Incidence of positive troponin test in patients with clinical suspicion of ACS without significant ECG changes

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Abstract

Abstract: Elevated troponin levels on a high-sensitivity cardiac troponin test indicate heart muscle damage or a heart attack. The normal value for a high-sensitivity cardiac troponin T test is 14 ng/L. Therefore, when a high-sensitivity cardiac troponin T test detects levels above 14 ng/L, heart damage or a heart attack is likely.

Objectives: The aim of this study was to examine troponin testing patterns at the Emergency Medicine Clinic of the University Clinical Hospital in Sarajevo for the months of October and November 2024 and to determine the impact of elevated values on further hospital treatment of the patient.

Methods: This retrospective study analyzed the medical records of all adult patients who underwent troponin testing at the Emergency Medicine Clinic of the University Clinical Hospital in Sarajevo during the months of October and November 2024. Patients who had ST-elevation myocardial infarction were excluded from the study.

Results: A total of 4000 patients were at the Emergency Medicine Clinic in the internal medicine ambulance in October and November, of which troponin tests were ordered for 246 (6.5%) patients. The majority of patients had negative troponin test results 3754 (93.85%).

Chest pain, palpitations, and shortness of breath were the most common complaints in those with positive troponin results.

Overall, only 28.2% of those with positive troponin test results had a definitive diagnosis related to heart disease, such as heart failure, acute coronary syndrome (ACS), atrial fibrillation, or other types of arrhythmia.

Conclusion: A positive troponin test was associated with increased hospitalizations, however, only a small proportion of these patients had a definitive diagnosis related to heart disease. Guidelines should be provided to ensure that troponin testing is performed only in cases where ACS is suspected.

Key words: *troponin test, acute coronary syndrome, heart diseases*

Introduction

Chest pain is one of the most common reasons for emergency department visits. Because there are many causes of chest pain, the emergency room physician has a responsibility to rule out potentially dangerous and serious conditions, such as myocardial infarction, aortic dissection, or pulmonary embolism. Necessary diagnostic tests include a detailed patient history and physical examination, chest X-ray, 12-lead electrocardiography (ECG), and blood tests for biomarkers of myocardial injury. Of these, the most widely used and validated biomarkers for detecting cardiac cellular injury are cardiac high-sensitivity troponins T and I (cTn-I) because they have high sensitivity and specificity for myocardial injury.

The troponin (T-test) is performed at the KCUS Emergency Medicine Clinic. The normal value for the high-sensitivity cardiac troponin T test (hs-cTnT) is up to 14 ng/L. However, because the troponin test is very sensitive, an inevitable number of false-positive results can be expected. Since the main reason for cardiac troponin testing is to rule out acute coronary syndrome (ACS), it is essential that troponin is checked only in circumstances where ischemic heart disease is highly likely and ACS is suspected. This study therefore aimed to review troponin testing patterns among patients presenting to the Emergency Medicine Clinic and to examine whether elevated troponin test values correlate with further hospital treatment.

Methods

This retrospective study included all patients aged ≥18 years who underwent troponin testing after admission to the Emergency Medicine Clinic in October and November 2024. Patients who had ST-elevation MI (STEMI) were excluded. Patient data were collected from the hospital's electronic medical records. Troponin levels were considered positive at ≥14 ng/L and negative at <14 ng/L. Patients' presenting complaints were classified as cardiac or non-cardiac, with cardiac complaints including chest pain, palpitations, shortness of breath, and epigastric pain. Epigastric pain was included as a cardiac symptom because it is potentially indicative of an atypical presentation of angina.

Each patient's final diagnosis was categorized as cardiac or noncardiac, with cardiac diagnoses including heart failure, ACS, atrial fibrillation, or other forms of arrhythmia.

Results

During the research period, a total of 4,000 patients were examined in the internist clinic of the KUM. Of these, 246 adult patients underwent cTnT testing. Patients who had confirmed STEMI on ECG were excluded from the analysis. The average age of the patients was 56.6 ± 16.7 years.

