Validation of novel electrocardiographic classification for stroke prediction in patients with atrial fibrillation undergoing cardioversion

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**Introduction:** Atrial cardiomyopathy (aCM) is an electromechanical entity reflecting abnormal conduction, structure and function of the myocardium predisposing to stroke and atrial fibrillation (AF), however, its electrocardiographic (ECG) definition is poorly characterized. We systematically assessed potential ECG markers of aCM in an attempt to identify those at risk for stroke and systemic embolism (SSE) or a combination of SSE, heart failure and death (major adverse events, MAE).

**Methods and Results:** We manually reviewed 1591 ECGs from patients with AF undergoing an acute cardioversion from the Finnish Cardioversion study (FIN-CV). Using post-CV 30d follow-up data as the derivation cohort, we determined the predictive performance of various P-wave indices including P-wave duration, morphology, and P-terminal force (PTF) for SSE prediction. The best predictive performance was found using a combination of prolonged P-wave (≥180ms), deflected P-wave morphology in lead II, biphasic P-waves in all inferior leads or increased PTF (≥80mm*ms) as markers for extensive aCM. We validated the findings using the long-term follow-up in patients with no anticoagulation of whom 219/874 (25.1%) had extensive aCM. During the median follow-up of 4.9 years, there was 51 (5.8%) new SSE and 152 (17.4%) MAE in total. At 3 years, 9 (4.1%), 4 (1.2%) and 1 (0.3%) patients with extensive, moderate or no aCM had suffered from SSE, respectively (p=0.002). At 5 years, the rates were 16 (7.3%), 8 (2.5%) and 5 (1.5%) (p<0.001). Extensive aCM remained an independent predictor for SSE (HR 4.5, 95%CI 2.1-9.5, p<0.001) and MAE (HR 1.7, 95%CI 1.1-2.6, p=0.01) after adjusting for CHA2DS2-VASc score (Figure 1).

**Conclusion:** Novel electrocardiographic markers of extensive aCM provided additional prognostic insight on risk for stroke in atrial fibrillation patients.

**Figure 1**

Graphical Abstract