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66   Heart and lung tissue characterization of COVID-19 pneumonia by T1 and T2 mapping magnetic resonance imaging

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Aims: Coronavirus disease 2019 (COVID-19) is a respiratory tract infection which can lead to systemic involvement including myocardial injury, severe respiratory failure and death. Magnetic resonance imaging (MRI) could potentially offer advantages in providing tissue characterization of lung parenchyma and heart muscle in COVID-19. The aim of the present study was to describe data on heart and lung MRI in a cohort of patients hospitalized due to COVID-19 pneumonia.

Methods and results: $n = 11$ patients hospitalized with COVID-19 pneumonia underwent a comprehensive MRI examinations including lung and heart tissue mapping, findings were compared to those of an age- and sex-matched cohort of $n = 11$ individuals. Lung native T1 and T2 mapping assessments were performed by drawing a circular region of interest (ROI) with diameter of 2 cm in the parenchyma visualized from the cardiac four chamber long axis-oriented slice; vessels and areas of pleural effusion were carefully excluded. Myocardial native T1 and T2 mapping were assessed by drawing a ROI within the midventricular left ventricular (LV) septum. No patients had previous history of cardiovascular disease (including known coronary artery disease, heart failure, cardiomyopathy, atrial fibrillation). As compared to controls, patients with COVID-19 had similar cardiac function, higher mid-septum myocardial native T1 (1028 ms vs. 985, $P = 0.05$) and significantly higher lung native T1 and T2 within affected areas (1375 ms vs. 1201 ms, $P = 0.016$ and 70 ms vs. 30 ms, $P < 0.001$ respectively), whereas non-significant differences were observed between remote lung areas of patients and controls (1238 ms vs. 1152 ms, $P = 0.088$ and 29 ms vs. 33 ms, $P = 0.797$ respectively). No significant associations were observed between cardiac and lung mapping findings.

Conclusions: In our cohort of patients with COVID-19, T1 and T2 mapping lung MRI identified pneumonia related abnormalities as compared to healthy controls, likely representing oedema and ongoing inflammation at the lung site. Myocardial native T1 was elevated suggesting the presence of cardiac involvement. A comprehensive MRI examination can be potentially used to assess multiorgan involvement in COVID-19.