Background: Left atrial appendage (LAA) is an important source of thromboembolism and stroke in patients with atrial fibrillation (AF). However, the remodeling of LAA in nonvalvular AF patients with stroke is not completely revealed. This study evaluated whether larger orifice of LAA is related with stroke and decreased flow velocity in nonvalvular AF patients.

Methods: We enrolled consecutive 46 nonvalvular AF patients with non-hemorrhagic stroke (11 women, age 65.5 ± 9.4 years). Control group included 139 nonvalvular AF patients without non-hemorrhagic stroke (35 women, age 55.5 ± 10.1 years). LAA was evaluated with multidetector computed tomography (MDCT) and transesophageal echocardiography.

Results: Patients with stroke had larger LA dimension (4.6 ± 0.8 vs. 4.2 ± 0.6 cm, p=0.001), LAA orifice area (4.6 ± 2.0 vs. 2.9 ± 1.0 cm², p<0.001), and slower LAA flow velocity (35.0 ± 20.0 vs. 54.4 ± 20.0 cm/s, p<0.001) than those without stroke. In total patients, the flow velocity and orifice size of LAA were negatively correlated (R² = -0.51, p<0.001) predicted stroke with a sensitivity of 79% and a specificity of 78% with the largest area under the ROC curve (AUC) of 0.82. The LAA flow velocity of < 37.0 cm/s predicted stroke with a sensitivity of 60% and a specificity of 81% with AUC of 0.75. Among patients with LAA flow velocity < 37.0 cm/s, only 5 out of 22 (23%) patients with smaller LAA orifice (< 3.5 cm²) had stroke, while 35 (75%) out of 47 patients with larger LAA orifice (> 3.5 cm²) had stroke. In multivariate logistic analysis, the larger LAA orifice area (OR 7.2, 95% CI 3.4-15.5, p=0.001) and the slower LAA velocity (OR 2.6, 95% CI 1.2-5.6, p=0.012) were found to be significant predictors of stroke. When both larger LAA orifice and slower LAA velocity were combined, OR of stroke was 8.9 (95% CI 3.9-20.2, p<0.001).

Conclusion: The LAA undergoes significant anatomic changes during chronic AF, and larger LAA orifice was related with decreased flow velocity of LAA and stroke. Large orifice of LAA accompanied with decreased flow velocity was a strong predictor of stroke in nonvalvular AF.