

Cardiovascular Disease and Coronavirus Infection

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ABSTRACT

The pandemic of severe acute respiratory syndrome Coronavirus Diseases-2019 (COVID-19) infection is causing considerable morbidity and mortality worldwide. Multiple reports have suggested that patients with Cardiovascular Diseases (CVD) and Heart Failure (HF) are at a higher risk of severe disease and higher mortality with COVID-19. Generally, myocardial damage, heart diseases and cardiac arrhythmia is associated with patients with COVID-19. Also, they may have a severe COVID-19 infection if patients have high prevalence of cardiovascular disease. Infection of myocardium due to infection is observed in a considerable percentage of patients with COVID-19. In this case, it should be emphasized that the Angiotensin-Converting Enzyme-2 (ACE2) acts as the main gateway for this infection, although the role of this converting enzyme inhibitors or angiotensin receptor blockers requires further investigation. According to the results of previous studies, the major cardiac abnormalities and complications in the SARS epidemic were hypotension, myocarditis, arrhythmia, and sudden cardiac death. Dealing with COVID-19 infection, except for similar disorders, poses a challenge to heart transplantation that affects donor selection, immunosuppression, and post-transplant management. There are a number of joint tests to recognize and therapies under active investigation to treat and prevent of COVID-19 infection. The main objective of this paper is reviewing the common symptoms and joint tests between CVD/HF and COVID-19 infection.

Introduction

Patients with COVID-19 and those with cardiovascular illnesses have shown similar results. The most prevalent pre-existing illnesses in patients with COVID-19 infection include Heart Failure (HF) and cardiac arrhythmia, as well as other risk factors including hypertension and diabetes mellitus, however the definition of CVD symptoms utilised in research was vague. Patients sent to the intensive care unit and those with prevalent cardiac problems were examined, and the significant prevalence of these indispositions was verified. Arrhythmias, myocarditis, hypotension, and mortality owing to abrupt cardiac arrest were all common symptoms. Importantly, completed diagnostic work revealed electrocardiographic alterations, as well as subclinical Left Ventricular (LV) diastolic dysfunction and blood troponin increase, following earlier involvement with SARS illness. In individuals with COVID-19, similar cardiac symptoms were seen. Autopsy of individuals

with COVID-19 infection revealed myocardial infiltration by interstitial mononuclear inflammatory cells, which was linked to elevated levels of biomarkers related to myocardial injury. Several symptoms, including myocardial damage, elevated levels of biomarkers, Coronary Artery Disease (CAD), Heart Failure (HF), and cerebrovascular disease, have been linked to infection caused by COVID-19.

There has also been a link between elevated troponin T levels and increased mortality due to cardiac damage. The majority of the patients were men, older, and had higher comorbidities such as hypertension and coronary heart disease, according to the findings. Infections with COVID-19 can cause infection-related myocarditis, which can lead to cardiac arrhythmias.

Pathophysiology

i. SARS-CoV2 and COVID-19 infection are the most common ways for coronaviruses

Received: 07-Mar-2022, Manuscript No. ijocs-22-57867;

Editor assigned: 09-Mar-2022, PreQC No. ijocs-22-55767(PQ);

Reviewed: 23-Mar-2022, QC No. ijocs-22-57867(Q);

Revised: 25-Mar-2022, Manuscript No. ijocs-22-57867(R);

Published: 30-Mar-2022, DOI: 10.37532/1753-0431.2022.16(3).234

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to enter cells *via* binding to the host's ACE2 receptor.

- The Renin Angiotensin System (RASspecific)'s receptor ACE2 plays a significant role in the pathogenesis of CVD/HF.This receptor is found in the lungs, heart, and blood vessels.
- cardiac diseases and heart failures linked to COVID-19 are likely related to RAS/ ACE2 system malfunction caused by infections and comorbidities such hypertension.
- iv. Cardiac abnormalities caused by COVID-19 infection, either as a primary or secondary symptom of acute lung damage, result in increased cardiac workload and arrhythmia, which are frequent in patients with CVD/HF.
- v. In COVID-19 infection, an imbalance of T cell activation and abnormal cytokine release (Cytokine release storm) may lead to CVD/HF.

