

Covid Vaccine Induced Myocarditis: A Bolt from the Blue: A Case Report

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Abstract

Myocarditis, a reported complication of COVID-19 infection, can also occur after administration of COVID-19 vaccination. If identified early, and treated properly, it will lead to full recovery.

The occurrence and recurrence of myocarditis in a 36-year-old lady who was treated for severe COVID-19 pneumonia 4 months before she got her first COVID-19 Astra Zeneca vaccine is narrated. She developed myo-pericarditis a week after the first dose of the vaccine and a recurrence a month later after the first episode of the myo-pericarditis

Conclusion: Severe myocarditis can occur after the first dose of the COVID-19 Astra Zeneca vaccine, with previous history of COVID-19. A high index of suspicion is required for its diagnosis post COVID-19 vaccination. Cardiac Magnetic Resonance (CMR) is key in the diagnosis of acute myocarditis.

Keywords: COVID-19; Covid vaccines; Myocarditis; Pericarditis; SARS-COV-2.

Introduction

Covid vaccination is already altering the occurrence and impact to health of coronavirus disease 2019 (COVID-19).¹ Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) is the causative

pathogen of COVID-19. This virus mainly affects the respiratory system as its name suggests.^{2,3} It has also been shown to affect other organ systems including the musculoskeletal system, gastrointestinal system, central nervous system.^{4, 5, 6} In this case report, the relationship between COVID-19, its vaccines and the cardiovascular system is evaluated.

Cardiac complications resulting from Covid infection are: myocarditis, cardiac rhythm abnormalities, endothelial cell injury, thrombotic events, vasculitis, and myocardial interstitial fibrosis.⁷ Severity of these complications may increase in the presence of a preexisting cardiovascular disease.⁸ It has been postulated that the increased expression of the angiotensin converting enzyme 2 (ACE2), the SARS-COV-2 entry receptor, on the cardiac pericytes is the reason behind the more severe disease in patients with preexisting cardiovascular disease.⁹ SARS-COV-2 may also initiate cytokine storm and systemic inflammation which may lead to cardiac tissue damage and myocarditis.⁸

Defined by the Dallas Criteria, Myocarditis is an inflammatory infiltrate of the myocardium with necrosis and/or degeneration of adjacent myocytes

not typical of the ischemic damage associated with coronary artery disease. This definition usually underestimates the incidence of myocarditis.¹⁰ Fever, tiredness, chest pain (in concurrent pericarditis), sweats, chills and dyspnea, are the common symptoms.¹¹ Adults may have mild and few symptoms. Sudden and severe diffuse cardiac inflammation is usually fatal from cardiogenic shock, ventricular arrhythmias, or multi organ failure.¹² Endomyocardial biopsy is essential for the diagnosis of acute myocarditis. Elevated troponin level is the hallmark of COVID-19-related myocarditis.¹³ Myocarditis usually presents during COVID-19 illness and convalescence but may delay up to a month after recovery.¹⁴ Cardiac MRI (CMR) is instrumental in the diagnosis and assessment of the degree of inflammation and can identify myocarditis presenting as a post-acute sequela of SARS-CoV-2 infection.

In COVID-19 associated myocarditis, there have been reports of myocarditis or pericarditis after vaccination with mRNA COVID-19 vaccines (Pfizer-BioNTech BNT162b2/Comirnaty and Moderna mRNA-1273). This commonly occurs after administration of the second dose of the vaccine.⁷ Myocarditis has also been reported after the administration of Astra Zeneca.¹⁵

This case report narrates the chronological story of a 36-year-old lady who was treated for severe COVID-19 pneumonia 4 months before she got her first COVID-19 Astra Zeneca vaccine. She then developed severe chest pain 2 weeks after the first dose of the vaccine and a recurrence a month later after the first episode of the myopericarditis.

Materials & Methods

A 36-year-old secondary school teacher with no comorbidity presented to the heart clinic for follow up 3 weeks after being discharged from inpatient care following a diagnosis of myocarditis. She had worsening central chest pain that she described as stabbing and crushing. The pain was worse with activity or motion and change of position and was relieved on lying still in a supine position. It radiated to the back. She also had severe lassitude, fatigue and a feeling of missed beats with occasional palpitations and dyspnea on exertion.

She had no known cardiac disease; with no family history of cardiac disease. She had severe COVID-19 pneumonia that warranted inpatient care six months prior to this visit. She consequently had breathlessness on mild activity and physical weakness for the four months leading up to the day she got her first Astra Zeneca vaccine dose.

