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Development of a Prediction Model for Atrial Fibrillation in Patients with Heart Failure and Preserved Ejection Fraction: Secondary Analysis of Treatment of Preserved Cardiac Function Heart Failure with an Aldosterone Antagonist (TOPCAT) Trial

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Development of a prediction model for atrial fibrillation in patients with heart failure and preserved ejection fraction: secondary analysis of Treatment of Preserved Cardiac Function Heart Failure with an Aldosterone Antagonist (TOPCAT) trial.

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Background

•Atrial fibrillation (AF) is the most common arrhythmia and is associated with high morbidity and mortality in patients with heart failure (HF) with either reduced ejection fraction (HFrEF) or preserved ejection fraction (HFpEF).

•Around 50% of HF cases are HFpEF with no effective therapy available due to the heterogeneous and incompletely understood pathophysiological mechanisms and associated multiple comorbidities.

•Around 62% of HFpEF patients will develop AF at some point during the disease course.

•AF has an independent prognostic impact in HFpEF.

Objective

•We sought to identify predictors and develop a risk score for incident AF among patients with HFpEF.

Methods

•This was an exploratory, post hoc analysis of the TOPCAT trial.

•Patients without known AF and with sinus rhythm documented by ECG at baseline were only included. Patients with history of AF at any time point or without ECG available at baseline were excluded.

•Echocardiographic parameters and natriuretic peptides values were not included as it was available only in small number of patients.

•Cox-regression was used to identify independent predictors of incident AF.

•A risk score was derived from the weighed sum of the regression coefficients of each independent risk factor in the final model using Cox regression analysis.

•We sought to identify predictors and develop a risk score for incident AF among patients with HFpEF.

Results

Risk factor	Event rate without risk factor	Event rate with risk factor	HR (95% CI)	Multivariate P-Value	Score
Age ≥ 65	24 (2.5%)	78 (6.3%)	2.60 (1.64-4.12)	<0.001	2
QRS > 120 ms	82 (4.3%)	20 (7.3%)	1.64 (1.01-2.7)	0.047	1
History PAD	84 (4.2%)	18 (8.4%)	1.79 (1.07-3.02)	0.027	1
History of DM	53 (3.7%)	49 (6.5%)	1.85 (1.22-2.8)	0.003	1

• **Table (1). Risk factors that independently predict new onset AF**

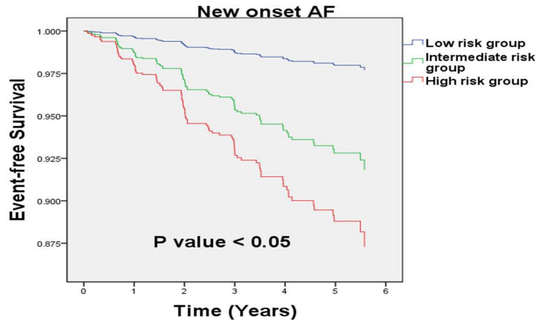

Figure (1). KM curves shows significantly higher incidence of new onset AF in the intermediate and high risk groups compared to low

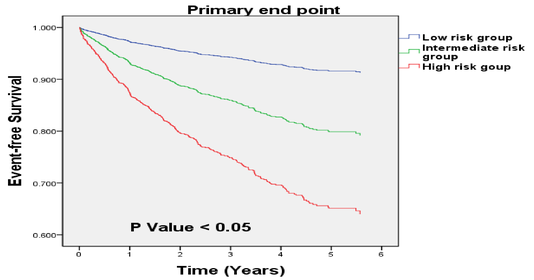

Figure (2). KM curves shows significantly higher incidence of the primary end point in the intermediate and high-risk groups compared to low risk group.

Discussion

•2192 patients (mean age 67 9 4 years 54 8 were females) with available ECG at baseline and follow up with no previous history of atrial fibrillation were Identified from TOPCAT database.

•Over the mean duration of follow up 3.2±17 years, 102 (4.7%) developed new onset AF.

•Patients who developed new onset AF were older age, had higher incidence of diabetes mellitus (DM) and peripheral arterial diseases (PAD) compared to those without AF.

•Diabetes (HR=1.85, 95%CI 1.22-2.8; p=0.003), peripheral arterial disease (HR=1.79, 95% CI 1.07-3.02; p=0.027), Age ≥ 65 years (HR=2.6, 95% CI 1.64 -1.12; p= <0.0001), and QRS duration >120ms (HR=1.64, 95% CI 1.01-2.7; p=0.047), independently predicted incident AF (Table1).

•Based on the simplified risk score which included these 4 variables, AF incidence rates were 1.1%, 4.5%, and8.2% in the low (score=0), intermediate (score=1or2), and high-risk (score>2) groups, respectively (log rank P<0.05). (Figure1).

•Compared to the low risk group, the intermediate and high-risk groups had a 4.6-fold and 9.6-fold increase in the risk of incident AF, respectively (HR= 4.6, 95% CI 1.9- 10.9, p=< 0 001 and HR= 9.6, 95% CI 4.1 -22.5, p< 0 001 respectively).

•Compared to the low risk group, the intermediate and high-risk groups had higher incidence of end point, cardiovascular death, all cause death and heart failure hospitalizations. (Figure 2)

•Model discrimination was good (c statistic= 0.660; 95% CI 0.611-0.710).

Conclusion

A simplified risk score derived from clinical and laboratory characteristics predicts incident AF in patients with HFpEF and, upon further validation, may be used clinically for risk stratification or for AF screening in high risk groups.

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