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Research Article

Cardiac Enzymes According to Time, Pain Characteristics or Lesion in Patients with a New AMI in Elbasan Region

Healthcare

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Abstract

Introduction: The presence in serum of cardiac markers with a high sensivity for the damage of myocardic such as cardiac troponin T or I (cTnT or cTnI) or isoensymes of creatine kinase MB (CK-MB) give the opportunity to the doctors to diagnose the acute myocardial infarction (AMI) and also to give a prognosis on the patients performance. Aim: The evaluation of performance of cardiac enzyme according to time and also the connection between the values of the enzymes and the pain characteristics or the infarction lesion in patients with AMI in Elbasan region. Methodology. The study is performed in the regional hospital of Elbasan, in the department of cardiology during 2009 and is involved patients diagnosed with new AMI. It is performed the measurement of the cardiac enzymes profile (CK, CK-MB, troponin I and T) in some period of time and the pain characteristics or lesion of AMI in the moment of hospitalized (according to the determination of cardiologist). SPSS 16 is used to analyze the data. $p<0.05$ is significantly for the statistics view. Results. 65 patients with AMI had taken part in the study. The values of cardiac enzymes in patients decreased in significant way based on days ($p<0.05$) but have a different model of normalization. For all the cardiac enzymes included in the study don't have significant changes in their average values according to the type of the pain (t test, $p >0.05$). The average values of cardiac enzymes in the hospitalized moment are significantly lower in patients who have a continuance of the pain less than six hours and who have had a lower acute myocardial infarction ($p<0.05$ in t- test). Conclusions. Cardiac enzymes should be considered together to better predict the time occurrence of a new AMI. The high values of cardiac enzymes are found in the patients with a continuance of pain more than six hours and a wide lesion of myocardial infarction, defining these patients as the most dangerous group for unfavorable results.

Introduction

Patients that have a moderate probability for coronary acute syndrome are performed analyzes for the damage markers of the myocardial such as: cardiac troponins T or I (cTnT or cTnI) or isoenzymes of creatine kinase (CK-MB). The presence in serum of cardiac markers with high sensitivity for the damage of myocard give the opportunity to the doctors to diagnose the myocardial infarction in one third of the patients that in the past will not fill the criteria for myocardial infarction (1, 2).

Approximately, one fourth of the patients with myocardial infarction do not experience the classic pain chest and the event cannot be notice in the EKG changes, the Q waves are not recorded which are pathological. The undiagnosed EKG are recorded at approximately in half of the patients that have experienced suspicion pain chest for myocardial infarction, patients that in the end are diagnosed with myocardial infarction.

Patients that are hospitalized with the syndrome of myocardial infarction, less than 20% of them are diagnosed that has experienced before myocardial infarction. In the majority of the patients, the cardiac markers need to be measured in time intervals, to be more certain about the diagnosis or to exclude the myocardial infarction diagnosis; such measurements will also be very effective for the infarction size.

The knowledge of the performance of the tracking cardiac enzymes play an important role not only in the diagnosis but also in the long term follow up of the patients with AMI (1, 2, 11).

Aim

The evaluation of the performance of cardiac enzymes according to time and also the connection between enzymes values and the pain characteristics or infarction lesion in patients with AMI in Elbasan region.

Methodology

The study is designed as a transversal time series for the evaluation of the changes in tracking enzymes of AMI and transversal to study the connection between the values of marked enzymes and clinic signs (pain) and lesion characteristics of AMI. In the study are included patients who are admitted in the regional hospital of Elbasan and are treated for a new AMI during year 2009. The study is performed in the department of cardiology. The data are gathered during the hospital staying of the patients. Bio-chemical data on the cardiac enzymes profile (CPK, MB-CPK, troponin I and T) are remeasured in time intervals according to each enzymes (hospitalized, after 24, 48, 96 hours and until and 10-14 days for troponin)

