

Cardiomegaly found in hospitalized patients with novel coronavirus disease (COVID-19)

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Dear Editor,

Recently, chest CT examination has been recommended as a reliable method for confirmed clinical diagnosis of COVID-19 [1]. In previous studies, COVID-19 patients with bilateral ground-glass opacities (GGO) with or without crazy-paving pattern or consolidation, lymphadenopathy and pleural effusion were presented [1] while in following study, we observed cardiomegaly in patients. Several etiologies as: coronary artery disease, hypertensive heart disease, pulmonary diseases as COPD, infectious myocarditis secondary to viral infection as HIV and specially arrhythmia are mentioned for cardiomegaly disease [2]. Among the studies which have been searched for the cardiovascular effects of new corona virus some illustrated

that the cardiac arrhythmias beside of reactions to drugs employed in the treatment of the illness may be the consequence of direct effects of COVID-19 infection [3]. However, because of relation between arrhythmia and cardiomegaly and in this regard, we presented a preliminary report on the cardiomegaly of CT findings and laboratory data of COVID-19 pneumonia.

The participants of the present study included 115 Patients with confirmed COVID-19 pneumonia (CT and RT-PCR Confirmed) undergoing a chest CT scan during their hospitalization in Baqiyatallah hospital between February 20, 2020 and March 9, 2020 in Tehran, Iran. Based on the CT finding, patients were divided into three groups: 1) with Cardiomegaly, 2) with Calcification, 3) without Cardiomegaly or Calcification.

The non-contrast chest CT scan was undertaken with the patient in the supine position, and scanning was performed at end inspiration and patients were instructed to hold breath to minimize motion artifacts. The main scanning parameters included tube voltage (120 kVp), automatic tube current modulation (30 - 70 mAs), pitch (0.99 - 1.22 mm), matrix (512 × 512), slice thickness (5 mm), and field of view (350 mm × 350 mm). Chest CT from cases was reviewed by two radiologists and physicists.

The clinical characteristics and laboratory results of all 115 COVID-19 patients of three groups are summarized Table 1. The results of the present study showed that 33 [28.9%] patients had cardiomegaly, 19 [16.52%] had calcification, 15 [78.94%] with Coronary arteries calcification, 2 [10.52%] with lung calcification and 1 [5.26%] with liver and 1 [5.26%] patient kidney calcification of CT abnormalities. The appearance of cardiomegaly is observed in all patients with coronary calcification.

The comparison of clinical characteristics of patients with cardiomegaly and coronary calcification showed significantly higher blood pressure. Maximum and minimum blood pressures of patients with cardiomegaly were 109 ± 13.18 and 68 ± 12.01 respectively. But, these parameters were 125 ± 5.66 and 78.84 ± 11.90 in patients affected with both cardiomegaly and coronary calcification. There are not significant differences between laboratory findings and heart rate of the two groups.

Based on the previous studies, cardiac complications are the secondary diseases of SARS-CoV and MERS-CoV (as an earlier coronavirus family). Moreover, cardiomegaly reported in patients with COVID 19 [4]. Thus, we decided to evaluate the prevalence of cardiac diseases, especially cardiomegaly in COVID-19 patients. Aline with our result, researches demonstrated that coronary artery calcification was detected on chest CT is a predictor of severity and mortality [4]. The results of the present study demonstrated that CRP, blood urea, nitrogen and creatinine levels significantly increased in patients with Cardiomegaly and

TABLE 1. Clinical characteristics and laboratory findings of patients with COVID-19

	Without cardiomegaly and calcification (n = 78)	With cardiomegaly (n = 33)	With calcification (n = 19)
Age	54 ± 1.68	64.25 ± 1.7	66.00 ± 2.74
Sex			
Female	22 (28.21%)	12 (36.36%)	7 (36.84%)
Male	56 (71.79%)	21 (63.64%)	12 (63.16%)
WBC(X10.3/μl)	5.85 ± 1.78	6.27 ± 1.89	4.99 ± 1.31 ^b
CRP (mg/L)	62.45 ± 30.27	79.07 ± 38.22	85.25 ± 34.88
ESR (mm/hour)	41.80 ± 3.09	47.29 ± 14.45	47.54 ± 19.58
Sodium (m Eq/L)	135.45 ± 2.70	133.32 ± 3.36 ^a	131.5 ± 3.31 ^{a (b)}
Potassium (mEq/L)	4.10 ± 0.42	4.11 ± 0.34	4.13 ± 0.35
Blood Urea Nitrogen (mg/dL)	13.58 ± 3.43	16.06 ± 4.57 ^a	22.00 ± 1.78 ^{a(b)}
Creatinine (mg/dL)	1.11 ± 0.20	1.38 ± 0.38 ^a	1.19 ± 0.39 ^(b)
Mortality (%)	8.86	12.13	36.84
Comorbidities (%)			
Diabetes	8.75	3.03	0
Hypertension	5.00	9.09	15.79
Cardio vascular disease (CABG, MI, Angioplasty or angiography)	3.85	6.06	5.26
Kidney disease	0	3.03	10.53
ANY ^c	72	48.49	30.02

Data are mean ± SD or (%).

^aDenotes significant difference of group 1 with group 2 or 3 (P < 0.05).

^bDenotes significant difference of group 2 with group 3 (P < 0.05).

^cANY: Without Comorbidities, WBC: Wight Blood Cell, CRP: C-reactive protein, ESR: Erythrocyte sedimentation rate, CABG: coronary artery bypass graft, MI: Myocardial Infarction.

Calcification compared to healthy groups (mild to severe trend). The data of the present study demonstrated that 48.49% of patients with cardiomegaly and 30.02% with cardiomegaly calcification did not report any comorbidities. It's worth noting that vascular calcification is a long-term process in which viral type has also been reported. But, it seems that patients who have not reported calcification were unaware of their disease.

The mechanism of novel corona-infected cardiovascular disease remained unknown. But, the investigators have indicated the high expression of ACE2 in the heart and lung. Moreover, ACE2 is expressed in other organs such as vascular endothelium and kidney explaining the multi-organ dysfunction and can be found in SARS-CoV-2 infection [3]. Moreover, the association between ACE2 and calcification may be considered as reason for the deleterious effects of cardiovascular disease in covid-19 patients [5].

In conclusion, preexisting cardiovascular disease may enhance vulnerability to COVID-19 and it can greatly affect the development and prognosis of pneumonia (Table 1: Mortality rate). Further, secondary damage of the virus on the cardiovascular system (short-term vs long-term cardiovascular effects) should not be forgotten. Therefore, therapists should pay attention to viral infection relating to cardiovascular diseases. The short time and longtime follow-ups of these patients are suggested.

Limitation

It is recommended to perform study in more centers and with larger sample size.

Competing interest

The authors declare that there are no conflicts of interest.

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Ethics approval and consent to participate

The study proposal was assessed and approved by Research Ethics Committee, Baghiyatallah University of Medical Sciences, Tehran, Iran; coded: IR.BMSU.RETECH.REC.1399.093. written consent was obtained from patients.

Availability of data and materials

Data are available upon request from corresponding author.

Consent for publication

Not applicable.

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