

## Can troponin T levels be useful in the diagnosis of rheumatic carditis?

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### ABSTRACT

- Objective** : Acute rheumatic fever (ARF) is an endemic disease observed in children of developing countries. The purpose of this study was to test if it was possible to identify myocardial involvement in cases with rheumatic carditis by the measurement of serum cardiac TnT.
- Methods** : 30 patients diagnosed as ARF underwent echocardiography and their cardiac troponin T (cTnT) serum levels were measured. Patients were divided into group 1: Arthritis alone, group 2: carditis, and group 3 carditis with congestive heart failure (CHF).
- Results** : cTnT serum levels were normal in all except one patient with in group 3. Two patients in carditis (group 2) and three patients in CHF (group 3) had dilation in left ventricular end diastolic diameter.
- Conclusions** : Normal cTnT levels in our patient group suggests that inflammation rather than myocardial necrosis is predominant in ARF carditis.
- Keywords** : Acute rheumatic fever, rheumatic heart disease, Troponin-T

### INTRODUCTION

Clinically significant abnormalities in acute rheumatic heart disease (RHD) are due to valvular problems rather than myocardial and pericardial involvement. Studies have shown that Troponin I (TnI) and TnT are significant indicators for identifying myocardial injury in hypoxic myocardial injury and viral myocarditis.<sup>[1-4]</sup> Clinically significant abnormalities in ARF are supposed to result from valvular rather than myocardial involvement. However, there are limited number of studies to determine TnI and TnT levels. We hypothesized that cTnT levels may elucidate myocardial involvement in rheumatic carditis patients.

### METHODS

#### Patient population

Thirty patients who were admitted to the pediatric cardiology department of Akdeniz University Medical School, with their first ARF attack, according to the modified Jones criteria, were enrolled to this prospective study. Thirteen (43.3%) of them were male and 17 (56.7%) female with ages between 5 and 18 years (mean:  $10.64 \pm 3.16$  years). Three patients (10%) had arthritis, 14 (46.7%) carditis, and 13 carditis with CHF. The patients had had no treatment before recruitment to the study. After detailed history and physical examination, blood samples were drawn for evaluating acute phase reactants and cTnT levels. ECG and echocardiographic evaluation were carried out in all patients.

#### Echocardiography

Echocardiography was performed with GE Vivid 7 machine, Norway, via 3, 5 and 7 MHz transducers. The two-dimensional, M-mode and Doppler ECHO were used to evaluate left ventricular end-diastolic and end-systolic diameters and volumes, systolic functions and valvular

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regurgitations. For the measurement of valvular regurgitation, modified Perry criteria for aortic valve and modified Helmcke<sup>[5]</sup> criteria for mitral valve were used. Echocardiographic evaluations were performed by the same experienced echocardiographer in all patients.

### Cardiac TnT levels

Serum samples were examined to measure of cTnT level, by Elecsys 2010 analyzer using Troponin T STAT kit in compliance with the electrochemiluminescence immunoassay method according to the manufacturer's recommendations. Measurement span was 0.01–25 ng/mL.

### Statistical analysis

First, identifying statistics were assigned to variables. Mean and standard deviations were calculated for time-varying variables and percentages were calculated for categorical variables.

## RESULTS

Erythrocyte sedimentation rates (ESR) were between 27 and 120 mm/hour (mean 81.3 mm/hour) and C reactive protein (CRP) levels were between 0.4–24.2 mg/dL (mean 7.2 mg/dL). There was no difference between the three groups in terms of ESR or CRP. Anti-Streptolysin O (ASO) values, were ranging from 160 to 2096 (mean 1193.3 IU/mL), were positive in all patients except one in the arthritis group. ECG showed prolonged PR interval in 6 patients and sinus tachycardia in 16 patients (13 of whom were in the CHF group). Among the patients with carditis, 25 (83.3%) had mitral insufficiency (11 cases with isolated mitral insufficiency), 16 (53.4%) had aortic insufficiency (2 cases with isolated aortic insufficiency), 14 (46.7%) had both mitral and aortic insufficiency. None of the patients showed any indication of myocarditis. Left ventricular end diastolic diameters were between 37 and 61 mm and exceeded age appropriate sizes in 5 (16.6%) patients suggesting dilation. Left ventricular end diastolic diameter in this patient was 61 mm, showing the highest dilation among all patients. Left atrial dimensions (LAD) were between 19 and 54 mm and aortic dimensions (AD) were between 18 and 32.5 mm. LAD/AD ratios ranged from 0.86 to 1.99. Nine (30%) patients had high ratios according to their age.

### Troponin levels

Troponin levels were normal in all the patients except one patient in group 3 with CHF, He had cardiac TnT level of 0.096 ng/mL (positive), all the others had troponin levels <0.01 ng/mL (negative).

## DISCUSSION

ARF is a systemic inflammatory disease that follows infection with some strains of group A streptococci (GAS). An immune response against streptococcal antigens

triggers events in inflammatory response against heart, joints and brain.<sup>[6]</sup> RHD, which is among major symptoms of ARF, is the most common acquired cardiac disease for all age groups in the world.<sup>[7]</sup> CHF is rare in patients with acute rheumatic carditis without hemodynamically significant regurgitation.<sup>[8-10]</sup>

The carditis of ARF is considered to be pancarditis. However, myocarditis may be difficult to diagnose because its clinical presentation is not typical in all cases. Despite clinical and pathological evidence of myocardial inflammation, the significance of myocarditis in the prognosis of ARF remains controversial. There are several studies with different results about the existence of cardiac troponins as indicators of myocarditis in ARF.<sup>[11-17]</sup> In our study, none of 30 patients showed high cTnT level, except for one in the CHF group.

Mishra *et al.*,<sup>[18]</sup> by using ECHO and cardiac TnI, argued that there was no serious myocardial involvement in ARF cases, and myocardial injury had no serious contribution to CHF development. It is stated that CHF is related to the degree of valvular involvement rather than myocardial injury.

Most studies about myocarditis in ARF is have measured TnI. But TnT is known to be more sensitive and specific in indicating myocardial injury. In a study involving 46 cases, Alehan<sup>[19]</sup> showed that there was no significant difference between carditis and arthritis groups in terms of CK-MB or Ccardiac TnT concentrations, and cardiac TnT level did not increase in carditis cases with no accompanying heart insufficiency. Low levels of cardiac TnT was considered to be related to the lack of myocyte injury in rheumatic carditis. Although, raised levels are not always seen in myocarditis.<sup>[11]</sup>

## CONCLUSIONS

Cardiac TnT levels are normal in patients with ARF. This may suggest that CHF in ARF is due to serious valvular regurgitation rather than myocardial necrosis.

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