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ANALYSIS OF MECHANICAL VENTILATORY ASSISTANCE PROTOCOLS IN PATIENTS WITH COVID-19: AN INTEGRATIVE LITERATURE REVIEW

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Abstract: Introduction COVID-19 is an infectious disease discovered in December 2019, caused by SARSCoV-2, which is part of the Coronavirus family of viruses. Mechanical Ventilation is a ventilatory support used mainly to treat acute respiratory failure in patients with pulmonary complications. **Objectives** To analyze the protocols of mechanical ventilatory assistance in patients with COVID-19, in addition to detailing protective mechanical ventilation; to verify which parameters are used in mechanical ventilatory assistance in patients with COVID-19 and to identify which ventilatory protocol is most cited in the literature. **Methodology** it was an integrative literature review, searching through the following databases: SciELO; LILACS, ScienceDirect; MEDLINE; guidelines; recommendations and protocols of health-related institutions, with the descriptors: COVID-19; Clinical Protocols; Mechanical Fans, 555 articles were found, selecting 7, through two screenings, for the explanation of the results. **Results** showed that the presence of hypoxemia is characteristic of both COVID-19 and ARDS, however, they may have different characteristics depending on the phenotype found. It was also observed that protective mechanical ventilation must be used in IMV, introducing the following parameters: VT at 6ml/kg; driving pressure < 15 cm/H2O; PEEP to the point of reducing PD, and maintaining PaO2 > 60 cm/H2O with FIO2 ≤ 60% to avoid lung injury. **Conclusion** It is therefore concluded that protective ventilation is essential for good results for patients diagnosed with COVID-19, and it is necessary to have knowledge about the subject and the patient's clinic to obtain positive results.
Keywords: COVID-19. Clinical protocols. fans mechanics.

INTRODUCTION

COVID-19 is a recently discovered infectious disease caused by SARSCoV-2, which is part of the Coronavirus family of viruses (GUIMARÃES, 2020). In December 2019, the first case was identified, in Wuhan, located in Hubei Province, China (WHO, 2020a). The disease spread around the world, arriving in Brazil in February 2020. In March 2020, it was declared by the WHO as a Pandemic (BRASIL, 2020a).

In Brazil, the incidence and mortality rate varied from region to region, with the North region, in the period of the 20th Epidemiological Week (SE), having the highest rates among them, surpassing the Southeast region. In addition to this, the Northeast region ended the 20th SE with a high incidence rate nationally, followed by the Southeast and Northeast regions, which also had high rates (CAVALCANTE et al., 2020)

According to the WHO (2020b), as of May 22, 216 countries, areas or territories have reported cases of COVID-19. On the world stage, among the countries that suffered the most from the pandemic, the following can be highlighted, on that same date: The United States of America, with 1,525,186 confirmed cases and 91,527 deaths; Brazil, with 291,579 confirmed cases and 18,859 deaths; Spain, with 233,037 confirmed cases and 27,940 deaths; Italy, with 228,006 confirmed cases and 32,486 deaths, and China, the country where the pandemic spread, with 84,520 confirmed cases and 4,645 deaths.

According to Noronha et al. (2020), age and comorbidities are some of the factors that are directly related to the great need for hospitalization by patients diagnosed with COVID-19.

According to Brazil (2020a), "the transmission happens from one sick person to another or by close contact, through: touch of the handshake; saliva droplets; sneeze; cough; phlegm; contaminated objects or surfaces, such as cell phones and tables. COVID-19 has common symptoms, such as dry cough, fever and shortness of breath, and others that can be presented, such as: nasal congestion, sore throat, headache and loss of taste and smell. Approximately 80% of people with COVID-19 do not require hospital treatment (WHO, 2020a).

Chakraborty et al. (2020), reported that in the Intensive Care Unit, some clinical findings were found among patients infected with SARS-CoV-2 admitted to the Intensive Care Unit, such as an increase in the number of neutrophils and leukocytes, in addition to higher levels of D-dimer., creatine and creatine kinase. It was also observed by them that the length of stay of patients in the ICU was approximately 10 days.

