



Clinical and echocardiographic risk factors for new atrial arrhythmias in hospitalized patients with COVID-19

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BACKGROUND

- Myocardial injury in COVID-19 has been associated with adverse outcomes
- The association between myocardial injury and arrhythmias, such as **atrial fibrillation/flutter (AF)**, in this population is not well established
- Transthoracic echocardiography allows for quantification of left atrial (LA) strain
 - LA strain is a measure of atrial deformation that is predictive of AF and cardiovascular events
- We aimed to characterize clinical and echocardiographic variables, including LA strain, in hospitalized COVID-19 patients with and without incident AF
- Hypothesis: markers of cardiac injury are associated with incident AF in COVID-19**

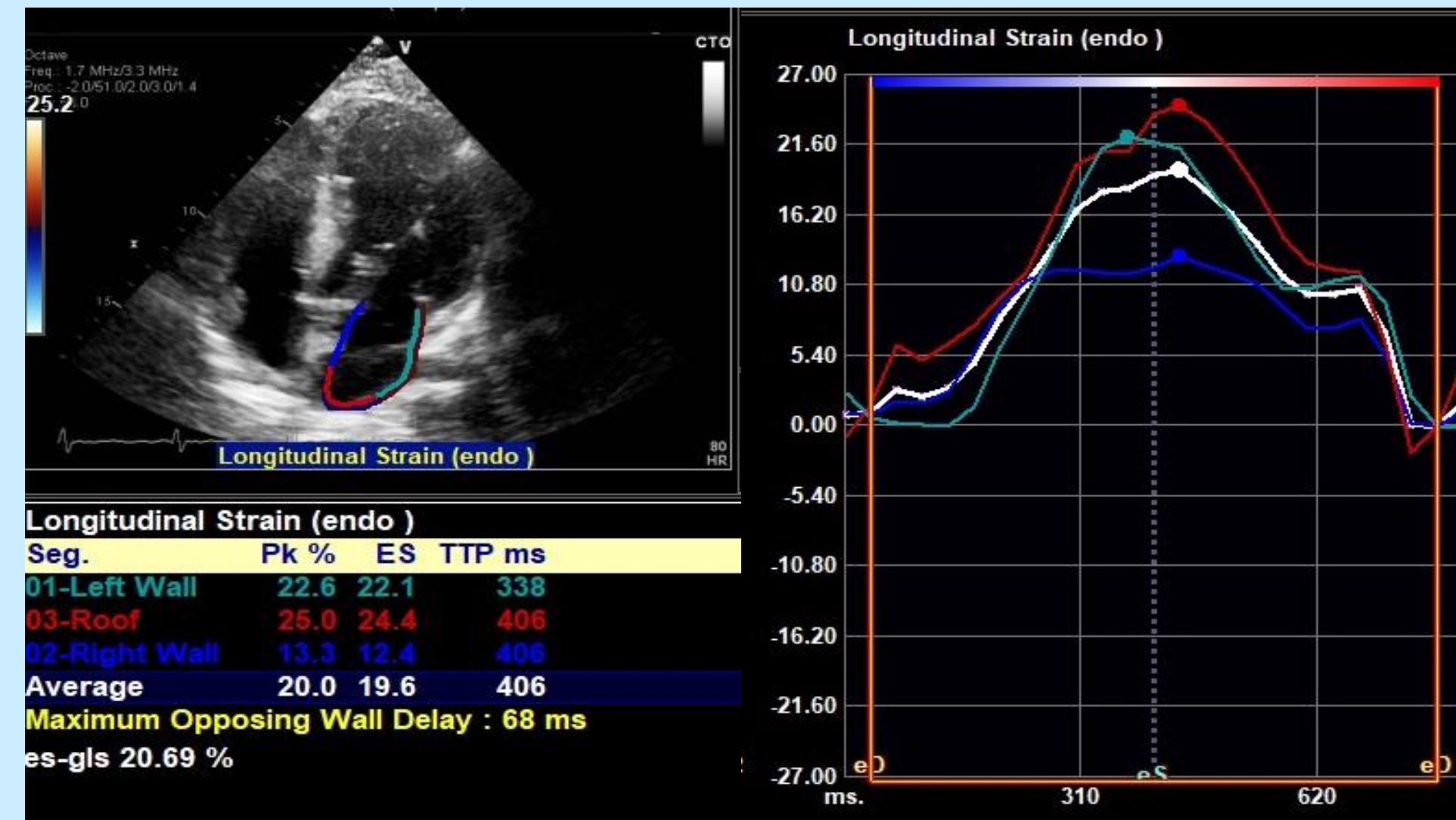


Fig1. Example of reduced reservoir left atrial (LA) strain in a COVID-19 patient who developed atrial fibrillation, with average LA strain 20% (normal generally considered >38%). **A)** shows manual tracing of LA endocardial border in apical 4-chamber view with corresponding segmental strain values below. **B)** is a graphical display of each segmental strain according to color over time of atrial relaxation and white as the chamber average.

RESULTS

Patients who developed AF were older (median [IQR]; 66 [60-79] vs 61 [51-69] years, $p=0.007$), with higher troponin I, NT-proBNP, D-dimer, ICU admission, and incidence of shock compared to controls (Table 1). There were no differences between groups in gender (38% women), race (43% Black), BMI (median 29.5 kg/m²), hypertension (70%), diabetes (36%), or coronary artery disease (13%). There were also no differences in standard echocardiography measurements, LA volumes, inflammatory markers, or death.

