Impact of anatomical relationship between esophagus and left atrium posterior wall on the esophageal luminal temperature during atrial fibrillation catheter ablation

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Introduction: Atrioesophageal fistula is a dreadful complication of radiofrequency catheter ablation for atrial fibrillation (AF). We investigated the impact of a positional relationship between esophagus and left atrium (LA) on the esophageal luminal temperature (ELT) during AF ablation.

Methods: Ablation on posterior antrum of left pulmonary vein (PV) was performed with a point-by-point technique using an open irrigated-tip catheter. RF energy was delivered for 15 seconds with the power limited to 25W and target contact force was 5-10g. Conventional esophageal temperature probe was used to check ELT. Posterior LA wall was divided into 2 segments: inferior PV (IPV) and superior PV (SPV). Preprocedural cardiac computed tomography was used to assess the positional relationship between esophagus and posterior antrum of PV. Also, the fat layer thickness between LA posterior wall and esophagus were measured (Figure). The primary endpoint was ELT elevation over 1.5°C.

Result: Among 100 patients (age 61.1±8.8, male 82.0%) and 187 segments (100 IPV's and 87 SPV's), The number of patients whose esophagus was overlapped with PV posterior antrum was 75 (75.0%). Fat layer between esophagus and LA was found in 66 patients (66.0%) and on 12 IPV's and 65 SPV's. The mean fat layer thickness was 1.79±1.94 millimeters. ELT elevation over 1.5°C was observed 37 PVs [27 (14.6%) IPV's and 10 (7.2%) SPV's] in 27 (27.0%) patients. In univariate analysis, lack of fat layer, esophagus on PV antrum, and IPV were associated with ELT elevation over 1.5°C. Multivariate analysis demonstrated that age, lack of fat layer, esophagus on PV antrum were independent predictors for ELT elevation over 1.5°C (Figure).

Conclusion: ELT elevation is not uncommon even during a short time and low power ablation. Lack of fat layer and anatomical proximity between PV antrum and esophagus are independent predictors of ELT elevation. Preprocedural CT image could predict the esophageal temperature rise in patients with AF.