Relationship of aging and incident comorbidities to stroke risk in 594,169 Patients with atrial fibrillation: a nationwide analysis

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Background: When assessing ischemic stroke risk in patients with atrial fibrillation (AF), the CHA2DS2-VASc score is calculated based on the baseline risk factors, and the outcomes are determined after a follow-up period. However, the stroke risk in patients with AF does not remain static, and with time, patients get older and accumulate more comorbidities. This study hypothesized that the "Delta CHA2DS2-VASc score", which reflects the change in score between baseline and follow-up, may be predictive of ischemic stroke compared with the baseline or follow-up assessments of the CHA2DS2-VASc score.

Methods: Based on the France nationwide administrative hospital-discharge database, we collected information for all patients treated with AF between 2010 and 2019 in France. Adverse outcomes were investigated during follow-up. A total of 594,169 patients with AF who did not have comorbidities of the CHA2DS2-VASc score except for age and sex, were studied. The Delta CHA2DS2-VASc score was defined as the change/difference between the baseline and follow-up CHA2DS2-VASc scores. During 1,290,721 person-years, 19,492 patients experienced ischemic stroke. The accuracies of baseline, follow-up, and Delta CHA2DS2-VASc scores in predicting ischemic stroke were analysed and compared.

Results: The mean baseline CHA2DS2-VASc score was 1.69, which increased to 2.33 during the follow-up, with a mean Delta CHA2DS2-VASc score of 0.64. The CHA2DS2-VASc score increased in 39.8% of patients. Among 19,492 patients who experienced ischemic stroke, 66.0% had a Delta CHA2DS2-VASc score $\geq$1 compared with only 38.9% in patients without ischemic stroke, and 5,811 (29.8%) patients had $\geq$2 new-onset comorbidity, the most common being hypertension. The follow-up CHA2DS2-VASc score and Delta CHA2DS2-VASc score were significant predictors of ischemic stroke (C-index 0.670 95% CI 0.667–0.674 and 0.637 95% CI 634–641 respectively) that performed better than baseline CHA2DS2-VASc score (C-index 0.613 95% CI 0.609–0.616, $p<0.0001$ for DeLong test).

Conclusions: In this AF cohort, we found that stroke risk (CHA2DS2-VASc score) was non-static, and that many patients developed $\geq$1 new stroke risk factor(s) before presentation with ischemic stroke. The follow-up CHA2DS2-VASc score and its change (ie Delta CHA2DS2-VASc, reflecting the change in stroke risk profile between baseline and follow-up) were better predictors of ischemic stroke than relying on the baseline CHA2DS2-VASc score. This emphasises how stroke risk in AF is a dynamic process due to increasing age and incident comorbidities, and regular re-assessment of risk is needed.