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Original Research Paper

General Medicine

TROPONIN-I CORRELATION IN NSTEMI PATIENTS WITH SEVERITY OF LV DYSFUNCTION A RECORD BASED CASE SERIES STUDY

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KEYWORDS :

INTRODUCTION:

Acute coronary syndrome (ACS) can be divided into subgroups of ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina.(1)

ACS is simply a mismatch in the myocardial oxygen demand and myocardial oxygen consumption. While the cause of this mismatch in STEMI is nearly always coronary plaque rupture resulting in thrombosis formation occluding a coronary artery, there are several potential causes of this mismatch in NSTEMI. There may be a flow-limiting condition such as a stable plaque, vasospasm as in Prinzmetal angina, coronary embolism, or coronary arteritis. NSTEMI and Unstable angina are very similar, with NSTEMI having positive cardiac biomarkers. (1)

Elevation of transaminases in peripheral blood in patients with a very recent MI was described for the first time by Karmen et al. in 1955.(2) Historically, the three enzymatic markers mainly used for infarct size estimation have been creatine kinase (CK), its more cardiospecific isoenzyme CK-MB and lactate dehydrogenase (3)

Troponin is a protein complex of three subunits (I, C and T) that modulate the calcium-mediated interaction between actin and myosin in skeletal and cardiac muscle tissue(4) The unique myocardial isoforms cardiac troponin I (cTnI) and cardiac troponin T (cTnT) can be detected by assays of monoclonal antibodies directed against cardiac-specific epitopes. In the event of myonecrosis, troponins are released and can be detected in the bloodstream only a few hours afterwards, as the cytosolic form is released, and then for a prolonged period of up to 2 weeks.(5) cTnI is 100% tissue-specific for the myocardium and it has shown itself as a very sensitive and specific marker for AMI. Troponin levels should be measured on first assessment, within 6 hours of the onset of pain, and in the 6-12 hours after onset of pain. It is now recognized that the major predictor of long-term survival after recovery from ACS is the functional status of the left ventricle which has usually been described in terms of the LVEF.(6)

Echocardiography is the mainstay of diagnosis of mechanical complications of myocardial infarction, It has huge practical advantages and is ideal for the temporal monitoring of left ventricular (LV) function as it enables side by side high quality images to be quickly available at multiple stations.(7)

AIMS & OBJECTIVES OF STUDY:

1. To measure troponin-I level in NSTEMI patients and correlating it with left ventricular dysfunction measured by 2D echocardiography.

METHODOLOGY:

Study design: Retrospective case series study

Source of study population: the data obtained from NSTEMI patients admitted in cardiology department of S Nijalingappa Medical College & HSK hospital, Bagalkot.

Inclusion criteria:

Patients with ACS, NSTEMI.

Exclusion criteria:

1. Patients with acute STEMI.
2. Patients with congenital heart disease, valvular heart disease, cardiomyopathy.
3. Patients had major non-cardiovascular disorder causing elevation of Troponin-I such as severe renal impairment, prolonged immobilization, major surgery, chest trauma, myocarditis (pericarditis), acute pulmonary embolism, prolonged tachyarrhythmia.
4. Patients with sepsis.
5. Patients with malignancy.
6. Patients were on chemotherapy.

Sample Size:

- Sample size estimation was done using Medcalc software.
- At 95% condfidence level, and 95% power of the study
- α (two-tailed) = 0.050 and at 95% confidence level.
- $\beta = 0.200$ and 80% of power of the study
- The standard normal deviate for $\alpha = Z\alpha = 1.960$
- The standard normal deviate for $\beta = Z\beta = 0.842$
- Sample size estimated is 59=60
- *Formula used:* $N = ([Z\alpha + Z\beta]/C)^2 + 3$, where $C = 0.5*\ln([1 + r]/[1 - r])$

Data collection :

Patients data was collected from the records of patients admitted in cardiology department with NSTEMI and underwent coronary angiography and coronary angioplasty between year 2021-22.

RESULTS:

In our study 60 patients with NSTEMI were divided into two groups based on LV function with Ejection fraction ≥55% and <55%. The results are compared between the two groups.

TABLE-1

GROUPS	No of cases	Percent
Group-1 (LVEF ≥55%)	28	46.7
Group-2 (LVEF <55%)	32	53.3
Total	60	100.0

this table shows out of 60 cases 28(46.7%) were having LVEF ≥55% and 32 (53.3%) were having LVEF <55%.

Table-2

Age in Yrs	Group-1 (n=28)		Group-2 (n=32)		P value
	N	%	N	%	
30-39	2	7	0	0	0.034**
40-49	7	25	2	6	

50-59	6	21	7	22	
60-69	8	29	9	28	
70-79	5	18	11	34	
≥ 80	0	0	3	9	
Mean ±SD	57.2 ± 13.1	65.3 ± 10.2	0.009*		
*Unpaired t test, **Chi square test					

this table shows the mean age of study population and was compared between the two groups, group-1 mean age was 57.2 ± 13.1 and group-2 was 65.3 ± 10.2.

