3D ECHOCARDIOGRAPHIC EVALUATION OF MITRAL APPARATUS DURING PRELOAD MANIPULATION IN PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY

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Authors: Hyemoon Chung, Ji-Hyun Yoon, Jong-Youn Kim, Pil-Ki Min, Young Won Yoon, Byoung-Kwon Lee, Bum-Kee Hong, Se-Joong Rim, Hyuck Moon Kwon, Eui-Young Choi, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, South Korea

Background: Three dimensional dynamic change of mitral geometry during preload manipulation has not been fully investigated yet. Therefore we investigated how preload manipulation affected the geometry of mitral apparatus in HCM patients using three dimensional (3D) echocardiography.

Methods: 8 HCM patients, comprised 10 patients with latent or resting LVOT obstruction (HOCM) and 8 patients without LVOT obstruction (NHOCM), and 6 healthy controls were studied. All the subjects underwent 3D echocardiography during rest, leg-raising, Valsalva maneuver, and Valsalva maneuver after sublingual nitroglycerin intake (NTG-Valsalva). During each preload manipulation, LVOT pressure gradients were measured. The left ventricular volume, mitral annular area, annular circumference, annular height and mitral leaflets tenting volume were measured using commercial software.

Results: Annular area decreased significantly during NTG-Valsalva maneuver in all three groups (6.30 to 4.56 mm² in control, p<0.05; 13.41 to 11.17 mm² in NHOCM, p<0.05; 12.70 to 10.86 mm² in HOCM, p<0.05). However, annular area change during sole Valsalva maneuver was more prominent in HOCM patients (12.70 to 10.56 mm², p<0.05) than NHOCM patients (13.41 to 11.80 mm²). Annular height increase in accordance with decrease in annular area during Valsalva maneuver, reflecting maintenance of saddle shaped geometry, was more blunted in HOCM patients (4.45 to 5.37 mm) than in NHOCM patients (2.56 to 4.58 mm, p<0.05). Mitral tenting volume decreased in NHOCM patients (3.90 to 2.42 cm³, p<0.05) but not in HOCM patients (4.01 to 3.52 cm³) during NTG-Valsalva maneuver. In contrast, preload augmentation by leg-raising did not show any significant changes in geometry of mitral apparatus suggesting inefficient preload augmentation method in HCM patients.

Conclusion: Mitral annular area decrease, annular height and leaflets tenting volume change during preload reduction might also affect development of LVOT obstruction. Our study results support the importance of additional efforts to preserve geometry of mitral annulus and mitral leaflets.