Tissue Doppler, Speckle Tracking and Strain Imaging

Cardiac function during COVID-19 intensive care unit hospitalisation - deformation analysis and outcomes

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Background: Although the cardiac burden of COVID-19 has been demonstrated, follow-up imaging studies are scarce. The aim was to use speckle-tracking deformation imaging (STE) to prospectively assess cardiac function during intensive care unit (ICU) hospitalisation, comparing ventricular and atrial function of COVID-10 patients that died and those that were discharged.

Methods: In a single-centre, COVID-19 patients (n = 41) (71% male, aged 65 ± 11 years) were prospectively followed with echocardiography as part of ICU treatment. The left and right ventricles (LV, RV, respectively) were studied with STE in the 4-chamber cardiac view. The endpoint was defined as death or ICU discharge. Average values of the strain parameters from the first and final scans in the ICU, respectively, were calculated for the two outcome groups.

Results: Endpoint was not reached in 15% (n = 6) at the time of analysis. The remaining patients (n = 32) were 69% male, aged 66 (inter-quartile range (IQR) 60-72) years, and with an ICU mortality 26% (n = 9). The median spent in ICU was 24 (IQR 15-43) days. On average, echocardiography was performed three times during ICU hospitalisation, amounting to 103 examinations. The changes in cardiac strain are shown in Table 1. The change in LV longitudinal strain during ICU hospitalisation is shown in Figure 1.

Conclusion: Worsening of LV strain and lack of improvement of RV strain is linked to higher mortality in the ICU. The assessment of cardiac function might contain prognostic information in COVID-19 patients that are admitted to the ICU.

	Patients discharged from thee OCU (n = 23)	Patients that died in the ICU (n = 9)	P value
Initial echo in the ICU			
LV strain, % (IQR)	18.00 (15.6-19.95)	14.4 (10.56-20.42)	0.158
RV strain, % (IQR)	16.00 (14.70-20.05)	15.50 (10.38-23.70)	0.712
Final echo before discharge			
LV strain, % (IQR)	17.35 (15.13-18.98)	13.20 (10.75-15.40)	0.007
RV strain, % (IQR)	17.65 (16.83-19.60)	15.75 (10.68-20.43)	0.438

ICU - intensive care unit; IQR-inter-quartile range
Abstract Figure 1