

Asymptomatic Bradycardia in COVID-19: Premonition of a cytokine storm?

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ABSTRACT

Cardiovascular manifestations of COVID-19 are of paramount importance. Given the increasing load of COVID-19 patients there has been an increase in the thromboembolic events as well as arrhythmias. Though the relationship of COVID-19 with arrhythmias is well studied, Sinus Bradycardia as a presentation of COVID-19 is rare. Here, we report a case of 45-year-old female who tested positive for COVID-19 following exposure to COVID and was completely asymptomatic with bradycardia. The patient later developed features like fever, cough and hypoxia indicating this bradycardia to be a premonition of inflammatory cytokine storm.

Keywords: Bradycardia, COVID-19, Cytokine storm

1. INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-Cov2) with its rapid spread in the current pandemic has confronted the health care facilities with its challenging presentations. COVID-19 has known to effect the respiratory, cardiovascular, and gastrointestinal as well as central nervous system. Cardiovascular manifestations of COVID-19 include Arrhythmias and thromboembolic episodes like Myocardial infarction. Acute injury to the myocardium is the most common presentation of COVID-19 in terms of cardiovascular manifestations (Driggin et al., 2020). COVID-19 is a pro thrombotic state with increased incidence of thrombus formation in the arteries due to endothelial injury, expression of the tissue factor, inflammation as well as inhibition of the fibrinolytic pathway (Zhou et al., 2020).

Left ventricular dysfunction as well as congestive cardiac failure can also be due to underlying COVID-19 infection. Tachycardia is a common manifestation of COVID-19 due to autonomic dysfunction caused by the coronavirus. Though, various types of arrhythmias continue to be reported in association with COVID-19 asymptomatic bradycardia is a rare manifestation. Possible mechanism for this bradycardia could be multifactorial with pro inflammatory cytokine acting on the pacemaker cells of the heart, severe hypoxia as well as exaggerated response to certain medications or various kinds of drug interactions.



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Increased level of pro inflammatory cytokines in the circulating system act on the cardiac pacemaker cells; thus leading to bradycardia (Stenina et al., 2012). Hence it can be said that this bradycardia is a warning sign seen in patients with COVID-19 before they enter the rapid decompensation phase due to cytokine storm. Here we report a case of a 45 year old female who tested positive for COVID-19 post exposure at her work but was completely asymptomatic with bradycardia and later developed to have bilateral infiltration of the lungs with hypoxia.

2. CASE REPORT

A 45 year old female who was a physiotherapist by occupation presented with history of exposure to a COVID-19 patient at work five days back and had later tested positive for COVID-19 via nasopharyngeal swab two days ago. Patient did not report any event of fever, cough or breathlessness. She also did not experience any loss of taste or smell. Patient had no history of hypertension, diabetes mellitus or any prior comorbidity. Patient was not a known case of any cardiac illness. On general examination the patient was stable, afebrile, with pulse 56beats/min, regular, blood pressure 120/80 mm hg in right arm supine position and spo2 was 97 on room air.

On systemic examination chest was bilateral clear, heart sounds were normal, patient was conscious and oriented and abdomen was soft, non tender with no hepatosplenomegaly. Patient was admitted in view of asymptomatic bradycardia for further investigations. ECG was done which was suggestive of sinus bradycardia (Figure 1). Lab investigations were suggestive of raised inflammatory markers with normal cardiac markers (Table 1). Patient was started on supportive management. On day 3 of admission patient witnessed high grade fever for the first time with dry cough. Her spo2 dropped to 93 percent on room air and she was supported with oxygen. HRCT chest was done which was suggestive of bilateral ground glass opacities with a CT Severity Score of 16/25 and CORAD 6 (figure 2). Patient was started on remdesavir, steroids and other supportive measures. Patient improved clinically and oxygen support was tapered. After 10 days of hospital admission patient was discharged in stable condition with a hear rate of 70 beats per minute and a normal ECG on discharge (Figure 3).

