COVID-19 pneumonia and disease severity in patients hospitalized during the first pandemic wave at University Hospital Centre Split: cardiovascular biomarkers strongly correlate with risk of poor outcomes

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Introduction: Acute elevations of biomarkers reflecting myocardial injury, thrombosis, systemic inflammation, and heart dysfunction are associated with poor prognosis among hospitalized patients with COVID-19.[1-3] In this study, we aimed to determine levels of these biomarkers in patients that were hospitalized with COVID-19 pneumonia at our institution during the first pandemic wave. Secondly, we aimed to determine if these biomarkers correlate with risk assessment tools such as MEWS (Modified Early Warning Score) and SOFA (Sequential Organ Failure Assessment) scores that reflect disease severity and clinical deterioration of patients.

Patients and Methods: Data of 40 consecutive hospitalized patients with PCR-confirmed SARS-CoV-2 infection and pneumonia verified by imaging methods were considered for the analysis.

Results: The mean age was 80.5 ± 9.9 years and 25 (78.1%) were women. Of these patients, 9 (22.5%) had a significant renal insufficiency (eGFR <44 mL/min./1.73 m2) and were excluded from the analysis. Of the remaining 31 patients, 17 (54.8%) had laboratory evidence of myocardial injury (high sensitivity cardiac troponin T – hs-cTnT >14 pg/mL) while 10 patients (32.3%) satisfied acute heart failure rule-in criteria according to natriuretic peptide cut-off values adjusted for age. The mean hs-cTnT value was

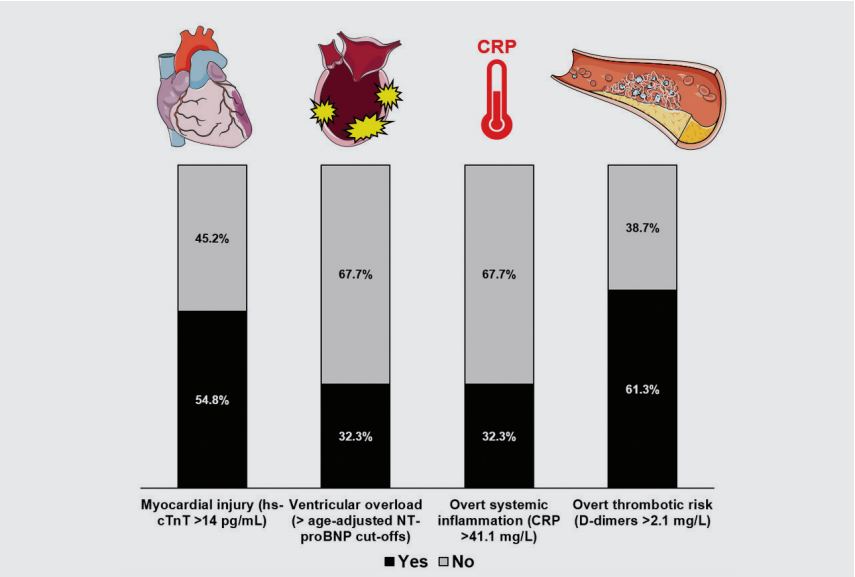

FIGURE 1. Prevalence of abnormal cardiovascular biomarkers reflecting myocardial injury, ventricular overload, systemic inflammation and thrombotic risk among patients hospitalized with COVID-19 pneumonia.
CRP - C-reactive protein; hs-cTnT - high-sensitivity cardiac troponin T; NT-proBNP - N-terminal of proBrain Natriuretic Peptide

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TABLE 1.Correlation of cardiovascular laboratory parameters with the risk of clinical deterioration (MEWS score) and estimated rate of organ failure (SOFA score).

Laboratory parameter	MEWS score		SOFA score	
	r-value	p-value	r-value	p-value
NT-proBNP	0.360	0.047*	0.360	0.047*
hs-cTnT	0.304	0.096	0.306	0.094
CRP	0.802	<0.001*	0.710	<0.001*
D-dimer	0.449	0.011*	0.439	0.013*

CRP-C-reactive protein; hs-cTnT-high-sensitivity cardiac troponin T; MEWS-Modified Early Warning Score for Clinical Deterioration; NT-proBNP-N-terminal of proBrain Natriuretic Peptide; SOFA-sequential organ failure assessment score

*denotes significant result at p<0.05; r-Pearson's correlation coefficient; p-statistical significance

28.9 ± 42.7 pg/mL while mean NT-proBNP value was 2481 ± 4662 pg/mL. One-third of patients (32.3%) had C-reactive protein values >41.1 mg/L (mean 33.7 ± 39.1 mg/L), highly predictive of severe disease. Nearly two-thirds of patients (N=19, 61.3%) had D-dimer levels >2.1 mg/L that was highly predictive of in-hospital death in previous studies (**Figure 1**). The mean MEWS and SOFA scores were 2.5 ± 1.6 and 3.1 ± 2.3 points, respectively. In decreasing order of relationship, CRP, D-dimer, and NT-proBNP values significantly correlated with both MEWS and SOFA scores as shown in **Table 1**. Troponin values had a borderline association with both risk scores.

Conclusions: Our data show that a significant number of patients hospitalized due to COVID-19 were elderly and with a high risk of thrombotic events and cardiac insufficiency. Likewise, a high inflammatory burden was observed in one-third of patients. CRP correlated the most with MEWS and SOFA score, followed by D-dimer levels and NT-proBNP while no significant interaction was observed with cardiac troponin values.

LITERATURE

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