



Risk assessment of acute kidney injury in patient with acute cardiovascular diseases

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Background and Objective

Study cardiorenal relationship has allowed developing the concept of CKD and acute kidney injury (AKI). Acute kidney injury (AKI) is common in critically ill patients and is associated with high morbidity and mortality. Early identification of high-risk patients provides an opportunity to develop strategies for prevention, early diagnosis and treatment of AKI.¹

Purpose: To identify predictors of different flow options AKI in patients with severe cardiovascular disease and to develop a risk assessment scale of AKI in patients with severe cardiovascular disease.

1. Malhotra R1, Kashani KB., et al. Nephrol Dial Transplant. 2017 May 1;32(5):814-822. doi:10.1093/ndt/gfx026.

Methods

The study included 987 people who were 3 groups: those with AD CHF (n = 278) and ACS without ST (n = 288), respectively, were hospitalized in cardiology, therapeutic and Cardiac Intensive Care Unit Moscow Clinical Hospital №64, in the third group consisted of patients with stable CHF (n = 421). Statistical analysis was performed using statistical software application package Statistica 10 and SPSS 22 using standard algorithms of variation statistics.

Table 1. Two options for calculating scores for assessing the risk of developing community-acquired acute renal damage in patients with acute cardiovascular pathology

Independent variables	Coefficient Regression B (Points)	Coefficient Significance (Points)
Diabetes	1	22
Alcohol abuse	7	2
Myocardial infarction	5	4
AHF/*AD AHF	9	1
Admission of ACE inhibitors at home	4	7
SBP <120 mm Hg*	10	2
SBP <110 mm Hg. *	5	14
SBP <90 mm Hg. *	12	5
SCr> 98 μmol/L *	14	0
SCr> 128 μmol/L *	8	2
GFR _{CKD-EPI} <45 ml/min/1,73 M ² *	7	3
GFR _{CKD-EPI} <15 ml/min/1,73 M ² *	7	8
Glucose>7 ммоль/л*	4	5
male	6	3
Lack of veroshpiron in home therapy	1	22

