Assessment of LAA with 3-D Echocardiogram in Comparison with 2-D Echocardiogram

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Background: Cardiogenic thrombus formation is of great concern in patients with atrial fibrillation due to potential stroke or other consequences of embolism. Greater then 15% of ischemic strokes are due to cardiogenic embolism (Khan, 2001), of which LAA thrombus is an important source. Currently 2-D transthoracic and transesophageal echocardiograms are used to find cardiogenic thrombus, with TEE being the gold standard in visualizing the posterior structures such as the LAA. However, TEE is a semi-invasive procedure requiring conscious sedation and esophageal intubation. Thus, finding a noninvasive method to assess the LAA would be valuable. Khankirawatana et al. (2006) and Maddukuri et al. (2006) addressed left atrial volume assessment using apical 4 chamber view. Jenkins et al. (2005) indicated that left atrial volume (LAV) “provides a more accurate and sensitive measure of changes in the LA size than does a single dimension or area.” However, there has been very little discussion in assessing left atrial appendage volume (LAAV) by 3-D Echocardiogram (3DE). Roldan et al. (2001) used 3DE to reconstruct four different LAA and then compare the 3-D images to that of the pathologic specimens. Roldan noted that, despite the small dimensions of the LAA, there was a very good reliability in the reconstructions of the 3-D images. Agoston et al. in 2006 used two independent reviewers to analyze and review LAA visualization and image quality. However, they did not use an objective measure in comparing 3DE and TEE. Thus, to my knowledge, assessment of LAA visualization by 3DE has not been systematically compared with TEE.

Specific Aim: Correlate LAA volume assessed by 3DE and TEE.

Hypothesis: 3DE is as effective in assessing the left atrial appendage as the current gold standard-2D TEE.

Method: An estimated four hundred adult patients greater than 18 years of age undergo TEE annually at Yale New Haven Hospital. These individuals will be consented for a transthoracic 3DE following the TEE. The people performing the 3DE on the patient will be blinded to the findings of the TEE. Also the individual reading the TEE will be blinded from the findings of the 3DE. For the 3DE measurements, a parasternal long axis and short axis as well as apical views will be acquired with all measurements of the LAA being done at the end of systole. The LAAV will be reported in mean values from the different views with standard deviation. Correlation will be assessed with Pearson’s Correlation.

Results: Obtaining the 3DE images was the initial step in the process of determining LAAV. Image quality was not adequate to proceed forward with this study. The degree to which this limitation is due to modifiable factors such as a low level of sonographer and physician experience with the new technology versus intrinsic factors such as patient body habitus is unclear.

Conclusion: The current 3DE technology with the current expertise is not appropriate to fully evaluate the LAA and thus LAAV. Thus, currently 2-D TEE continues to remain the gold standard in the assessment of thrombus in the LAA.