

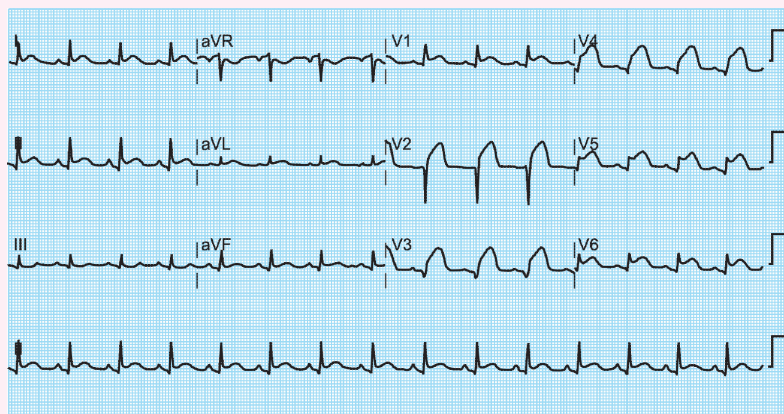
Myocardial Infarction and Enzyme Marker

A 56-year-old chronic smoker for past 30 years who is a lawyer by profession presents with heaviness in chest with pain on left upper limb for past 12 hours. He is known hypertensive on regular antihypertensive medication. He is not a known diabetic.



Male presenting with chest pain

ECG was done immediately which showed significant **ST segment elevation** in I, II and V1 to V6 leads



ECG finding

Following are the results of various laboratory investigations:

Troponin T = 134 ng/ml (normal = <5 ng/ml)

Troponin I = 240 ng/ml (normal <0.04 ng/ml)

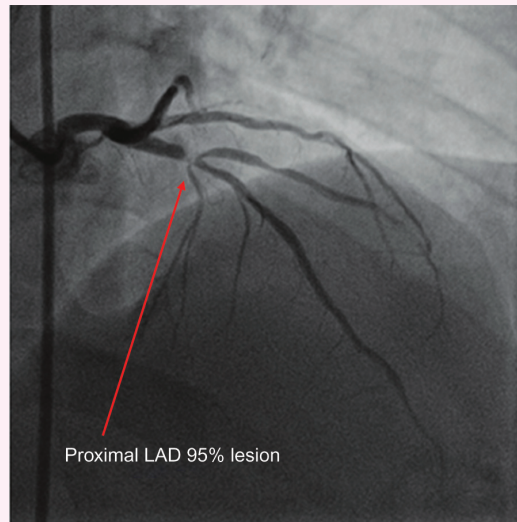
CPK-Total = 2000 IU/L (normal = 40–300 IU/L)

CPK-MB = 340 IU/L (normal 5–25 IU/L)

AST = 765 IU/L (normal = 15–45 IU/L)

LDH = 323 IU/L (normal = 140–280 IU/L)

Angiography revealed **95% block** in proximal portion of **left anterior descending (LAD)** artery.

**QUESTIONS**

Q.1. What may be the diagnosis in the above case?

Q.2. What is angina?

Q.3. What are the various enzymes and nonenzymatic markers for assessment of MI which can be assessed to diagnose and monitor MI? What is time of their appearance, peak and persistence in the plasma?

Q.4. Why troponin is more specific for MI? Which troponin is better for detection of MI: Troponin T or Troponin I?

Q.5. Name the enzyme/s which may be used for treatment in such cases.

Q.6. What are the risk factors for myocardial infarction?

Explanations

Ans.1. The clinical presentation and biochemical finding in this case suggest that this patient is suffering with myocardial infarction. MI is the condition when cardiac myocyte **undergoes necrosis*** due to lack of blood supply to those cells.

Ans.2. Angina is often described as a **burning or compression sensation located in the precordial region** or any other region of the chest, radiating to the neck, shoulder

and left arm. It usually increases in intensity within minutes and may be accompanied by symptoms such as nausea and sweating. It can be triggered by physical or emotional stress and relieved by rest or use of nitrates.

Ans.3. There are various enzymes which are used in assessment of MI. They are:

CPK-total, CPK-MB, AST, LDH

Out of these, **AST and LDH** are nonspecific markers of MI as these enzymes are found in other cells also in addition to heart. They have a wide tissue distribution that significantly limits the specificity for myocardial necrosis.

CPK is enzyme which serves as carrier of high energy phosphate and has got three isoenzymes, namely CPK-BB, CPK-MB, CCPK-MM. Creatine kinase MB (CK-MB) is an isoenzyme of creatine kinase that is most abundant in the heart and should be assessed to rule in or rule out the myocardial infarction.

Nonenzymatic markers of MI are troponin T and troponin I and myoglobin.

Below mentioned graph is well representing the time of onset, peak and duration of persistence of various enzymes in a typical case of MI.

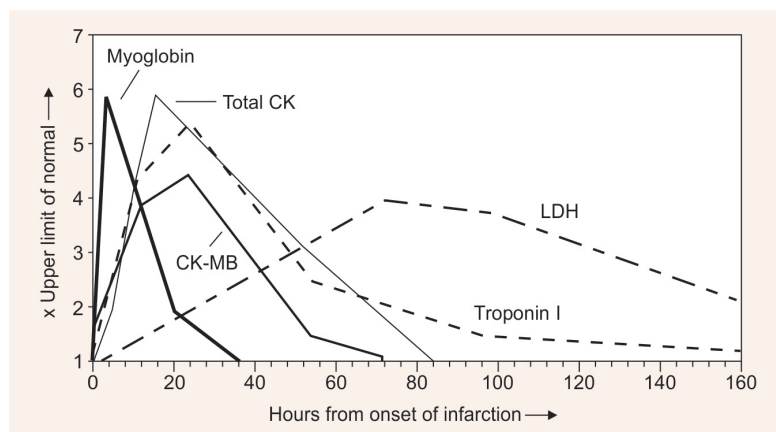


Fig. 1: Graphical representation of various enzymatic and nonenzymatic markers in case of MI

Ans.4. Troponin I is better than troponin T.

Ans.5. There are few enzymes which are being used as **thrombolytic agents** in such cases of MI. They are **streptokinase, urokinase**, etc.

Ans.6. Important risk factors for myocardial infarction are: Dyslipidemia, male gender, diabetes mellitus, hypertension, smoking, sedentary lifestyle, advanced age.

Bibliography

1. <https://www.emra.org/emresident/article/acute-mi-case-report/>
2. Ribeiro WN, Yamada AT, Benvenuti LA. Case 4/2014—A 66-year-old man with acute myocardial infarction and death in asystole after primary coronary angioplasty. Arq Bras Cardiol. 2014 Sep;103(3):e31–6. doi: 10.5935/abc.20140129. PMID: 25317943; PMCID: PMC4193075.

Word Meaning

Necrosis: Cell death.