A report is presented of a liquefaction necrosis of mitral annular calcification in a patient with chronic renal failure that had been managed by hemodialysis for 11 years. The mass was echogenic with an echo-lucent area inside, high density on computed tomography and low intensity on magnetic resonance imaging. The uptake of gallium-67 (67Ga)-citrate and the bone agent technetium-99m-methylene diphosphonate (99mTc-MDP) was seen in the mass. These findings were compatible with liquefaction necrosis of the mitral annular calcification. After treatment with low calcium concentration hemodialysis, the size of the mass reduced with disappearance of the echo-lucent area on the echocardiography and there was no uptake of 67Ga-citrate or 99mTc-MDP. Liquefaction necrosis might be the early and reversible form of mitral annular calcification. When a tumorlike echogenic mass at the base of mitral leaflets is seen in patients with predisposing factors for mitral annular calcification, consider the possibility of this specific form of mitral annular calcification in order to avoid any unnecessary surgical intervention.  

**Key Words:** Chronic renal failure; Echocardiography; Gallium-67-citrate; Magnetic resonance imaging; Mitral annular calcification

Mitral annular calcification is a degenerative process that is commonly seen in the elderly, especially in women, and is usually recognized on M-mode and 2-dimensional echocardiography as a dense echo band moving parallel with the left ventricular free wall beneath the posterior mitral leaflet. Chronic renal failure is one of the predisposing factors of this condition. We report a case of liquefaction necrosis of a mitral annular calcification mimicking an intracardiac tumor in which both gallium-67 (67Ga)-citrate and technetium-99m-methylene diphosphonate (99mTc-MDP) uptake was noted, in a patient with chronic renal failure that had been managed by hemodialysis for 11 years. The size of the liquefaction necrosis was reduced with low calcium concentration hemodialysis.

**Case Report**

An asymptomatic 58-year-old woman who had been on hemodialysis for 11 years because of chronic renal failure came to hospital for examination of an abnormal intracardiac mass, which had been found incidentally during an annual echocardiographic examination, and which had not been seen the year before. The patient’s blood pressure was 126/72 mmHg. The heart rate was 76 beats/min with regular rhythm. The fourth heart sound and a grade 3/6 systolic ejection murmur were heard at the apex. Slightly anemic conjunctivae, dry skin and mildly distended abdomen due to ascites were seen. Laboratory studies were as follows: red blood cell count 367×10⁴/mm³, hemoglobin 11.3 g/dl, C-reactive protein <0.3 mg/dl, blood sugar 86 mg/dl, serum cholesterol 222 mg/dl, blood urea nitrogen 40 mg/dl, creatinine 7.1 mg/dl, calcium 2.4 mmol/L, phosphorus 2.7 mmol/L, alkaline phosphatase 308 U/L and the intact parathyroid hormone level 888 pg/ml. The patient had been given calcium carbonate and erythropoietin to correct the hypocalcemia and anemia, and pulse therapy of 1,25-dihydroxycholecalciferol (1,25(OH)₂D₃) had also been performed for secondary hyperparathyroidism approximately 6 months before presentation.

Transthoracic echocardiography demonstrated an echogenic 2.0×2.0×2.0 cm spherical mass with an internal echo-lucent area at the base of the posterior mitral leaflet and the lateral portion of the mitral annulus (Fig 1a,b). No mitral regurgitation on Doppler color flow mapping was seen and there was normal left ventricular wall motion, although a small amount of pericardial effusion was noted.

A high-density mass was observed at the base of the posterior mitral leaflet on computed tomography (CT) and a low-intensity mass was observed in the same area on magnetic resonance imaging (MRI) using the field echo technique; both these masses were compatible with calcification (Fig 2). Single photon emission CT with 67Ga-citrate (Fig 3) and 99mTc-MDP scintigraphy (Fig 4) revealed focal uptake at the same site as the spherical mass seen on echocardiography. Parathyroid scintigraphy by subtraction of thallium-201-chloride and 99mTc-pertechnetate scan revealed 4 hypertrophied parathyroids compatible with secondary hyperparathyroidism due to chronic renal failure. A blood culture was negative.

These findings suggested that the spherical mass was a specific form of mitral annular calcification, considered to...
represent liquefaction necrosis. The patient was treated by hemodialysis with a low calcium concentration. Three months after this treatment, echocardiography revealed a reduced echo-dense mass without the echo-lucent area (Fig 1 c,d), and there was no uptake of $^{67}$Ga-citrate nor $^{99m}$Tc-MDP by the mass.

**Discussion**

Liquefaction necrosis of mitral annular calcification is a rare form of degenerative change$^{4-8}$ and has been described in only 3% of autopsy cases with mitral annular calcification.$^9$ The echocardiographic appearance of this change is a spherical intracardiac echo-dense mass with an echo-lucent center at the base of the mitral leaflets, and it mimics tumorlike myxoma, vegetation or an abscess of infective endocarditis, or thrombus attached inside the left atrium.$^7,9$ although common mitral annular calcification usually shows a dense echo band of a J, C or U shape. Chemical analysis of the liquefaction necrosis shows yellowish-white
or light-gray pasty material with calcium, cholesterol and fatty acids.

Predisposing factors for this type of mitral annular calcification are considered to be aging, female gender, increased mitral stress such as hypertension, aortic stenosis and hypertrophic cardiomyopathy, abnormal mitral valve motion such as a mitral valve prolapse, Marfan’s syndrome and mitral valve replacement, and a metabolic abnormality such as chronic renal failure, hypercholesterolemia and diabetes mellitus. In the present patient the administration of calcium carbonate and a large dose of 1,25(OH)2D3 to correct the hypocalcemia and secondary hyperparathyroidism due to chronic renal failure had caused an acute change in the serum calcium level, which might have contributed to the formation of this specific form of ectopic mitral annular calcification. The fact that the mass demonstrated a high density on CT and low intensity on MRI, and that hemodialysis with a low calcium concentration reduced the size of this calcified mass, also indicated that liquefaction necrosis of the mitral annular calcification took place.

The accumulation of 67Ga-citrate and 99mTc-MDP in the liquefaction necrosis is an interesting finding because 67Ga-citrate has some properties of bone imaging. Some authors have reported 67Ga-citrate uptake at sites of heterotopic calcification, along with the accumulation of a 99mTc-phosphate compound. The occurrence of heterotopic calcification has been postulated to be the result of mesenchymal metaplasia, and active osteogenesis with considerable osteoblastic and osteoclastic activity has been observed, especially in the early lesion. Liquefaction necrosis might be an early and reversible form of mitral annular calcification induced by a surge in the serum calcium level, and demonstrates a rapid calcium turnover. The mass decreased in size and the echo-lucent area disappeared after hemodialysis with a low calcium concentration, which meant that only stable calcification remained and might explain why 67Ga-citrate and 99mTc-MDP did not accumulate in the mass after the hemodialysis treatment.

The possibility of liquefaction necrosis of a mitral annular calcification should be considered when a tumor-like mass with calcification and an internal echo-lucent area is seen at the base of the mitral leaflets, especially in patients with predisposing factors such as chronic renal failure, in order to avoid any unnecessary surgical intervention.

References


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