

Clinical Significance Of Borderline Cardiac Troponin (cTnI) In Patients Presenting With Acute Coronary Syndrome Who Are Referred For Cardiac Catheterization

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Citation

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Abstract

Background: Given the heterogeneity of troponin values and cut-off points, it is not clear what magnitude of troponin elevation is essential for decision-making. Borderline troponin values are particularly challenging for physicians needing to triage patients. This study was designed to evaluate the clinical significance of borderline cardiac troponin (cTnI) in patients presenting with acute coronary syndrome who are referred for cardiac catheterization.

Methods: The study population was derived from patients presenting to the Newark Beth Israel Medical Center (Newark, New Jersey) emergency room, who were admitted to telemetry/critical care unit and who subsequently went for cardiac catheterization. A fraction of these patients (total 865) had simultaneously collected samples of CK-MB and cTnI. Post hoc analysis of prospectively gathered clinical and laboratory data was tabulated on these patients. Patients with borderline cTnI values (0.5-2.0 ng/ml) were the focus of this analysis. In our institution the normal range for cTnI is 0-1.5 ng/ml.

Results: Fifty patients met the above criteria. 37/50 (74%) had significant coronary artery disease. 13(26%) patients had luminal irregularities; coronary artery disease that was clear-cut but nonobstructive. Zero patients had smooth, normal coronary arteries.

Conclusion: Patients with high clinical index for coronary artery disease, who are referred for cardiac catheterization and have a borderline elevation in cTnI, have a strong likelihood of coronary artery disease.

INTRODUCTION

Cardiac troponin I (cTnI) and T (cTnT) are very specific for myocardial injury and are excellent predictors of future myocardial infarctions in patients with acute coronary syndrome.^[1,2] The advent of enzyme-linked immunoassays specific for cTnI and cTnT has allowed for the early identification of patients with myocardial injury and the early exclusion of patients with false positive elevation in creatine kinase (CK) and CK-MB fraction. Moreover, serum levels of cardiac enzymes have become an essential part of our routine management of patients presenting with chest pain. Clinical studies have demonstrated the clinical utility and the prognostic value of significant elevation in

cTnT. ^[3] However, the relationship between borderline elevations of cardiac troponins cTnI and the presence of

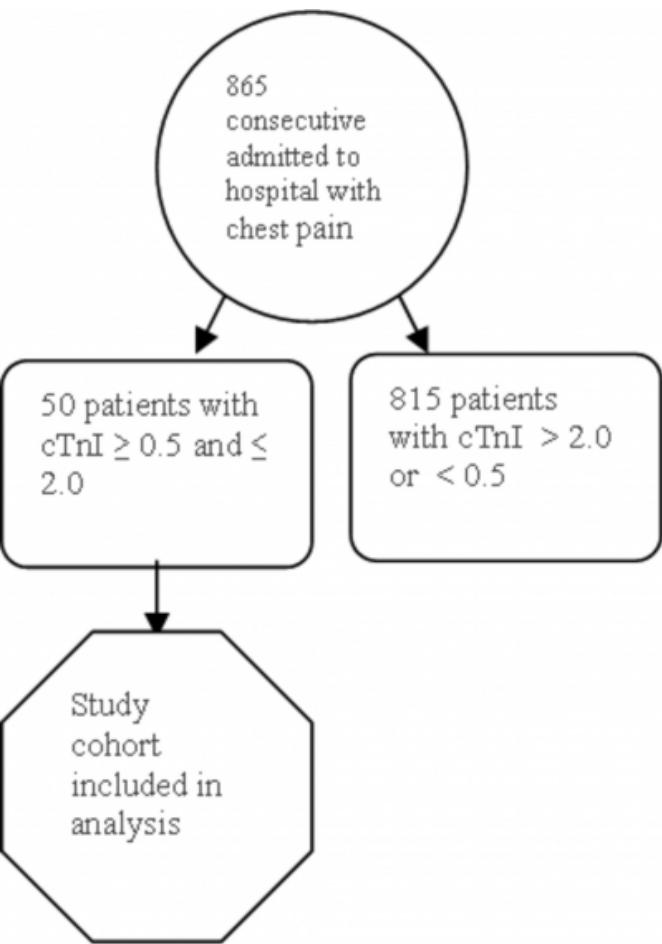
significant coronary artery disease (CAD) has not been fully established. This study was undertaken to describe the angiographic presence of significant CAD in those with borderline cTnI elevation, who are referred for cardiac catheterization.

