Role of left atrial reservoir function in rheumatic mitral stenosis tolerance

N. Bouchahda[1], Y. Kallala[1], T. Hasnaoui[2], H. Ibn Haj Amor[2], G. Sassi[1], M. Jarraya[1], M. Boussaada[1], A. Dhouibi[1], K. Memmi[1], M. Ben Messaoud[1], M. Mahjoub[1], M. Hassine[1], H. Gamra[1]

[1]Fattouma Bourguiba University Hospital, Monastir, Monastir, Tunisia; [2]Taher Sfar university hospital, mahdia, mahdia, Tunisia

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Introduction: Rheumatic mitral stenosis (MS) is still frequent in low income countries.

Unlike the other left sided valvular heart diseases, symptoms' occurrence is still not well understood. Previous attempts to correlate mitral valve area (MVA), pulmonary hypertension and even mitral valve stenosis severity scores with symptoms' severity have failed to establish any strong relationship. Recent advances in the characterization of the left atrium (LA) function by echocardiographic strain technique, yielded a new understanding of symptoms genesis in MS.

Purpose: To assess the correlation between LA reservoir function determined by two-dimensional (2D) Speckle Tracking Echocardiography (STE) and New York Heart Association (NYHA) functional status in patients with MS.

Methods: We prospectively performed comprehensive 2D trans thoracic echocardiography (TTE) in patients with rheumatic MS. Echocardiographic parameters, such as indexed LA volume, trans mitral mean gradient, maximal trans tricuspid velocity (MTTV), valve area using planimetry and pressure half time (PHT) were recorded. All doppler parameters are expressed as a mean of at least three measurements. LA global strain curve and peak reservoir strain value were then obtained on a four-chamber view. NYHA functional status was assessed just before performing the echo procedure.

Results: We enrolled 186 patients with rheumatic MS, with a mean age of 50.55±12.07 years. 20 patients were excluded from the study because of the presence of impaired systolic LV function (n=12), severe mitral regurgitation (n=7) or severe aortic regurgitation (n=1).

A total of 69.4% of our cohort were female (n=129), 56.2% (n=104) had a history of percutaneous transvenous mitral commissurotomy (PTMC), 59.9% had permanent atrial fibrillation (n=109). The mean MVA was 1.40±0.47 cm^2, PHT derived Area was 1.47±0.52 cm^2, mean gradient was 10.72±5.82 mmHg, mean indexed LA volume was 80.70±45.34 ml/m^2 and mean MTTV was (3.09±0.62m/s). 75 patients (39.9%) were in NYHA III or IV functional class. Mean LA reservoir strain value was 11.08±7.76%. Comparing the group in NYHA III or IV functional class with the group NYHA I or II functional class, there was no statistically significant difference in mean MVA by planimetry or PHT, nor in mean gradient, MMTV or indexed LA volume.

Interestingly, the NYHA III or IV functional status group had a significantly lower mean LA reservoir strain value compared to the NYHA I or II functional status group (8.94±5.57% vs 11.92±8.31%, p=0.011). Even in mild MS patients with a planimetry MVA $\geq$1.5cm^2 (n=65), a significantly lower mean LA reservoir strain value was found in NYHA III or IV group compared to the NYHA I or II group (15.08±10.09% vs 9.76±4.35%, p=0.05).

Conclusion: LA reservoir function is highly correlated to the severity of symptoms in rheumatic MS.