ORIGINAL ARTICLE

Alteration of serum myoglobin levels in AMI patients

Akshya Purohit

Department of General Medicine, Gold Field Institute of Medical Sciences & Research, Faridabad, Haryana, India

ABSTRACT:
Background: The present study was conducted for assessing alteration of serum myoglobin levels in AMI patients.**Materials & methods:**A total of 50 AMI patients were enrolled. Complete demographic and clinical details of all the patients was obtained. In addition to standard diagnostic procedures (e.g., history, physical examination, ECG), patients agreed to providing additional experimental blood samples, which were collected from patients upon arrival and then 1 and 2 hours later. Serum blood samples were obtained from all the patients. Enzyme-linked fluorescent immunoassay was used for evaluation of serum myoglobin levels. All chemical reagents are included in a self-contained, unit dose test module. All samples were collected in the emergency department.**Results:**Mean myoglobin levels at 0-hour, 1 hour and 2 hours on admission was 133.5 ng/mL, 141.8 mg/mL and 113.9 mg/mL respectively. Mean alteration of mean myoglobin levels at 1 hour and 2 hours was 6.21 percent, and 114.68 percent respectively. **Conclusion:**Myoglobin level determinations isa sensitive test to detect acute myocardial infarction during the first 2 hours of a patient's stay.
Key words: Serum Myoglobin, Acute myocardial infarction

Corresponding author: Akshya Purohit, Department of General Medicine, Gold Field Institute of Medical Sciences & Research, Faridabad, Haryana, India

INTRODUCTION

The term acute coronary syndrome (ACS) refers to any group of clinical symptoms compatible with acute myocardial ischemia and covers the spectrum of clinical conditions ranging from unstable angina (UA) to non—ST-segment elevation myocardial infarction (NSTEMI) to ST-segment elevation myocardial infarction (STEMI).[1, 2]It was shown in 1975 that myoglobin is released into the circulation soon after the onset of acute myocardial infarction (AMI), identifying myoglobin as a potential serum marker for the diagnosis of AMI. Myoglobin, a small 17.8-kD single-heme protein, appears in the peripheral blood earlier than other markers such as the creatine kinase MB isoenzyme (CK-MB) or cardiac troponin T (cTnT). Myoglobin is not specific for cardiac tissue, as it is also present in skeletal muscle. Several reports have shown that myoglobin is more sensitive than total creatine kinase (CK), CK-MB, or troponin T for the early detection of AMI, although others have found equivalent sensitivities.[3- 5] Hence; the present study was conducted for assessing alteration of serum myoglobin levels in AMI patients

MATERIALS & METHODS

The present study was conducted for assessing alteration of serum myoglobin levels in AMI patients.

A total of 50 AMI patients were enrolled. Complete demographic and clinical details of all the patients was obtained. In addition to standard diagnostic procedures (e.g., history, physical examination, ECG), patients agreed to providing additional experimental blood samples, which were collected from patients upon arrival and then 1 and 2 hours later. Serum blood samples were obtained from all the patients. Enzyme-linked fluorescent immunoassay was used for evaluation of serum myoglobin levels. All chemical reagents are included in a self-contained, unitdose test module. All samples were collected in the emergency department. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

A total of 50 AMI patients were evaluated. Majority of the patients belonged to the age group of more than 40 years. Mean age of the patients was 51.7 years. 62 percent of the patients were males. Mean myoglobin levels at 0 hour, 1 hour and 2 hours on admission was 133.5 ng/mL, 141.8 mg/mL and 113.9 mg/mL respectively. Mean alteration of mean myoglobin levels at 1 hour and 2 hours was 6.21 percent, and 114.68 percent respectively.

Table 1: Demographic data

Variable		Number	Percentage
Age group (years)	Less than 40	12	24
	40 to 50	20	40
	More than 60	18	36

Gender	Males	31	62
	Females	19	38

Table 2: Alteration in serum myoglobin levels

Time interval	Mean myoglobin levels (ng/mL)	Percentage change in comparison to baseline (0 Hours)
0 hour	133.5	-
1 hour	141.8	6.21 %
2 hours	113.9	114.68 %

DISCUSSION

Acute myocardial infarction (AMI) is a major cause of morbidity and mortality worldwide. The burden of AMI can be substantial if the individual is relatively young as they are commonly breadwinners of the family and in the prime of their working life with significant contributions to the society. Several studieshave described the clinical profiles and outcomes of young adults with AMI and its incidence ranged between 2% and 10%. In general, young patients are more likely to be male, have a history of smoking and hyperlipidemia but less likely to have other co-morbidities and demonstrate less extensive coronary artery disease (CAD) on coronary angiogram.[8-11]

