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Primary predictor of esophageal injury after catheter ablation of atrial fibrillation

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Background: It has been demonstrated that the short distance between the esophagus and the posterior left atrium (LA) is closely associated with the occurrence of esophageal injury (EI) after catheter ablation of atrial fibrillation (AF). Meanwhile, it has not been fully elucidated whether esophageal temperature monitoring sufficiently prevent EI.

Objectives: The purpose of this study was to examine the usefulness of esophageal temperature monitoring for avoiding EI. Further we analyzed the relation between the incidence of EI and the distance between the esophagus and the posterior LA measured on the contrast computed tomography (CT).

Methods: Among 403 patients who underwent catheter ablation of AF, upper gastrointestinal tract endoscopy was performed the next day after ablation to examine for EI. The incidence of EI was compared between 95 patients who used esophageal temperature probe (ETP) (ETP Group) and 308 patients who did not used ETP (Non-ETP Group) during ablation. The shortest distance between esophagus and posterior LA measured on contrast CT (SD-CT) was also compared between the ETP and Non-ETP Groups.

Results: In all patients, EI was found in 35 patients (8.6%). The SD-CT in patients with EI was significantly lower than that in patients without EI (2.3±0.6 vs 4.1±0.8 mm, $p<0.001$).

No differences were observed between the two groups in terms of age, body mass index, LA diameter, esophageal course, total number of radiofrequency (RF) energy applications, total amount of RF energy applications, or the location of SD-CT. Also, EI occurred at nealy the same frequency between the ETP Group and Non-ETP Group (8/95 patients; 8.4% vs 27/308 patients; 8.8%, p=0.553). The severity diagnosed as moderate (erosion) in 3 patients and mild (erythema) in 5 patients of ETP Group, and as severe (ulcer) in 23 patients and mild (erythema) in 4 patients of Non-ETP Group. There was no significant difference in the SD-CT between the ETP Group and Non-ETP Group (3.96±0.98 vs 4.19±1.01 mm, p=0.54). However, the SD-CT in patients with EI was significantly shorter than the SD-CT in patients without EI, both in the ETP Group (2.3±0.6 vs 4.1±0.9 mm, $p<0.001$) and in the Non-ETP Group (2.5±0.2 vs 4.2±0.9 mm, p=0.017), respectively. Multiple regression analysis revealed that only SD-CT significantly correlated with EI. The area under a receiver operating characteristic curve using ST-CT as a predictive marker in EI patients was 0.971 ($p<0.001$). When the cut-off value of EI was set at 2.9mm, the sensitivity and specificity for EI diagnosis were 96.6% and 87.5%.

Conclusions: The incidence of EI was significantly correlated with SD-CT. Esophageal temperature monitoring did not reduce EI, however, the use of monitoring alleviated the severity of EI, especially in patients with short SD-CT.