Symptoms and signs

Patients with COVID-19 infection may experience symptoms that are distinct from those associated with heart failure. As a result, it is critical to consider it as a confounding factor in patients with CVD/HF. As a result, all hospitalised patients should be screened as soon as feasible for COVID-19 infection. Admission to particular COVID units should be based on clinical and laboratory screening results, as well as pneumonia and pulmonary oedema. COVID-19 pneumonia symptoms are difficult to distinguish from pulmonary congestion based on clinical findings. Fever, dry cough, anosmia, and pulmonary crackles are more specific signs of COVID-19 infection, although they might be mistaken with pulmonary symptoms produced by lung congestion. Fever is not the only sign that leads to a COVID-19 diagnosis; according to the newest studies, fever was diagnosed in only 44% of patients on admission, despite the fact that fever developed in 89 percent of patients during hospitalisation. COVID-19 infection can produce extreme weariness and shortness of breath, as well as tachycardia, which is typical in individuals with acute heart failure.Patients with normal or COVID-19-related myocarditis or takotsubo syndrome may have chest discomfort and angina. From 5 days to 10 days after the

beginning of infection, most patients with severe COVID-19 have dyspnea and hypoxia, which quickly progress to acute respiratory distress syndrome (ARDS) and dysfunction or multiple organ failure.

Prevention of Covid-19 in Patients with CVD/HF

Because the symptoms of both disorders overlap and encourage one other to develop, there is a clinical irregularity in assessing and treating CVD/HF patients with COVID-19. However, little data on the management of CVD/HF patients with COVID-19 available to analyse and explain the problem. These issues make it difficult for professionals throughout the world to provide the best possible treatment to their patients. It is critical that all required precautions be taken to guarantee illness prevention in CVD/ HF patients. Patients should avoid routine hospital visits if they do not have any urgent needs. As a result, virtual visits and indirect interaction with CVD/HF patients should be replaced with elective regular treatment prior to clinic sessions. This form of patient monitoring might also be beneficial in motivating patients and lowering their stress levels. If at all feasible, medical professionals should transform office visits into indirect visits, especially with the use of video conversations. If sufficient technology is available, it is preferable for patients to regulate some symptoms such as heart rate, heart rhythm, and blood pressure.

Routine laboratory examination

Because health care personnel who care for Covid-19 patients may be unwittingly carriers of the virus, they should consider routine laboratory checks and joint testing to verify that all patients are protected. As long as their infection test is negative, health care providers and medical employees with symptoms of Covid-19 should isolate themselves. It's critical that they follow the rules to the letter. Below are several biomarkers and specific tests that are currently being investigated for their significance in determining prognosis in COVID-19 patients.

Blood cell count: In the early stages of COVID-19, the white blood cell count may be normal or low, while the lymphocyte count is low. The total quantity of lymphocytes as well as the ratio of lymphocytes to white blood cells are both decreased. The amount of lymphocytes

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is negatively related to the intensity of Covid-19, with a drop in lymphocytes associated with an increase in mortality.

Lactate Dehydrogenase Level (LDH): Lactate Dehydrogenase (LDH) is a fascinating biomarker, especially since high LDH levels have previously been linked to poor outcomes in patients with different viral infections. According to the most recent data in COVID-19 patients, there is a substantial variation in LDH levels between individuals with and without severe illness. In patients with Covid-19, elevated LDH levels were linked to a more severe illness and a higher fatality rate. More research is needed to corroborate these findings.

Troponin: Various studies have found that a high troponin value with high sensitivity indicated a poor prognostic indicator related with cardiac injury in COVID-19 patients. COVID-19 caused myocardial damage in more than 20% of hospitalised patients. Patients with elevated troponin levels had a higher incidence of significant sequelae, such as cardiac arrhythmia, acute renal damage, ARDS, the requirement for mechanical ventilation, and death. More subsequent research have corroborated these findings.

ESR: In confirmed COVID-19 individuals, an increased Erythrocyte Sedimentation Rate (ESR) has been documented. The abnormal increase in ESR levels persisted for a long time after the patient recovered from COVID-19, despite the fact that no findings linked to tumour, TB, rheumatic illnesses, anaemia, or other factors could explain the abnormal increase in ESR in this instance. The present research cannot explain the precise rise in ESR, which might be linked to aberrant histological alterations in some COVID-19 patients and a poor prognosis, and provide insight into the disease's course and prognosis.

Ferritin: Ferritin levels in the blood were found to be higher in individuals with severe COVID-19 symptoms than in those with mild symptoms. As a result, serum ferritin levels were shown to be strongly linked to the severity of COVID-19. Ferritin is a critical modulator of immunological disarray, especially in severe hyperferritinemia, contributing to the cytokine storm through direct immune-suppressive and pro-inflammatory actions. Many diabetic individuals have high serum ferritin levels and are known to be at a higher risk of significant COVID-19 consequences. High inflammatory indicators, such as a high serum ferritin level, are related with important and life-threatening disorders, according to laboratory findings in patients with severe covid-19.

Magnesium: According to this research, hypermagnesemia is a key sign of illness severity and a poor prognosis in SARS-CoV-2/ COVID-19 infections. In room air, individuals with hypermagnesemia exhibited considerably lower oxygen saturation (80%) than those with normomagnesemia (87%). Dexamethasone and oxygen supplementation were given to patients with hypermagnesemia. Serum magnesium should be added to the panel of tests routinely done to diagnose severe COVID-19 infection, according to the researchers.