The diagnosis of COVID-19 can be confirmed in three ways: clinical, depending on the clinical analysis associated with the physical examination, as well as from the patient's epidemiological data; laboratory, performed through RT-PCR, which can be collected by removing respiratory content from the upper airways, such as SWAB; and differential, through the exclusion of other possible viruses, based on clinical characteristics (BRASIL, 2020b; 2020c).

About one in five people who have COVID-19 are short of breath, due to the greater severity of the disease (WHO, 2020a). Pneumonia caused by COVID-19 has a common feature of severe hypoxemia and compliance of the respiratory system with little change. Currently, two distinct phenotypes have been observed: Type L, characterized by low elastance with high compliance, low V/Q ratio, low lung weight and low recruitability, while the type H phenotype is characterized by high elastance, followed by greater complications, as it is found in the most severe state of the disease (GATTINONI, et al., 2020).

According to Alhazzani et al. (2020), mechanical ventilation is an intervention of great potential, capable of saving many lives. It is a ventilatory support used mainly to treat acute respiratory failure (ARI) or acute chronic respiratory failure (CARVALHO; TOUFEN JUNIOR; FRANCA, 2007). However, when not used properly, this support can worsen lung injury. Protective ventilation is an alternative to minimize this injury, consisting of the application of smaller volumes and pressures, so as not to cause alveolar hyperdistention (GUIMARÃES, 2020).

According to Robba et al. (2020), the use of invasive mechanical ventilation must be used after some clinical signs presented by the patient, such as: when manifesting tachypnea, with RR > 30 irpm, and when presenting hypoxemia, with $SpO_2 < 90\%$ and/or $PaO_2 < 60$ mmHg, even with oxygen therapy administered with an FIO_2 above 60%.

Health professionals are highly vulnerable, with high chances of acquiring COVID-19, because they are in direct contact with patients and resources in which the virus is present. In addition, many are susceptible to routine stress, as they are in contact with patients in serious situations, and in the workplace, which are often not in good condition or do not have the necessary resources for better patient care (TEIXEIRA et al. al., 2020).

Therefore, based on the fact that most patients with Coronavirus who develop severe hypoxemia and/or acute respiratory distress will need treatment in an Intensive Care Unit (ICU) with the assistance of a multidisciplinary team, in addition to therapy through mechanical ventilatory support, with specific adjustments and parameters for good clinical management and progressive improvement of the patient, this work is therefore justified, where the guiding question is based on how the recommendation of scientific protocols about ventilation is made protective mechanics and ventilatory parameters applied to the patient with COVID-19.

Thus, the present study aimed to analyze the protocols of mechanical ventilation assistance in patients with Covid-19, and as specific objectives, to detail protective mechanical ventilation; to verify which parameters are used in mechanical ventilatory assistance in patients with COVID-19 and to identify which ventilatory protocol is most cited in the literature.

METHODOLOGY

This was an integrative literature review which, according to Medeiros (2013), constitutes a research in which the search for data takes place indirectly, since the collection of information is done through documentation, using sources secondary through a survey in documents, books and magazines of relevant interest to the research carried out. However, the data collection for this research was carried out through a database of articles published in scientific journals, guidelines and/or protocols of bodies and institutions linked to health services.

The research was carried out by searching the following databases: SciELO; LILACS, through the Virtual Health Library (VHL); ScienceDirect; MEDLINE, through PubMed; *guidelines;* recommendations and protocols of bodies and institutions linked to health services, using descriptors in three different languages: Portuguese, English and Spanish. To search for the studies that guided this research, combinations of the following descriptors were used: "COVID-19", "Clinical Protocols" and "Mechanical Fans". After searching in Portuguese, a similar search was performed in English, using the descriptors:

"COVID-19", "Clinical Protocols" and "Mechanical Ventilators". Finally, the search was carried out with the following descriptors in Spanish: *"COVID-19", "Clinical protocols" and "Mechanical fans"*.

