Case Studies

Calcified Amorphous Tumor Causing Shower Embolism to the Brain: A Case Report with Serial Echocardiographic and Neuroradiologic Images and a Review of the Literature

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An 89-year-old woman with chronic atrial fibrillation, hypertension, chronic heart failure, and dementia was admitted to our hospital due to multiple small cerebral and cerebellar infarctions. Transthoracic echocardiogram revealed a floating calcified mass lesion arising from the endocardium of the posterior portion of the mitral annulus with mitral annular calcification. Furthermore, the mass had a heterogeneity of the echogenicity. The mass was diagnosed as a calcified amorphous tumor based on specific echocardiographic features. Serial echocardiograms showed shrinkage and disappearance of the mass, and magnetic resonance image revealed new infarction in the left occipital lobe. Embolization of the mass appeared to cause systemic embolism. **Key Words:** Embolic stroke—calcified amorphous tumor—shower emboli—mitral annular calcification.

Case Report

An 89-year-old woman with a medical history of chronic atrial fibrillation, hypertension, chronic heart failure, and dementia developed fatigue with decreased activity and was admitted to our hospital due to multiple small cerebral and cerebellar infarctions (Day 0).

No neurological deficits were observed, with the exception of chronic, mild apathy and short-term memory loss due to dementia.

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Blood examinations showed good warfarin control (PT-INR 1.96). Brain computed tomography on admission revealed no hemorrhagic or ischemic changes (Fig 1, A-C). Diffusion-weighted images showed multiple small, high-intensity areas in several arterial distributions (Fig 1, D-F). Whole body computed tomography showed calcification around the mitral valve. Transthoracic echocardiogram revealed a floating hyperechoic mass arising from mitral annulus with mitral annular calcification (MAC) (Fig 1, J).

A presumptive diagnosis of infectious endocarditis was made. Four sets of blood cultures were obtained and intravenous ampicillin/sulbactam (9 g/day) and gentamycin (80 mg/day) was started. Based on echocardiographic features, specifically, a calcified mass arising from the mitral valve that was accompanied by MAC,[2,5-9] we assumed that the mass was a calcified amorphous tumor (CAT). Serial transthoracic echocardiogram showed the mass decreasing in size and ultimately disappearing (Fig 1, K-L). Transesophageal echocardiogram on Day 11 showed MAC without the mass (Fig 1, M). Magnetic resonance imaging on Day 11 revealed a new, asymptomatic infarction in the left occipital lobe (Fig 1, G-I). Because all blood cultures were negative, antibiotic therapy was stopped. The

