Imaging -- Echocardiography -- Systolic and Diastolic Function

The association between transthoracic echocardiographic parameters and severity of COVID-19 in hospitalised adults - a retrospective analysis

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Background: The coronavirus disease 2019 (COVID-19) is an ongoing global pandemic with more than 220 million cases and 4.5 million deaths reported worldwide. Its clinical spectrum varies widely, and non-invasive prognostic markers are valuable as they can guide efficient resource allocation. Cardiovascular complications of COVID-19 include myocardial injury, acute heart failure, and arrhythmias. Both de novo cardiovascular complications and pre-existing cardiovascular co-morbidities are associated with a poor prognosis. Transthoracic echocardiography (TTE) can be used to assess cardiovascular structure and function non-invasively.

Purpose: To investigate the association between TTE parameters and severity of disease in hospitalised adults with confirmed COVID-19

Methods: This single-centre retrospective analysis was conducted at a COVID-19 referral hospital in Indonesia. All consecutive adults hospitalised with confirmed COVID-19 who underwent TTE assessment between 3 April 2020 to 6 April 2021 were included. Comprehensive data including demographics, peak COVID-19 severity, pre-existing co-morbidities, and TTE findings were extracted from electronic medical records. Patients with mild-moderate and severe-critical disease were compared using the chi-square test and odds ratios (OR), with a confidence level of 95%.

Results: A total of 488 patients were included in this study; 202 with mild-moderate disease and 286 with severe-critical disease. Frequency of old age (>60 years), obesity, diabetes, chronic kidney disease, and congestive heart failure were higher in the severe-critical group (P < 0.05). On TTE assessment, Patients with severe-critical disease had higher odds of left ventricular hypertrophy (LVH) (OR: 2.20; CI: 1.49 – 3.24), LV wall motion abnormality (OR: 3.33; CI: 1.68 – 6.60), diastolic dysfunction (OR: 1.46; CI: 1.02 – 2.11), valve abnormality (OR: 1.93; CI: 1.27 – 2.92), and right ventricular (RV) dysfunction (OR: 5.53; CI: 1.63 – 18.73). After matching for age, obesity, and diabetes, patients with severe-critical COVID-19 continued to have higher odds of LVH (OR: 1.91; CI: 1.21 – 3.02), LV wall motion abnormality (OR: 2.76; CI: 1.28 – 5.96), diastolic dysfunction (OR: 1.55; CI: 1.00 – 2.38), and RV dysfunction (OR: 3.86; CI: 1.06 – 14.08).

Conclusions: The presence of LVH, LV wall motion abnormality, diastolic dysfunction, and RV dysfunction on TTE assessment were associated with severe-critical disease in hospitalised adults with COVID-19. These findings must be validated in a larger prospective study.

Abstract Figure. Odds Ratios for the Entire Cohort
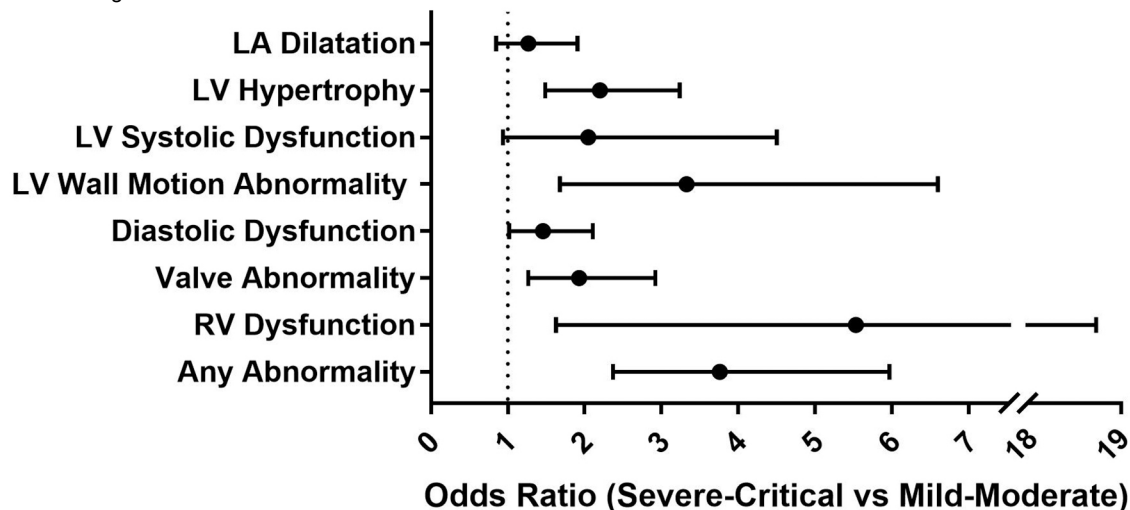
Abstract Figure. Odds Ratios for the Matched Cohort