Scientific articles published in the following languages were considered in the inclusion criteria: Portuguese, English and/or Spanish, in the last 12 months, in the year 2020, in view of the current status of the disease, which were related to the guiding question of the present research, that were performed in humans, that were available in full in the researched databases, and that presented the parameters used for mechanical ventilation in patients with COVID-19. The exclusion criteria used to eliminate the selected articles will be repetition in the databases during the search, restriction of access to articles, studies and bibliographic reviews.

The population of the present study consisted of all research, studies and scientific articles found in the researched databases, which contemplated COVID-19, in a total of 555 articles identified through the search in the databases: Pubmed (n=277), SciELO (n=7), Science Direct (n=250), LILACS (n=20) and ASSOBRAFIR (n=1).

The sample was composed of researches that contained the recommendations for the use of Mechanical Ventilation in patients with COVID-19, having the inclusion criteria, accounting for 7 articles to expose the results. Figure 1 represents the screening

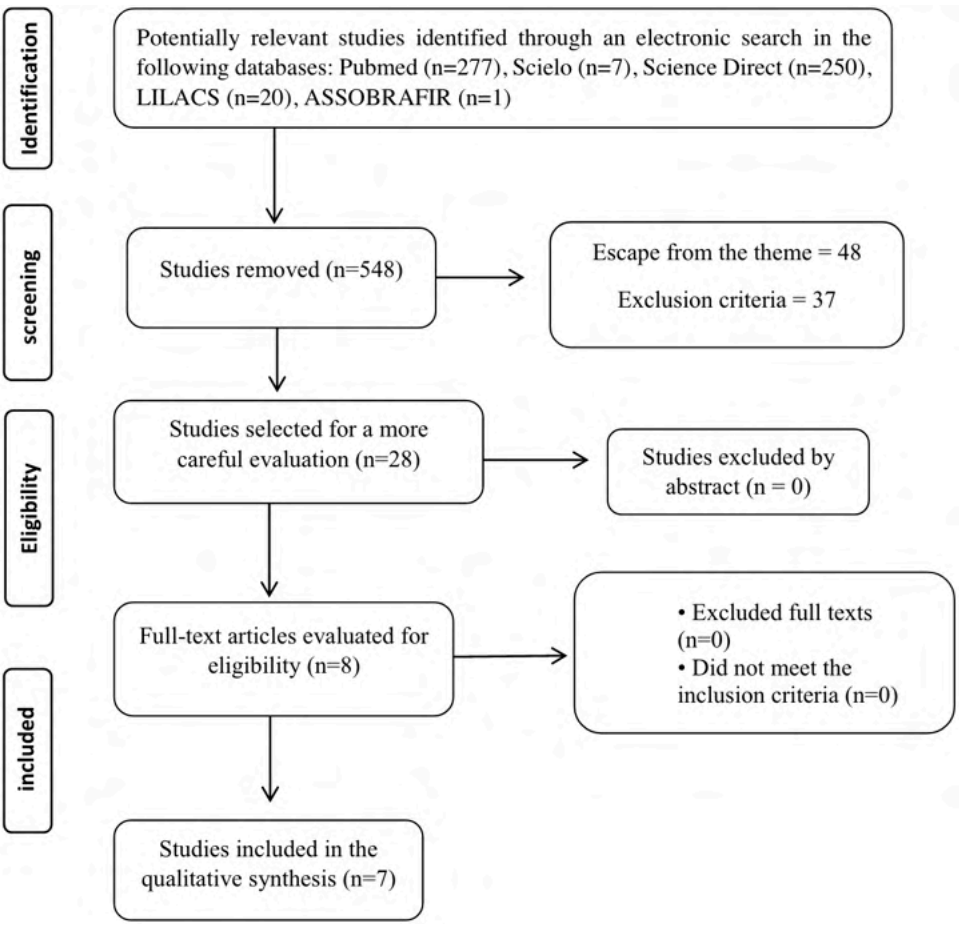

Figure 1 - Flowchart of the article search and selection process.

Source: Survey Data, 2020.

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done through a flowchart, detailing the number of excluded and selected articles.

