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| **Title:** 3D echocardiography-derived left atrial global longitudinal strain may outperform 2D echocardiography for detecting diastolic dysfunction |
| **Background:** Left atrial (LA) strains have been proposed to provide incremental value beyond traditional echocardiographic estimates of left ventricular (LV) filling pressure. LA global longitudinal strain (LA-GLS) obtained by 2D echocardiography (2DE) is inversely correlated with LV end-diastolic pressure (LVEDP) and may indicate diastolic dysfunction. We sought to compare 3D LA-GLS, 2D LA-GLS, and conventional ASE/EACVI guideline indices, in patients with normal and elevated LVEDP.  **Method:** Twelve patients with preserved ejection fraction without atrial fibrillation or mitral regurgitation underwent echocardiography examinations within one hour of cardiac catheterisation. Routine 2DE measurements were obtained, and 3DE analyses were performed using Siemens EchoBuildR (Clinical Prototype v3.5.0). Dynamic 3D models of the LA were constructed by manual segmentation and border tracking. Elevated LVEDP was defined as >15mmHg based on invasive pressure measurements, and Wilcoxon rank-sum tests were used to identify significant differences (p<0.05) between groups.  **Results:** 3D LA-GLS was significantly lower in patients with elevated LVEDP (n=6, median=17%) compared to those with normal LVEDP (n=6, median=29%) (p=0.009). 2D LA-GLS did not differentiate between elevated LVEDP (median=22%) and normal LVEDP (median=26%) (p=0.59). No individual 2DE parameter recommended by ASE/EACVI (E/e’, septal/lateral e’ velocity, tricuspid regurgitation velocity, or LA volume index) was significantly different between the normal and elevated LVEDP groups.  **Conclusion:** Initial results indicate 3DE-derived LA-GLS detects elevated LVEDP, unlike conventional 2D LA-GLS and standard diastolic indices. Incorporating 3D LA-GLS into algorithms for identifying elevated filling pressure may enhance diagnostic performance, but further evaluation in a larger sample is needed to establish clinical utility. |