ISSN:2828-6235
Impact factor:13.77

International Journal of Literature and Language Studies(IJLLS)

UDC: 616.12-008.46

PROGNOSTIC VALUE OF sST2 AND NT- proBNP BIOMARKERS IN PREDICTING CARDIOVASCULAR EVENTS IN CHRONIC HEART FAILURE

Makhsudov O.M.
Andijan State Medical Institute, Andijan, Uzbekistan
doi:https://doi.org/10.5281/zenodo.24052536

Annotation: CHF with reduced left ventricular ejection fraction is characterized by a high risk of rehospitalization and cardiovascular death. Biomarkers NT- proBNP and sST2 reflect hemodynamic stress, fibrosis, and myocardial remodeling .
The aim of the study was to evaluate the prognostic value of sST2 and NT- proBNP and the relationship between their dynamics during treatment and adverse cardiovascular events over the course of a year.
Materials and methods. Data from 132 patients with CHF with reduced ejection fraction (mean age 59±10.7 years; 89.4% men) were analyzed. Biomarkers were assessed at discharge and during follow-up; prognostic significance was determined using ROC analysis, HR, and 95% CI.
Results. sST2 at discharge ≥29.3 ng /mL was associated with an increased risk of adverse events within a year (HR=2.050; 95% CI: 1.179–3.564; p=0.011; AUC=0.631). After 6 months, patients who did not achieve the target values of sST2 ≤23.4 ng /mL and NT- proBNP ≤1132 pg /mL had a higher risk (HR=6.583; 95% CI: 3.448–12.569; p< 0.001)
Conclusion: A combined assessment of sST2 and NT- proBNP dynamics may provide additional prognostic information for cardiovascular event risk stratification and treatment monitoring in patients with CHF with reduced ejection fraction.
Key words: chronic heart failure, left ventricular ejection fraction, sST2, NT- proBNP , ROC analysis, prognostic value, cardiovascular events.

Introduction

Chronic heart failure (CHF) is one of the pressing problems in modern cardiology, characterized by repeated decompensations, hospitalizations, and a high risk of cardiovascular death [1, 2]. In patients with reduced left ventricular ejection fraction (LVEF), timely assessment of the prognosis is especially important.
NT- proBNP reflects the hemodynamic load on the myocardium [3], sST2 reflects fibrosis, inflammation, and remodeling [4, 5]. A single measurement at discharge does not always reflect the long-term prognosis, so assessing the dynamics of biomarkers is important.

Purpose of the study

To evaluate the value of sST2 and NT-proBNP at discharge and during treatment to predict adverse cardiovascular events within a year in patients with CHF with reduced LVEF.

Materials and methods

Data from 132 patients with CHF and reduced LVEF (age 59±10.7 years; 118 men (89.4%)) observed in 2025–2026 at the Andijan State Medical Institute were analyzed. Causes of CHF: coronary heart disease, dilated cardiomyopathy, hypertension. Clinical, laboratory, and echocardiographic parameters, sST2 (ng/ml), NT-proBNP (pg/ml), troponin T, and SCF (CKD-EPI) were assessed.
Adverse events included rehospitalization for CHF decompensation and cardiovascular death (follow-up period : 1 year). Cutoff values were determined by ROC analysis; AUC, sensitivity, specificity, HR, and 95% CI were calculated; differences were considered significant at $p < 0.05$.

Results and discussion

The cause of CHF was coronary heart disease in 49.2% of patients, dilated cardiomyopathy in 31.8%, and hypertension in 18.9%. Atrial fibrillation was detected in 60.6%, obesity in 54.5%, and diabetes mellitus in 30.3%. The median LVEF was 30% [26; 34], sST2 was 28.8 [21; 45] ng/ml, and NT-proBNP was 2477.5 [1247; 4543] pg/ml.

For sST2, at a threshold of ≥29.3 ng/ml, the risk of adverse events within a year was significantly higher (HR=2.050; 95% CI: 1.179–3.564; p=0.011; AUC=0.631; p=0.010), but the independent accuracy of the marker is limited.

Table 1.

Prognostic indicators of biomarkers at discharge

Indicator	sST2	NT-proBNP
Threshold value	≥29.3 ng/ml	≥2647 pg/ml
AUC (95% CI)	0.631 (0.534–0.728)	0.615 (0.518–0.713)
Sensitivity, %	64.3	57.1
Specificity, %	61.8	60.5
HR (95% CI)	2.050 (1.179–3.564)	1.587 (0.927–2.716)

Note: CI – confidence interval; AUC – area under the ROC curve; HR – hazard ratio.

For NT-proBNP, the threshold was 2647 pg/mL (AUC=0.615; p=0.024), but the risk difference did not reach significance (HR=1.587; 95% CI: 0.927–2.716; p=0.092). The model with both biomarkers had AUC=0.596 (95% CI: 0.499–0.693; p=0.062).

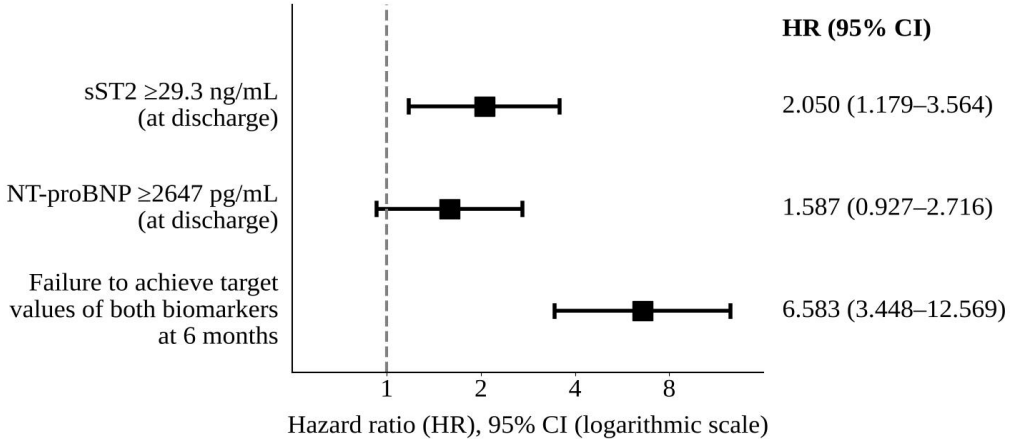


Fig. 1. Association of biomarker indicators with the risk of adverse cardiovascular events within a year (HR and 95% CI; dotted line – HR=1)

After 6 months of treatment, the target sST2 value of ≤23.4 ng/ml was characterized by AUC=0.746 (95% CI: 0.647–0.846), which was higher than the value at discharge (0.631); for NT-proBNP, the target value was ≤1132 pg/ml. In patients who did not achieve the target values of both biomarkers, the risk of adverse events was higher (HR=6.583; 95% CI: 3.448–12.569; p<0.001) (Fig. 1).

Conclusion : At discharge, sST2 ≥29.3 ng/mL was associated with an increased risk of adverse events within 1 year (HR=2.050; p=0.011) with limited discrimination (AUC=0.631); for NT-proBNP and the combination, no significance was obtained. After 6 months, sST2 ≤23.4 ng/mL had prognostic value (AUC=0.746), and failure to achieve target values of both biomarkers significantly increased the risk.

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