Comparison of the Accuracy of CT versus Echocardiography to Measure Left Atrial Volume

Avelar, Erick[1]; Durst, Ronen[2]; Rosito, Guido A.[3]; Thangaroopan, Molly[3]; Abbara, Suhny[3]; Cury, Ricardo C.[3]

[1]University of Connecticut Health Center, Farmington, CT, USA; [2]Hadassah Hebrew University Medical Center, Massachusetts General Hospital, Jerusalem, Israel, Cardiology;

[3]Massachusetts General Hospital, Boston, MA, USA

Left atrial (LA) volume is an important prognostic factor in cardiovascular disease. Multidetector computed tomography (MDCT) is an emerging cardiac imaging modality; however, its accuracy in measuring the LA volume has not been well studied. The aim of our study was to determine the accuracy of MDCT in quantifying the LA volume. A total of 48 patients underwent MDCT and 2-dimensional (2D) echocardiography (2DE) on the same day. The area-length and Simpson's methods were used to obtain the 2D echocardiographic LA volume. The LA volume assessment by MDCT was obtained using the modified Simpson's method. Four artificial phantoms were created, and their true volume was assessed by an independent observer using both imaging modalities. The correlation between the LA volume by MDCT and 2DE was significant (r = 0.68). The mean 2D echocardiographic LA volume was lower than the LA volume obtained with MDCT (2DE 79 +/- 37 vs MDCT 103 +/- 32, p <0.05). In the phantom experiment, the volume obtained using MDCT and 2DE correlated significantly with the true volume (r = 0.97, p <0.05 vs r = 0.96, p <0.05, respectively). However, the mean 2D echocardiographic phantom volume was 16% lower than the true volume (2DE, Simpson's method 53 +/- 24 vs the true volume 61 +/- 24, p <0.05). The mean volume calculated using MDCT did not differ from the true volume (MDCT 60 +/- 21 vs true volume 61 +/- 24, p = NS). 2DE appeared to systematically underestimate the LA volume compared to phantom and cardiac MDCT, suggesting that different normal cutoff values should be used for each modality. In conclusion, LA volume quantification using MDCT is an accurate and feasible method.