Following the vaccination, she developed fever that was associated with headache, severe fatigue, a worsening of the breathlessness, a sensation of missed beats and general muscle aches.

She used paracetamol without much improvement. An electrocardiogram (ECG) done a week after the vaccine showed first-degree atrioventricular (AV) block. She was promptly advised to go for a cardiology consult. The echocardiogram showed normal cardiac anatomy and function. There were no valvular lesions, effusions or wall motion abnormalities. She had an elevated erythrocyte sedimentation rate (ESR) of 28mm/hr.

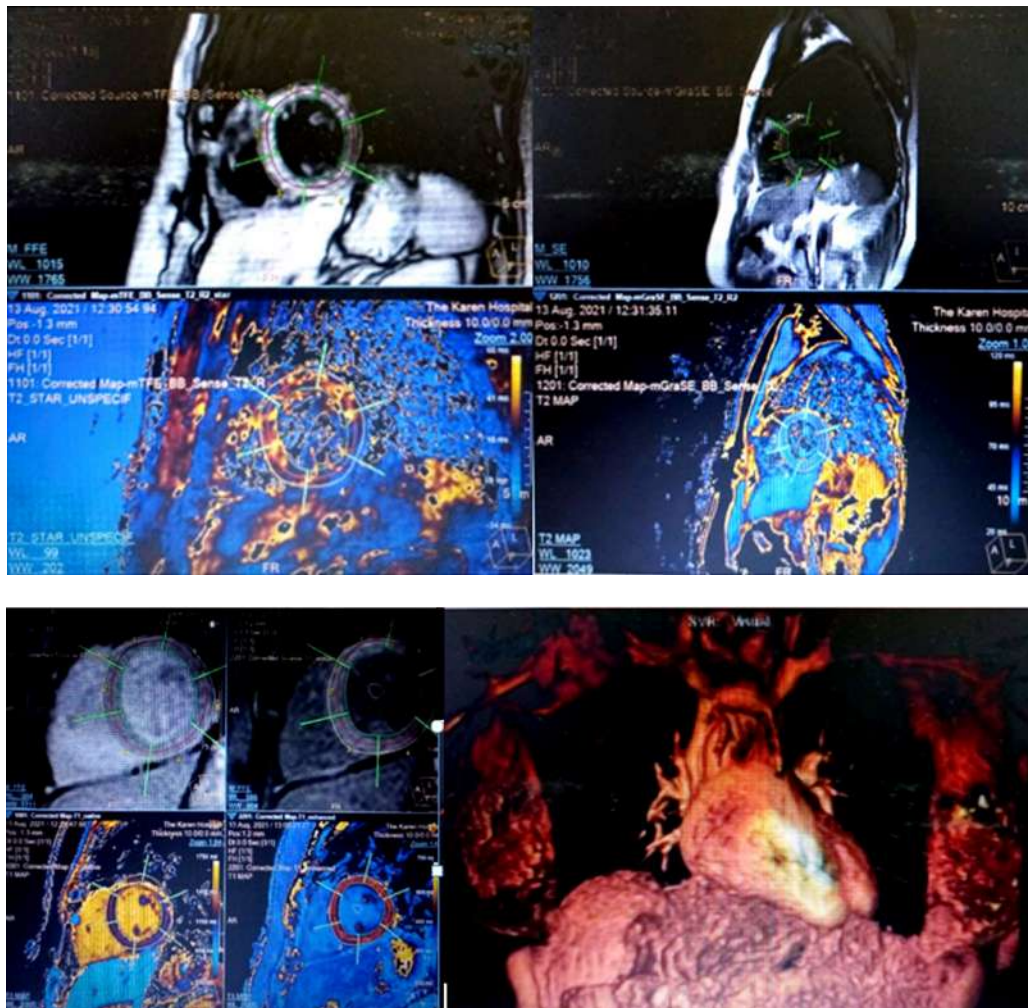
Lipid profile, urea, creatinine, electrolytes, liver function tests, d-dimers, HbA1c, INR, hemogram, pro-b-type natriuretic peptide (BNP), amylase, serum calcium, phosphorus, thyroid function tests, C-reactive protein, highly sensitive troponin-I were within normal ranges. The patient was negative for rheumatoid factor, SARS-COV-2 antigen, anti-nuclear antibodies, human immunodeficiency virus (HIV) hepatitis B and Cviruses. The X-ray however showed borderline cardiomegaly but normal lung parenchyma and vascular distribution. Coronary angiogram found normal coronary anatomy.