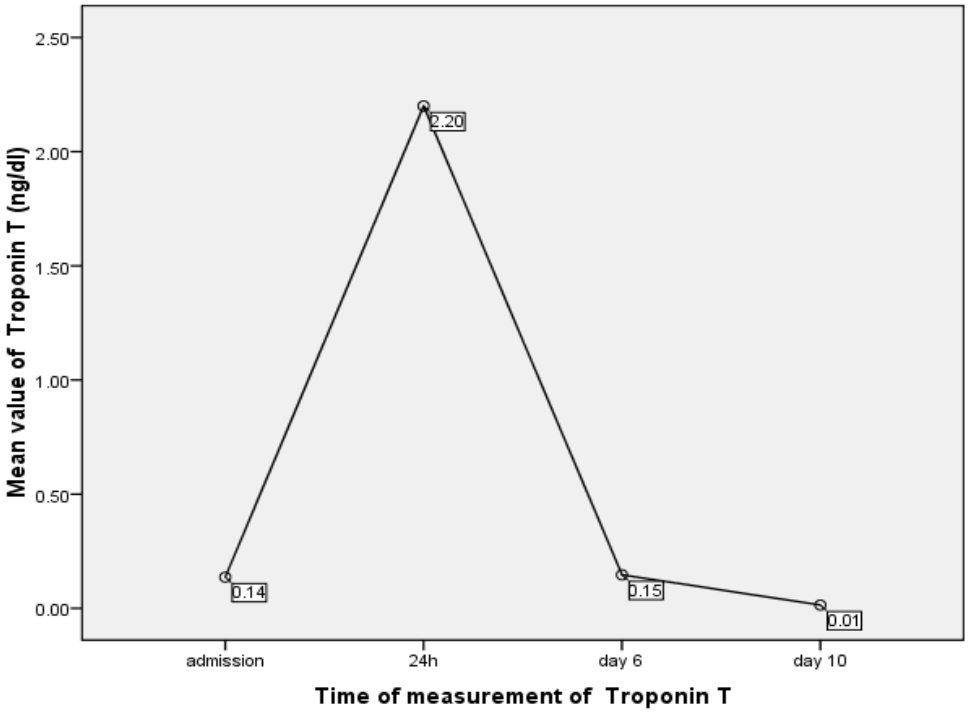
The data were gathered based on the type of pain (typical, atypical) duration of the pain (less or more than 6 hours), lesion size (little or wide, defined by the doctor in the medical), location(anterior, posterior or other).

SPSS 16 is used to study the connection of the biochemical profile values according to the time, clinic and lesion characteristics. T test or ANOVA are used to evaluate the changes in the enzymes values according to the enzymes measurements using the spearmen correlation technic, to highlight if there is a change between the average values of the enzymes according to the pain characteristics or lesion. A $p<0.05$ is considered significant for the statistics view.

Results

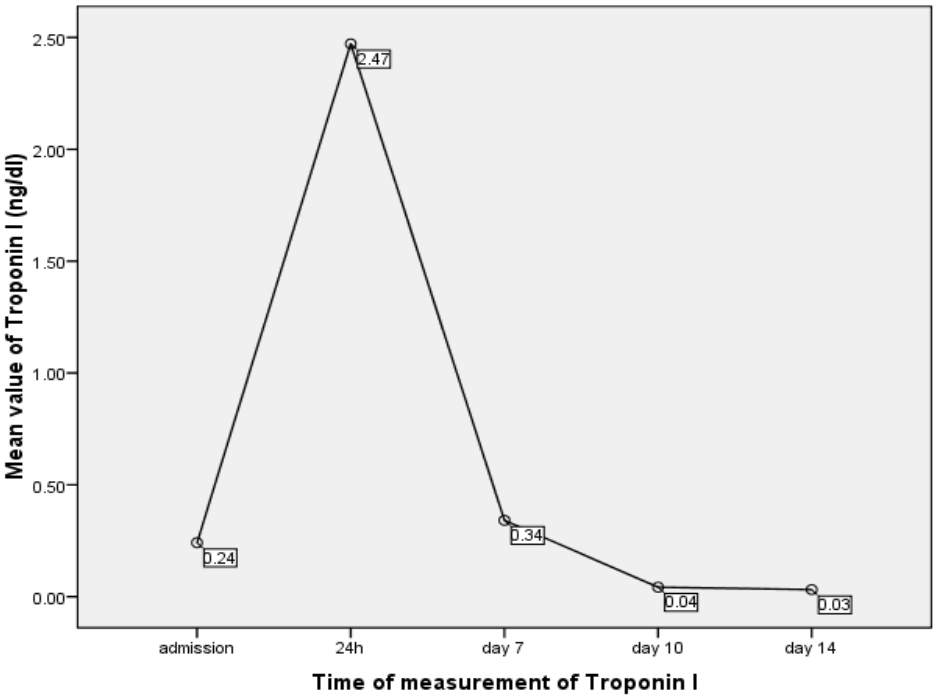
Sixty five (65) patients with a new AMI have taken part in the study. In the above graphics, the performance of the cardiac enzymes in patients with myocardial infarction acute according to the time of measurement is given.