The search was performed through combinations of the previously mentioned descriptors, adding the use of Boolean operators "AND". Of these, the titles and abstracts were read, excluding those that matched the exclusion criteria, or that did not contain information necessary for the analysis and construction of the results and discussions of this research. After selection, a careful reading of these articles was carried out, selecting those that fit the inclusion criteria.

The extracted data were properly archived, cataloged and analyzed using Microsoft Excel 2016®. The results were presented in the form of tables in which the information extracted from the selected articles was exposed, highlighting the topics of interest for the analysis, such as authors, year of publication, title of the work, methodology, sample and the main related results. with the guiding question of the present study, in addition to a discussion containing the comparison between studies. The Microsoft PowerPoint 2016® program was used to present this study to the evaluators.

RESULTS AND DISCUSSION

Table 1 presents the characteristics of the selected studies (seven), of which: three are guidelines or recommendations on the parameters used in mechanical ventilation in patients with COVID-19; one is an observational and retrospective multicenter study, with a sample of 530 patients; another is a retrospective study involving 20 patients; one is part of a descriptive study, with a sample of 125 patients; and another is a case report, involving 2 patients diagnosed with COVID-19. These were cataloged and exposed in Table 1 below, containing the author's name attached to the year, work title, methodology and main results, arranged in alphabetical order according to the author's name.

With regard to the use of Invasive Mechanical Ventilation (IMV) in COVID-19, Holanda and Pinheiro (2020), describe in their article the importance of using IMV in this period of pandemic by COVID-19. They report that it is going through its biggest challenge after the 70s, due to this virus, which is recognized as a "life-saving technique" (HOLANDA and PINHEIRO, p.1, 2020).

In view of this, they explain that errors in the use of IMV can be lethal to the patient's life, requiring health professionals to know how to handle them with caution and wisdom. For this, there are ways to increase the safety and update of these professionals, such as: courses on the subject and virtual simulators; the emergence of telemedicine. As well, it is also observed the need for new attitudes for this facilitation, such as: the precision of fans that are easier to handle and restoration of old inoperative models and adaptation of devices.

Based on this, Guimarães (2020), states that the role of the physical therapist is of paramount importance, and must be recognized with more attention. The physical therapist in the ICU is responsible for several conducts, among them, the following are explained in the study: "Help with intubations, several pronations and returns to the supine position, many monitoring, PEEP titrations, mechanical ventilation adjustments, alveolar recruitments, weaning, extubations, among others. (GUIMARAES, p.2, 2020).

The study by Allen et al. (2020), showed us the use of mechanical ventilation in a different environment: transport between hospitals, which took an average of 25 minutes for each transfer of patients, in a total of 20 patients, among which 18 were transported in dorsal decubitus, and 2 in prone position, whose were transferred due to lack of ICU beds and ECMO evaluation.