A total of 246 patients (6.15%) had cardiac symptoms. In relation to gender, 132 (53.3%) patients were men and 114 (46.7%) patients were women. Of these, chest pain was the most common, followed by shortness of breath, epigastric pain and palpitations. Interestingly, a large proportion of patients (n = 3754; 93.85%) did not have any cardiac symptoms. Overall, only 65 (26.0%) of those with cardiac symptoms had initial positive troponin test results.
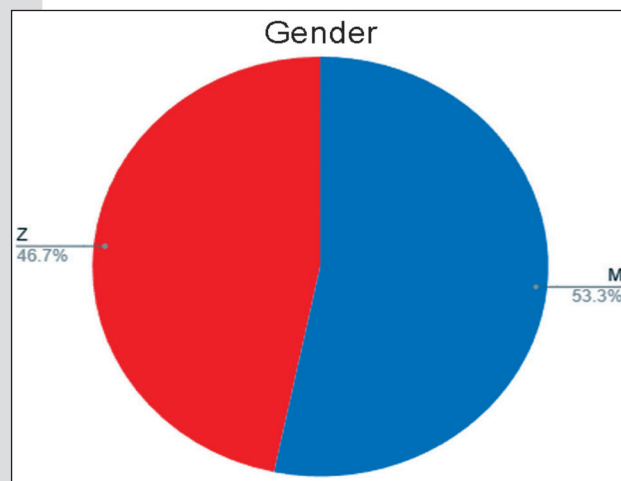

Figure 1. *Presentation of patients in relation to age and gender*

Regarding treatment, 212 patients (86.1%) did not have a repeated troponin test, and 34 (13.9%) underwent at least one repeated troponin test.
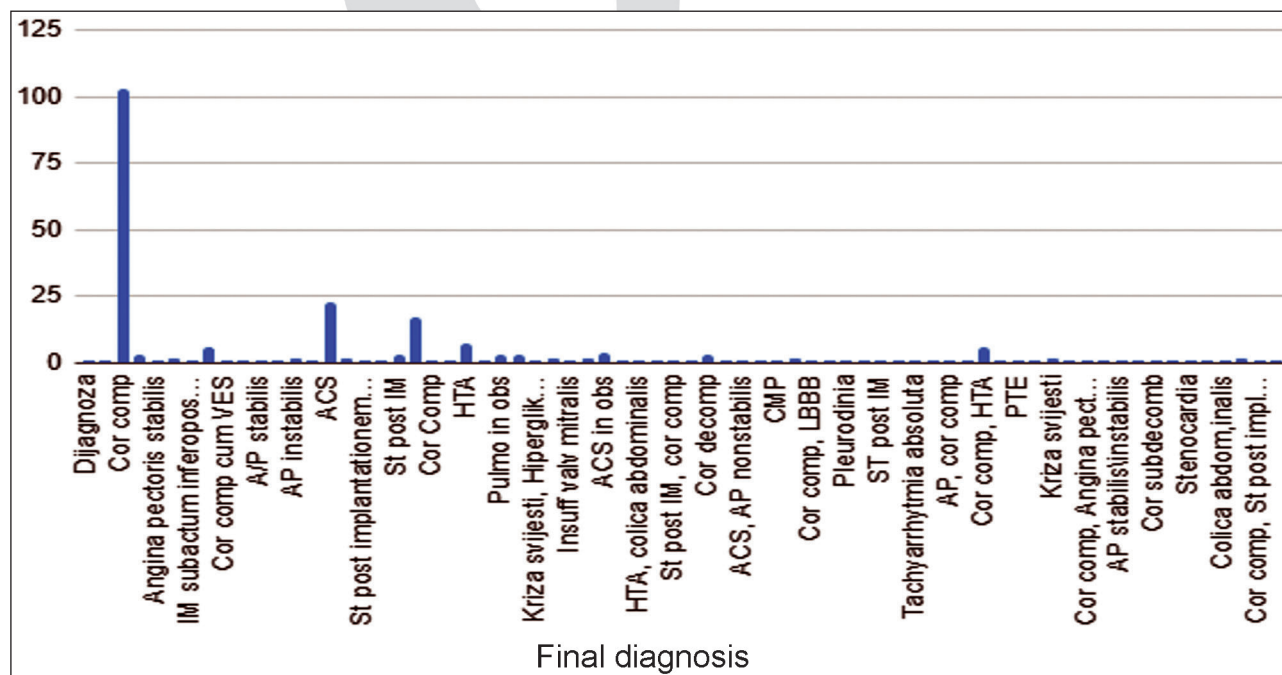

Figure 2. *Presentation of patients with the result of the tropnin test in relation to the final diagnosis*

Only 30 (12.0%) patients with a positive troponin test were referred to a cardiologist, i.e. 10 (9.1%) patients underwent ACS treatment.

