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Troponin T As A Predictor of Severity of Cardiac Failure

KEYWORDS: Troponin T, Cardiac failure

* Dr. Shiva Kumar	Dr .Arun Kumar M	Dr. Gopi Kumar
Department of General Medicine MVJ Medical College and research Hospital, Bangalore-562114 * Corresponding Author	Department of Physiology M S Ramaiah medical College and Hospitals, Bangalore-560054	Department of Physiology Rajarajeshwari Medical College and Research Institute, Bangalore-560060

ABSTRACT *Chronic heart failure is a clinical syndrome caused by different underlying cardiac disease. Cardiac Troponin T is a highly sensitive and specific marker for myocardial necrosis. This study is to observe the relation between Cardiac Troponin T and non ischemic chronic heart failure. Plasma Troponin T was measured in 53 patients with chronic non-ischemic heart failure patients and 28 controls enrolled in our study. Troponin T was detectable in 9 (16.9%) chronic heart failure patients (P=0.024*) whereas it was undetectable in all the controls. There is a significant relationship between heart failure and Troponin T. The level correlates with the severity of heart failure with respect to NYHA functional class. This ongoing myocardial necrosis was a strong predictor of worsening chronic heart failure, suggesting a role of Troponin based monitoring to identify high-risk patients.*

Introduction

Chronic heart failure is a clinical entity caused by different underlying cardiac disease. Progression of chronic heart failure is known to occur, but the underlying mechanisms remain unclear Cardiac Troponin T, a Tropomyosin-binding protein is located on the contractile apparatus of cardiac myocytes is a newly developed highly sensitive and specific marker for myocardial necrosis. It is highy cardiacspecific& increase in plasma concentration indicates myocardial cell necrosis. It is elevated in non ischemic type of chronic heart failure and can be used as a marker of cardiac myocytes injury. This study is to observe the relation between Cardiac Troponin T and non-ischemic chronic heart failure.

A study done by Roberto Latini, et al [1] concluded that in patients with heart failure, detectable cardiac Troponin T predicts adverse outcomes in chronic heart failure. Troponin T retains a prognostic value at previously undetectable concentrations by the highly sensitive assay.

A study done by Eduardo R. Perna et al [2] concluded that abnormal Troponin T concentrations were detected in more than 50% of outpatients with chronic heart failure. This ongoing myocardial necrosis was a strong predictor of worsening chronic heart failure, suggesting a role of cardiac Troponin T based monitoring to identify high-risk patients. Hence cardiac Troponin T is a suitable candidate-marker molecule to monitor congestive heart failure from a structural perspective [3].

Methodology

Patients hospitalized for non ischemic chronic heart failure in Victoria Hospital and Bowring and Lady Curzon Hospital. Fifty three non ischemic chronic heart failure patients with 28 age and sex matched controls. Patients with non ischemic chronic heart failure according to NYHA criteria were included in the study. Patients diagnosed to be Myocardial infarction; unstable angina, skeletal muscle diseases, and end stage renal disease were excluded from the study.

Patients were classified using NYHA (New York Heart Association) functional classification into four grades: I-IV. Cardiac Troponin T was measured in all the patients and controls using Immunoassay Methods.

Descriptive statistical analysis has been carried out in the present study. Significance is assessed at 5 % level of significance. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups Inter group analysis) on metric parameters,

Results:

The study group included 53(100%) patients 25(47.2%) males and 28(52.8%) females and mean age in years of heart failure patients was 51.53±12.16yrs with male female ratio 1:1.12. The oldest patient was 70yrs and youngest was 33yrs. The cases and controls were age and sex matched.

On applying the chi-square method incidence of increased Troponin T level is significantly more in cases compared to controls (16.9% vs 0%). In the study group out of 53 cases 9(16.9%) were positive for serum Troponin T (Troponin T >0.1ng/ml) and 44(83.0%) patients were negative for Troponin T (Troponin T <0.1ng/ml).

All the 28(100%) controls were negative for serum Troponin T (Troponin T <0.1ng/ml). The p value is 0.024.

Table-1: Comparison of Troponin T levels in cases and control

Troponin T levels	Cases	Controls
Positive(>0.1ng/ml)	9 (16.9%)	0
Negative(<0.1ng/ml)	44(83.0%)	28(100.0%)
Total	53(100.0%)	28(100.0%)
Inference	P=0.024*	

According to NYHA classification there are 19(35.8%) patients had NYHA class II heart failure, 7 male and 12 female.Twenty four (45.3%) patients had NYHA class III heart failure, 12 male and 12 female. Ten (18.9%) patients had NYHA class IV heart failure, 6 male and 4 female.

In our study patients who were positive for Troponin T had more severe heart failure with respect to NYHA functional

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class, 7(77.8%) patients were in class IV and 2(22.2%) in class III.

Ten (18.9%) patients had NYHA grade IV heart failure, 6(24%) male and 4(14.3%) female.

No patients had NYHA grade I heart failure.

In the control group all patients were asymptomatic.

Table-2: Correlation of NYHA functional class with Troponin T levels

NYHA class	Troponin T	
	Negative	Positive
I	0	0
II	20(45.5%)	0
III	21(47.7%) 2(22.2%)	
IV	3(6.8%)	7(77.8%)
Total	44(100.0%)	9(100.0%)
Inference	Higher NYHA class is significantly associated with Positive Troponin T with P<0.001**	

This shows that in the study group, patients who were positive for Troponin T had severe heart failure with higher NYHA class P<0.001** than Troponin T negative patients. Higher NYHA functional class is significantly associated with Positive Troponin T with P<0.001**.

Discussion

The present study was done to determine whether Troponin T is elevated in chronic non- ischemic heart failure patients and also to evaluate the significance of elevated Troponin T in patients with chronic heart failure. The present study confirms that serum cardiac Troponin T is significantly elevated in chronic non ischemic heart failure patients as compared to controls (P=0.024*).

In cardiac failure due to the continued ongoing ischemic damage to the myocardial cells ,there will be release of troponin T in minimal but detectable amount. Ischemic damage is due to cardiac hypertrophy and decreased blood supply & increased stress on the heart because heart failure.

Furthermore in the present study we concluded that Troponin T positive chronic heart failure patients had more severe heart failure with respect to NYHA class.

Chuncai Xue, et al[4] studied 265 patients with CHF and 75 healthy people, they concluded that serum cardiac Troponin T was increased in patients with chronic heart failure and the level paralleled the severity of chronic heart failure.

Eduardo R. Perna[2] studied 115 patients (mean age, 61±11 years) and concluded that abnormal Troponin T concentrations were detected in more than 50% of outpatients with chronic heart failure. This ongoing myocardial necrosis was a strong predictor of worsening chronic heart failure, suggesting a role of cardiac Troponin T based monitoring to identify high-risk patients.

Junnichi Ishii et al[4] studied 100 patients, 54(54%) had NYHA functional class III and 46(46%) had class IV. In a study done by Chuncai Xue, et al[5] 75(29.3%) had class I NYHA , 67 (25.3%) had class II NYHA ,70(26.3%) had class III NYHA, 53(20%)had class IV NYHA heart failure.

Troponin T a marker of myocardial cell necrosis is significantly elevated in chronic heart failure. Elevated serum cTnT in chronic heart failure may indicate ongoing myocardial damage involved in the progression of CHF. Elevated serum cTnT in CHF is caused by multiple processes that eventually destroy the contractile apparatus.

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