A total of 50 AMI patients were evaluated. Majority of the patients belonged to the age group of more than 40 years. Mean age of the patients was 51.7 years. 62 percent of the patients were males. Mean myoglobin levels at 0 hour, 1 hour and 2 hours on admission was 133.5 ng/mL, 141.8 mg/mL and 113.9 mg/mL respectively. Mean alteration of mean myoglobin levels at 1 hour and 2 hours was 6.21 percent, and 114.68 percent respectively. In a study conducted by McComb JM et al, on 35 patients with a definite or possible myocardial infarction seen within the first 5 h of the onset of symptoms and who could clearly define the onset of symptoms, the serum myoglobin was raised in 20% of those in whom blood was sampled within 1 h of the acute event. In 11 of the 35 (31%) patients the serum myoglobin was normal in the first blood sample. Of the nine patients seen within the first 2 h of the onset of symptoms who had frequent samples taken, the first raised serum myoglobin was recorded from 45 min to 3 h 15 min after the onset of symptoms. The serum levels started to rise 15-20 min before levels greater than 85 ng/mL were reached. In the absence of further chest pain more than one peak in serum myoglobin was recorded in 58% of the patients with acute myocardial infarction. The serum myoglobin level returned to normal within 24 h of the onset of symptoms in 44% of patients and within 36 h in 67%.[12]The reliability of serum myoglobin as a marker for acute myocardial infarction was evaluated in 157 consecutive coronary-care admissions in a previous study conducted by Witherspoon et al. Admission myoglobin was elevated in 47 of 52 patients with acute infarction. Excluding those patients who presented later than 24 hr after symptom onset, only one patient with acute infarct had a normal admission myoglobin. In 22 of 105 patients with no infarct, myoglobin was elevated in association with angina, congestive heart failure, arrhythmias, and renal insufficiency. The detection of acute infarction by serum myoglobin measurement equals that of serial serum creatine phosphokinase isoenzymes (CPK-MB) by electrophoresis, but an elevated myoglobin is not specific for what is now considered clinically significant myocardial infarction.[13]

A total of 817 consecutive patients who were examined in the emergency department for possible AMI were studied in a study conducted by Sallach SM et al. In patients whose electrocardiograms were nondiagnostic, we measured levels of myoglobin and cardiac troponin I at presentation, at 90 minutes, and at 3 and 9 hours. Patients whose initial levels of myoglobin (<200 ng/ml) and cardiac troponin I (<0.4 ng/ml) were normal underwent receiver-operating characteristic curve analysis to determine the best cutpoint for a myoglobin increase from 0 to 90 minutes. Overall, 75 patients (9%) were diagnosed with AMI, including 27 patients with normal cardiac levels of troponin I at presentation. An increase of 20 ng/ml of myoglobin from 0 to 90 minutes provided maximal diagnostic utility in patients who did not have increased levels of myoglobin or cardiac troponin I at presentation. In the absence of an increased level of cardiac troponin I or myoglobin at presentation in the emergency department, a change >or=20 ng/ml of myoglobin at 90 minutes produced 83.3% sensitivity, 88.6% specificity, and 99.5% negative predictive value for AMI.[14]Davis CP et al determined the sensitivity and specificity of a new myoglobin assay for acute myocardial infarction (AMI), considering both the total amount of serum myoglobin and its percentage change over 2 hours.Myoglobin testing was performed at presentation (time 0) and at 1 and 2 hours after arrival. A myoglobin level > 100 micrograms/L (ng/mL) or a change > or = 50% from baseline (increase or decrease) any time during the 2-hour period was considered positive. The sensitivity of the myoglobin technique for detection of AMI in the first hours in the ED was 13/14. The 1 patient who had a false-negative test had evidence of AMI on the ECG and an initially abnormal creatine kinase-MB (CK-MB) assay. The specificity was 22/28. However, of the 6 patients who had "false-positive" myoglobin tests, all had serious illness: significant cardiac disease, in-hospital death, or deep venous thrombosis.Myoglobin level determinations are sensitive tests to detect AMI during

the first 2 hours of a patient's stay in the ED and may complement current clinical tools.[15]

CONCLUSION

Myoglobin level determinations isa sensitive test to detect acute myocardial infarction during the first 2 hours of a patient's stay.

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