LETTER TO THE EDITOR

Prognostic value of cardiac troponins in COVID-19 infection

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The novel acute respiratory syndrome caused by coronavirus appears to have emerged from Wuhan, China, in December of 2019 (COVID-19) and has now developed to a rapid pandemic spread. At the end of August 2020, the infection has resulted in more than 25 million documented cases with more than 850,000 deaths worldwide. Although the mortality is often associated with acute respiratory distress syndrome, there are increasing reports of cardiac involvement with electrocardiographic abnormalities and elevated serum cardiac biomarkers which also are related to increased incidence of mortality.

In the past decades, measurement of cardiac troponin T (cTnT) and troponin I (cTnI) has become laboratory standard method for diagnosis of myocardial injury and infarction, thereby replacing creatine kinase (CK) and creatine kinase myocardial band (CK-MB) determinations. Sophisticated immunoassays have been developed which showed cardiac troponin testings with improved analytical sensitivity and precision. The new assays have also been shown to have a high diagnostic performance and prognostic value in patients with chest pain presenting to the emergency department[1,2]. With regard to COVID-19 infection, several studies reported significantly higher serum levels of cardiac troponins in severe disease requiring admission to the intensive care unit (ICU) and in nonsurvivors as compared to those with milder symptoms and in survivors. In addition, significant troponin elevations were noted in patients with severe form of the disease who finally progressed to multiorgan dysfunction, failure and death.

Myocardial injury, defined by an increase in troponin serum concentrations above the 99th percentile reference limit, seems to be a common manifestation in COVID-19 patients. Kang et al.[3] summarised the results from 6 studies in China and reported the prevalence of troponin elevations to be between 7.2 to 27.8%. More importantly, increased levels of the troponins significantly correlate with disease severity and mortality even after controlling for other comorbidities. In this context, Zhou et al.[4] found that 17% of the 191 COVID-19 patients developed acute cardiac injury, and nonsurvivors showed significantly higher blood levels of high-sensitivity cardiac troponin I (hs-cTnI) on admission (22.2 ng/L) when compared with the levels in survivors (3 ng/L). Similar results were obtained from two recent studies in Wuhan, China. Huang et al.[5] reported the prevalence of increased hs-cTnI to be 31% in patients admitted to the ICU as compared with those without ICU admission of 4%. In the study by Wang et al.[6], hs-cTnI levels in the ICU patients were significantly higher than those of the non-ICU patients (11.0 versus 5.1 pg/mL). In addition, Liang et al. [7] have demonstrated in a study of 1,590 COVID-19 patients from 575 hospitals in China that the mean levels of hs-cTnI in patients with crititical illness (defined as the composite measure of admission to the ICU, invasive ventilation, or death) were markedly higher than those without (288.1 versus 42.7 pg/mL). As shown in a study on 274 COVID-19 patients by Chen et al.[8], hs-cTnI levels on admission were significantly higher in deceased patients (40.8 pg/mL) than in recovered patients (3.3 pg/mL), with eight deceased patients having peak hs-cTnI levels above 1,000 pg/mL and two above 10,000 pg/mL. Similarly, Nie et al.[9] have demonstrated in a study of 311 laboratory-confirmed COVID-19 cases that hs-cTnI concentrations in the non-survivor group were significantly higher than those in the discharged group (32.5 versus 2.8 ng/L), and their levels were independent predictor of mortality in these patients. Furthermore, two another studies have shown that the in-hospital mortality was much higher in patients with myocardial injury as compared to those without: 51.2 versus 4.5% in the study by Shi et al.[10], and 59.6 versus 8.9% in the study by Guo et al[11]. Of particular interest was the observation by the latter authors that the mortality during hospitalisation was higher in patients with elevated cTnT levels but without underlying cardiovascular disease (CVD) (37.50%) than those with underlying CVD but normal cTnT levels (13.33%). The value of serial measurements of cTnI in predicting mortality was recently demonstrated in a large trial of 2,736 COVID-19 patients from five New York City hospitals. It was found that of the patients with increasing troponins over time, 24% (223 of 922) died, compared to 12% (102 of 811) of those with decreasing troponins and 18% (181 of 1,003) of those with no subsequent troponin measurements[12]. In a meta-analysis of 6 studies involving 1,231 COVID-19 patients, elevated cardiac troponin levels were found to be significantly associated with an increase in in-hospital mortality, with a pooled odds ratio of 22.7[13].

In conclusion, the severity of COVID-19 infection is highly associated with acute cardiac injury, and myocardial cell injury with release of cardiac troponin into the circulation is

associated with mortality. Initial measurements of troponin serum concentrations early after hospitalisation for COVID-19 infection, as well as longitudinal monitoring during hospital stay, therefore, may provide an effective means in predicting the progression of the disease towards a worse clinical outcomes[14].

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