Table 1 Showing Lab Investigations of the case

CBC	Hb-13.5gm/dl MCV-83fl Platelet count-124000/dl WBC Count-7800/dl
LFT	Total Protein-7.0gm/dl, Albumin3.5gm/dl, Globulin3.5gm/dl, aspartate aminotransferase 21 units/l , alanine aminotransferase 29 units/l, AlkanlinePhophatase99 IU/l, Total Bilirubin :1.3mg/
KFT	Creatinine:0.8mg/dl, Urea27mg/dl, Sodium136mmol/l, Potassium -4.4mmol/l
CRP	79.0mg/dl
D-Dimer	0.83
Interleukin 6	63pg/ml
Serum Ferritin	560ng/ml

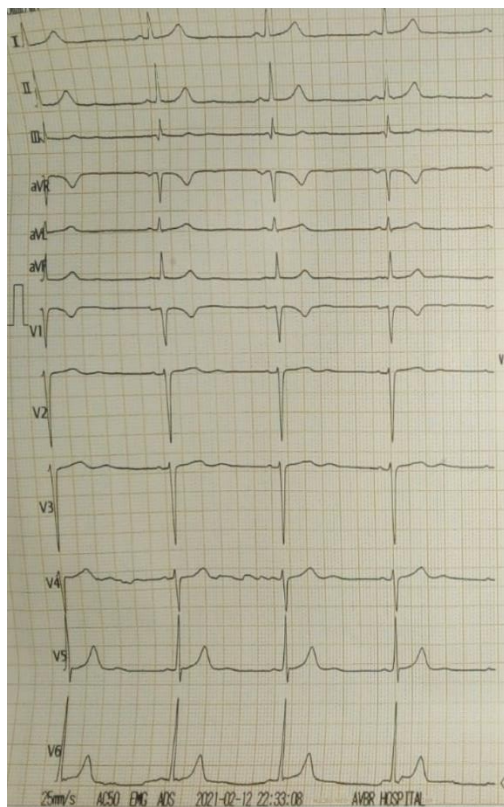


Figure 1 ECG on admission showing bradycardia

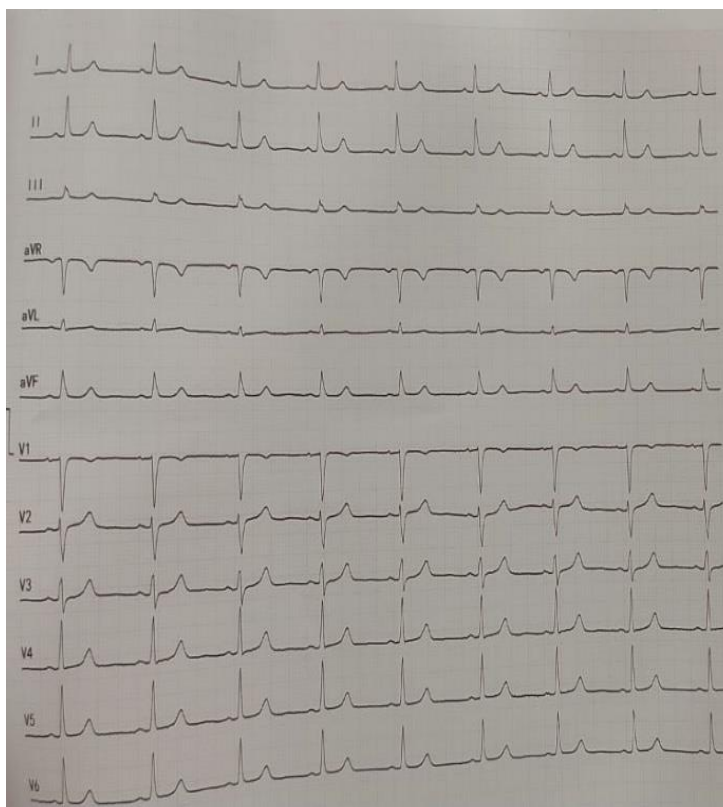


Figure 3 normal ECG post treatment with antiviral and steroids

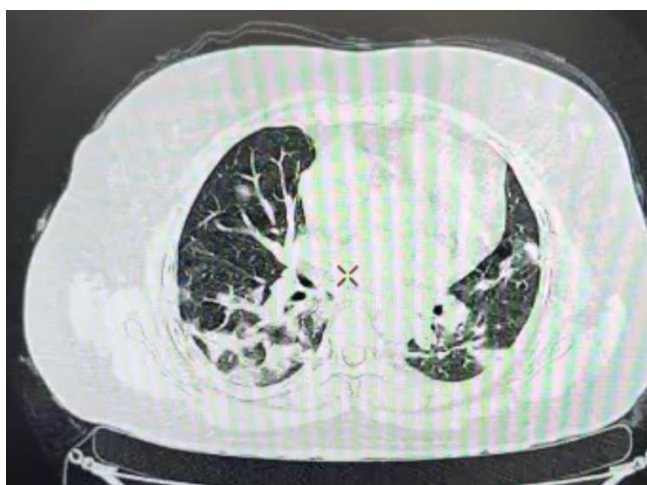


Figure 2 HRCT Chest showing bilateral ground glass opacity

3. DISCUSSION

SARS-Cov2 or Severe acute Respiratory Syndrome Coronavirus 2 has wide range of presentations with multiple organs as its target (Jain et al., 2020). Cardiovascular System has various means of manifestations as far as typical presentations of COVID-19 are concerned. It may range from Tachycardia due to autonomic dysfunction to Arrhythmias to myocardial infarction. Relative Bradycardia is known as dissociation between temperature of the patient and his or her heart rate in a state of fever which is seen mainly in typhoid, legionnaires disease, scrub typhus and psittacosis. Although, relative bradycardia is associated closely to various illnesses, our case of asymptomatic bradycardia with no fever and no prior symptoms is a rare one.

The mechanisms which may be postulated for this is direct damage caused to the myocardium by the coronavirus, hypotension, hypoxia, down regulation of receptors of Angiotensin convertase enzyme 2, toxicity due to various drugs and pro inflammatory cytokines. Out of the above postulated mechanisms most likely to cause bradycardia in COVID-19 are direct injury to the heart muscle and the effect exerted by the profound systemic inflammation. It is important to account that the inflammatory markers

were raised in our patient thus indicating towards an inflammatory pathophysiology. It can be hypothesized that the inflammatory cytokines increased during the cytokine storm of COVID-19 and by the affect exerted by them on the pacemaker cells of the heart they caused bradycardia.