Results

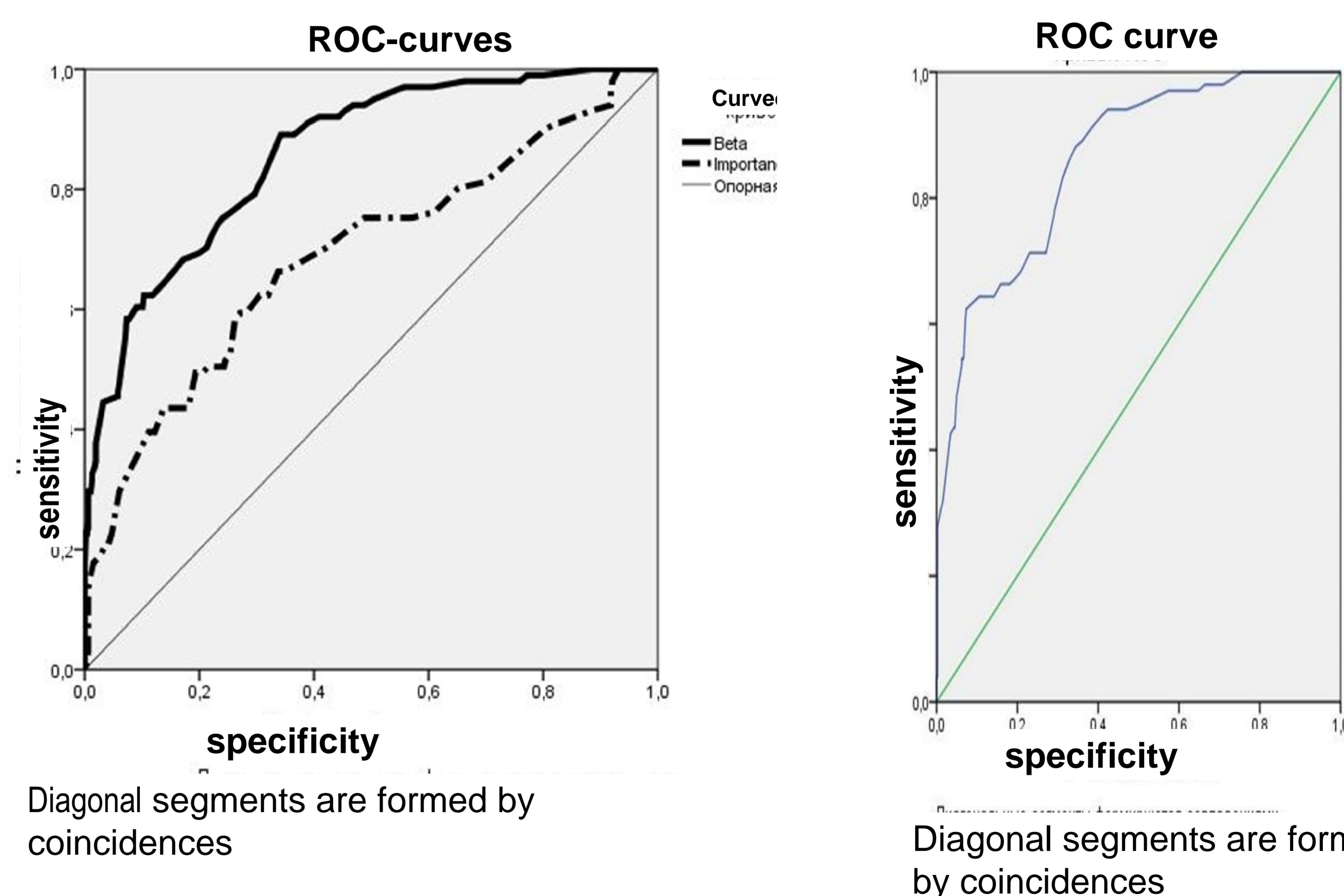
- Risk of AKI determined primarily renal function and blood pressure levels, as well as in patients with existing comorbidities.
- Predictor of outpatient AKI, moreover, it was alcohol abuse (OR 2.31, 95% CI 1,4-3,81, p <0.001), and for the hospital AKI - appointment of loop diuretics (OR 2.32, 95% CI 1,53-3,51, p <0.001) and veroshpiron (OR 2.04, 95% CI 1,35-3,09, p <0.001) in the hospital, age older than 80 years (OR 1.78, 95% CI 1,12-2,8 CI, p <0.05).
- Predictors of persistence AKI had LVEF <35% (OR 2.12, 95% CI 1, 24-3,62, p <0.001), the appointment veroshpiron (OR 2.12, 95% CI 1,37-3,28, p <0.001) and loop diuretics (OR 2.66, 95% CI 1,71-4,14, p <0.001) for the first time in the hospital, as compared to its transitory nature - SBP at admission> 180 mm Hg. Art. (OR 4.42, 95% CI 1,22-15,95, p <0.05).
- Thus obtained predictors were included in the regression model, the predictive power of which amounted to 88.5%. Scale was developed risk assessment of AKI, which is based on the values of the regression coefficient B (area under the curve of 0.860). As a result of the sum of points on the selected risk assessment scale AKI for each patient was built ROC curve, the area under the curve was 0.860, which is rated as very good quality model.

Figure 1. Definition of the threshold score of the risk assessment scale of AKI, taking into account the sensitivity and specificity of the test

Threshold Score	29		30		32		34		35	
Diagnosis of AKI	Prognosis		Prognosis		Prognosis		Prognosis		Prognosis	
	AKI +	AKI -	AKI +	AKI -	AKI +	AKI -	AKI +	AKI -	AKI +	AKI -
AKI+	90	11	90	11	81	20	79	22	77	24
AKI-	170	295	159	306	140	325	131	334	119	346
Sensitivity	89%		89%		80%		78%		76%	
Specificity	63%		66%		70%		72%		74%	
Positive Prognostic Significance	35%		36%		37%		38%		39%	
Negative prognostic significance	96		97		94		94		94	

Figure 2. ROC-curves of regression models of risk scales of development of OPP using coefficient B and significance factor

Figure 3. ROC-analysis of the quality of the risk assessment scale for the development of OPP in patients admitted to hospital



Conclusions

The most significant risk factors for ACS are signs of impaired renal function and low levels of SBP at admission, anemia, or AHF or AD CHF, alcohol, appointment veroshpiron and loop diuretics for the first time in the hospital, IHD, CKD, with type 2 diabetes.

The specific predictors for patients with AD CHF are the absence of β-blocker therapy in the outpatient phase, the high status of hydration and history of hospitalizations for heart failure decompensation during the last year, and for patients with ACS without elevation ST - old age, hypoglycemia admission and development of MI in the outcome of ACS.

Declaration of interest: nothing to declare