Graphic 1. Performance of average values of troponin T according to time.



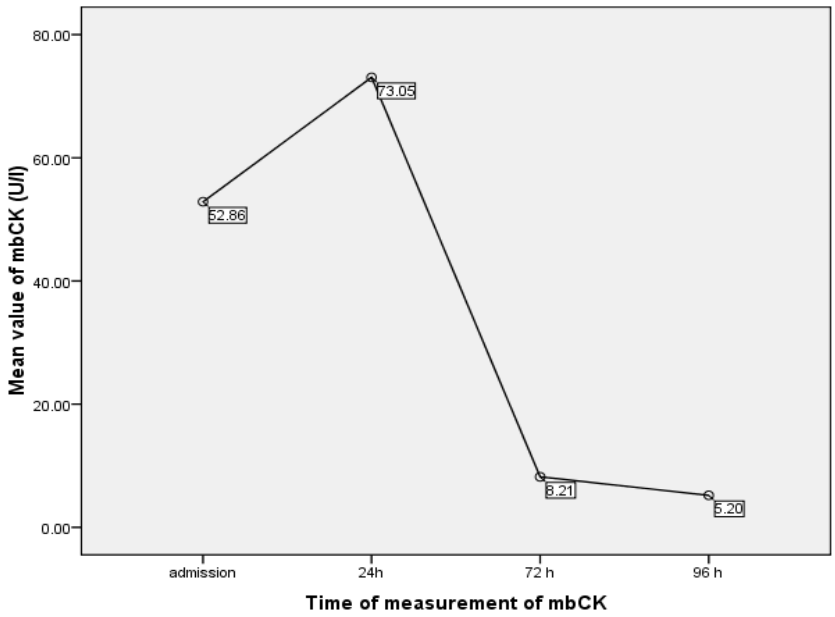
After a significant rise of the troponin T values within the first day, there is a significant decrease in the sixth day and it reached normal values on the tenth day(inANOVA; $p<0.05$).

Graphic 2. Performance of average troponin I values according time.