Thus it may be believed that a wide range of pro inflammatory cytokines including Interleukin 6 act the SA Node thus resulting in bradycardia just before the cytokine storm. It is an important point to conclude as bradycardia might be the warning sign before the unpredictable cytokine storm leads to rapid decompensation in COVID-19. Steroids play pivotal role in the treatment of the systemic inflammation due to COVID-19 due to their strong anti-inflammatory effects (Ye et al., 2020). Our patient's bradycardia improved post steroids thus further supporting inflammatory markers etiology of bradycardia. Onset of fever along with hypoxia post bradycardia also point towards inflammatory cytokines to be the culprit of this bradycardia.

Direct involvement of SA node by the Coronavirus might also result in bradycardia thus indicating viremia. It should also be noted that our patient had no prior cardiac illness and no history of any drug intake like beta blockers which might cause bradycardia. In the presence of above scenario, it is reasonable to conclude that the etiology of bradycardia in our case was COVID-19 induced pro inflammatory cytokines. Thus, Bradycardia even though asymptomatic should not be neglected in COVID-19 patients as it may be a indication of the upcoming cytokine storm.

4. CONCLUSION

Thus, through our brief case report we would like to highlight the importance of bradycardia in COVID-19 patients as it may be a premonition of the upcoming profound systemic inflammation by the coronavirus. The physicians treating COVID-19 should thereby be on the lookout for bradycardia to predict the onset of otherwise unpredictable cytokine storm.

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Conflict of interest

The Authors have no conflicts of interest that are directly relevant to the content of this clinic-pathological case

Financial Resources

There are no financial resources to fund this study

Informed Consent

Informed Consent was obtained from the patient.

Author's contribution

All the authors contributed equally to the case report.

Data and materials availability

All data associated with this study are present in the paper.

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