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Letter to the Editor

Oxygenation device with reservoir and PEEP (ODRPEEP) in patients with acute respiratory distress due to COVID-19☆

Dispositivo de oxigenación con reservorio y PEEP (DORPEEP) en pacientes con dificultad respiratoria aguda por COVID-19

To the Editor:

On 11th March 2020, the World Health Organization (WHO) declared a global pandemic status due to the current outbreak of coronavirus disease (COVID-19), which was first reported in Wuhan (China) on 31 December 2019.[1] At present, COVID-19 is severely impacting a large number of countries, including those that are supposed to be most resilient. In 2009, Castro et al. indicated the need to create a triage system to adapt our healthcare system to possible influenza pandemics.[2] This article written for Influenza A (H1N1) already showed the need to adapt protocols to the different phases of the pandemic, to avoid the spread of the virus, the saturation of healthcare centres with mild patients and the contamination of healthcare facilities with the virus, as well as reducing the morbidity and mortality of critically ill patients.

In this same sense, with respect to COVID-19, the *Center for Disease Control and Prevention* (CDC), recommends decreasing and taking extreme caution with aerosol-generating procedures,[3] such as: Ventilation with mask and self-inflating bag, aspiration of secretions, orotracheal intubation (OTI), application of nebulisations, use of non-invasive ventilation (NIV) and cardiopulmonary resuscitation (CPR) manoeuvres.

The results of the analysis of a cohort of COVID-19 patients throughout China have shown that 3.4% of infected patients presented with acute respiratory distress syndrome (ARDS), representing 40% of the total number of patients who showed severe pathologies.[4]

ARDS causes exudate alveolar invasion in the lung and a decrease in lung compliance, generating mainly hypoxemic respiratory failure. In prehospital care, diagnosis is based on detecting an ineffective respiratory pattern with impaired ventilatory auscultation, a decrease in oxygen saturation, and an increase in respiratory rate.

In these patients, oxygenation with a reservoir mask will be a priority as the first step in the treatment of ARDS. In the second step, the use of non-invasive ventilation (NIV) will be considered as risk due to possible leaks that may appear,[4,5] especially dur-

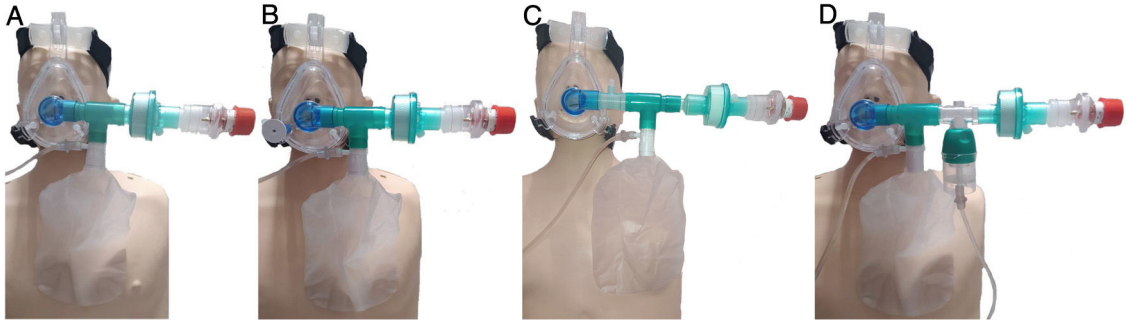

Fig. 1. Diagram of the different options related to the oxygenation device with reservoir and PEEP (ODRPEEP).
A: It consists of an appropriately sized, one-piece T-shapedNIV mask with closed elbow connected to a reservoir bag with its 15 L/min oxygen connection, a filter for bacteria and viruses with a filtering efficiency of > 99.99 % and a PEEP valve. The necessary inspiration volume will be made from the reservoir bag while the patient's expiration is done through the PEEP valve with an antibacterial and viral filter.
B: In the case of needing to administer inhaled drugs, we use the pressurized cartridge fitting, needing an O_2 extension end for its connection which we will snap into one of the holes in the mask.
C: We can apply an inhaled drug without nebulization. We will use the diagram of option «a» adding a T-fitting for a pressurized cartridge between the elbow and the T of the reservoir bag.
D: It will allow us to nebulize reducing the risk of aerosol leaks. We will use the diagram of option «a» adding a T-piece with a nebulization cup and extension. Without nebulization, we will provide the reservoir with a flow of 15 L/min and during nebulization, the flow must be distributed between the reservoir and the nebulizer cup to avoid hyperoxygenation.