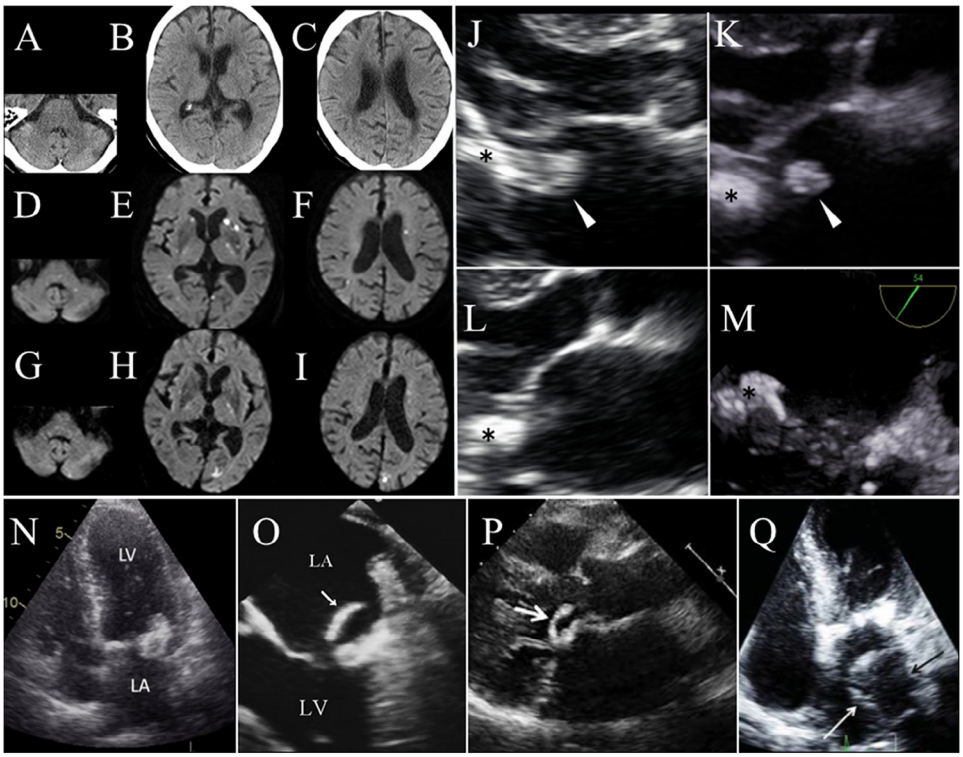

Figure 1. *Neuroradiologic and echocardiographic findings and typical echocardiographic images from previous reports. (A-C) Head CT on admission without hemorrhagic or ischemic features. (D-F) Diffusion-weighted images on admission revealing multiple, small infarctions in the territory of the superior cerebellum artery and the posterior and middle cerebral arteries. (G-I) Diffusion-weighted images on Day 11 demonstrating a small infarction in the territory of the posterior cerebral artery. (J) Transthoracic echocardiogram (TEE) on admission showing a floating, mainly calcified, 17.5 mm by 9.7 mm mass (arrowhead) arising from the posterior potion of the mitral valve and associated with mitral annular calcification (*). (K) Transesophageal echocardiogram on Day 3 demonstrating a decrease in mass size (arrowhead) to 15.1 mm by 6.5 mm with persistent mitral annular calcification (*). (L) TEE on Day 9 revealing complete resolution of the mass and persistent mitral annular calcification (*). (M) TEE on Day 11 demonstrating resolution of the mass and persistent mitral annular calcification (*). (N) Transesophageal echocardiogram revealing a mainly hyperechoic mass with a hypoechoic area in a patient with histologically diagnosed CAT.*[1] *(O) TEE demonstrating a totally hyperechoic mass* (arrow) *in a patient with histologically diagnosed CAT.*[2] *(P) TEE revealing a totally hyperechoic mass* (arrow) *in a patient with lipomatous hamartoma.*[3] *(Q) TEE demonstrating a mass* (white arrow) *with cyst* (black arrow) *in a patient with intramural hematoma.*[4]

patient was continued on warfarin (1.25 mg/day). Her symptoms resolved, and she was discharged on Day 14. No recurrence was observed.

Discussion

The diagnostic criteria for CAT include histological components, such as nodular calcifications, inflammation, and degenerated blood elements. However, of the 44 cases of CAT from 29 reports in the literature, 2 cases were diagnosed by the echocardiographic features described above.[6,7] Furthermore, Masuda et al reported that few cases of CAT arising from the mitral valve occur without MAC, and most cases are accompanied by MAC.[10] Lipomatous hamartomas and intramural hematomas have also been reported in association with MAC.[3,4] To understand the echocardiographic features of CAT, we focused on the echogenicity of the mass. To the best of our knowledge, of the 41 cases of CAT diagnosed by histological examination, echocardiography was reported in 22 cases (Table 1). Of these 22 cases, 18 cases showed mass heterogeneity, with primarily hyperechoic features accompanied by partially hypoechoic or isoechoic components (Fig 1, N). In the remaining 4 cases, the mass was completely hyperechoic (Fig 1, O). The echocardiographic heterogeneity may reflect the histology of CAT, which includes nodular calcifications, inflammation, and degenerated blood element. On the other hand, lipomatous hamartomas are completely hyperechoic or hyperechoic with cysts (Fig 1, P).[3] Hematomas are hypoechoic with or without hyperechoic areas (Fig 1, Q).[4] In our case, the mass had echocardiographic features most consistent with CAT. We thus diagnosed the mass as CAT based on echocardiographic features, without histologic examination.

CAT is a rare intracardiac mass with many puzzling features. It is well known that CAT causes systemic embolization but the mechanism of embolism is unclear. It has been suggested that embolization may originate from the mass itself or from fibrin on the mass surface.[11] We found that the CAT resolved after a few days, during