The BNT162b2 (Pfizer- BioNTech) and mRNA 1273 (Moderna) vaccines are the first messenger RNA (mRNA)-based vaccines ever approved. In both vaccines, an mRNA sequence determines the structure and assembly of the immunogen, the SARS-CoV-2 spike (S) glycoprotein. Previous studies reported cases of myocarditis and/or pericarditis that developed following immunization with mRNA COVID-19 vaccines. In this study, the authors from Hong Kong, China, investigated the cardiac outcomes in adolescents diagnosed with COVID-19 vaccine-associated myocarditis up to one year after the diagnosis.

Most cases of myocarditis and/or pericarditis associated with mRNA COVID-19 vaccines were males under 30 years old. Symptoms usually occur within the first three days following the second dose of mRNA COVID-19 vaccines. A recent Norwegian nationwide registry-based study has shown increased risks of adverse events, including anaphylactic reaction, lymphadenopathy, and myocarditis/pericarditis in older adolescents aged 12–19 years, after the second mRNA COVID-19 vaccination. https://discovermednews.com/norwegian-nationwide-study-adverse-events-in-older-adolescents-after-anti-sars-cov-2-vaccination/

The findings of elevated troponin serum levels, abnormal ST-elevations in the electrocardiogram (ECG), altered ventricle movement in echocardiogram, or late gadolinium enhancement (LGE) in cardiac magnetic resonance imaging (MRI) suggest the development of myocarditis. Although most cases had a clinically mild course, some patients required intensive care support or even died of acute heart failure. In most young patients the short-term clinical trajectory demonstrated a resolution of cardiac symptoms and normalization of the left ventricular ejection fraction. However, some studies reported sequelae in myocardial tissue (inflammation and edema) in a small proportion of adolescents approximately two months after the vaccination. https://discovermednews.com/pet-and-mri-visualization-of-myocardial-tissue-sequlae-in-17-patients-with-myocarditis-after-covid-19-vaccination/

About the Study and Results

This study evaluated cardiac outcomes in adolescents diagnosed with COVID-19 vaccine-associated myocarditis up to one year after the diagnosis. The study included 40 patients diagnosed with vaccine-associated myocarditis, with a median age of 15.1 years (ranging from 12.7 to 17.9 years). The majority (33/40) were males. At presentation and the latest follow-up, all participants underwent ECG, echocardiogram, and cardiac MRI.

The participants were followed for an average of 10 months (ranging from 5.6 to 12.3 months). During the follow-up period, 73% (29/40) were asymptomatic. The remaining eleven patients had symptoms such as noncardiac chest pain, reported by 18% (7/40) of patients, palpitations, reported by 8% (3/40)of patients, and fatigue, reported by one patient (3%).

At presentation, 78% (31/40) of participants had abnormal ECG with ST-segment or T-wave abnormalities, but, ECG was normalized in all patients at the latest follow-up. The echocardiogram showed normal left ventricular ejection fraction in all patients at presentation. Mildly increased echogenicity of the pericardium or left ventricular lateral wall was found in 15% of patients (6/40), and minimal (<2 mm) pericardial effusion in 5% of patients (2/40). At the latest follow-up, 5% of patients (2/40) had borderline left ventricular ejection fraction (51.1% and 53.6%), whereas in 95% of patients left ventricular ejection fraction was normal.

At presentation, cardiac MRI underwent 39 patients, and 26 had abnormal findings. Myocarditis was found in 56% (22/39), abnormal T1 values in 54% (21/39), abnormal T2

values in 62% (24/39), LGE in 49% (19/39), and reduced left ventricular ejection fraction in 18% (7/39) of patients.

Out of 26 patients with abnormal MRI at presentation, 58% (15/26) had mild residual LGE, and 42% (11/26) had normal MRI findings at follow-up. 8% (2/26) had borderline left ventricular ejection fraction. It is worth noting that LGE on the initial MRI correlated with the findings of residual LGE at follow-up. At follow-up, no patients had abnormal T1 values or features of myocarditis.

Conclusion

The authors noted that this study is the longest follow-up study of vaccine-associated myocarditis in adolescents. The results demonstrated preserved global systolic ventricular function. However, further cardiac evaluation revealed impaired left and right ventricular myocardial deformation and persistence of residual LGE in MRI in a significant number of patients (58%) up to one year of follow-up.

According to researchers, these results indicate subclinical myocardial dysfunction and fibrosis with a potential long-term effect on exercise capacity and cardiac functional reserve during stress.

This article was published in Circulation.

Journal Reference

Kwong-man Yu C et al. Cardiovascular Assessment up to One Year After COVID-19 Vaccine–Associated Myocarditis. *Circulation*. 2023;148:436–439. Published online 2023 Aug 1 (Open Access) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10373639/


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