Table-3

Gender	Group-1 (n=28)		Group-2 (n=32)		P value
	N	%	N	%	
Male	22	79	20	63	0.175
Female	6	21	12	37	
Chi square test					

this table shows gender distribution of the study population between two groups.

Table- 4

Comorbidities		Group-1 (n=28)	Group-2 (n=32)	P value
DM	Yes	9 (32)	19 (59)	0.034
	No	19 (68)	13 (41)	
HTN	Yes	11 (39)	10 (31)	0.515
	No	17 (61)	22 (69)	

This table shows the comorbidities compared between two groups and the diabetes present in 9 out of 28 (32%)in group-1 and 19 out of 32(59%) in group-2.

Table-5

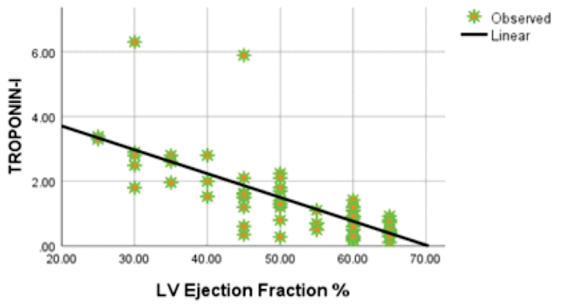
Parameter	Group-1 (n=28)	Group-2 (n=32)	P value
Troponin-I	0.68 ± 0.35	2.11 ± 1.31	0.001
Unpaired t test			

This table shows mean troponin-I in group-1 0.68 ± 0.35 ng/ml and group-2 2.11 ± 1.31 ng/ml

Table-6

GROUPS	Troponin-I ng/ml	P Value	LV Ejection Fraction	P Value
Group-1 (LVEF ≥55%) (n=28)	0.68 ± 0.36	P <0.001	61.43 ± 3.29	P<0.001
Group-2 (LVEF <55%) (n=32)				
45 - 54% (19)	1.61 ± 1.17		47.63 ± 2.56	
35 - 44% (6)	2.28 ± 0.53		37.5 ± 2.74	
< 35 % (7)	3.28 ± 1.43		28.57 ± 2.44	
ANOVA, Highly Sig				

This table shows correlation of troponin-I with LVEF between two groups.



Graph-1

Pearson Correlation between troponin-I LVEF%	
r Value	-0.722
Significance	P<0.001

This graph shows negative correlation between troponin-I and LVEF% with medium strength of negative correlation (r value -0.722 and P <0.001) and it is significant .

DISCUSSION:

In ACS the troponin-I is significant marker for diagnosing myocardial infarction and in our study we compared the level of troponin I in NSTEMI patients for LV function. LVEF is a good predictor of outcome of ACS and correlating it with troponin-I makes its value significant for predicting the outcome of ACS. Age is an important predictor of survival after ACS. Mean ages in our study group-1 was 57.2 ± 13.1 and group-2 was 65.3 ± 10.2 and were statistically significant (P<0.009).

In our study gender distribution was predominantly male with 22(79%) out of 28 in group-1 and 20(63%) out of 32 in group-2 as the CAD are more common in male sex compared to women of same age.

Diabetes and hypertension are major risk factors for CAD and in our study population 9(32%) out of 28 in group-1 were diabetics and 19 (59%) out of 32 in group-2 were diabetics and results were statistically significant (P<0.0 34). Hypertension was present in 11(39%) out of 28 in group-1 and 10(31%) out of 32 in group-2 however the results were not statistically significant.

In our study the mean troponin-I was correlated with LVEF% in both groups and mean troponin-I was 0.68±0.36 ng/ml in group-1 and mean LVEF was 61.3 ±3.29 and group-2 was divided into 3 sub groups depending of LVEF%, Mild LV dysfunction with EF 45-54% in this group mean troponin-I was 1.61±1.17ng/ml and mean EF was 47.63±2.56%, Moderate LV dysfunction with EF 35-44% and in this group mean troponin-I was 2.28±0.53ng/ml and mean EF was 37.5±2.74%, Severe LV dysfunction with EF <35% in this group mean troponin-I was 3.28±1.43ng/ml and mean EF was 28.57±2.44% and these results were highly significant statistically (P< 0.001). In our study results showed negative correlation between troponin-I and LVEF% with medium strength of negative correlation by pearson correlation test(r value -0.722 and P <0.001) and it is significant.

CONCLUSION:

Our study showed that troponin-I is negatively correlated with LV function in NSTEMI patients and hence troponin-I can be used to predict the LV function with high sensitivity and specificity. However this study need to be done on higher population to confirm the correlation between troponin-I nad LVEF.

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