

## Mitral Annulus Caseous Calcifications: Multi-Detector Computed Tomography Imaging

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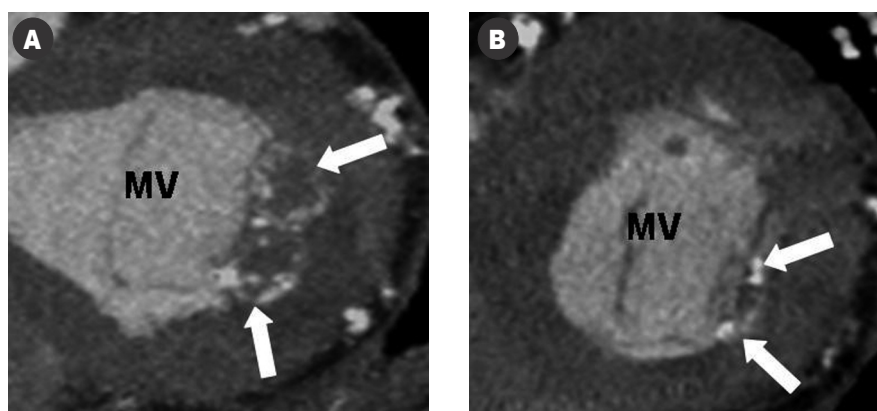
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Caseous calcification of the mitral annulus is a rare entity in cardiac imaging and represents a variant of mitral annular calcification that should be included in the differential diagnosis of cardiac masses. It generally appears on echocardiography as a large round mass-like calcification with a central echolucent area that may lead to diagnostic errors. We present the cardiac computed tomography angiography findings in an asymptomatic patient with two large intramyocardial lesions located in the posterior mitral annulus consistent with caseous calcification of the mitral annulus, which was treated conservatively.

### Patient Description

A 55 year old man with systemic hypertension, hyperlipidemia, previous cerebrovascular accident and a family history of coronary artery disease underwent routine transthoracic echocardiography examination to assess his cardiac morphology and ventricular function. This examination showed two large round echogenic masses with smooth borders situated in the periannular region, resembling intracardiac tumor. In addition, concentric hypertrophy of the left ventricle with normal ejection fraction was observed. Similar findings were found on transesophageal echocardiography examination. Physical examination was unremarkable. There was no history of the use of tobacco or alcohol, risk factors for human immunodeficiency virus infection, hemoptysis, paroxysmal nocturnal dyspnea, chest pain, or syncope. He had negative tuberculin skin test and normal chest X-ray. Further evaluation



Cardiac CT angiography performed with 64-MDCT scanner. **[A]** Short-axis CCTA reformatted image showing two round intramyocardial lesions located in the posterior mitral annulus with central low density and ring-like calcifications (arrows). None of the lesions showed enhancement after contrast media administration. **[B]** Follow-up short-axis reformatted view obtained 6 months later at the same level of **[A]** showing almost complete regression of both lesions (arrows). MV = mitral valve.

of the lesions was performed by a CCTA using 64-row multi-detector CT (Sensation 64, Siemens, Germany), with retrospective electrocardiographic triggering after intravenous administration of iodinated contrast material. Non-enhanced CT showed two round (2 x 2 cm) hyperdense intramyocardial lesions located in the posterior mitral annulus with ring-like calcification. On CCTA obtained after contrast media administration, both lesions appeared as soft tissue masses with central low density and showing no enhancement [Figure A]. No other segments of the mitral annulus were involved.

Based on the findings of both imag-

CCTA = cardiac computed tomography angiography

ing modalities the diagnosis of caseous calcification of the mitral annulus was made. There was no associated mitral valvular dysfunction, thus our case was treated conservatively with steroids and followed by CCTA 6 months later. This study revealed a significant regression of both lesions [Figure B]. During the follow-up period of 24 months the patient was free of signs and symptoms of infectious or neoplastic disease.

### Comment

Caseous calcification is a less-known and rarely described entity representing a variant of mitral annular calcification, which is typically located in the posterior mitral annulus [1]. Unlike symmetric mitral annular calcification, asymmetric tumor-like

calcification of the mitral annulus is a rare and often unrecognized condition. The echocardiographic prevalence of caseous calcification is 0.6% in patients with mitral annular calcification and 0.06–0.07% in large series of patients of all ages [2]. The incidence at necropsy reported by Pomerance in 1970 [3] for patients over 50 years of age was 2.7% of all autopsies with mitral annular calcification. More recently, a prospective registry of patients with mitral annular masses was reported by Harpaz et al. [1]. The prevalence was 0.63% of all mitral calcifications and 0.067% of all consecutive echocardiographic studies; these authors defined the lesion as “caseous calcification” of the mitral annulus and reported the operative findings of three patients referred for surgery due to mitral valve dysfunction or cerebral embolic events. Macroscopic examination of the sectioned masses highlighted the presence of a toothpaste-like caseous material and microscopy revealed an amorphous acellular material with areas of multiple calcifications, necrosis and inflammatory infiltrate. Caseous calcifications can cause obstruction of the transmitral left ventricular inflow tract or lead to prolapse of a mitral leaflet causing mitral regurgitation. Systemic embolization has also been reported. Most commonly, however, no hemodynamic effect is caused. Kato et al. [4] described a patient on chronic hemodialysis with caseous calcification of the mitral annulus who underwent resection of the lesion and mitral valve replacement due to mitral obstruction. In our case, the patient responded to therapy with steroids with a significant regression of both cardiac lesions and without developing any hemodynamic complications. We believe that the resolution of both cardiac

lesions (within 6 months) was the result of treatment with steroids. Such medical treatment of mitral annulus caseous calcification has never been previously reported. Surgery should be reserved for cases with coexistent mitral valve dysfunction. Spontaneous resolution of such lesions has been previously described [5].

The differential diagnosis includes mitral annular abscess, infective endocarditis (including fungal endocarditis), enlarged lymph nodes, benign cardiac tumor (such as myxoma) and malignant cardiac tumors, such as lymphoma, sarcoma and metastatic disease. Correct diagnosis of caseous calcification of the mitral annulus is essential and may prevent unnecessary explorative thoracotomy. Echocardiography is the primary modality for imaging intracardiac disease. Transesophageal echocardiography provides high resolution and real-time images of the cardiac structures. However, as image acquisition with CCTA (using 64-row MDCT) has become steadily faster, this modality has acquired an increasingly important role in the evaluation of cardiac masses. Although spatial and temporal resolution is lower using CCTA, the soft-tissue contrast is superior. CCTA may differentiate between caseous calcification and other cardiac lesions such as abscess, benign soft tissue cardiac tumors and malignant cardiac tumors with or without myocardial involvement. In addition, CCTA allows imaging of the entire mediastinum and evaluation of the extracardiac extent of disease, as well as accurate assessment of the coronary arteries. The non-enhanced CT appearance, as reported in this case, consists of a well-defined, round or oval

MDCT = multi-detector computed tomography

hyperdense mass with ring-like calcifications. The mass revealed no enhancement after contrast media administration. The CT appearance is most likely explained by the pathological finding of a dense tenacious substance filling the center of the lesion. Similar CT findings have been previously demonstrated.

In summary, CCTA using 64-MDCT with new reconstruction and post-processing programs permits a better tissue characterization and more clearly defines the relations of the mass with the surrounding structures and mitral valve apparatus and may have an important role in the evaluation of unusual mitral annular calcifications.

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