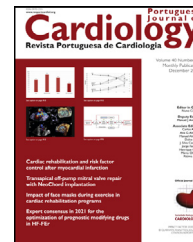




Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



EDITORIAL COMMENT

Epicardial fat as a predictor of COVID-19 disease severity: Just a surrogate for obesity or a true independent predictor?

A gordura epicárdica como fator preditivo da gravidade da doença COVID-19: apenas um marcador de obesidade ou um verdadeiro fator preditivo independente?

Christopher Strong

Serviço de Cardiologia, CHLO, Hospital de Santa Cruz, Carnaxide, Portugal

Available online 18 July 2022



Since it was first reported in China in 2019, COVID-19, the infection caused by the new coronavirus SARS-CoV-2, has become a global pandemic, with more than 500 million confirmed cases worldwide as of June 2022.¹ Health care systems around the world have been placed under tremendous strain by COVID-19, and the virus will likely leave lasting effects for years to come.

Fortunately, most people infected with the virus experience mild to moderate respiratory illness and recover without needing hospital admission. Some, however, become seriously ill with severe or critical disease following the development of an acute respiratory distress syndrome caused by systemic hyperinflammation and cytokine release.

Vaccination has had a major impact in reducing morbidity and mortality resulting from COVID-19 infection,² with billions of vaccine doses administered since the first approval

in December 2020. Its long-term protection against severe infection is still not established, especially with the advent of new mutated strains, and there will likely be a need for regular vaccine boosts in years to come, particularly for higher-risk groups.

Multiple studies have demonstrated that comorbid cardiovascular disease and cardiovascular risk factors are linked to a more severe course and higher mortality from COVID-19.³ Obesity, in particular, has been established as a risk factor for COVID-19 disease severity, with higher risk for hospitalization, intensive care unit (ICU) admission, invasive mechanical ventilation and death.⁴ This may be due not only to the stronger association of obesity with cardiovascular risk factors (such as hypertension and type 2 diabetes) and cardiovascular disease (coronary artery disease and heart failure) – which by themselves are a risk factor for COVID-19 disease severity – but also to the proinflammatory state associated with obesity resulting from the release of various inflammatory molecules.^{3,5} In the setting of COVID-19, obesity can therefore result in further inflammation and subsequent cytokine storm, increasing the risk of severe

DOI of original article: <https://doi.org/10.1016/j.repc.2021.05.016>

E-mail address: christopherstrong479@yahoo.com

<https://doi.org/10.1016/j.repc.2022.07.004>

0870-2551/© 2022 Published by Elsevier España, S.L.U. on behalf of Sociedade Portuguesa de Cardiologia. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

disease.⁶ Epicardial adipose tissue is increased in obese people, and might also play a role in adverse outcomes.⁷

In their article published in this issue of the *Journal*,⁸ Erdöl et al. report a single-center retrospective study that took place at Ankara City Hospital in Turkey, with data collected during an unspecified period. A total of 101 consecutive patients diagnosed with COVID-19 infection were enrolled (26 of them with severe or critical disease and admitted to the ICU). Clinical, laboratory and imaging (computed tomography [CT] scan) data were collected. The main objective was to assess the association between epicardial fat volume (EFV), inflammatory biomarkers (C-reactive protein, procalcitonin, serum ferritin, and interleukin-6) and prognosis (composite endpoint of death or admission to the ICU). Patients admitted to the ICU were significantly older and had a higher prevalence of comorbidities such as coronary artery disease and chronic obstructive pulmonary disease, compared to those with milder disease admitted to the ward (n=75). Demographic and clinical characteristics such as gender, body mass index, smoking and diabetes were not different between the groups. Inflammatory biomarkers were significantly more elevated in patients admitted to the ICU, and so was EFV. The authors⁸ also found a moderate correlation between each of the inflammatory biomarkers and EFV ($r=0.26-0.49$). A cut-off value of 102 cm³ for EFV was found to have a 94% negative predictive value for predicting more severe disease. On multivariate logistic regression analysis, EFV and age independently predicted admission to the ICU.

A recently published study by Mehta et al. also found that epicardial adipose tissue is a risk factor for severe COVID-19, independently of age, body mass index and comorbid conditions.⁹

Angiotensin-converting enzyme 2, recognized as a key receptor in the cell entry of SARS-CoV-2, has also been found in epicardial adipose tissue, further confirming this fat depot as a potential player in the pathophysiology of the disease. In the setting of COVID-19, epicardial adipose tissue may play a role in generating an imbalance between pro- and anti-inflammatory adipokines, potentially leading to the cytokine storm described in patients with severe COVID-19.¹⁰

Since most patients with severe COVID-19 will undergo a CT scan, with no need for gating, it is an easily accessible parameter that further helps in the risk stratification of these patients.

This paper has several limitations, mainly that it reports a single-center retrospective study with a small sample size.

Furthermore, the results might have been different in the post-vaccination era, with many of the vaccinated patients admitted to the ICU with severe COVID-19 nowadays being those under chronic immunosuppression.

This study, however, contributes to current knowledge of the role of EFV in adverse outcomes, and to further risk stratification of COVID-19 patients.

Conflicts of interest

The author has no conflicts of interest to declare.

References

1. WHO Coronavirus (COVID-19) Dashboard. Available from <https://covid19.who.int> [accessed June 2022].
2. Moghadas SM, Vilches TN, Zhang K, et al. The impact of vaccination on coronavirus disease 2019 (COVID-19) outbreaks in the United States. *Clin Infect Dis*. 2021;73:2257–64.
3. Baigent C, Windecker S, Andreini D, et al. European Society of Cardiology guidance for the diagnosis and management of cardiovascular disease during the COVID-19 pandemic: part 1-epidemiology, pathophysiology, and diagnosis. The Task Force for the management of COVID-19 of the European Society of Cardiology. *Cardiovasc Res*. 2022;118:1385–412.
4. Huang Y, Lu Y, Huang Y-M, et al. Obesity in patients with COVID-19: a systematic review and meta-analysis. *Metabolism*. 2020;113:154378.
5. Michalakis K, Panagiotou G, Ilias I, et al. Obesity and COVID-19: a jigsaw puzzle with still missing pieces. *Clin Obes*. 2021;11:e12420.
6. Korakas E, Ikonomidis I, Kousathana F, et al. Obesity and COVID-19: immune and metabolic derangement as a possible link to adverse clinical outcomes. *Am J Physiol Endocrinol Metab*. 2020;319:E105–9.
7. Packer M. Epicardial adipose tissue may mediate deleterious effects of obesity and inflammation on the myocardium. *J Am Coll Cardiol*. 2018;71:2360–72.
8. Erdöl MA, Eser FC, Aslan AN, et al. The predictive value of epicardial fat volume for clinical severity of COVID-19. *Rev Port Cardiol*. 2022;41:729–37.
9. Mehta R, Bello-Chavolla OY, Mancillas-Adame L, et al. Epicardial adipose tissue thickness is associated with increased COVID-19 severity and mortality. *Int J Obes (Lond)*. 2022;46:866–73.
10. Malavazos AE, Goldberger JJ, Iacobellis G, et al. Does epicardial fat contribute to COVID-19 myocardial inflammation? *Eur Heart J*. 2020;21:2333.