COVID-19

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Mild SARS-CoV-2 infection leaves long-lasting effects on cardiovascular health

Early in the COVID-19 pandemic, the infected individuals that experienced mild symptoms and did not require hospitalization considered themselves lucky. From the onset of the pandemic, cardiac injury was shown to be a common complication of patients hospitalized with COVID-19, as evidenced by increased circulating levels of troponin, and was linked to poor prognosis and higher risks of cardiac complications. However, as we learned more about SARS-CoV-2 and the aftermath of its infection, it became clear that many non-hospitalized individuals who had a mild initial COVID-19 infection and no previous cardiac conditions started to develop profound cardiovascular symptoms, despite rarely showing signs of cardiac damage evident by significant rises in troponin. The lingering cardiovascular complications, which included exercise intolerance, palpitations and atypical chest pain, started weeks or months after the virus was cleared from their system and persisted for a long time. In a study performed on young athletes, subtle myocardial inflammatory changes, non-ischemic myocardial scarring and pericarditis were documented shortly after the initial severe acute SARS-CoV-2 infection.

In a recent study published in *Nature Medicine*, Puntmann et al. took measurements from 346 individuals that experienced mild COVID-19 symptoms at 109 and 329 days (median value) after infection, by evaluating blood pressure, cardiac function, volumes, mass, myocardial mapping and non-ischemic scarring by cardiac magnetic resonance (CMR) imaging, as well as blood markers of cardiac damage such as C-reactive protein (CRP), high-sensitivity troponin T (hs-TropT) and N-terminal pro-brain natriuretic peptide (NT-proBNP). At the baseline evaluation, 252 individuals (73%) reported cardiac symptoms that were mild in 38% of them, moderate in 33% and severe in 3% of participants. The most common cardiac symptom was shortness of breath during exercise (62%), followed by palpitations (28%), chest pain (27%) and fainting (3%). Compared with controls, participants had significantly higher diastolic blood pressure. During the follow-up visits, the number of participants with cardiac symptoms decreased to 198 (57%). Among these, 16 participants developed new symptoms after being asymptomatic at baseline, and the rest showed long-lasting cardiovascular issues. In total, 70 of the initially symptomatic participants became asymptomatic over the observation period. At both time points, women were more represented among symptomatic participants, and no differences were observed in the levels of blood biomarkers between participants with or without symptoms and healthy individuals, which indicates a lack of detectable cardiac damage.

The most interesting data came from the CMR imaging, a technique that can detect diffused inflammatory myocardial involvement (a non-specific measure of abnormal myocardium) by T1 mapping, and myocardial water content by T2 mapping. The CMR imaging was done in the presence of a gadolinium-based contrast agent, using late gadolinium enhancement as a readout of regional myocardial injury. At baseline, participants showed higher myocardial mapping measurements (both T1 and T2), detectable pericardial effusion and non-ischemic scarring, especially among those that exhibited cardiovascular symptoms. In general, CMR imaging suggested cardiac inflammation after SARS-CoV-2 infection as a common denominator, irrespective of the presence of cardiac symptoms. At the follow-up, mapping values improved in all participants but showed a trend towards higher values in those with persistent cardiac symptoms. Female gender and higher baseline native T1 predicted the symptomatic status at follow-up. In conclusion, this single-center, observational study showed that the presence of long-lasting cardiac symptoms in individuals with mild COVID-19 infection may, at least in part, associate with mild chronic cardiac inflammation without significant structural heart disease or increased levels of biomarkers of cardiac damage. The authors warn that although their data provide valuable pathophysiological insights into lingering cardiovascular symptoms after mild COVID-19 infection, the conclusions are not immediately transferable to clinical practice owing to a lack of standardization and methodological variations.

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