A total of 97 patients (39.5%) had a final diagnosis related to heart disease, of which 36 patients (15.1%) had positive troponin tests, as shown in Figure 2. Patients were referred for further hospital treatment under different diagnoses, the most common of which was ACS.
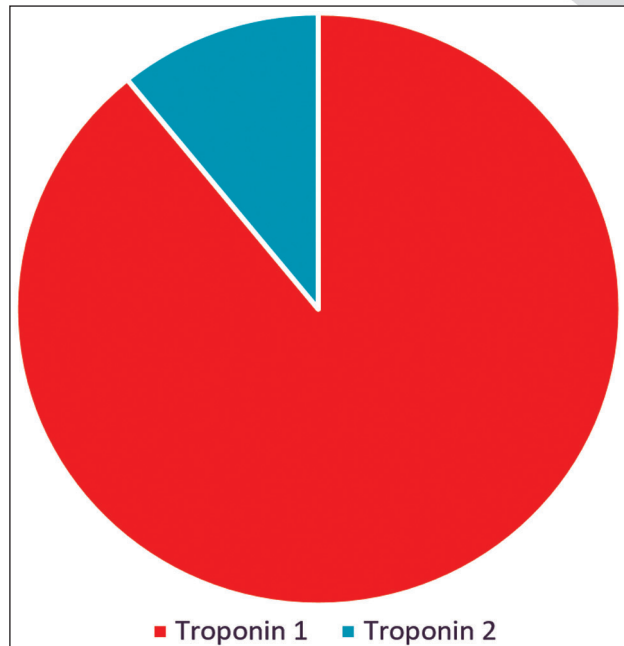

Figure 3. Positive troponin findings (n = 30) Negative troponin findings (n = 216)

Discussion

Although the results showed that cardiac troponin testing was performed mainly for patients with chest pain or in cases where ACS was suspected, it was also occasionally requested for patients with non-cardiac symptoms. It is possible that the attending physician in those cases requested troponin testing because he believed that the patient's presentation could be the result of an atypical manifestation of ACS.

Although troponin tests are widely available, not all hospitals have clear guidelines or protocols on when to request a troponin test, which may inadvertently lead to inappropriate use of this diagnostic test.

Although troponin tests are mainly used to diagnose ACS, troponin levels can also be elevated in other cardiac conditions such as heart failure,

tachyarrhythmias and post-cardiac arrest as well as non-cardiac conditions such as cerebrovascular insults, head injuries, sepsis and pulmonary embolism.

In these circumstances, a troponin test should only be performed if there is a strong suspicion of ACS - such as previous chest pain or ECG changes - since a positive result can be misleading.

Interestingly, although 97 patients in the current study had final cardiac-related diagnoses, only eight of these patients (8.2%) had a diagnosis of ACS.

As expected, patients with positive troponin test results in this study had a significantly longer hospital stay than those with negative findings.

These patients were also significantly more likely to be treated for ACS, referred to a cardiologist, and underwent angiography.

However, only 13.8% of patients with positive troponin findings were referred to cardiologists; it is likely that the remaining 86.2% of patients were not considered to have significant heart disease and were therefore not referred. In these cases, it is unclear why a troponin test was requested if such patients were not subsequently referred to a cardiologist despite elevated troponin levels.

If ACS is suspected and the initial troponin test result is negative, it is recommended that the test be repeated within six hours to completely rule out MI and improve diagnostic accuracy.

However, in the current sample, only a small number of patients underwent a second test, and this proportion was even smaller among those with an initial negative result.

Overall, the results of the current study confirm the results of similar studies conducted in other parts of the world. Such findings highlight the need for appropriate emergency department guidelines and protocols for requesting troponin testing. For economic reasons, it is prudent to limit such requests for unnecessary tests, thereby reducing unnecessary hospital stays and admissions.

This study was subject to certain limitations due to its retrospective nature and the method of data collection using patient records and a hospital information system (BIS). Final cardiac diagnoses were not subcategorized by specific condition as this was beyond the scope of this study; the focus of the analysis was to determine the pattern of requests for cTn-I testing rather than to study the prevalence of individual cardiac conditions.

Conclusion

In the current study, it was shown that a large number of patients visiting the Emergency Department underwent troponin testing despite not having cardiac symptoms. Only a small proportion of patients with initial positive troponin test results received a definitive cardiac-related diagnosis after discharge. Such unnecessary testing may lead to prolonged patient stays and unnecessary referral to the cardiology department. Therefore, hospital protocols regarding the appropriate use of troponin testing are needed to guide emergency physicians for triage.

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