Technical aspects of the respiratory system in an aired valetudinarian with a covid-19 associated pattern of acute respiratory distress.

Eugenio Falk*

Institute for Lung Research, Universities of Giessen and Marburg Lung Center, Philipps University, Germany

Abstract

There has been much discussion regarding the relationship between respiratory mechanics, specifically respiratory system static compliance (CRS), and the severity of hypoxemia in patients with acute respiratory distress syndrome (ARDS) related to covid-19. Some studies have reported distinct ARDS phenotypes based on CRS. It is crucial to ascertain whether these traits exist since they may need for different breathing techniques than those employed in individuals with ARDS brought on by other causes. We assessed the mechanics of the respiratory system, ventilator parameters, gas exchange parameters, and clinical outcomes in patients with COVID-19-related ARDS in a systematic review and meta-analysis of articles published between December 1, 2019, and March 14, 2022. Increasing ARDS severity was linked to a decline in CRS; hence it is believed that no adjustment to traditional lung-protective breathing techniques is necessary.

Keywords: Respiratory system, Aired valetudinarian, Covid-19, Acute respiratory distress.

Introduction

The clinical illness known as acute respiratory distress syndrome (ARDS) has a number of different etiologies, including viral and non-infectious triggering causes. Acute onset, hypoxaemia, and bilateral pulmonary opacities on a chest x-ray or CT that are not entirely explained by heart failure or volume overload are all symptoms of ARDS [1]. The severity of ARDS is divided into three categories based on the ratio: mild, moderate, and severe. Low respiratory system compliance is a common characteristic of ARDS patients, but the Berlin definition of ARDS did not include this characteristic because respiratory mechanics did not add much predictive value.

With calls for a more individualised strategy, the existing protocolized approach to treating ARDS has come under intense scrutiny, particularly during the covid-19 pandemic [2]. Small observational investigations of patients with ARDS caused by covid-19 led to the first hypothesis that the degree of hypoxaemia was not proportional to the impairment in respiratory system dynamics. These patients, despite meeting the criteria for moderate-to-severe ARDS, were found to have relatively normal respiratory system compliance and a shunt fraction that was out of proportion to the non-aerated lung fraction, or the percentage of cardiac output circulating through the lungs that is not completely oxygenated [3]. This finding may have ramifications for ventilation control if it can be applied to the wide group of patients with ARDS caused by covid-19.

ARDS progression through patient self-inflicted lung injury has also been suggested to be mediated by severe hypoxaemia and high respiratory drive in patients with covid-19-related and non-covid-19-related ARDS who otherwise have preserved respiratory system static compliance or respiratory system compliance when there is no airflow [4]. P-SILI is the term used to describe the lung damage that might result from vigorous inhalation. Although different covid-19-related ARDS patient phenotypes could theoretically exist based on CRS values, the extent of the aerated lung at the time of measurement, which is dependent on the timing of endotracheal intubation and invasive mechanical ventilation, is intricately linked to measure CRS [5].

Numerous small observational studies have indicated a unimodal distribution of CRS in covid-19-related ARDS, but they have not been able to distinguish between such various CRS forms. In the early stages of the pandemic, when less intrusive respiratory supports were discouraged, patients with hypoxaemia who were intubated early and put on mechanical ventilation may have displayed elevated CRS [6]. The development of disease-modifying treatments, such as corticosteroids, as well as increased adoption of less intrusive supports and less proactive endotracheal intubation may all have contributed to the incidence of the high-CRS phenotype.

Conclusion

When measured just before the start of invasive mechanical ventilation in patients with covid-19-related ARDS, the pooled CRS was normally distributed. It found no distinctive CRS-based clinical characteristics in patients with ARDS caused by covid-19. Additionally, the correlation between higher PEEP,

***Correspondence to:** Eugenio Falk, Institute for Lung Research, Universities of Giessen and Marburg Lung Center, Philipps University, Germany, E-mail: eugenio.falk@uni-marburg.de

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VT, or both and higher CRS suggests that clinicians may have used either of these ventilator settings based on respiratory mechanics rather than the more conventional low-VT, high-PEEP approach. Similarly, the value of plateau pressure as a guide to PEEP and VT optimization in patients with covid-19-related ARDS is supported by the association between higher plateau pressure and lower CRS. In order to create a tailored and secure approach to ventilation management for patients with covid-19-related ARDS, future studies that make use of patient-level data should investigate the intricate interrelationship and trajectory of respiratory system mechanics, gas exchange, and control of breathing.

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