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Journal of Cardiovascular Medicine and Cardiology
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MEDICAL GROUP
JOURNAL OF Cardiovascular Medicine and Cardiology
ISSN: 2455-2976 DOI: https://dx.doi.org/10.17352/jcmc

Commentary

Covid-19... The Dilemmas of a Cardiologist!

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Received: 21 April, 2020
Accepted: 30 April, 2020
Published: 02 May, 2020

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Keywords: Covid-19; Cardiologist; STEMI; Hydroxychloroquine; Angiotensin converting enzyme

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Abstract

The world is witnessing the devastations of SARS-CoV-2 pandemic. It is spreading fast and decimating the society due to high secondary attack rates and high virulence. Patients with known cardiovascular diseases are at an even greater risk of adverse outcomes and mortality by this infection. Also, Covid-19 may present with a multitude of cardiovascular manifestations. This challenges the cardiologists in making the right diagnosis and providing an adequate treatment to these patients, while protecting themselves too from acquiring the infection. Another concern is the dramatic fall in the number of acute coronary syndrome patients reaching the cardiology ER. This makes the patients devoid of the mortality advantage primary percutaneous intervention offers. Lack of definitive treatment and vaccine makes preventive strategy as the most important part while dealing with Covid-19. In this article, the authors summarise the various cardiovascular manifestations of Covid-19 and precautions needed while handling them.

Abbreviations

STEMI: ST Elevation Myocardial Infarction; NSTEMI: Non ST Elevation Myocardial Infarction; ACE: Angiotensin Converting Enzyme; ARBL: Angiotensin Receptor Blocker; PCI: Percutaneous Intervention; ICU: Intensive Care Unit; RNA: Ribonucleic Acid

Introduction

Being hit by the third zoonotic corona virus pandemic over the previous few decades, the world is bearing with novel corona virus, SARS-CoV-2. According to WHO's daily report, as of April 20, 2020, this Corona virus disease 2019 (Covid-19) has affected more than 2.4 million people over 210 countries globally with more than one hundred and sixty thousand deaths. Patients with pre-existing cardiovascular diseases are reported to have the highest mortality [1]. It has been found to have a worse prognosis in patients with chronic medical conditions, hypertension and diabetes. Health care providers need to take adequate precautions to avoid getting infected themselves. In a study, approximately 4% of the Covid-19 affected individuals were health care personnel [1].

Covid-19 with Cardiovascular Presentations

Apart from causing fever, cough and dyspnea, Covid-19 may present with a multitude of cardiovascular manifestations [2]. There have been case reports of patients presenting as Non-ST Segment Elevation Myocardial Infarction (NSTEMI) with non specific ST-T wave changes on electrocardiogram with an elevated troponin levels as well as ST Segment Elevation Myocardial Infarction (STEMI). Many patients present with arrhythmias, cardiomyopathy and pulmonary edema. There is a case report of Covid-19 induced myopericarditis even in the absence of clinically evident pulmonary involvement [3]. Such a presentation may lead to a delay in diagnosis of Covid-19 and a high degree of suspicion is required. 26% of the Covid-19 patients required cardiologic intensive care in a report on 138 patients hospitalised at Zhongnan University Hospital of Wuhan [4]. Of these, 16.7% developed arrhythmias and 7.2% had acute cardiac injury. Although very little is yet known, it is perhaps due to pro-inflammatory state induced by the infection and increased metabolic demands that it leads to such cardiac complications. According to a meta-analysis, biomarker of cardiac injury, troponin I was significantly more in patients with more severe illness [5]. Patients with Covid-19 are at increased risk of venous thromboembolism with elevated D-dimer levels [6].

The Do's and the Don'ts while Managing Covid-19 Patients

We have all grown up hearing that 'Prevention is better than cure'. This is the time to understand this locution more

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DOI: https://dx.doi.org/10.17352/2455-2976.000121

than ever. Due to perplexing presentations of Covid-19 and similarities with cardiovascular diseases, cardiology ICU staff are at great risk of unknowingly dealing with a Covid-19 patient. Therefore, patients should be isolated in a separate room with adequate monitoring until Covid-19 is excluded by testing. It is advisable to judiciously weigh the risks and benefits of invasive and non-invasive testing. For a suspected or Covid positive patient, it is preferable to use systemic thrombolytic therapy for STEMI and activate the catheterisation laboratory for rescue PCI or in patients with cardiogenic shock [7]. Minimum instruments should be kept in the catheterisation laboratory to prevent contamination. Negative pressure rooms are ideal. If not possible, at least central air conditioning should be avoided. In patients in whom we anticipate the need for invasive ventilation or intra-aortic balloon pump (IABP), such procedures should be done bedside to avoid doing emergently in catheterisation laboratory. Disinfection of the instruments and catheterisation laboratory is essential after each case. Chlorine containing disinfectants are shown to be effective in clearing the viral load [8].

The doctors and the staff attending to the patients should take adequate precautions in order to minimise inadvertent exposure to the virus. A few departments and hospitals have got closed down due to spread among healthcare personnel. We need to be very careful about hand hygiene and social distancing while we attend to our patients. Also, the devices like stethoscope need proper decontamination and perhaps lesser use in a suspected or known Covid-19 positive patient. Patients should be allowed to bring only one person for help along with them. All the persons entering the hospital premises should be screened for Covid-19 related symptoms. The patients and the attendants should wear masks and keep proper distancing even in the waiting area. Infact, they should be advised to stay inside their vehicles and come into the premises only when their turn comes. This needs telephonic co-ordination.