LA strain analysis was feasible in 68 patients (45 controls and 23 with AF), and showed significantly lower strain in those with incident AF (22.2 [20.5-27.7%] vs 30.6 [26.3-35.7%], $p=0.0002$). LA strain remained independently associated with AF on multivariate logistic regression after adjusting for age, NT-proBNP, shock, and ICU admission ($p=0.014$).

METHODS

Study Population:

We retrospectively studied 128 sequential patients hospitalized with COVID-19 who underwent transthoracic echocardiogram with at least fair quality. Patients were excluded for history of atrial arrhythmia ($n=19$) or non-AF arrhythmia during admission ($n=2$).

Echocardiogram Analysis:

Echocardiograms were analyzed offline for peak longitudinal LA strain as well as LA ejection fraction using 2D-speckle-tracking software. (Fig 1).

Statistical Analysis:

Comparisons were made between those who developed AF ($n=33$; 31%) and controls ($n=74$), in addition to logistic regression to investigate variables association with AF

Table 1: Significant findings in COVID-19 patients with AF

Characteristics	Total cohort (n=107)	Controls (n=74)	AF (n=33)	p-value
Age, years, med [IQR]	63 [53-71]	62 [50-68]	66 [60-79]	0.007
Troponin I, ng/mL	0.04 [0.03-0.16]	0.03 [0.03-0.06]	0.11 [0.03-0.30]	0.008
NT-proBNP, pg/mL	393 [143-1693]	265 [120-921] n=64	997 [441-6734] n=26	0.0007
D-dimer, mg/L FEU	2.1 [0.9-7.7]	1.4 [0.8-5.8]	3.9 [1.8-10.8]	0.026
ICU admission	87 (81%)	56 (76%)	31 (94%)	0.025
Shock	63 (59%)	38 (51%)	25 (76%)	0.018
LA reservoir strain, %	27.8 [22.0-34.1]	30.6 [26.3-35.7]	22.2 [20.5-27.7]	0.0002

CONCLUSIONS

- Myocardial injury, as determined by both serum biomarkers and echocardiographic findings, was associated with incident AF in hospitalized COVID-19 patients
- Patients with new AF were also older, sicker, and had higher d-dimer
- LA strain was independently associated with AF even after adjusting for confounders
- Reduced LA strain may represent a higher-risk COVID-19 phenotype and warrant closer monitoring

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Conflicts of interest There are no conflicts of interest.

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