-specific imaging technique

Conflicts of interest: The authors have no potential conflicts of interest relative to this document.

Copyright 2018 by the American Society of Echocardiography. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

2468-6441

<https://doi.org/10.1016/j.case.2018.01.004>

was then injected intravenously. When the left ventricular cavity and myocardium became opacified, the mass demonstrated similar echogenicity as the myocardium (Figure 3, Video 3), which would be in agreement with the diagnosis of a tumor. The findings on contrast echocardiography were therefore suggestive of a vascularized tumor with fibrotic tissue within.

The tumor was subsequently surgically resected, with a final diagnosis of a papillary fibroelastoma (Figures 4 and 5).

## DISCUSSION

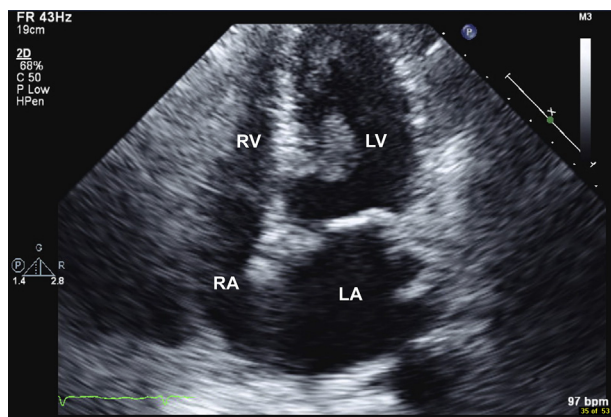
Papillary fibroelastomas in the left ventricle are uncommon, benign cardiac tumors. Pathologically, these tumors grossly resemble a “sea anemone” because they are composed of multiple frond-like projections.<sup>1</sup> Histologically these tumors are derived from the endocardium. The microscopic appearance of these tumors shows that they have a dense core of connective tissue surrounded by elastic fibers, smooth muscle cells, and loose connective tissue covered by endothelium with a lack of vascular structure.<sup>1</sup> The findings in our case demonstrate that the fibroelastic tissue in a tumor provides bright signal in contrast-specific imaging technique without contrast administration. This finding is in agreement with a previous study by Gaibazzi *et al.*<sup>2</sup> in which the contrast-specific imaging technique was able to identify myocardial scar or fibrotic tissue in patients with coronary artery disease. Although a papillary fibroelastoma is an avascular tumor, it can appear vascularized after contrast injection because a contrast agent can disperse between the finger-like structures, resulting in an incorrect assumption of a vascularized tumor.<sup>3</sup> Physicians should be aware of this finding when assessing a cardiac tumor’s vascularity using contrast echocardiography.<sup>3</sup>

## CONCLUSIONS

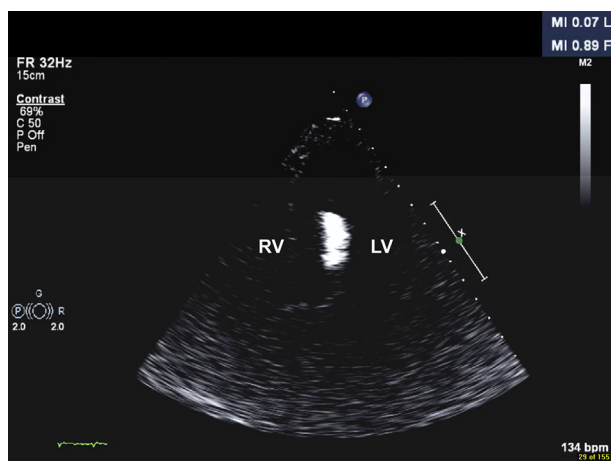
Contrast echocardiography has potential value in helping diagnose a papillary fibroelastoma in the left ventricle. The contrast-specific imaging technique can detect fibrotic tissue in a papillary fibroelastoma, in a fashion similar to the concept of contrast echocardiography assessing scar tissue without requiring the administration of contrast agents.

