

Changes in the Left Atrial-Esophageal Relationship with the Insertion of An Esophageal Protective Device: A Cadaveric Imaging Study

Background: Atrial fibrillation is the most common cardiac rhythm disorder in North America and is frequently treated by a minimally invasive procedure called catheter ablation. A rare, but often fatal complication of this procedure is development of an atrial-esophageal fistula (AEF) due to the proximity of the esophagus to the left atrium (LA) of the heart. Esophageal protective devices may potentially mitigate the risk of developing an AEF but their impact on the relationship between the esophagus and LA is unknown. This study will investigate the relevant anatomical changes that occur upon insertion of an esophageal protective device.

Methods: 13 fresh cadaveric torsos were scanned with and without an esophageal protective device on the computed tomography (CT) modality. The width and anterior-posterior dimension of the esophagus were measured digitally and compared between pre- and post-device insertion scans. From the scans, 3D models of the LA and esophagus were created and used for a spatial analysis of their relationship. A heatmap was generated for each LA highlighting areas of close contact with the esophagus and how they changed post-device insertion.

Results: Preliminary results have indicated the width and anterior-posterior dimension of the esophagus increase significantly with the insertion of the protective device ($p < 0.05$). Further analysis of the esophagus-left atrial distance is still ongoing.

Discussion: Data from this study will provide valuable insight on changes that could be made to the device design and potentially boost its clinical efficacy and prevent AEF formation.