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IPRONATION IN THE EARLY TREATMENT OF HYPOXIA IN THE MANAGEMENT OF COVID-19

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Abstract: Many publications have emphasized the acute and chronic complications of COVID-19, in contrast to the absence of effective protocols that reduce long-term complications. Currently, means to increase oxygenation are recommended only for severe cases with respiratory failure. Hypoxia plays an important role in the pathophysiology of acute and chronic COVID-19, inducing inflammation, thrombogenesis and facilitating viral entry. The rationale for early outpatient treatment in preventing hospitalization, death, and disabling sequelae has not yet been determined. Meanwhile, treatment guidelines must include the introduction of means to increase oxygenation in the home environment. Pronation is a safe method to improve oxygenation, and patients with early signs of hypoxia, such as fatigue, drowsiness, tachycardia, or headache, must be instructed to maintain pronation according to individual tolerance.
Keywords: COVID-19, hypoxia, oxygen therapy, pronation, home monitoring.

A significant number of publications address the well-known post-COVID syndrome, as a variety of symptoms that persist for more than three months after the initial infection, including those without comorbidities and with mild acute illness.[1, 2, 3] The poor long-term outcomes emphasize the need to rethink the initial assumptions regarding acute treatment to avoid long-term disability.

Yet the patients who are considered to have an indication for oxygen therapy are only those with acute respiratory distress syndrome (ARDS). Other measures to improve oxygenation, such as prone position, high-flow nasal cannula, and invasive hand positive pressure ventilation (NIPPV) are reserved for cases with persistent hypoxia. [4,5]

The body's response to active hypoxia triggers important acclimatization mechanisms, both in the blood and in the cardiorespiratory system, which can be compared with acclimatization at high altitudes, where there is a low concentration of O2 in the air, and, consequently, in the blood. At first, brainstem receptors are stimulated, which will lead to an increase in respiratory rate, along with sympathetic release and consequent increase in heart rate. One of the most striking cardiovascular changes caused by hypoxia is pulmonary hypertension - the answer pressor pressure results in an increase in pulmonary artery pressure, which leads to an increase in right ventricular afterload and may be important in the genesis of acute pulmonary edema secondary to hypoxemia. Hypoxia also increases the concentration of hemoglobin in the blood, initially due to the reduction in plasma volume, which leads to an increase in blood viscosity by stimulating erythropoiesis.[6]

The concept that hypoxia can induce inflammation has gained general acceptance. In people with acute mountain sickness caused by hypoxia, levels of circulating pro-inflammatory cytokines increase and fluid leaks from the vessels, causing pulmonary or cerebral edema. This intense inflammatory state and the increase in blood viscosity by erythropoiesis are strong triggers for thrombus formation, which leads to a series of damage to various organs, including the lung itself. Lung damage leads to a ventilation/perfusion mismatch, due to the existence of compromised areas of the lung compromised by inflammation and edema, making gas exchange difficult. In other areas, perfusion is compromised by thrombogenesis. This whole process leads to a difficulty in gas exchange, contributing to the worsening of hypoxia. [7]

Cardiac complications may also be partially responsible for hypoxemia in patients with COVID-19. Heart failure can be caused by direct viral myocardial damage, causing hypoxia, hypotension, or an increased inflammatory state, as well as secondary hemophagocytic lymphohistiocytosis.[8]

Innovative solutions are needed to effectively meet the unprecedented increase in demand on our healthcare systems created by the COVID-19 pandemic. Home treatment and monitoring of mildly symptomatic patients can be readily implemented to ease the burden on the healthcare system while maintaining the safety and effectiveness of care. 9 Considering the role of hypoxia in the pathophysiological basis of COVID-19, it is conceivable that some, if not most, hospitalizations could be avoided with a home-first treatment approach. 10 In addition, this approach may also have a beneficial effect on reducing chronic complications.

Pronation is still a measure that is still little used for non-severe cases, therefore a simple measure that has great advantages. Since the consequences of hypoxia are early and with the advantage of not overloading the health system. The pronation technique consists of simply placing the patient on his stomach. The pathophysiological mechanism that justifies its benefit may well be explained by the following image 1 and 2.

In the supine position (figure 1), the alveoli and airways of the dorsal part of the lung are compressed by the weight of the mediastinum and lungs. While in the prone position (figure 2), the heart and mediastinal structures are weighted over the sternum, causing a redistribution of lung density. In the prone position, there is an improvement in the ventilation/perfusion ratio, as the blood flow is independent of the gravitational state, the dorsal region will always receive greater perfusion, regardless of the position. [5]

In view of this context, it is coercive to propose home pronation counseling according to individual tolerance, for those patients who are not in a serious situation of the disease, as an early treatment of hypoxia, as an option to avoid complications related to COVID-19. Its main advantages are safety with low risk of complications, accessibility without overloading health services, low cost and easy applicability. We emphasize that there is still no evidence in the literature regarding the effectiveness of this treatment, and quality scientific research is recommended.

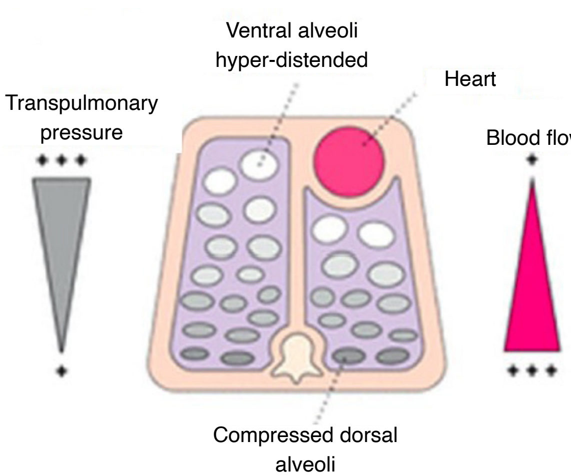

Figure 1: bench pressure.

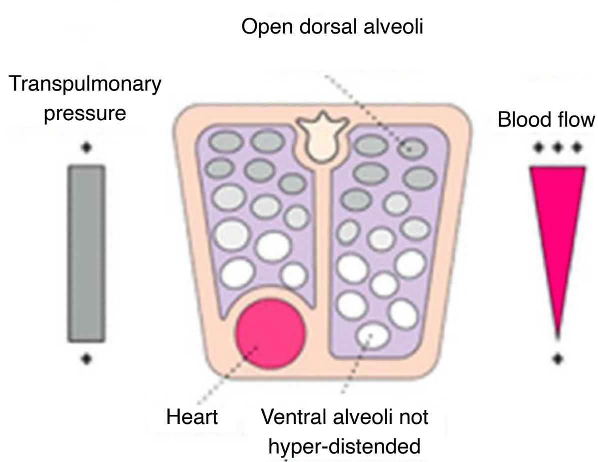

Figure 2: prone.

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