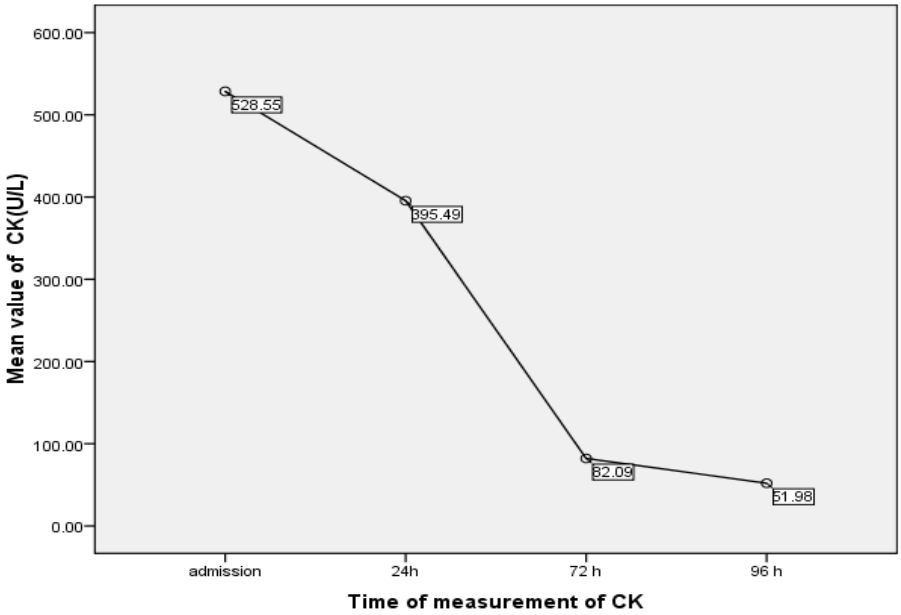
Even for troponin I, a significant rise of the average values from 0.24 ng/dl to 2.47 ng/dl during the first 24 hours and after there is a reduction that is more sensitive during the first day to seventh day and less from seventh day to tenth day and there is a normalization of the values in the 14th day. The performance of troponin I values according to the days is significant in ANOVA post hoc test Bonferroni ($p<0.05$).

Graphic 3. The performance of average values of mbCK according time.



During the first 24 hours, there is a rise of the cardiac enzymes values mbCK, but in the following days there is a decrease of the average values until its normalization in the fourth day. From the statistics view, this change of values of mbCK is significant (ANOVA $p<0.05$).

Graphic 4. The performance of average values of CK according time.



Apart from other cardiac enzymes, the values of CK do not rise during the performance of the myocardial infarction. They decrease and normalize within the third day of the hospitalization. The decrease of the values of CK from one measurement to the other is significant for the statistics.

In the first table, it is shown the average of cardiac enzymes according to the type of the pain (atypical or typical).For all cardiac enzymes taken in the study, there isn't significant changes in the average values according the type of pain (t test $p>0.05$).

Table 1. The average of cardiac enzymes in the moment of hospitalization according to the type of pain.

	Type of pain		
	Typical	Atypical	
	Average+SD	Average +SD	P value*
CK (U/L)	518.5 +230	599.88+273	0.202
Troponin T (ng/dl)	0.135+0.115	0.1812+0.09	0.1
Troponin I (ng/dl)	0.23675+0.15	0.29+0.14	0.16
mbCK (U/L)	52+18	61.8+24.5	0.09

**t test*
$p<0.05$ is considered significant

The average values of the cardiac enzymes in the moment of hospitalization are significant smaller in patients that have the duration of the pain less than six hours (see table 2).

Table 2. The average of cardiac enzymes in the moment of hospitalization according to the pain.

	Pain duration		
	Less than 6 hours	More than 6 hours	
	Average+SD	Average+SD	p value*
CK (U/L)	478.8+219.8	709.5+240	0.001
Troponin T (ng/dl)	0.135+0.114	0.191+0.09	0.048
Troponin I (ng/dl)	0.231+0.15	0.316+0.10	0.033
MbCK (U/L)	49.6+18.9	70.8+19.9	0.001

**t test*
p<0.05 is considered significant

Tabela 3. The average of the cardiac enzymes in the moment of hospitalization according the size of the myocardial infarction.

	Infarction size		
	Wide	Small	
	average+SD	average+SD	p value*
CK (U/L)	729.5+221.9	451.35+205.5	0.001
Troponin T (ng/dl)	0.233+0.137	0.108+0.06	0.T001
Troponin I (ng/dl)	0.346+0.14	0.20+0.12	0.001
MbCK (U/L)	72.8+20.1	47.02+16	0.001

**t test*
p<0.05 is considered significant

Patients with myocardial infarction acute with a wide lesion, the average values of cardiac enzymes are significant higher than in patients who have had a myocardial infarction acute in smaller sizes (p<0.05 në t test).

Table 4. The average of cardiac enzymes in the moment of hospitalization according to the location of the myocardial infarction.