AUTHOR/ YEAR	TITLE	METHODOLOGY	RESULTS
Allen et al. (2020)	Interhospital Transfer of Critically Ill Patients Because of Coronavirus Disease 19–Related Respiratory Failure	Retrospective study, with 20 patients with a mean age of 47 years, transported from a peripheral hospital to a hospital which is a regional reference.	Parameters used in the 19 patients using invasive mechanical ventilation during transport. 9 patients in VCV mode, with the parameters: FIO2: 94%; PEEP of 15 cm/H_2O; VT of 410 ml; FR of 22 irpm. 9 patients in APRV mode, with the parameters: High time: 4.4 s; Low time: 0.6 s; High pressure: 30 cm / H2O Low pressure: $_{1.3}$ cm/H2O 1 patient in PCV mode.
Aranda et al. (2020)	Recommendations for the management of patients with COVID -19 with indication ventilation therapy _ mechanics that are eventually connected to anesthesia machines.	Clinical recommendation, with available evidence based primarily on expert opinion, with three or more authors participating in the decisions.	VT: 4 to 8 ml / kg of ideal weight to avoid lung injury caused by the mechanical ventilator. PEEP: through PEEP titration, so that SPO2 remains between 90-96% Pressures: P. Plateau less than 28cm/$H_2$0; Distending Pressure with a value ≤ 14 cm/H_2O. FR: The value necessary for $PaCO_2$ to remain between 35-60mmHg. FIO_2: Required to maintain saturation between 90-96%, and PaO_2 greater than 60 mmHg.
ASSOBRAFIR (2020a)	Indication and use of non-invasive ventilation and high-flow nasal cannula, and guidelines on the management of invasive mechanical ventilation in the treatment of acute respiratory failure in covid-19.	This is a guideline created to deepen the information disclosed in an up-to-date manner.	Protective strategy in invasive mechanical ventilation: VT set at 6 ml/kg; SD less than 15 cm/H2O; PEEP at higher levels, in order to reduce PD and maintain PaO2 above 60 cm/H2O with FIO2 ≤ 60%.
Botta et al. (2020)	Ventilation management and clinical outcomes in invasively ventilated patients with COVID-19 (PRoVENT -COVID): a national, multicentre, observational cohort study	Multicenter, observational and retrospective study, with 553 patients over 18 years of age, using invasive mechanical ventilation in 18 ICUs	Mean parameters used in the study patients: Mode most used initially: PCV; VT: 6.3 ml/kg; PEEP: 14 cm/H2O; SD: 14 cm/H2O; Respiratory System Compliance: 31.9 ml/cm of H2O.
Gattioni et al. (2020)	COVID-19 pneumonia: different respiratory treatments for different phenotypes?	This is an editorial, based on detailed observation of several cases and professional discussions that treat these patients.	Parameters of invasive mechanical ventilation in patients with the following phenotypes: Type L: PEEP adjusted according to patient compliance, so as not to cause lung injury; VT can reach 8-9ml/kg, in case of hypercapnics. Type H: parameters equal to those used in patients with severe ARDS, including high PEEP.

Xia et al. (2020)	Increased physiological dead space in mechanically ventilated COVID-19 patients recovering from severe acute respiratory distress syndrome: a case report.	Case report, with 2 patients diagnosed with COVID-19, who were monitored using the General Electric R860 ventilator.	Case 1: PCV mode; P. insp between 15-18 cm/H2O; PEEP in the range of 6-8 cm/H2O; RR from 25 to 30-40 irpm; VT between 410-418ml; MV from 10 to 12-15 L/min; FIO2: 50-70%. Case 2: PEEP of 3 cm/H2O; 30% FIO 2; VT of 651ml; FR:31 irpm.
Wang et al. (2020)	Epidemiological and clinical features of 125 Hospitalized Patients with COVID-19 in Fuyang, Anhui, China.	Descriptive study using data collected from electronic medical records, admission data and direct communication with the patient, with a sample of 125 patients. Among them, 25 are critical, of which 19 were admitted to the ICU at a people's hospital in Anhui province, China.	Parameters used in 4 of the patients selected in the study: Patient 116: PCV mode; 80% FIO 2; PC of 16 cm/H2O; PEEP of 14 cm/H2O; FR: 20irpm. Patient 117: PCV mode; 50% FIO 2; 11 cm/H2O PC; PEEP of 12cm/H2O; FR: 18irpm. Patient 118: PCV mode; 50% FIO 2; PC of 13 cm/H2O; PEEP of 14 cm/H2O; FR: 16 irpm Patient 123: PCV mode; 60% FIO 2; PC of 10 cm/H2O; PEEP of 12 cm/H2O; FR: 15irpm.

Legend: PCV - Controlled Pressure; VCV - Controlled Volume; Irpm - incursions per minute; P. insp. - Inspiratory Pressure; PEEP - Positive End Expiratory Pressure; RR - Respiratory Rate; VT - Tidal Volume; VM - Minute Volume; FIO2 - Inspired Oxygen Fraction; P. Plateau - Plateau Pressure; ICU - Intensive Care Unit; ARDS - Acute Respiratory Distress Syndrome.

Table 1 - Characterization of the selected studies through the author's name, year of publication, title of the work, methodology and main results.

Source: Survey Data, 2020.

