THE DIAGNOSIS OF MYOCARDIAL INFARCTION USING TROPONIN T COMPARED WITH CLINICAL AND ELECTROCARDIOGRAPHIC CRITERIA

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Abstract: *The inclusion of cardiac troponin in the criteria for diagnosis of myocardial infarction led to an increase in this diagnosis. Magnitude is closely related to criteria, such as enzymes and higher values are used in conventional diagnosis of myocardial infarction since the definition varies in different studies. Increased number of myocardial infarctions generated by introducing more precise diagnostic methods and specific is not a new phenomenon in the evolution of myocardial diagnostics. It was demonstrated in the 1980s in Minnesota Heart Study that heart attacks increased attack rate by 17% or 24% when CK or CK MB activity was added diagnostic algorithm.(1) A significant proportion of patients who were initially unstable angina have now received a new diagnosis of myocardial infarction. Lately have become increasingly active pharmacological treatment and practice revascularization in patients with acute coronary syndrome. Patients with elevated levels of cardiac troponin appear to benefit most from such treatment strategies.(2)*

Cuvinte cheie: troponine, infarct miocardic, evenimente majore coronariene

Rezumat: *Includerea troponinelor cardiace printre criteriile de diagnostic ale infarctului miocardic a condus la creşterea numărului de astfel de diagnostice. Amploarea creşterii este strâns legată de criterii, de exemplu enzimele şi valorile superioare, sunt folosite în diagnosticarea convenţională a infarctului, de vreme ce definirea infarctului miocardic variază în diferitele studii. Creşterea numărului de infarcte miocardice generat de introducerea metodelor de diagnosticare mult mai precise şi specifice nu este un fenomen nou în evoluţia diagnosticării infarctului. A fost demonstrat încă din anii 1980, în Studiul asupra Inimii Minnesota că rata atacurilor infarcturilor a crescut cu 17% sau 24% când activitatea CK sau CK MB a fost adăugată algoritmului de diagnostic.(1) O parte însemnată dintre pacienţii care au fost iniţial cu angină pectorală instabilă au primit acum un nou diagnostic de infarct miocardic. În ultimul timp au devenit din ce în ce mai active tratamentul farmacologic şi practica revascularizării la pacienţii cu sindrom coronarian acut. Pacienţii cu nivel crescut al troponinelor cardiace par să beneficieze cel mai mult de pe urma acestor strategii de tratament.(2)*

PURPOSE AND OBJECTIVES

The aim of this study was to investigate the role of biochemical indicators of myocardial damage in diagnostic and prognostic evaluation of ACS (acute coronorian syndrome).

The specific objectives were: investigating differences in the number of myocardial infarctions diagnosed based on troponin T versus clinical and electrocardiographic diagnosis and prognosis of patients with discordant diagnoses.

METHODS

This study is a follow-up of a random series of consecutive patients admitted through the emergency department clinch County Hospital Oradea Cardiology Clinic presumption of acute coronary syndrome. During the study period between 2010-2012, were identified 341 such patients. 22 patients (6.36%) were excluded from the study on any of the following exclusion criteria: inability venipuncture, collecting a single sample of blood, transfer to another department of the hospital, no measurements of biochemical indicators. However, patients who died during hospitalization were included in the study. Thus, the study included a total of 319 patients.

He watched the value of biochemical markers in the diagnosis of acute myocardial infarction compared with clinical and electrocardiographic diagnosis in patients admitted with acute coronary syndrome presumption.

RESULTS

We included patients admitted with acute coronary syndrome presumption (n = 319). Patients with troponin T> 0.10 ng / 1 were diagnosed with myocardial infarction (diagnostic certainty). Positive troponin T was detected in 98 patients. Number of patients with clinical diagnosis was 74 (53.24%) and those with electrocardiographic diagnosis was of 80 (57.55%), p = 0.53. Of the patients included in the study, 35 (23.27%) had only clinical diagnosis of myocardial infarction and 28 patients (20.14%) had electrocardiographic diagnosis of myocardial infarction, p = 0.38. 76 patients had concordant diagnosis of MI (clinical and electrocardiographic). 65 patients (66.33%) had a clinical diagnosis consistent and positive troponin and 68 patients (69.39%) had diagnostic electrocardiographic consistent and positive troponin, p = 0.71.