	Location			
	Anterior	Inferior	Other	P value*
	Average+SD	Average+SD	Average+SD	
CK (U/L)	605+257	531.1+239.4	335+145	0.104
Troponin T (ng/dl)	0.17+0.09	0.149+0.12	0.08+0.02	0.393
Troponin I (ng/dl)	0.291+0.15	0.24+0.15	0.16+0.05	0.18
MbCK (U/L)	61.1+24	53.7+18.1	43.2+27	0.193

**anova*
p<0.05 is considered significant

Apart from the location of the myocardial infarction, anterior, posterior or other, the average values of the cardiac enzymes do not have significant changes between location (p>0.05 in ANOVA) (see Table 4).

Table 5. The average of cardiac enzymes in the moment of hospitalization according to the pain lasting.

	Pain lasting		
	Lasting	Not lasting	P value*
	Average+SD	Average+SD	
CK (U/L)	584.5+252	494.2+237.7	0.157
Troponin T (ng/dl)	0.167+0.128	0.126+0.062	0.112
Troponin I (ng/dl)	0.28+0.16	0.21+0.108	0.051
MbCK (U/L)	59.15+21	51.3+21.6	0.157

**t test*
$p<0.05$ is considered significant

In table 5 are shown the values of cardiac enzymes in the moment of hospitalization according to the lasting of the pain. Patients that had a lasting pain had higher values of the cardiac enzymes then patients that reported not lasting pain, but for statistics these changes are not significant ($p>0.05$ in t test).

Discussion and conclusion

Through the tracking cardiac enzymes of the lesion location in the cardiac muscle, troponin I and T and also CK-MB are cardiac enzymes that reach their peak within 24 hours from the hospitalization, while CK is an enzyme that within 24 hours is considerably reduced from the initial values in the moment of hospitalization of the patients.So, these three enzymes are the significant markers that show the myocardial infarction location even 24 hours after the infarction occurrence, while CK could not be used as a marker for the infarction location after 96 hours. Our study conclusion are in accordance with other studies performed in this field concluding that troponin I, T and CK-MB are some significant markers for the myocardial infarction location (3, 4, 5).

Troponin T and I are cardiac enzymes that need more time to come back at their normal values than CK and CK-MB and for this reason, troponin T and I could be the markers that show the location of the myocardial infarction even after one week.

Only a combination of the cardiac enzymes values in the moment of hospitalization could orientate the location of AMI. The conclusions of our study are comparable with other studies performed in this field that emphasize the values of the cardiac markers in the definition of the infarction time occurrence (3, 4, 5).

Cardiac enzymes are a precise mirror of the clinic situation and the short term of myocardial infarction history until the hospitalization of the patient, and also to highlight the results in the patients that have an wide infarction size the values of the cardiac enzymes are higher compared with the patients who have a small infarction lesion size.

Patients who have a typical or atypical pain have the same average values of the cardiac enzymes, which means that the type of the pain does not define the lesion size.

It is the pain duration that is accompanied with the high values of the cardiac enzymes. This is explained that the more time the patients have passed with the pain or have started the infarction process, the higher the risk of the cardiac tissue affection and consequently is accompanied with a high level of cardiac enzymes such as troponin I, T, CK and mbCK. This is consistent and with the result of comparative the values of

the cardiac enzymes according to the lesion size, the bigger the lesion, the higher the level of the cardiac enzymes (4, 6, 7, 11, 9).

The higher the cardiac enzymes values in the moment of hospitalization the poorer the long term prognosis of the patients with AMI, because the higher values of the enzymes are closely connected in the present of a wide lesion, this resulting in showing in the medical centers after a considerable time that worsen the long term prognosis of the AMI patients. This could be explained even with the fact that the patients with atypical pain came even later neglecting such a pain (8, 10).

As a conclusion, cardiac enzymes should be valuated together to better orientate in terms of AMI location. The higher values of the cardiac enzymes found in the patients with the duration of the pain with more than six hours and a wide lesion of myocardial infarction, define these patients as a risker group for unfavorable results.

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