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CORRELATION OF ANGIOGRAPHIC FINDINGS AND SYNTAX SCORE WITH HIGH SENSITIVITY TROFON IN PATIENTS PRESENTING WITH NON ST ELEVATION MYOCARDIAL INFARCTION

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ABSTRACT

Objective: This study was done to find out how angiographic findings including severity, site, type of lesion, calcification and based on these findings the Syntax Score were related to the level of cardiac Troponin-I (cTn-I) in patients of Non ST Elevation Myocardial Infarction.

Study Design: Cross sectional study.

Place and Duration of Study: Armed forces institute of Cardiology / National Institute of Health Sciences Rawalpindi Pakistan, from July 2016 to Dec 2016.

Material and Methods: A total of 120 patients were studied over a period of 6 months. They were divided into two groups according to High sensitivity Trop I levels; high / Group A (Troponin-I level >0.78ng / ml) and low Group B (Troponin-I 0.06–0.78 ng / ml). Thus 54 patients fell into Group A while 66 into Group B. The angiographic characteristics and Syntax Score of the two groups of patients were then compared.

Results: A total of 120 patients were studied. There were 86 (71.6%) males and 34 (28.3%) females with age range 29-77 years. cTnI was markedly raised in 59 (49%) patients i.e. Group A and lower in 61 (51%) i.e. Group B. High levels of cnT-I were related to number of vessels involved $p<0.001$. Three vessel involvement was higher 34 (57%) of Group A in comparison with group B 4 (6.5%). While more patients had single vessel involvement in Group B vs Group A i.e. 38 (62%) and 5(8.4%). Type A lesions were more common in Group A than Group B; 44(72%) vs 11(18%). Thrombus burden was higher in Group A, Calcification frequency was more in Group A than B; 73% vs 11% $p<0.001$ and Syntax Score was >32 in 52% of Group A and in 3% of Group B $p<0.05$. Proximal lesions were more frequent in Group A 33(55%) than Group B 26(42%) but the correlation was insignificant $p=0.48$.

Conclusion: Patients of Non-ST elevation Myocardial Infarctionwith raised serum Troponin-I had more severe coronary disease and higher Syntax Score than those with lower serum Troponin-I.

Keywords: Angiographic profile, Syntax Score, Troponin-I.

INTRODUCTION

Ischemic heart disease is the leading killer in the world[1,2]. More than 7 million patients suffer acute coronary syndromes annually a substantial number of which constitutes Non-ST ACS.With appropriate therapy the mortality reduced markedly in these patients.Early diagnosis is the key in management of these patients.

Cardiac troponins have superseded other biomarkers in terms of sensitivity. Since the inclusion of high sensitivity Trop I the patients could undergo testing well before other biomarkers are detectable in blood.A set of High sensitivity Trop I performed at 0 and 1 hour of presentation can rule in or rule out patients for Non ST Elevation ACS and help in taking early decisions at ER. Patients who have high risk features including raised cardiac biomarkers are subjected to Early Invasive approach with favorable results. Trop I levels have found to be correlating in terms of severity of Angiographic lesions[3].

In comparison to patients with ST Elevation patients presenting with Non ST Elevation M are known to have non obstructive plaque rupture and multi vessel involvement[3]. A recent report of

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American College of Cardiology National Cardiovascular Database Registry reported multivessel involvement in NSTEMI as high as 42%.New AHA and ESC guidelines now endorse Cardiac Trop I Hs a marker of prognostic significance and all patients with markedly raised levels are considered highrisk[4].

Fernandez and colleagues studied NSTEMI patients who underwent coronary angiography and stratified their study population into two groups based on the cardiac troponin I levels. They found patients with higher troponin I levels (> 10 folds ULN) had more three vessel CAD involvement (39%), *p*=0.001 on coronary angiography as compared to patients with troponin I levels<10 folds ULN[5].

It is essential to further adjudicate whether the degree of rise in troponin levels in the setting of NSTEMI equates with a greater proportion of such patients found to have severe multi-vessel CAD, proximal involvement of vessels and higher Syntax Score. This finding will have important therapeutic and prognostic implications as early identification of severe and extensive CAD and subsequent referral to early coronary revascularization would result in clinical benefit. It would also help in taking a guarded decision for early invasive approach if the levels are very high. This would also help to minimize the risk of major adverse cardiac events in the risky waiting period of initial medical therapy alone. To test this hypothesis, we sought to determine whether there is an association between cardiac troponin I levels and the disease severity in NSTEMI.