Thus, the proportion of patients with clinical diagnosis of myocardial infarction compared to the number of confirmed

MI in troponin T> 0.10 ng / l was 66.33% and the proportion of patients with electrocardiographic diagnosis of myocardial infarction compared to the number of confirmed MI in troponin T> 0.10 ng / l was of 69.39%.

1. Clinical diagnosticul of patients with acute MI

Acute myocardial infarction was clinically diagnosed in 74 patients (23.27%) of the 319 subjects. Of the 74 patients who were clinically diagnosed myocardial infarction, 9 (12.6%) had troponin T $\leq$ 0.10 ng / L.

Of the 245 patients without clinical diagnosis of myocardial infarction, 33 (13.47%) had troponin T> 0.10 ng / L. (Table 1).

Number of myocardial infarctions was 98, with 33% higher (n = 24), when the diagnosis of myocardial infarction was based on elevated concentrations of troponin T (> 0.10 ng / l).

Table no. 1. Concordance between clinical diagnosis and troponin T values

Observation A	Clinical diagnosis		
Observation B	Diagnosis based on troponin		
	Observation A		
Observation B	absent	present	
absent	212	9	221 (69,3%)
present	33	65	98(30,7%)
Total:	245 (76,8%)	74 (23,2%)	319
Kappa coefficient	0,668		
Standard error (Kw'=0)	0,055		
Standard error (Kw'#0)	0,046		

Kappa coefficient of 0.66 (95% confidence interval 0.57, 0.73), reflected a relatively good agreement between clinical diagnosis of myocardial infarction based on troponin T.

2. Electrocardiographic myocardial infarction diagnosis

Of 319 patients, 80 (25.08%) were diagnosed with acute myocardial infarction on the basis of modified FINMONICA criteria (electrocardiographic diagnosis).

If the diagnosis of myocardial infarction was based on elevated troponin T level, the number of heart attacks increased by 23% compared to diagnosis based on modified FINMONICA criteria (n = 98).

Table no. 2. Concordance of diagnosis based on ECG and troponin values

Observation A	ECG diagnosis		
Observation B	Troponin		
	Observation A		
Observation B	absent	present	
Negative	209	12	221 (69,3%)
Positive	30	68	98 (30,7%)
	239 (74,9%)	80 (25,1%)	319
Kappa coefficient	0,674		
Standard error (Kw'=0)	0,055		
Standard error (Kw'#0)	0,046		

12 of the patients (14%) who were diagnosed with myocardial infarction using electrocardiographic criteria were troponin T $\leq$ 0.10 ng / L. 30 patients (37.5%) had troponin T> 0.10 ng / l, but without electrocardiographic diagnosis of myocardial infarction. Agreement between electrocardiographic diagnosis of myocardial infarction and troponin T was based on relatively good, as assessed by kappa coefficient of 0.67 (95% confidence interval 0.60, 0.79) (table no. 2).

Of the 319 patients, 76 (23.82%) were concordant diagnosis of myocardial infarction by clinical and electrocardiographic criteria and myocardial infarction was ruled for 180 (56.43%) patients. 35 patients (10.97%) had only

clinical diagnosis of myocardial infarction and 28 (8.78%), only electrocardiographic diagnosis. Agreement between clinical and electrocardiographic criteria was pretty good (kappa coefficient of 0.55 with 95% CI = 0.54, 0.62) (table no. 3).

Table no. 3. Correlation between clinical diagnosis and electrocardiographic

Observation A	Clinical diagnosis		
Observation B	Electrocardiographic diagnosis		
	Observation A		
Observation B	absent	present	
absent	180	35	215 (67,4%)
present	28	76	104 (32,6%)
	208 (65,2%)	115 (34,8%)	319
Kappa coefficient	0,550		
Standard error (Kw'=0)	0,056		
Standard error (Kw'#0)	0,049		

Of prognosis we excluded two patients who died in the emergency department immediately after taking the first blood sample was collected in the first two hours of symptom onset. Both had to troponin T concentration of 0.08 ng / L.

