The term cardiac calcified amorphous tumor (CAT) was coined in 1997 by Reynolds et al., who described 11 cases with nonneoplastic cardiac masses characterized by a pedicle and diffuse calcification. Additionally, CAT could originate in any of the 4 chambers. Once the mass is excised, its unique histological features such as the presence of calcified nodules in an amorphous background of fibrin with degeneration and focal inflammation allow an accurate diagnosis of cardiac CAT. However, in cases when CAT has arisen close to the cardiac valves and is mobile, it is not always easy to distinguish between CAT and mitral valve vegetation preoperatively. Here, we report 2 cases of CAT arising from mitral annular calcification (MAC) and propose imaging features that can be used to distinguish CAT from mitral valve vegetation.

Case 1. A 58-year-old man with end-stage renal disease secondary to diabetic nephropathy was referred to our hospital. He had been maintained on hemodialysis for the past 4 years. Transthoracic echocardiography revealed 2 cardiac tumors adherent to the posterior MAC (Figure 1A). One was a highly mobile, spindle-shaped tumor attached to the atrial side. Notably, transesophageal echocardiography showed the revolving movement of the tumor, which was moving in a circular manner in the left atrial and ventricular cavity (Figure 1B and Movie I in the online-only Data Supplement). The other was an immobile, round tumor with partial echolucency attached to the atrial side. Notably, transesophageal echocardiography showed the revolving movement of the tumor, which was moving in a circular manner in the left atrial and ventricular cavity (Figure 1B and Movie I in the online-only Data Supplement). The other was an immobile, round tumor with partial echolucency attached to the atrial side. Mild mitral regurgitation was noted but was not associated with the original site of the tumor. Because of the high risk of embolization, the patient underwent surgical resection and mitral valvuloplasty, and the clinical course was uneventful. The putty-like liquefaction was sucked from the immobile tumor, compatible with liquefactive necrosis.

Case 2. A 65-year-old man with chronic glomerulonephritis who had received hemodialysis for 8 years was admitted to our hospital because a mobile club-shaped tumor was found on transthoracic echocardiography. The tumor was attached to the ventricular and anteromedial side of the MAC (Figure 2A and Movie II in the online-only Data Supplement). Transesophageal echocardiography showed the revolving movement of the tumor in the left ventricular tract regardless of the mild mitral regurgitation jet (Figure 2B and 2C). Moreover, 3-dimensional transesophageal echocardiography revealed that the original site of the tumor was not associated with the mitral regurgitation jet (Movie III in the online-only Data Supplement). Surgical resection was performed successfully.

In both cases, histological examination revealed nodular calcification encapsulated in amorphous material, including dense fibrin, chronic inflammation, and blood capillaries, which confirmed the diagnosis of CAT (Figures 3 and 4). Four cases of MAC-related CAT, including our cases, have been reported to date. All patients suffered from end-stage renal disease, and the CATs were highly mobile and appar-
ently mimicked valve vegetation. Although MAC-related CAT is considered to be a subgroup of CAT, these features are not common in CATs originating from other sites. Mitral annulus involvement in end-stage renal disease patients is most commonly manifested as MAC. Recently, liquefactive necrosis (also known as annular caseous calcification) within a zone of MAC is increasingly recognized as a variant of MAC. Indeed, the immobile tumor in case 1 was identified as liquefactive necrosis. Similarly, mobile CAT arising from the mitral annulus may also be an atypical variant of MAC. However, the specific features of MAC-related CAT are not well documented. Preoperatively, mobile MAC-related CAT represents a diagnostic challenge. Our patients were asymptomatic and afebrile, and both were suffering from end-stage renal disease. No remarkable inflammatory changes were detected on routine blood examination. In addition to this clinical background, the continuity with MAC, the lack of association with valve leaflets and regurgitation jet, and the revolving movement among the left atrial and ventricular cavities, constituting a unique echocardiographic appearance, are characteristic features that distinguish these lesions from valve vegetation. Unlike other modalities of cardiac imaging, echocardiography can evaluate rapid motion with ease. The observed echocardiographic appearance of the revolving movement has not been reported previously and represents valuable information for the diagnosis of MAC-related CAT.

Figure 2. Transthoracic echocardiogram (A) and 2-dimensional transesophageal echocardiogram (B) in case 2 shows the mobile club-shaped mass (arrow) attached to the ventricular side of mitral annular calcification and moving in a circular manner in left ventricular outflow tract. Three-dimensional transesophageal echocardiogram (C) also shows the revolving movement of the tumor (arrow) regardless of the mitral regurgitation jet. Ao indicates aorta; AV, aortic valve; LA, left atrium; LV, left ventricle; and MV, mitral valve.

Figure 3. High-powered histological view of the mobile spindle-shaped tumor in case 1 shows deposits of calcium with surrounding amorphous fibrin material and chronic inflammation (magnification ×200).

Disclosures
None.

References
Figure 4. Macroscopic appearance in case 2 (A) indicates yellowish color and partially calcified resected tumor (7×2 mm in size). Microscopic views of the tumor shows nodular calcification covered with dense fibrin and hyperplasia of blood capillary (B; magnification ×100; C, ×200).
Two Cases of Calcified Amorphous Tumor Mimicking Mitral Valve Vegetation
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