Thus, the parameters used in IMV were different before and during transport, having in common only the ventilatory mode used in the patients, in which 19 underwent invasive ventilation, using the following parameters: 9 in VCV mode, with FIO2: 94 %; PEEP of 15 cm/H2O; VT of 410 ml; FR of 22 irpm; 9 in APRV mode, with High Time: 4.4 s; Low time: 0.6 s; High pressure: 30 cm/H2O; Low pressure: 1.3 cm/H2O, and finally 1 patient in PCV mode.

According to Barbas et al. (2014), the volume mode (VCV) is used when the objective is to maintain the most stable minute volume, in addition to being used to measure peak pressure and plateau pressure, in order to calculate compliance and resistance of the respiratory system under constant inspiratory flow. and square. The same author also justifies the use of positive end-expiratory pressure (PEEP) to be a maximum of 15cmH2O, as this is a sufficient value to avoid the collapse of the airways and alveoli and ensure adequate gas exchange, in addition to the respiratory rate, in the case of restrictive diseases higher frequencies (>20irpm) can be used.

Regarding the ventilation mode by releasing pressure in the airways (Airway Pressure -Release Ventilation - APRV) has the benefit of offering high pressure levels to improve gas exchange and reduce dead space, being a mode in which the ventilator will work at two pressure levels, similar to the controlled pressure mode with in relation to the inspiratory time and the expiratory time, with or without changes, being distinguished only by allowing spontaneous cycles in the two pressure levels when the patient has the ability to perform triggers (CARVALHO, TOUFEN JUNIOR E FRANCA, 2007).

Aranda et al. (2020), showed in their study that Anesthesia Machines (AM) are being used to replace mechanical ventilators, in cases where it is not possible to obtain other ventilatory support for the same purpose. Among the AM fans, the most used are the bellows fan, using compressed gas, and the electric piston fan, which have the following ventilation modes: VC, PC, PS, SIMV. It was also highlighted that to avoid barotraumas and hypoventilation, the ventilator must not be used for two or more patients.

This, Aranda et al (2020) used the following parameters: VT: 4 to 8 ml / kg through the predicted weight, so that the plateau pressure remains below 30 cm / H2O, otherwise, the pressure must decrease. VT value, or increase it, in cases of hypercapnia or hypoxemia; PEEP: through PEEP titration, so that SPO2 remains between 90-96%, so as not to cause complications, which are observed in cases of high PEEP values, even if there is an improvement in oxygenation; Pressures: P. Plateau less than 28cm/H20; Distending Pressure ≤ 14 cm/H2O; FR: The value necessary for PaCO2 to remain between 35-60mmHg; FIO2: Necessary to maintain saturation between 90-96%, and PaO2 greater than 60mmHg.

Alveolar recruitment, observed in the study by Ortiz (2017), was in line with the study by Aranda et al. (2020), in which it was used for PEEP titration, in PCV mode, with PEEP initially of 35 cm/H2O, with pressure delta of 15 cm/H2O. Subsequently, PEEP was reduced to 15 cm/H2O, with pressure delta remaining at 15 cm/H2O. Finally, PEEP was reduced and maintained at 10 cm/H2O, with ΔP maintained at 15 cm/H2O.

In the recommendation made by ASSOBRAFIR (2020a), it was observed that in invasive mechanical ventilation, protective mechanical ventilation must be used, which has the most suitable parameters to prevent lung injury or its worsening. Therefore, the following parameters must be applied: VCV or PCV mode depending on the criteria already mentioned by Araújo, Leão and Ferreira (2014); SD < 15 cmH2O; elevation of PEEP levels, in order to reduce PD levels; permissive hypercapnia tolerance; prone position indicated based on the patient's PaO2/FIO2 values; alveolar recruitment or ECMO, in cases of refractory hypoxemia.

In line with ASSOBRAFIR (2020b), Corrêa et al. (2020), reports in its recommendation the following initial parameters: PCV mode; tidal volume (CV) of 6mL/kg predicted weight; initial PEEP of 15cmH2O; RR from 20 to 24 irpm, maintaining MV between 7 and 10 L/min; driving pressure up to 15cmH2O and SPO2 between 92 and 96%.

