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Physiologic Determinants of Left Atrial Longitudinal Strain: A Two-Dimensional Speckle-Tracking and Three-Dimensional Echocardiographic Study in Healthy Volunteers.

Miglioranza MH[1], Badano LP[2], Mihăilă S[3], Peluso D[2], Cucchini U[2], Soriani N[2], Iliceto S[2], Muraru D[4].

Author information

Abstract

BACKGROUND: Left atrial (LA) **longitudinal strain** (LS) using **two-dimensional speckle-tracking** echocardiography has emerged as an important diagnostic and prognostic parameter in various cardiovascular conditions. However, its reference values, their correlations with demographics characteristics, and its **physiologic determinants** remain to be established.

METHODS: Accordingly, 171 **healthy volunteers** (mean age, 45 ± 12 years; 61% women) in whom LS was obtained from both apical four- and two-chamber dedicated views of the **left** atrium, considering the P-P interval on the electrocardiogram as the reference cardiac cycle, were prospectively studied. From the LA LS curve we measured the extent of the negative deflection (LSneg), representing LA active contraction, the positive deflection (LSpos) during LA filling, and total LS (LStot), as the sum of LSneg and LSpos values.

RESULTS: Average values for biplane LA LSpos, LSneg, and LStot were 19.7%, -14.5%, and 33.3%, respectively. On multivariate analysis, age, **left** ventricular (LV) global LS and volume, and LV diastolic function were the main **physiologic determinants** of LA LSpos (R^2 = 0.57) and LStot (R^2 = 0.40), whereas systolic blood pressure, E/A ratio, global LS, and LV stroke volume were the main **determinants** of LA LSneg (R^2 = 0.20). Women had higher LSpos and LStot than men, particularly before 50 years of age. LA LSpos and LStot decreased with aging, with different trends in men and women.

CONCLUSIONS: LA LS values are different in men and women and should be interpreted taking into account patient age and LV function as well. These reference values may help identify subclinical LA dysfunction in several cardiovascular or systemic conditions.

KEYWORDS: Left atrium; **Longitudinal strain**; Reference values; **Speckle-tracking** echocardiography

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