MATERIAL AND METHODS

We conducted a prospective, cross sectional study of 120 patients at AFIC/NIHD Rawalpindi admitted with the diagnosis of non-ST-elevation myocardial infarction between July 2016 to Dec 2016. Patients included had history of chest pain or discomfort within the past 48 hours of presentation or angina equivalent symptoms with or without ECG changes and a positive high sensitivity cardiac troponin I test, defined as a level above the upper limit of normal (0.06 ng/ml) at admission. Those whose levels were > 0.06ng/ml but less than 0.78 ng/ml were designated as high Hs Trop I and placed in Group A while those with >0.78 ng/ml were labelled very high Hs trop I and labelled Group B. The exclusion criteria included ST-segment elevation on electrocardiography (ECG) indicative of acute ST elevation myocardial infarction, pathologic Q waves, new or presumed new left bundle branch block or paced rhythm, previous history of coronary artery disease, prior coronary revascularization procedures either CABG or angioplasty or coronary stenting, renal insufficiency-serum creatinine >1.4 mg/dl (upper limit of normal), serious intercurrent disease and patients who refused to undergo coronary angiography during the hospitalization. Written informed consent was obtained in all cases for recruitment in the study and the procedures. Study protocol was approved by the ethical review committee of the hospital. NSTEMI was defined as positive biomarkers of myocardial necrosis (Troponin-I) with or without electrocardiographic ST-segment depression (>0.5 mm) or prominent T wave inversion in the absence of ST-segment elevation. All patients received standard medical therapy for NSTEMI. Blood samples for cardiac troponin I were immediately drawn in lithium heparin bottles upon presentation to the emergency room and a second sample was drawn 3 hours later after admission. Cardiac troponin I was determined using Advia Troponin (Seimens Laboratories). The 99th percentile was 0.06 ng/ml as described by the manufacturer. The assay was designed to have a precision <10% total coefficient of variation with 95% confidence. All assays were performed by technologists unaware of rest of the data.All recruited patients underwent invasive evaluation by coronary angiography within 72 hours of the same hospital admission. Diagnostic coronary angiography was performed via either the trans-femoral or trans-radial approach using standard techniques. Cine angiographic films were analyzed independently by two

experienced operators who had no knowledge of the patients' clinical information and cTnI status significant CAD was defined as >70% stenosis in any of the three major epicardial coronary arteries or a left main coronary artery stenosis >50. Angiograms revealing coronary artery stenosis <70% in major epicardial coronary arteries were termed as non-obstructive CAD. Extent of CAD was defined as significant single, two or three vessel CAD involvement. Other properties including calcification, thrombus burden, collateral circulation, location of the most severe stenosis and based on these findings the Syntax Score was calculated. A proforma was designed to record all the patient data including demographics and Angiographic characteristics. For each of comparison different variable were made into groups.

Statistical Analysis

The collected data were entered and analyzed by the Statistical Package for Social Sciences version 20.0 Software (SPSS v20). Chi-square test was used to evaluate the relation between cardiac troponin I levels and CAD extent, properties and Syntax Score in the two groups of cardiac troponin I. All significancetests were 2 sided, and the results were considered statistically significant when *p*-value<0.05.

RESULTS

A total of 120 patients were studied. There were 86 (71.6%) males and 34 (28.3%) femaleswith age range 29-77 years (fig). cTnI was markedly raised in 59 (49%) patientsi.e. group Aand lowerin 61 (51%) i.e. group B (table-I). High levels of cnT-I were related to number of vessels involved *p*<0.001. Three vessel involvement was higher 34 (57%) of group An in comparison with group B, 4 (6.5%) (table-I). While more patients had single vessel involvement in group BVs group Ai.e.38(62%) and 5(8.4%). Type A lesions were more common in group A than group B; 44(72%) vs 11(18%) (table-II). Thrombus burden was higher ingroupA, Calcification frequency was more in group A than B; 73% vs 11% *p*=0.001 and Syntax Score was >32 in 52% of group A and in 3% of group B *p*<0.05. Proximal lesions were more frequent in group A 33(55%) than group B 26(42%) but the correlation was insignificant *p*-value 0.48.

Figure: Frequency of gender among the patients.

Table-I: Syntax score relationship to high sensitivity (Hs) trop I.

S.No	Hs TROP I	Syntax score			
		<22	22-32	>32	Total
1.	Group-I	3	25	31	59
2.	Group-II	41	18	2	61
					120

Table-II: Vessel involvement in relation to high sensitivity (HS)trop I.

