

Left atrial adaptation to different overloads: is atrial enlargement always related to atrial dysfunction?

M. Mimbbrero Guillamon¹, F. Loncaric¹, L. Nunno¹, L. Tirapu¹, L. Sanchis¹, S. Montserrat¹, A. Doltra¹, B. Bijmens², M. Sitges¹

¹Hospital Clinic of Barcelona, Barcelona, Spain; ²Institute of Biomedical Research August Pi Sunyer (IDIBAPS), Barcelona, Spain

Funding Acknowledgement: Type of funding source: Foundation. Main funding source(s): Fundació La Marató de TV3

Introduction: The adaptative response to different loading conditions of the left atrium (LA) has been scarcely studied. This might have clinical implication in terms of risk of emboli and atrial fibrillation development. Our aim is to assess function in enlarged LA with 3-dimensional (3D) echocardiographic volume assessment and speckle-tracking deformation analysis, and compare findings between patients with arterial hypertension (HTN), mitral regurgitation (MR) and endurance athletes (EA).

Methods: A population of 478 subjects were enrolled: 57% (n=273) EA, 37% (n=176) patients with well-controlled HTN and 6% (n=29) with moderate-to-severe MR. From this cohort, we selected the patients with enlarged atriums defining a 2D cut-off value of ≥ 34 mL/m². These patients underwent 2D and 3D echocardiography. LA function was assessed with speckle-tracking analysis and phasic volume indices.

Results: LA enlargement was seen in 63% (n=299) of the cohort: 80% (n=219) of EA, 30% (n=53) of HTN and 93% (n=27) of MR patients. Analysis of LA function in these patients is shown in Table 1. As expected, MR was related to the largest LA volumes, followed by athletes - which had significantly larger volumes than HTN patients. LA reservoir strain and LA ejection fraction, as well as LA conduit strain and LA passive Ejection Fraction, were preserved in the athletes group while reduced in HTN and MR, whereas the LA contractile strain and LA active Ejection Fraction were reduced only in the MR subgroup.

Conclusions: These findings suggest that LA adapts differently to pressure and volume overload and also influenced by the amount of overload. Additionally, LA enlargement may not be associated with the same degree of LA dysfunction in different at-risk populations.

Enlarged atriums function analysis

Variable	Athletes (n=219)	Hypertensive (n=52)	Mitral regurgitation (n=27)	P value
LA 2D Volume max. indexed (mL/m ²)	43.5 (38.2–50)	38.7 (36.2–45.4)	47.5 (41.3–67.5)	<0.001
LA 3D Volume max. indexed (mL/m ²)	47 (41.4–54.1)	40.7 (36.1–46)	54.6 (44–69.9)	<0.001
LA 3D Vol min. indexed (mL/m ²)	20 (17.3–23.6)	18.6 (15.8–20.7)	25.7 (23.2–39.5)	<0.001
LA 3D volume preP indexed (mL/m ²)	29 (26.1–34.2)	27.5 (23.2–32.1)	37.4 (32.4–49.4)	<0.001
3D LAEF (%)	57.6 (53.4–60.2)	53 (48–60)	47.5 (41.3–53.5)	<0.001
3D LA passive emptying fraction (%)	37.3 (33.3–41.3)	31.1 (23.3–39.1)	31.1 (23.1–38)	<0.001
3D LA active emptying fraction (%)	31.1 (26–36.1)	32.1 (26.7–37.7)	21.4 (18.7–31.5)	<0.001
Negative LA strain (%)	14.8±2.23	14.75±2.92	12.47±2.59	<0.001
Positive LA strain (%)	19.2±4.14	13.7±4.24	13.84±4.39	<0.001
Global LA strain (%)	34.3 (31.28–36.9)	29.4 (25.23–31.19)	24.67 (22.48–30.7)	<0.001

LA function assessed with speckle-tracking analysis and 3D-echocardiography.