

Post-acute midterm follow-up cardiac MRI findings and clinical outcomes in patients with COVID-19 vaccine-associated myocarditis: a comprehensive systematic review and meta-analysis

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Abstract

Purpose

Although previous investigations revealed favourable in-hospital outcomes of COVID-19 vaccine-related myocarditis, the mid-term prognosis is still unclear. Hence, we aim to summarise existing evidence on the follow-up imaging and clinical findings in patients with COVID-19 vaccine-related myocarditis.

Methods

We performed a systematic search in online databases using relevant key terms covering COVID-19 vaccine, myocarditis, follow-up, and cardiac MRI. We included all observational studies that reported cardiac MRI findings of patients with myocarditis following COVID-19 vaccination in both acute and follow-up phases. Data on clinical outcomes and cardiac MRI findings were extracted and pooled using a random-effect model.

Results

A total of 27 studies (126 patients) met our eligibility criteria. At the time of follow-up, myocarditis symptoms were resolved in all patients, but abnormal electrocardiography and elevated troponin levels were detected in 18.7% and 3.8% of them, respectively. Median imaging follow-up times varied from 3 to 6.3 months. On follow-up cardiac MRI, the persistence of LGE was observed in 76% (95%CI: 62 to 85%), but its extension declined compared to the baseline in almost all patients. Persistent LGE was accompanied by myocardial edoema in six patients, and it was consistent with myocardial fibrosis (LGE without edoema) in the remaining cases. Mean changes (95%CI) of cardiac MRI left ventricular ejection fraction (LVEF) (%) was +2.97 (+1.59 to +4.34) from baseline.

Conclusion

In conclusion, although most patients likely experience favourable clinical outcomes without serious complications, cardiac MRI abnormalities, mainly LGE, may persist in a notable proportion of them beyond the acute phase.

Keywords:

- [COVID-19 vaccine](#)
- [follow-up](#)
- [cardiac magnetic resonance imaging](#)
- [myocarditis](#)

- [mRNA vaccine](#)

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Author contributions

PS and HR contributed to the conception and design of this review. EJ, PS, and AT carried out the literature review, systematic search, and data extraction, and EJ and HR analysed and interpreted the imported data. PS drafted the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

As our study is a systematic review of available litterateurs, thus there is no need for ethical approval.