CPK-mb or creatine kinase-MB: Creatine Kinase-MB (CK-MB) levels were found to be elevated in a number of published articles and were linked to the severity of COVID-19 in patients. CK-MB levels and mortality risk in patients on Covid-19 have recently become the subject of several review articles. The findings of several investigations, however, are conflicting.

D-dimer: D-Dimer in a health blood plasma circulation as a product of Fibrin Degradation (fibrinolysis) is at low concentration. Since active blood coagulation, resulting in fibrinolysis, is associated with increased plasma D-dimer concentrations, it has been shown to be a clinically useful biomarker for thrombotic disease. The most well-known use of the D-dimer test in patients with suspected venous thromboembolism and its screaming is Pulmonary Embolism (PE) with increased D-dimer and is widely used to help rule out a diagnosis. New findings indicated that COVID-19 can may be associated with elevated D-dimer.

Special joint test: Brain Natriuretic Peptides (BNP), In COVID-19 patients, elevated levels of Brain Natriuretic Peptide (BNP) or N-Terminal Pro Brain Natriuretic Peptide (NPBP) have been detected, indicating a concomitant cardiac malfunction and a weaker clinical course. They are not, however, specific for COVID-19's simultaneous detection of CVD and HF. Low levels of brain natriuretic peptides also have a strong negative predictive value, which means

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they can rule out concurrent heart disease.

Markers of inflammation and thrombogenicity: Most patients had elevated C-reactive protein, erythrocyte sedimentation rate, and other inflammatory and thrombogenicity indicators such ferritin, interleukin-6, lactate dehydrogenase, fibrinogen, and D-dimer. An increase in these markers is linked to a greater risk of death. Markers of inflammation and thrombosis risk should be assessed initially to minimise the risk of death and to identify individuals at elevated risk of thromboembolic illness. They should be repeated every 2 days to 3 days if the clinical situation worsens.

Conclusion

The widespread incidence of COVID-19 presents new issues for clinicians and individuals in communities all over the world. Patients with COVID-19 or CVD/HF who are prone to infection are more likely to develop cardiovascular illnesses. As a result, it's critical for this group of

patients to take extra precautions. Furthermore, because CVD/HF patients are more likely to develop major problems after getting any form of infection, they will have more severe sickness and death if they contract COVID-19. COVID-19 infection causes myocardial damage, heart disease, and cardiac arrhythmias, according to latest study findings. Because symptoms may overlap greatly in any hospitalised CVD/HF patient, tracing symptoms and conflict with COVID-19 infection is critical. Because of the growing body of research and scientific findings, it is important to note that present guidelines are mostly focused on the current disease pandemic, and major changes in the signs and symptoms of COVID-19 infection across the world necessitate continual updating. Specialists should consider the standard laboratory exams and specialised tests outlined in this article as particular joint tests to assure the safety of all patients in order to be more confident.

References

- World Health Organization. Multidrug and extensively drug-resistant TB (M/XDR-TB): 2010 global report on surveillance and response. Geneva Switzerland. (2010).
- A special supplement to the Global Tuberculosis Report titled, Drug-resistant TB-Surveillance & Response, marks the 20th anniversary of the Global Project on Anti-Tuberculosis Drug Resistance Surveillance and its TB Supranational Reference Laboratory Network (2014).
- Centers for Disease Control and Prevention. Provisional CDC guidelines for the use and safety monitoring of bedaquiline fumarate (Situro) for the treatment of multidrug-

resistant tuberculosis. 62(9), 1-12 (2013).

- Jahnavi G, Sudha CH. Randomised controlled trial of food supplements in patients with newly diagnosed tuberculosis and wasting. Singapore Med J 51(12), 957-962 (2010).
- Partners in Health. The PIH Guide to the medical management of multidrug-resistant tuberculosis, 2nd Edition. Boston, MA. USAID TB Care II. (2013).
- Vincent N. Voluntary madness: My year lost and found in the loony bin. Penguin (2008).
- Caminero JA, Sotgiu G, Zumla A, et al. Best drug treatment for multidrugresistant and extensively drug-resistant

tuberculosis. Lancet Infect Dis 10(9), 621-629 (2010).

- Chan ED, Laurel V, Strand MJ, et al. Treatment and outcome analysis of 205 patients with multidrug-resistant tuberculosis. Am J Respir Crit Care Med 169(10), 1103-1109 (2004).
- Bereda G, Bereda G. Determinant of and factors influencing medication poor adherence to pulmonary tuberculosis treatment at the tuberculosis clinic of mettu karl referral hospital, southwestern oromia, ethiopia: A prospective cross sectional study, 2021. Arch Respirat Pulmon Med 1(1) (2020).