During hospitalization, mortality was 8.82% for patients with confirmed myocardial infarction and 7.5% for patients with confirmed or possible myocardial infarction according to electrocardiographic diagnostic criteria. When the statistical analysis were used clinical diagnoses, hospital mortality was 7.69% for patients with confirmed myocardial infarction and 6.76% respectively for patients with acute myocardial possible. However, in patients diagnosed with myocardial infarction based on troponin T, the hospital mortality was lower by 6.12% (table no. 4).

Table no. 4. Mortality in the subgroup of patients with electrocardiographic diagnosis of MI

	Number of patients (n)	%
Dgs MI electrocardiographic and positive troponin (n=68)	n=6	8,82%
Dgs FINMONICA de MI (n=80)	n=6	7,5%
Dgs MI clinical and positive troponin (n=65)	n=5	7,69%
Dgs MI clinical (n=74)	n=5	6,76%
MI sure (positive troponin) (n=98)	n=6	6,12%

Table no. 5 presents the number of events, standardized incidence rates and Cox hazard ratios adjusted for age for major coronary heart disease events during follow-up of 17 months in patients with elevated troponin peak TnT> or $\leq$ 0.10 ng / l, and with or without clinical or electrocardiographic diagnosis of myocardial infarction.

Table no. 5. Age-standardized rates and Cox hazard ratios adjusted for age (95% confidence intervals) during the mean follow-up of 17 months for major coronary events in patients with and without clinical or electrocardiographic diagnosis of myocardial infarction
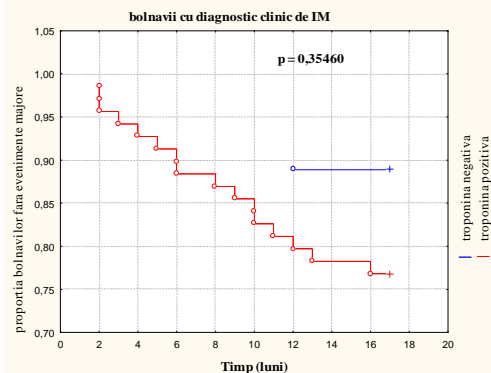
	MI	Without MI
	Clinical diagnosis	
Troponin >10 ng/l	N=65	N=33
Events	16(14)	7(33)
HR	1,70	1,07

Troponin ≤10 ng/l	N=9	N=212
Events	1(3)	20(5)
HR	0,93	1,00
DElectrocardiographic diagnosis		
Troponin >10 ng/l	N=68	N=30
Events	16(13)	5(10)
HR	1,71	1,09
Troponin ≤10 ng/l	N=12	N=209
Events	2(11)	18(5)
HR	0,87	1,00

As expected, the prognosis was worst in patients with concordant diagnosis of myocardial infarction based on troponin T (TnT> 10 ng / dL), clinical or electrocardiographic compared with patients who only had clinical or electrocardiographic diagnosis not confirmed by troponin values (TnT ≤ 0.10) (figure no. 1).

Figure no. 1. The proportion of patients without major events in the subgroup of patients with electrocardiographic diagnosis of MI based on troponin values

Incidence rates for major coronary heart disease events were 2.1, 2.3 and 2.4 times respectively higher or clinically diagnosed patients, ECG and troponin T on myocardial infarction compared with patients without myocardial infarction.

Among patients for whom clinical diagnosis was not made of myocardial infarction, the prognosis was not significantly worse for patients with troponin T> 0.10 ng / L than in those with troponin T ≤ 0.10 ng / L. But this finding is based on a relatively small number of patients. In patients without electrocardiographic diagnosis but positive troponin, the prognosis was significantly worst than patients without diagnostic ECG and negative troponin (figures no. 3, 4).