Cardiac magnetic resonance scanning was performed on 3.0 T MR System where multi-planar post-contrast and delayed post-contrast images were obtained. The heart was normal in size with no fatty infiltration in both ventricles. There was normal cardiac motility with preserved ejection fractions for both right and left ventricle. The pericardium and all the valves were normal. There was no aortic dissection or coarctation, and normal pulmonary arteries and veins. Cardiac mapping with MOLLI at 3T demonstrated: Patchy mid wall hyper intense areas on T2 STIR black blood imaging. Mid-wall early enhancement in the mid septal wall was observed on dynamic contrast. In addition, an area of late enhancement in the mid septal wall was noted on late gadolinium enhancement. An impression of acute myocarditis was made. She was allowed home after 12 days in the ward where she had shown remarkable improvement

Three weeks later, she presented with a chest pain that was similar in character to the previous one, associated with palpitations and severe fatigue but with no fever or chills. She had another syncopal attack during this admission. ECG still showed a prolonged PR interval whereas the echocardiogram and the other tests were normal.

Fig. 1: Cardiac MR images: Areas of T1 prolongation on T1 native mapping; elevated extracellular volume (ECV) mean-values in anterior myocardial segments; regions of mild increase in the lateral

segments on T2 mapping; and patchy mid wall hyper intense areas on T2 STIR black blood imaging. Mid-wall early enhancement in the mid septal wall was observed on dynamic contrast. In addition, an



area of late enhancement in the mid septal wall was noted on late gadolinium enhancement.

The ESR was 18mm/Hr. She stayed in the wards for a week and was allowed home. She is awaiting her second Astra Zeneca COVID vaccination.

Discussion

Serious adverse events after COVID-19 vaccination are rare but are of great concern. The rare Thrombosis with Thrombocytopenia Syndrome (TTS), Guillain Barre Syndrome and Capillary Leak Syndrome associated with the Astra Zeneca (Covishield/Vaxzevria) vaccine have drawn much publicity. Nevertheless, attention is being drawn towards myocarditis soon after the second dose of covid vaccine. This is mainly with the mRNA COVID-19 vaccines of Pfizer and Moderna.⁷

Astra Zeneca, an adenoviral vector vaccine, has also been reported to cause myopericarditis in the United Kingdom albeit at a lower incidence compared to the mRNA vaccines.¹⁶ Overall, there is a very low occurrence of myocarditis/pericarditis of 2.0 per million doses for viral vector vaccines.¹⁵ In Canada, nearly two thirds of the 111 myocarditis/pericarditis that were reported occurred after the first dose of the vaccine.¹⁵

This case report shows a deviation from the typical 'Post COVID-19 vaccine myocarditis patient' who is mainly a young male, younger than 30 years of age who present within 3 days of receiving the second dose of the COVID-19 vaccine. The onset of symptoms has been reported to range between 5 hours and 92 days post vaccination.⁷ In our patient it occurred within a week. In Canada, the median age for women was higher than the

median for men (49 vs 38 years). This tallies well with this case report.⁵ Our patient had a previous COVID-19 infection and suffered from Long Covid in variance with the epidemiology of the post vaccine myocarditis patients who were reported to be previously well.⁷

Our case report raises some questions that further studies may explore: does COVID-19 infection, particularly Long Covid, predispose to myopericarditis? How frequently should these patients be followed, and which is the best modality of follow-up? Does this type of myocarditis also lead to dilated cardiomyopathy? Should patients who develop myocarditis after the first dose defer or refrain from the second dose of the vaccine given that side effects tend to be more intense after the second dose¹⁷? Can one have episodes of recurrent myocarditis attacks after the initial one after a period of improvement as other reports have intimated¹⁸?

Conclusion

Myocarditis severe enough to warrant inpatient care can occur after the first dose of the COVID-19 Astra Zeneca vaccine, previous history of COVID-19 disease notwithstanding. It may recur before administration of the second dose of the vaccine. A high index of suspicion and a thorough laboratory and radiological work up is required for its diagnosis and to rule out other possible diagnoses. The role of Cardiac MR (CMR) cannot be over emphasized in the diagnosis of acute myocarditis. Caution should be exercised when these vaccines are rolled out to be administered to young adults and children.

Abbreviations

COVID 19: coronavirus disease 2019

SARS-COV-2: Severe Acute Respiratory Syndrome Coronavirus-2

ECG: electrocardiogram

AV: atrioventricular

ESR: erythrocyte sedimentation rate

Pro-BNP: prohormone b-type natriuretic peptide

HIV: human immunodeficiency virus

CMR: cardiac magnetic resonance

OGD: oesophago-gastro-duodenoscopy

ECV: extracellular volume

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