Exploring Left Ventricular Global Longitudinal Strain by Contemporary Echocardiography Software: A Prospective Comparative Cohort Study

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Background: Speckle-tracking transthoracic echocardiography (TTE) provides a well-established assessment of left ventricular systolic function through LVGLS, offering numerous clinical applications. Although recent advancements have enabled strain software to become vendor-neutral, there is a deficiency in external validation studies. In this study, we examined the normal ranges and correlated factors for two-dimensional LVGLS quantification using contemporary strain software, including EchoPAC, TomTec, Epsilon and VVI, in a healthy prospective cohort. **Methods:** We prospectively recruited one hundred healthy subjects at our institution who underwent Transthoracic Echocardiography (TTE) between January and April 2023. The participants were evenly distributed across age groups, with 20 individuals per group, and the gender distribution was 50% female. Imaging scans were conducted using both GE and Philips machines, with an equal representation of 50% for each. Two-dimensional Left Ventricular Global Longitudinal Strain (LVGLS) was quantified in all patients using TomTec version 51.02 (Autostrain LV), EchoPAC version 206 (AFI-LV), VVI version (V.2.00-070730), and Epsilon (5.0.2.11295). These measurements were utilized for both comparative and regression analyses. **Results:** The means and Lower limits of normal (with 95% confidence intervals) for LVGLS were as follows: EchoPAC -17.8% (-18.4%, -17.2%) and -14.4% (-15.3%, -13.5%); TomTec -17.1% (-17.5%, -16.7%) and -14.7% (-15.4%, -14.0%); Epsilon -17.0% (-17.6%, -16.4%) and -12.8% (-13.8%, -11.8%) and VVI -16.3% (-16.9%, -15.7%) and -13.0% (-13.9%, -12.1%); In Linear mixed model multivariable regression longitudinal analyses, factors significantly associated with LVGLS measurements and their respective beta-coefficients (with 95% confidence intervals) were as follows: female -1.36 (-2.12, -0.59), heart rate (per 10 bpm) 0.38 (0.10-0.66), left ventricular ejection fraction (per 10%) -1.03 (-1.72, -0.34), EchoPAC (versus TomTec) -0.62 (-1.2, 0.0), VVI (versus TomTec) 0.82 (0.23, 1.41), and Epsilon (versus TomTec) 0.13 (-0.45, 0.72).

Conclusion: All four modern strain software exhibited vendor-neutral capabilities for assessing LVGLS in both GE and Philips Transthoracic Echocardiography (TTE) scans. This encompassed the determination of means and normal ranges in healthy patients, along with the identification of clinical and TTE factors influencing LVGLS measurements.

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