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Evaluating cardiac anatomy as a predictor for success after pulmonary vein isolation for the treatment of atrial fibrillation

Paul Richter, Evan Rochlis*, Ethan Halpern

Introduction: Atrial Fibrillation is a condition characterized by the production of ectopic beats by the heart. One common treatment for Atrial Fibrillation is catheter guided pulmonary vein isolation (PVI), however this treatment is only effective in around 60-70% of the population. Our research hopes to elucidate a link between cardiac anatomy and successful treatment of A-fib by pulmonary vein isolation.

Methods: The medical records for 78 consecutive patients who underwent PVI for atrial fibrillation at Jefferson from July 2013 to March 2016 were gathered. Included in these charts were ECG-gated cardiac CT angiogram and two-year follow up history. Different variables from the imaging data such as left atrial volume, ejection fraction, and pulmonary vein area were analyzed and compared to likelihood of recurrence of A-Fib after PVI. A T-test was used to compare continuous variables in patients who had recurrence versus those that did not and a Chi-Squared Test was used to compare likelihood of recurrence in those with persistent versus paroxysmal A-Fib.

Results: Recurrent atrial fibrillation was found in 32/72 (44%) of treated patients by 24 months. Univariate analysis demonstrated a higher incidence of recurrent atrial fibrillation among patients who remained on anti-arrhythmic medications 14/22 = as compared to those who did not 18/50, $p = 0.03$. There was a lower incidence of recurrent atrial fibrillation in males 20/52 (38%) as compared with females 12/19 (63%), though this difference was only marginally significant ($p = 0.056$). Multivariate analysis of additional variables with logistic regression demonstrated a marginally significant association of reduced ejection fraction with recurrent atrial fibrillation ($p = 0.064$). Logistic regression analysis demonstrated no significant differences in recurrence rate based upon age, paroxysmal/persistent fibrillation, left atrial volume, CHADS2 score, pulmonary vein area, and catheter type.

Discussion: The only marginal predictors for recurrent atrial fibrillation after PVI were Gender and left ventricular ejection fraction. The other variables including anatomical features and the catheter type used for the procedure had no significant impact on long-term recurrence rates after PVAI. This was a surprising result given other data in the field, which seemed to indicate a link between cardiac anatomy and recurrence of A-Fib after PVI. More research should be conducted in this area, perhaps with a larger data set than was used in this study.