Thus, Seiberlich et al. (2011), reports that acute lung injury is characterized by refractory hypoxemia, attributed to high tidal volumes, which can cause an inflammatory response, which recruits inflammatory cells to the alveoli, thus leading to volutrauma and atelectrauma. Therefore, the use of protective ventilation can decrease alveolar stretching, consequently preventing the inflammatory response and alveolar collapse.

Chiumello (2016) observed in his study that airway PD can be a considerable way to detect pulmonary stress in mild and moderate Respiratory Distress Syndrome, which can be significantly observed with values greater than 24 and 26 cm/H2O, as it depends on the pulmonary elastance, and the severity of the disease can be better observed.

The study by Botta et al. (2020) presented a sample of 533 patients, of which 417 were men and 136 were women, with a mean age of 67 years, with common comorbidities, such as diabetes, in 111 patients, and hypertension, in 200 patients. All were diagnosed with ARDS associated with COVID-19. 46 of these patients had a PaO2/FIO2 ratio < 100 mmHg, with a median value of 158.8 mmHg. Among the 449 patients with PaO2/FiO2 < 150 mmHg, in the first 4 days of invasive mechanical ventilation, 234 were placed in the prone position.

Therefore, it was possible to observe, in a study carried out by Guan et al. (2019), that the most severe cases of patients with COVID-19 are present in the elderly and in patients with comorbidities. In the study, it was seen that among the general population studied, 23.7% had at least one co-existing comorbidity, such as Chronic Obstructive Pulmonary Disease (COPD) and Arterial Hypertension.

The same also observed in his study that admission to the intensive care unit (ICU), the use of invasive mechanical ventilation (IMV) or death occurred in 67 (6.1%) of the patients in his sample. Of these, 2.3% underwent IMV, of which 1.4% died. The same also reported that the incubation lasted, on average, 4 days.

In view of this, Figueira et al. (2020), reported in their article that the prone position, in patients with ARDS, is based on recruitment in the posterior part of the lungs, increasing the end-expiratory volume, as well as the elasticity of the chest wall, with an improvement in pulmonary hemodynamics, increasing ventilation and perfusion, and consequently decreasing the mortality of these patients.

Gattioni et al. (2020), showed us in their study that hypoxemia is characteristic of both COVID-19 and ARDS, being secondary to COVID-19, although it has its specific characteristics, as presented in the study by Xia et al. (2020), increased retention of CO2 and VM. Gattioni et al. (2020), also reports on the different phenotypes observed, which are seen by the present authors as results from factors that are related to different patterns in COVID-19, such as the severity of the infection, the time of treatment after diagnosis., and the patient's body response to hypoxemia, thus requiring different treatments for each, given that type L is milder than type H, which must have the same treatment as severe ARDS.

Thus, Gattioni et al. (2020) explains that the compliance observed in the lung with pneumonia secondary to COVID-19 may have different characteristics, depending on the phenotype found. In the L-type phenotype, compliance does not show significant changes, remaining in its physiological state. On the other hand, compliance in patients with type H phenotype is observed with considerable decrease.

In line with Gattioni et al. (2020), in the study by Grasselli et al. (2020), it was seen that ARDS is a complication of COVID-19, which was diagnosed in 40% to 96% of ICU patients. the protective strategy as a treatment for severe hypoxemia resulting from the most severe forms of ARDS, which is responsible for 40 to 50% of mortality (HEKIMIAN, FRERE & COLLET, 2020).

With regard to the increase in $CO_{2 \text{ retention}}$ cited by Gattioni et al. (2020), Lippi and Henry (2020), were able to observe in their meta -analysis, with 1692 patients diagnosed with COVID-19, that patients with COPD have a five times greater risk of serious infection by COVID-19, unlike people who do not diagnosed with COPD, advising health professionals to carefully monitor patients with this pathology, especially those at risk of infection.