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ing ambulance transport, with invasive mechanical ventilation and extracorporeal membrane oxygenation (ECMO) being relegated to the last step of treatment. The administration of inhaled therapy must be strictly supervised to avoid external contamination.[5]

At the prehospital level, we are faced with the problem of how to ventilate patients who are inefficient in oxygenation by means of a mask with a reservoir bag. In this case, the next step would be the use of NIV, but we have the risk of external contamination. As it is a high-flow ventilation, its use is limited to hospital rooms with negative pressure.

In this exceptional context that COVID-19 has generated, it is where we propose to assess the use of our device that, although we do not have randomized clinical trials (RCTs) that support its use, we think that it can be an alternative when there is no chance of performing mechanical ventilation, and especially for patients in whom the usual oxygen therapy techniques are not being effective enough, designed not to replace NIV but as an alternative in this context. With the 'oxygenation device with reservoir and PEEP' (ODRPEEP) (Fig. 1) we can oxygenate the patient with a reservoir bag in the inspiratory phase, and in the expiratory phase the inlet of the reservoir bag will be closed with the built-in valve and the exhalation will be done through a virus and bacteria-proof filter with a > 99.9% efficacy and a PEEP valve avoiding alveolar collapse thanks to a spring system. In addition, the device will allow us to safely apply inhaled drugs.

The inherent safety of this device is based on the fact that there is no external contamination thanks to the NIV mask, the low pressures inside and the exhalation through the filter. Even so, the authors recommend caution when applying and conducting RCTs that compare the results of ODRPEEP with NIV and determine if both options can be considered to have a certain therapeutic equivalence.

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Conflict of interests

The authors declare no conflict of interest.

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Hydroxychloroquine in the treatment of COVID-19: How to use it waiting for conclusive scientific evidence☆

Hidroxicloroquina en el tratamiento del COVID-19:cómo utilizarla a la espera de evidencia científica concluyente

To the Editor

To date, there is no effective treatment against the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), responsible for the COVID-19 disease. Numerous clinical studies are evaluating the utility of antiviral and immunomodulatory drugs, where antimalarials such as chloroquine and hydroxychloroquine (HCQ) are one of the alternatives studied.[1]

So far, clinical experience in the use of HCQ arises mainly from treatment in patients with systemic lupus erythematosus (SLE), whose long-term effects show multiple benefits. However, high cumulative doses have been associated with serious adverse effects, especially in the retina and myocardium.[2]

Many healthcare protocols propose the use of HCQ in the treatment of COVID-19.[1] However, it is important to consider adverse myocardial effects, such as the development of severe arrhythmias.[3,4]

In the COVID-19 patient, possible cardiac involvement is mainly related to 4 factors: 1) underlying heart disease (often silent in older patients); 2) myocardial involvement caused by the infection and the inflammatory response itself, which leads to myocarditis with elevated troponins; 3) acute toxicity probably associated with the use of antimalarials in high doses, more evident in chloroquine treatments and 4) concomitant use of other treatments that, together with HCQ, prolong the corrected QT interval (QTc), with the risk of serious ventricular arrhythmias.[3–5]

In the absence (pending) of conclusive scientific evidence, what considerations should be taken into account when using HCQ in the treatment of COVID-19? It is necessary to change the way in which HCQ is usually used in patients with SLE, adapting its prescription and control of potential adverse effects to this new therapeutic scenario. The following considerations aim to optimize the HCQ treatment of COVID-19:

- When the doctor considers that HCQ can be useful, it should be initiated as early as possible after diagnosing the infection, due to the decrease in viral replication and dissemination demonstrated *in vitro* and *in vivo*.[1]
- Using HCQ in an acute treatment (5 days), with loading dose (400 mg/every 12 h) the first day and 4 days of maintenance (200 mg/every 12 h), after requesting an informed medical consent (with COVID-19 being an indication not contemplated in the SmPC).
- Minimize the risk of prolonged QTc. For this, a baseline electrocardiogram (ECG) must be performed prior to the start of treatment. If the QTc is greater than or equal to 500 ms, HCQ should not be started. If the QTc is less than 470 ms in men or less than 480 ms in women, treatment can be initiated, repeating the ECG in 48 h. If the QTc is greater than or equal to 500 ms or an increase greater than or equal to 60 ms is observed, treatment should be discontinued.[4]
- Avoid or discontinue the simultaneous use of drugs that prolong the QTc, particularly azithromycin, clarithromycin, levofloxacin, moxifloxacin, ciprofloxacin, haloperidol, quetiapine, risperidone, domperidone and ondansetron, among others.[4,5]

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