## SUPPLEMENTARY DATA

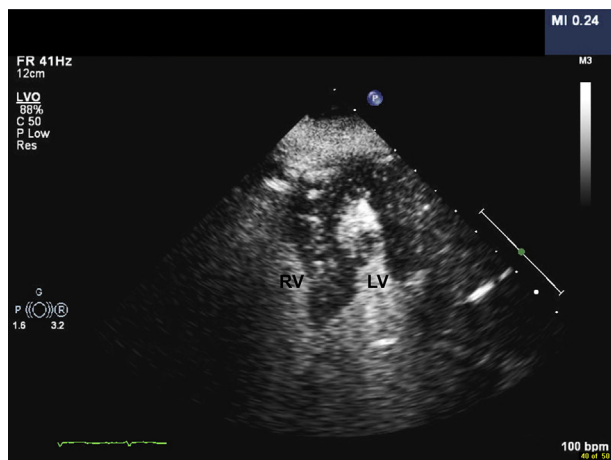
Supplementary data related to this article can be found at <https://doi.org/10.1016/j.case.2018.01.004>.



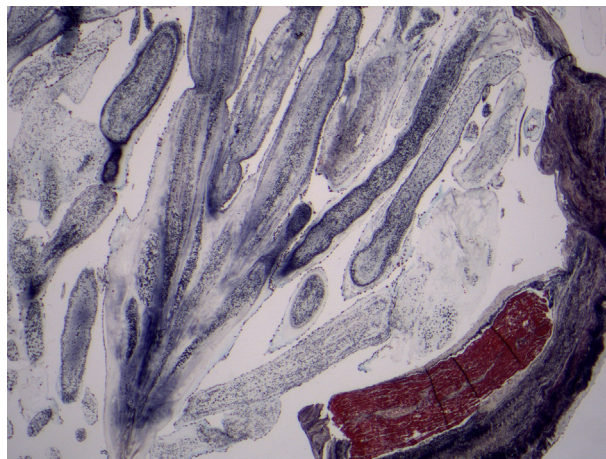
**Figure 1** Transthoracic echocardiogram showing a mass attached to the midseptum of the left ventricle (LV). LA, Left atrium; RA, right atrium; RV, right ventricle.



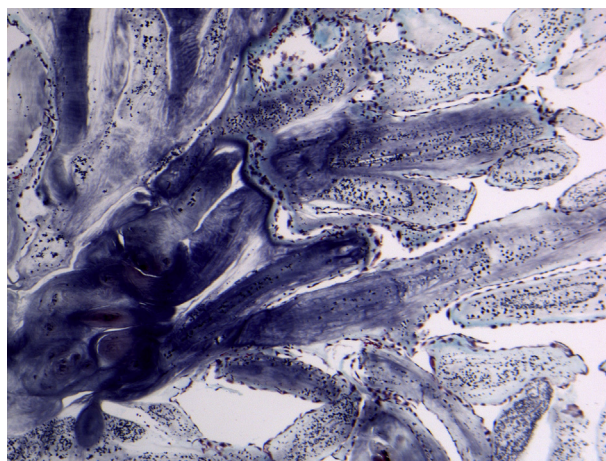
**Figure 2** A very low mechanical index contrast-specific imaging technique without contrast administration showing bright signal from the mass. LV, Left ventricle; RV, right ventricle.



**Figure 3** Contrast echocardiogram demonstrating contrast enhancement in the mass similar to the adjacent myocardium. LV, Left ventricle; RV, right ventricle.



**Figure 4** Papillary fibroelastoma, showing tumor papillae and base of tumor (*right lower corner*) with dense fibroelastic tissues and myocardial tissue. Movat's pentachrome stain (fibrous tissues *blue-green*, elastic tissue *black*, myocardial tissue *red*), magnification 25 $\times$ .



**Figure 5** Papillary fibroelastoma, showing tumor papillae near the tumor base with dense fibroelastic tissues in those papillae (*left lower field*). Movat's pentachrome stain, magnification 50 $\times$ .

## REFERENCES

1. Klarich KW, Enriquez-Sarano M, Gura GM, Edwards WD, Tajik AJ, Seward JB. Papillary fibroelastoma: echocardiographic characteristics for diagnosis and pathologic correlation. *J Am Coll Cardiol* 1997;30:784-90.
2. Gaibazzi N, Bianconcini M, Marziliano N, Parrini I, Conte MR, Siniscalchi C, et al. Scar detection by pulse-cancellation echocardiography: validation by CMR in patients with recent STEMI. *JACC Cardiovasc Imaging* 2016;9:1239-51.
3. Duke J, Greaves K, Detrick A. Use of microbubble contrast in the diagnosis of a left ventricular papillary fibroelastoma. *Echo Res Pract* 2015;2:K43-5.