Xia et al. (2020), describes in their study two cases of patients with COVID-19 associated with ARDS, so that parameters were used in mechanical ventilation in order to minimize lung injury, through low levels of tidal volume (6-8 ml/ kg), with evidence, however, of severe hypercapnia, as well as higher levels of tidal volume (8-9 ml/kg) and low levels of PEEP (3-6 cm/H20), thus not occurring barotrauma. This way, he concluded his study explaining that the tidal volume between 8–9 ml/kg can be increased, so that the plateau pressure is observed, so as not to cause barotrauma.

Therefore, correct parameters for each patient are essential, as presented by ASSOBRAFIR (2020c), in one of its recommendations, stating that although some authors use the PEEP table for ARDS, it can cause hyperdistention. Thus, higher PEEP values may be required, or an alveolar recruitment maneuver may be performed. With this, PEEP, depending on the observed phenotype, can be from 20 cmH20 in type H patients, and since they usually need higher levels, and from PEEP 7, for type L phenotype.

ASSOBRAFIR (2020b; 2020c), also tells us that low tidal volume is necessary, as a protective strategy, to reduce lung injury caused by the mechanical ventilator, using the TV between 4-8 ml/kg of predicted weight. Seiberlich et al. (2011), confirms that the tidal volume is calculated based on the predicted weight, using the height and gender of the patient, thus preventing the VT calculated for invasive mechanical ventilation from being overestimated or underestimated.

Regarding the study by Wang et al. (2020), it was explained that their sample consisted of 71 men and 34 women, with a mean age of 41.46 years, within which 34 patients had underlying chronic diseases. 19 of these patients were admitted to the ICU, presenting bilateral pneumonia, so that 4 were submitted to invasive mechanical ventilation, in the same mode: PCV, with parameters that presented the PaO2/FIO2 ratio with the following results, in the first arterial blood gas analysis collected after intubation: Patient 116 with 196 mmHg; patient 117 with 239.4 mmHg; patient 118 with 274.8 mmHg; patient 123 with 175 mmHg.

Thus, Araújo, Leão and Ferreira (2014), tell us that the PCV mode is the mode that most closely resembles the physiological one, with some advantages, such as: ensuring that there is no alveolar hyperdistension. However, it also states that the choice of ventilation mode to be used (PCV or VCV) will depend on the patient's clinic, the procedure to which it will be submitted, the therapist's experience and the comorbidities that the patient may present. Consequently, in theory, there is no better way than the other.

Carvalho, Toufen Junior and Franca (2007) tell us in their article that the PaO2/FIO2 ratio is correlated with the identification of the severity of the lung injury. Therefore, if it is above 300 mmHg, there is no risk of lung injury, as it is within the normal range. However, if this ratio is below 200 mmHg, it is stated that the patient has a considerable and high level of pulmonary impairment.

Ranieri et al. (2012), reinforces the idea of Carvalho, Toufen Junior and Franca (2007), when they say that the hypoxemia found in acute respiratory distress syndrome can be characterized in the following degrees: mild (200mmHg < PaO2/FIO2 ≤ 300mmHg); moderate (100mmHg < PaO2/FIO2 ≤ 200mmHg) and severe (PaO2/FIO2 ≤ 100mmHg).

FINAL CONSIDERATIONS

It was concluded, therefore, that it is of great importance to obtain knowledge about the L and H types phenotypes, for a better ventilatory management, with a protective ventilation of individual parameters, adjusted at the moment. Therefore, it is essential to monitor constant oxygenation, avoiding both hypoxemia and the deleterious effects of hyperoxemia, and for that, a team of specialized intensivists is necessary, especially the physical therapist, who will be the professional who will deal with the disease. directly with the patient's ventilatory management, in addition to the care and clinical protocols necessary for the patient to evolve with a satisfactory prognosis.

It was possible to observe, through the studies and recommendations analyzed, that the parameters used in invasive mechanical ventilation, in patients with COVID-19, were very similar to each other, concluding that these professionals, who participated in the investigated works, are selecting the most indicated parameters, currently, for the treatment of patients with this diagnosis.

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