S.No	Hs TROP I	Number of vessels involved				Total
		One	Two	Three	None	
1.	Group-I	5	20	34	0	59
2.	Group-II	38	15	4	3	61
						120

DISCUSSION

A considerable number of patients with Non ST Elevation Myocardial Infarction will have to undergo catheterization with possible Percutaneous Coronary Intervention. Cardiac

specific troponins show small elevations above the ULN in small infarctions, eg. in NSTEMI compared with large infarctions characteristic of STEMI in which troponin levels can be more than 20-50 times ULN[6]. The degree of Trop I rise will help the treating physician in predicting the Coronary Anatomy of these patients. The present study provides insight into the association between the two cutoff levels of cardiac troponin I borderline raised and very high i.e >10 times greater in NSTEMI in terms of the number of epicardial vessels involved, characteristics of the plaque lesions and the Syntax Score.

The study demonstrated that among patients with raised cTnI levels but <10 folds ULN the disease severity will vary considerably if the cTnI levels are >10 folds.

57% of patients with markedly raised CnT-I had three vessel disease whereas the proportion of patients having single vessel disease was higher in the other group B i.e. 62% vs 8%. We found a statistically significant relationship between cTnI level >10 folds ULN and severely affected three vessels CAD. Thrombus burden was also higher and the complexity in lesion was also higher in patients with higher Trop Levels. This is in accordance to other regionally and globally conducted studies[7]. Several of which have identified a series of factors associated with elevated troponins in patients with NSTEACS[8]. As compared to patients with normal troponin values, patients having troponin-positive have more extensive coronary disease, as well as more severe and more complex culprit lesions with a higher incidence of thrombus[9,10,11]. In addition, patients with positive markers show more compromised flow (TIMI 0-1) in the artery causing the symptoms[12,13]. In a substudy of the FRISC II investigation assessing the potential mechanism for the prognostic capability of troponin, Lindaht et al found that patients with markedly elevated troponin had presented more severe initial electrocardiographic alterations and showed a higher incidence of visible thrombus and complete occlusion of the circumflex artery on coronary angiography[14].

Despite the presence of studies which have evaluated the association of troponins to angiographic findings of culprit lesion morphology in the setting of ACS, studies evaluating angiographic correlations in terms of the number of significantly narrowed coronary arteries and the exact incidence of multivessel CAD and Syntax Score with different cardiac troponin levels have been extremely limited in international literature. Qadir et al demonstrated a similar outcome in terms of number and the type if vessels involved with >10 fold raise in trop I levels[15].

Since the landmark SYNTAX (Synergy between PCI with Taxus and Cardiac Surgery) Trial comparing CABG with PCI in patients with complex coronary artery disease (unprotected left main or de novo three vessel disease), numerous validation studies have confirmed the clinical validity of the SYNTAX Score for identifying higher-risk subjects and aiding decision-making between CABG and PCI in a broad range of patient types. The SYNTAX Score is now advocated in both the European and US revascularization guidelines for decision-making between CABG and PCI as part of a SYNTAX-pioneered heart team approach. Patients who have high >32 Syntax score would benefit more from Surgical Intervention. The association of higher Syntax Score with markedly raised Trop I has been suggested. Our study shows that patients with >10 fold higher Trop I raise are more likely to have a higher Syntax Score i.e. 52% Vs 3% when the Trop was only marginally raised. This could help making an informed decision before taking the patient to Cath lab.

Many other studies have noted absence of CAD as an uncommon finding in patients undergoing coronary angiography for ACS[2]. Our study revealed that 3 (4.9%) patients with cTnI<10 folds ULN and none with the cTnI >0.78 ng/ml had a perfectly normal coronary angiogram. There were more females with normal coronary angiograms in the lower troponin I level group. The TACTICS-TIMI-18 sub study involving 895 patients revealed that in

patients who present with symptoms of ACS and have no critical epicardial CAD angiographically, the presence of an elevated troponin was still associated with an adverse prognosis[16]. The use of angiography provides an invasive approach to risk stratification.

Overall, the results of our study suggest that elevated troponin I levels are associated with a greater severity and extent of myocardial ischemic territory and lesion complexity during the index event of NSTEMI. The limitations of this study include that it represents a single institution experience. The severity and location of the coronary lesions was based on the operator visual estimation without quantitative or physiological evaluation, however inter-observer agreement between angiographic images was taken into account in order to minimize bias. The study evaluated the extent of CAD in terms of the number of severely diseased major coronary arteries and was not designed to identify the culprit vessel or to assess the coronary lesion morphology-complex lesions. The conclusions of this study should not be extended to cardiac troponin T or to the other assays available for Troponin I without further validation.

CONCLUSION

Patients of Non-ST elevation Myocardial Infarctionwith raised serum Troponin-I had more severe coronary disease and higher Syntax Score than those with lower serum Troponin-I.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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