Risk of stroke in patients with chronic heart failure and sinus rhythm: clinical prediction model based on the Swedish heart failure (Swede-HF) registry

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Background

Chronic heart failure (HF) is accompanied by a 2-3 fold increased risk of ischemic stroke, independent of atrial fibrillation (AF), yet anticoagulant therapy has not shown to be effective on a group level in HF patients without AF. Improved risk stratification using readily available clinical information may facilitate the identification of HF patients at higher risk of ischemic stroke.

Purpose

To describe the incidence and independent predictors of ischemic stroke in patients with heart failure without atrial fibrillation.

Methods

We selected 16,275 HF patients without AF, not receiving anticoagulation from the nationwide Swedish HF (Swede-HF) registry between 2000-2012. A Weibull Hazard Model with backwards selection was used to develop a clinical prediction model for ischemic stroke and/or TIA within 1 year after HF diagnosis.

Results

Stroke occurred in 982 (6.0%) patients during a median follow up of 2.35 years [IQR range 0.97 – 4.21 years], amounting to an incidence rate of 21.5/1000 patients-years respectively. Using a Weibull Hazard model with backwards selection, 12 predictors were included in the final multivariable prediction model and the strongest predictors were: age (hazard ratio (HR) 1.39, 95% confidence interval (95% CI), 1.25 – 1.55 per 10 years), diabetes (HR 1.40, 95% CI 1.12 – 1.74), hypertension (HR 0.79, 95% CI 0.62 – 0.99), peripheral artery disease (HR 1.49, 95% CI 1.12 – 1.98) and previous stroke or TIA (HR 2.16, 95% CI 1.69 – 2.75). The model performance had a c-statistic of 0.689 (95% CI 0.662 – 0.716) (Figure 1a). Based on the prediction model we classified patients based on risk quartiles into highest, high, intermediate and low risk of stroke (Figure 1b). Of note, neither dilated cardiomyopathy, coronary artery disease or HF type (HF with preserved ejection fraction (EF), HF with midrange EF, HF with reduced EF) were independently associated with increased risk of stroke.
Conclusion Using 12 clinically available variables, HF patients with sinus rhythm at high risk of stroke could be identified with moderate accuracy, and the highest risk quartile had stroke rates comparable to HF patients with AF.