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Letter to the Editor

Intra-ventricular rebound flow and systolic anterior motion of the mitral valve with left ventricular outflow tract obstruction in elderly, hypertensive women

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Over the course of a few years, a 71-year-old woman developed dyspnea and was referred for evaluation of an electrocardiographic abnormality and systolic murmur at her left sternal border. She had a history of diabetes mellitus, dyslipidemia, and hypertension treated with an angiotensin-2-receptor antagonist. Echocardiographic findings showed asymmetric septal hypertrophy and systolic anterior motion of the mitral valve (SAM), causing mild mitral regurgitation. The continuous-wave, Doppler-assessed peak pressure gradient at the left ventricular (LV) outflow tract (LVOT) was 89 mm Hg. Four-dimensional cardiac computed tomography (4DCT) angiography (320ADCT, Aquilion ONE/Vision Edition; Toshiba Medical Systems, Nasu, Japan), demonstrated moderate coronary stenosis in the mid-left anterior descending artery. 4DCT showed SAM involving the residual anterior mitral leaflet (AML) and the postero-medial papillary muscle, which were displaced anteriorly with lax chordae (Fig. 1 and Video 1). Cardiac magnetic resonance imaging (MRI) (Ingenia 3.0T; Philips Medical Systems, Best, The Netherlands) demonstrated no LV late gadolinium enhancement. Velocity-encoded cine, phase-contrast MRI revealed rebound flow from the LV base to the apex during mid to late systole, suggesting a rebound flow due to SAM-related obstruction in the LVOT (Figs. 2 and 3).

SAM involves a complex mechanism and is a cause of LVOT obstruction [1–8]. To our knowledge, this is the first case to confirm rebound flow during SAM using phase contrast MRI. The intra-ventricular rebound wave was first established from the apex to the base and was found to "rebound" back to the apex due to an obstruction. The base-to-apex flow would drive the increasing intracavitary pressure. A pattern of forward flow was established through the LVOT (SAM) towards the aortic valve, and a pattern of backward flow was established through the insufficient mitral valve (mitral regurgitation), while the rebound flow occurred from the base to the apex due to the obstruction. Thus, the rebound and backward flow (mitral regurgitation) would be clinically considered to reduce cardiac output.

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Conflict of interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.ijcard.2015.04.057.

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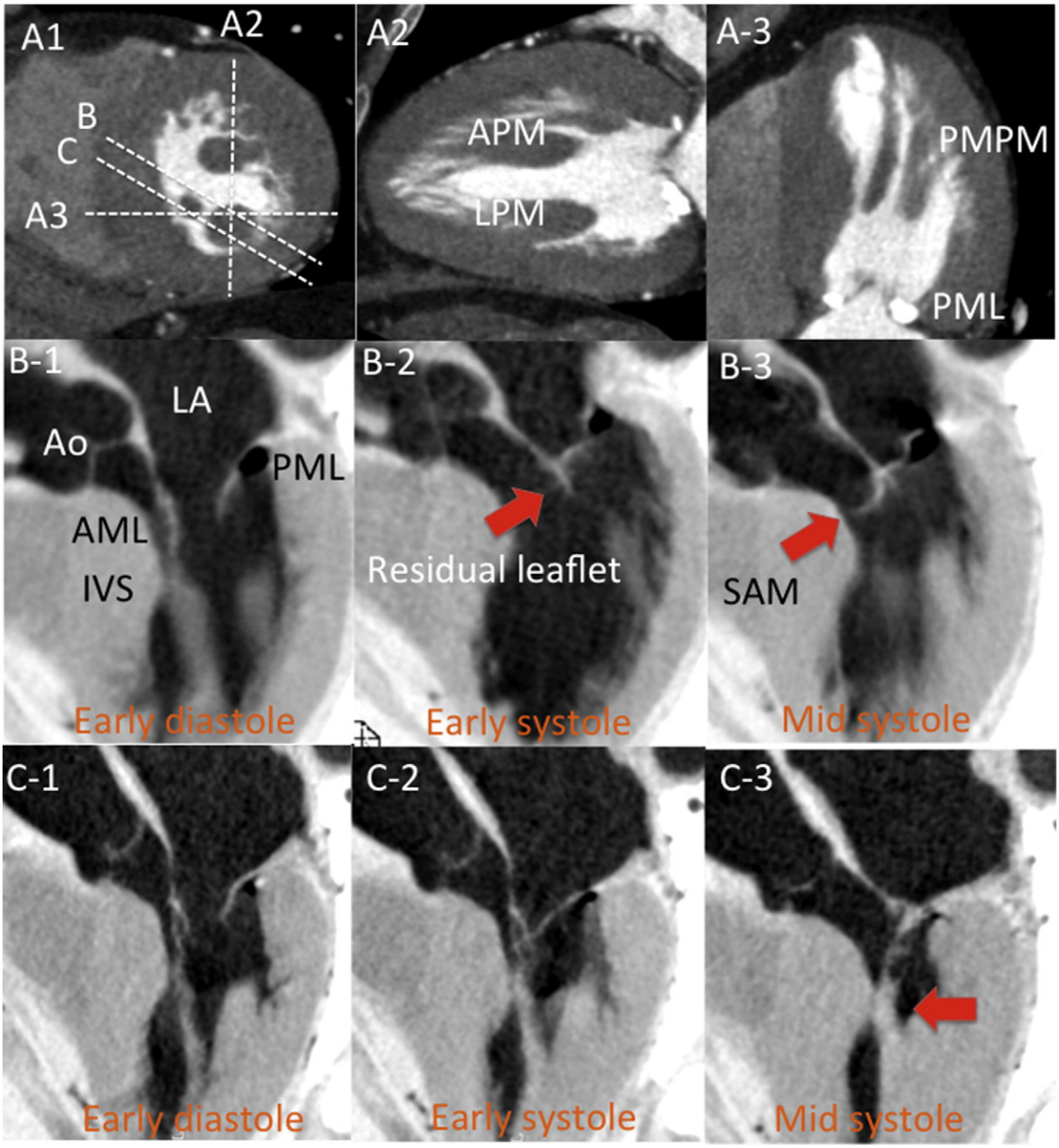

Fig. 1. Four-dimensional cardiac computed tomography (4DCT) of the systolic anterior motion of the mitral valve (SAM). Cross-sectional (A1), long-axis (A2), and 4-chamber (A3) views showing the papillary muscle orientation, with the hypertrophied papillary muscles and intra-ventricular septum. 4DCT shows SAM, with the residual leaflet of the AML (B1–B3) and the PMPM (red arrow) being displaced anteriorly (C1–C3). AML, anterior mitral leaflet; APM, anterior papillary muscle; IVS, intra-ventricular septum; LA, left atrium; LPM, lateral papillary muscle; PMPM, postero-medial papillary muscle; PML, posterior mitral leaflet.