It is not surprising to have a shortage of adequate personal protective kits during such an unforeseen pandemic. There should be minimum staff at a time. It is acceptable to postpone routine follow up visits and elective procedures [7]. Percutaneous interventions for stable coronary artery disease and procedures for structural heart diseases need to be postponed. It is important to prevent cross contamination as well as to preserve resources.

Telemedicine offers a helpful way to reach out to our patients in such challenging times. This helps prevent exposure of other patients and hospital staff to Covid-19 positive patients. As our patients with established cardiovascular diseases are at maximal risk of serious illness, we need to take utmost care to prevent cross-infection. We need to solve their queries and tell them to refill their prescription medicines without exposing them to the hospital crowd, as far as we can. We need to inform them to take special care of themselves and follow hand hygiene and social distancing. But in developing countries like India, this is very difficult. There is a lack of resources and preparedness to achieve this effectively.

Dilemmas in treatment

While there is no proven therapy or vaccine for this viral disease, preventive measures and supportive management of complications are the sole determinants of its containment. No clinical trial supports the role of any medicine even for prophylactic use. Although chloroquine and hydroxychloroquine have been tried with limited benefit, we need randomised clinical trials to support this. Hydroxychloroquine is known to prolong QTc interval and this effect may be marked when it is given in combination with other QTc prolonging drugs like azithromycin [9]. We need to be more watchful for this side effect as this may precipitate lethal ventricular tachyarrhythmias, especially in elderly, women, concomitant diuretic use, hypokalemia and hypomagnesemia [Table 1] [10]. A Tisdale score of ≤ 6 predicts low risk, 7-10 medium risk, and ≥ 11 high risk of drug-associated QT prolongation [Table 2]. Drugs like ritonavir, lopinavir, oseltamivir, ribavirin have been tried but lack strong evidence [11]. In the absence of clinical trials and conflicting data from in-vitro and animal studies, the use of interferons and corticosteroids also cannot be recommended [11]. Hu, et al. [12] report treating Covid-19 associated fulminant myocarditis with a combination of methylprednisolone (200 mg/day) and immunoglobulin (20 g/day) each for four days. There have been certain reports of using plasmapheresis to deal with the cytokine storm in this illness, but there are no studies to recommend this at present. Remdesivir, a monophosphate prodrug that undergoes metabolism to an active C-adenosine nucleoside triphosphate analogue is emerging as a promising therapy for the treatment of RNA viruses including this novel corona virus [11].

There have been various social media posts suggesting that ACE inhibitors increase the risk of infection as well as the severity of Covid-19. SARS-CoV-2 enters human cells through binding with its spike protein to angiotensin converting

Table 1: Risk score for drug associated QTc prolongation [11].

Risk factor	Points
Age ≥68 y	1
Female sex	1
Loop diuretic	1
Acute myocardial infarction	2
Admission QTc ≥450 ms	2
Serum K+ ≤3.5 mEq/L	2
Sepsis	3
Heart failure	3
One QTc-prolonging drug	3
≥2 QTc-prolonging drugs	3
Maximum Risk Score	21

Table 2: Tisdale score and Risk of Drug-Associated QT Prolongation [11].

Score	Risk level
≤6 points	Low risk
7-10 points	Moderate risk
≥11 points	High-risk

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enzyme 2 (ACE2) receptors [13]. This has triggered worry regarding the use of ACE inhibitors and ARBs as these drugs upregulate the ACE2 receptors [14] and may lead to more deleterious effects. Contrary to this, there is some evidence supporting the protective effect of ARB and ARNI (Angiotensin II Receptor-Neprilysin Inhibitor) [15,16]. In view of conflicting data and no evidence of harm, it is currently recommended to continue these drugs in patients already taking them [17].

Missing STEMI!

Around the world, the number of acute coronary syndrome patients reaching the emergency room has dramatically fallen. Catheterisation laboratory activation for primary percutaneous coronary intervention of STEMI is reduced by approximately 40% [18,19]. Similarly, the number of patients arriving for other reasons like worsening heart failure has reduced. Perhaps, people are afraid of getting out of their homes and especially visiting a hospital for the fear of catching infection with this corona virus. There are no routine follow up visits anyway due to lockdown, whether imposed by the government or self imposed. When this pandemic shall pass away, may be we will have an increasing number of STEMI who could seek no timely intervention. Lot of them may even face adverse consequences of the same as they are getting deprived of the mortality advantage that primary PCI gives [20].

Concluding Hopes for Health!

While the researchers strive to find a vaccine for this virus, let's keep all precautions to avoid getting infected. Let's have a stronger will power to work and serve our patients in these adverse circumstances. Let's be more vigilant to rule out Covid-19 infection among our cardiology ICU patients. We should advice our patients to keep their mind and body occupied in a healthy way during the lockdown period. Exercising indoors and eating a healthy food are essential. Keep your minds occupied with positive ideas to avoid depression in these gloomy times. The doctors and other health care providers also should keep special focus on their health both physical and mental as many are becoming depressed. There's light at the end of the tunnel!

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