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Clinical evidence of the mitral valve leaflet remodeling after st-elevation acute myocardial infarction: longitudinal observation using real-time 3D echocardiography

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Background: Mitral valve (MV) leaflet remodeling after acute myocardial infarction (AMI) has been proposed as biological and physiological reaction under the ischemic environment mainly by animal experiments. Clinical evidence of leaflet growth after AMI is lacking.

Purpose: We aimed to assess the clinical evidence of the mitral valve leaflet remodeling after acute myocardial infarction by serial 2D/3D transthoracic echocardiography.

Methods: Sixty-six patients with first-onset ST-elevation MI (33 anterior and 33 inferior) were serially examined by 2D/3D-transthoracic echocardiography. MV complex geometry including leaflet surface area and leaflet thickness was quantitatively analyzed in acute phase and 6-month follow-up.

Results: 3D-leaflet surface area was significantly increased in 6-month follow-up (anterior MI; 5.58 [4.93-6.00] versus 5.98 [5.68-6.40] cm²/m²; P < 0.001, inferior MI; 5.48 [4.69-6.07] versus 5.79 [4.74-6.37] cm²/m²; P < 0.001). In anterior MI, both anterior and posterior leaflet lengths significantly increased (anterior leaflet; 12.78 [11.55-13.55] versus 13.63 [12.52-14.15] mm/m²; P = 0.001, posterior leaflet; 9.61 [8.73-10.77] versus 9.84 [8.94-10.96] mm/m²; P = 0.037). In inferior MI, posterior leaflet length significantly increased (9.18 [8.50-10.38] versus 10.00 [8.56-10.85] mm/m²; P = 0.029), while there was no significant change in anterior leaflet length (12.54 [11.61-13.56] versus 12.56 [12.08-14.06] mm/m²; P = 0.214). Leaflet thickness was found to become greater in both groups in 6-month follow-up (anterior MI; 1.08 [0.92-1.21] versus 1.32 [1.25-1.45] mm; P < 0.001, inferior MI; 1.14 [0.98-1.25] versus 1.32 [1.21-1.49] mm; P < 0.001) (Figure).

Conclusions: In six months from the onset of AMI, MV enlarged in area and increased in thickness. Anterior leaflet mainly enlarged in anterior MI, while posterior leaflet enlarged in inferior MI. This is the first clinical evidence of the MV remodeling after AMI, and long-year follow-up should contribute to assess the course of valve growth with relation to ischemic mitral regurgitation.

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