Figure no. 2. The proportion of patients without major events in the subgroup of patients with electrocardiographic diagnosis of MI based on troponin values
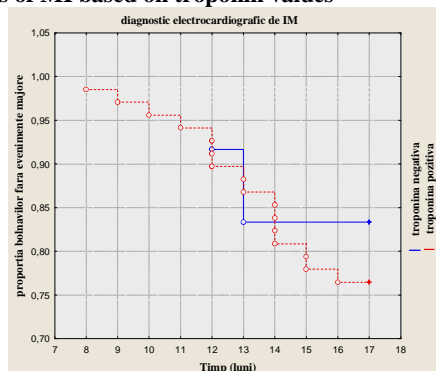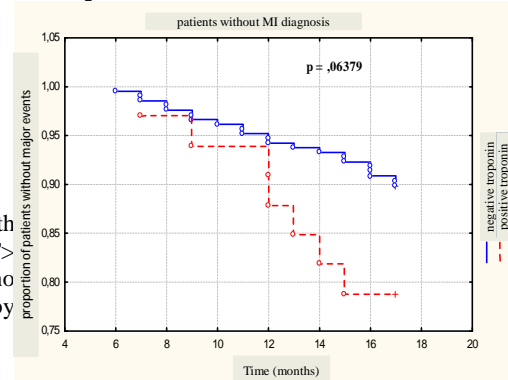

Figure no. 3. Proportion of patients without major events in the subgroup of patients without clinical diagnosis of MI based on troponin values
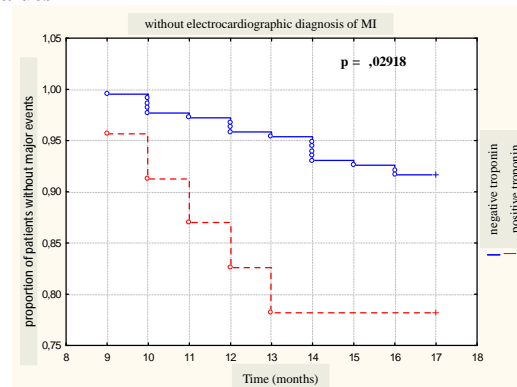

Figure no. 4. The proportion of patients without major events in the subgroup of patients without electrocardiographic diagnosis of MI based on troponin values

In table no. 6 are presented Cox hazard ratios adjusted for age for different categories of coronary events in these patients, in terms of peak values of CK, CK-MB and troponin T. For these patients troponin T and CK-MB were better than CK in predicting coronary events during the 17 months of monitoring.

Table no. 6. Cox hazard ratios adjusted for age (95% confidence intervals) for coronary events in patients for whom electrocardiographic diagnosis of myocardial infarction was definitely excluded (n = 239) on the peak values CK, CK-MB and troponin T. risk ratios were calculated for a standard deviation difference in registration of 10 units for CK, CKMB and troponin T

Risk ratio (95% CI)			
Event	CK	CK-MB	TnT
Coronary deaths	1,56	2,09	1,83
Major coronary events	1,35	1,85	1,74
Any coronary event	1,18	1,32	1,46

In patients suspected of acute coronary syndrome, the use TnT as the primary diagnosis of myocardial infarction increases the number of patients diagnosed with myocardial infarction.

Growth ratio was 33% and 23% compared with clinical and electrocardiographic diagnosis of myocardial infarction may or permanently.

CLINICAL ASPECTS

CONCLUSIONS

1. In patients suspected of acute coronary syndrome, the use TnT as the primary diagnosis of myocardial infarction increases the number of patients diagnosed with myocardial infarction. Growth ratio was 33% and 23% compared with clinical and electrocardiographic diagnosis of myocardial infarction may or permanently.

2. Using modern indicators reduces false-positive diagnosis of myocardial infarction. Risk of coronary heart disease-related events in patients with TnT> 0.10 ng / l was not significantly higher than in those with TnT ≤ 0.10ng / L among patients without a diagnosis of myocardial infarction or electrocardiographic criteria clinch, although store a trend for worse prognosis. So the prognosis of patients with isolated growth TnT require further investigation on a larger group of patients.

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