MATERIALS AND METHODS

The study group was derived from patients presenting to the Newark Beth Israel Medical Center's (Newark, New Jersey) emergency room, who were admitted to telemetry/critical care unit and who subsequently went for cardiac catheterization, between January 2000 and October 2002. A fraction of these patients (total 865) had simultaneously collected samples of CK-MB and cTnI. Post hoc analysis of prospectively gathered clinical and laboratory data was tabulated on these patients. Borderline elevation in cTnI was

defined as any elevation in cTnI ≥ 0.5 and ≤ 2.0 (normal 0-1.5 ng/ml). Measurements were conducted by our hospital's clinical laboratory using Dade Behring's dimension RxL analyzer. Cine angiographic films were then analyzed. Significant CAD was defined as a vessel narrowing of $\geq 50\%$. Diagram 1.

Figure 1
Diagram 1



RESULTS

A total of 50 patients had borderline elevation in cTnI their clinical characteristics are compared in table 1.

Figure 2

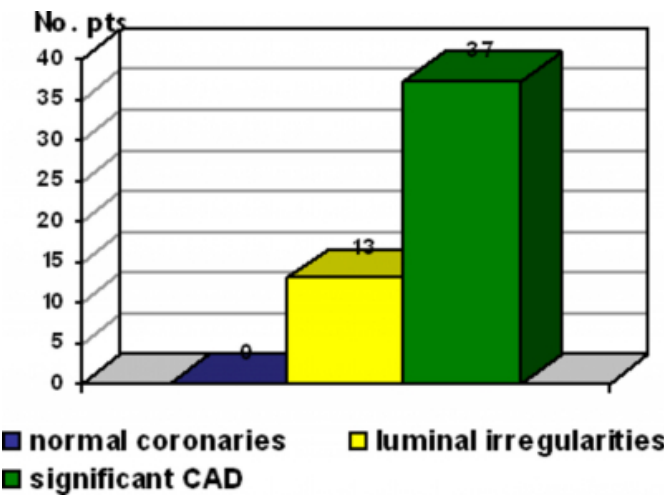


Figure 3
Table 1: Clinical characteristics

Age (years)	62 ±15
Male	61%
Comorbidities:	
Diabetes	33%
Hypertension	60%
Hemodialysis	3%
History of CVA	4%
PVD	11%
COPD	13%
History of CHF	25%
Obesity	18%

Among the 50 patients studied, 37 (74%) had significant coronary artery disease requiring percutaneous coronary intervention (PCI). 13 (26%) had luminal irregularities (coronary artery disease that was clear cut but non obstructive). Zero (0%) had normal smooth coronary arteries.

DISCUSSION

Cardiac troponins are specific for myocardial injury. They are elevated in acute coronary syndrome (ACS), myocardial trauma, myocarditis, myocardial drug toxicity, pulmonary embolism and drug induced coronary vasoconstriction.[3] Moreover, cTns are useful as prognostic indicators.[2,4,5,6]

The Global Use of Strategies to Open Occluded Coronary Arteries in Acute Coronary Syndromes (GUSTO II-a) trial showed that elevations in cTnT isoenzyme above 0.1 ng/ml was associated with higher mortality within 30 days (11.8% vs. 3.9%). [4] The Thrombolysis in Myocardial Ischaemia Phase IIIB (TIMI IIIB) study showed that cTnI levels above 0.4 ng/ml were associated with a significantly higher mortality within 42 days (3.7% vs. 1.0 %).[5]

The long term prognostic values of cTns were demonstrated by the Fragmin during Instability in Coronary Artery Disease (FRISC) trial. In this study the risk of death or myocardial infarction during five month follow up increased significantly with increasing levels of cTnT. [6]

Henrikson et al. [8] demonstrated that patients with marginal cTnT elevation are more likely to have adverse outcomes than those with undetectable cTnT levels. He also hypothesized that those with marginal troponin elevation may have active CAD resulting in the higher event rates than those without any elevation (15 % vs. 5%).[8]

Our study demonstrates that those with borderline elevated cTnI and who are referred for cardiac catheterization may have significant CAD requiring PCI. It is therefore suggested that patients with borderline elevated cTnI should undergo aggressive therapeutic strategies. Further studies are

needed to evaluate for morbidity and mortality in patients with borderline elevated cTnI.

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