Tissue Doppler, Speckle Tracking and Strain Imaging

Persistent dyspnea 1 year after COVID - 19 infection in apparently healthy subjects: a potential indicator of subclinical cardiac dysfunction

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Introduction: Coronavirus disease 2019 (COVID-19) impacted healthcare systems worldwide, evolving into a global pandemic(1,2). Recent studies showed the presence of persistent exertional dyspnea or fatigue at one- to three-months follow-up after COVID-19(1,2). However, little is known regarding the mechanisms behind the possible cardiac-related symptoms post COVID-19 at mid- and long- term follow-up.

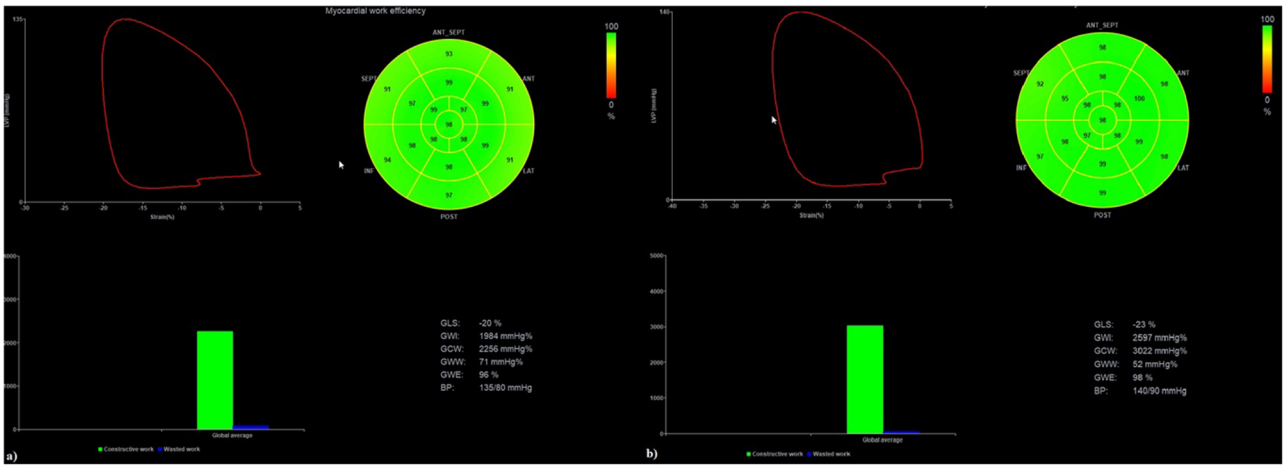
Purpose: We investigated the presence of persistent dyspnea one year after the acute phase of COVID-19 in patients without previous cardiovascular or pulmonary disease. Secondly, we analyzed the potential subclinical cardiac dysfunction in these patients, assessed by echocardiography.

Methods: 310 COVID-19 patients were prospectively included between March and April 2020. 143 patients continued the follow-up at 6 months and one year.Patients with a previous history of cardiovascular or respiratory disease were excluded from the analysis.The follow-up consisted in clinical evaluation, and spirometry at 6 and 12 months, chest computed tomography and comprehensive transthoracic echocardiography (TTE) including speckle tracking and myocardial work analysis at one-year follow-up.

Results: 66 patients (mean age 49.64 ± 10.66 years, 37 (67.3%) males)were included in the final analysis.In these patients, TTE parameters were in the normal range, with a mean left ventricle ejection fraction of 56.98 ± 4.64%, mean global longitudinal strain (GLS) of -20.90 ± 2.37%, global constructive work (GCW) of 2381.45 ±463.68mmHg% and global work index (GWI) of 2132.49 ±419.22.Type 1 diastolic dysfunction was observed in 11(16.7%) patients.One (1.5%) patient had type 2 diastolic dysfunction. A normal respiratory pattern was reported in 31(47%) patients at 6 months spirometry evaluation, while 19(28.8%) patients presented pulmonary restriction patterns.23 (34.8%) patients reported exertional dyspnea at one year follow-up. No significant differences regarding clinical, laboratory or imaging findings at baseline were found between patients with and without dyspnea. TTE showed that GLS, GCW and GWI were different between symptomatic and asymptomatic patients (-19.97 ± 2.14 vs. -20.90 ± 2.37,p = 0.039; 2183.14 ± 2483.14 ± 422.42,p = 0.024; 1960.06 ± 396.21 vs 2221.17 ± 407.99, p = 0.030).(Figure 1) Multivariable analysis showed that GCW, GWI and normal respiratory pattern at 6 months were inversely associated with persistent dyspnea (p = 0.038,OR 0.998, 95% CI 0.996-1.000; p = 0.042, OR 0.998, 95% CI 0.996-1.000; p = 0.020, OR 0.195, 95% CI 0.049-0.773, respectively).(Figure.2)

Conclusion: Persistent exertional dyspnea one year after COVID-19 infection was present in more than a third of apparently healthy patients. GCW and GWI were independently associated with symptoms, suggesting a decrease in myocardial performance in this population. Further studies should focus on the long-term evolution of COVID-19 patients and the occurrence of possible cardiac consequences.

Abstract Figure. Fig. 1 Example of myocardial performance



Abstract Figure. Fig. 2 Independent predictors of exerti

Table1	**Predictors of dyspnea after COVID - 19 infection in apparently healthy subjects**								
Parameter	Univariable analysis			Multivariable analysis					
	OR	95% CI	P value	OR	95% CI	P value	OR	95% CI	P value
Normal function - 6 months spirometry	0.255	0.076-0.862	0.028	0.195	0.049-0.773	0.020	0.188	0.047-0.762	0.019
GLS_LV	1.321	1.004-1.738	0.047	1.148	0.813-1.622	0.432	1.147	0.809-1.625	0.441
GCW	0.998	0.997-1.000	0.035	0.998	0.996-1.000	0.038			
GWI	0.998	0.997-1.000	0.040				0.998	0.996-1.000	0.042