Artículo de posición

Non-invasive mechanical ventilation for chronic obstructive pulmonary disease

Ventilación no invasiva para la enfermedad pulmonar obstructiva crónica

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ABSTRACT

Chronic obstructive pulmonary disease is, as the name suggests, chronic, irreversible and progressive, so that over time it leads the patient to a fatal outcome. It presents a high morbidity and mortality. It is characterized by periods of remission and exacerbations that influence and deteriorate the patient's quality of life. Non-invasive ventilation is very effective; patients with chronic obstructive pulmonary disease benefit from it. The aim of this paper is to analyze how these patients can benefit from non-invasive ventilation and improve the lifestyles of patients by reducing exacerbations of the disease.

Keywords: chronic obstructive pulmonary disease; non-invasive ventilation; main indication.

RESUMEN

La enfermedad pulmonar obstructiva crónica es, como su nombre lo indica, crónica, irreversible y progresiva, de tal manera que con el transcurso del tiempo lleva al paciente a tener un desenlace fatal. Presenta una alta morbimortalidad. Se caracteriza por periodos de remisión y exacerbaciones que influyen y deterioran la calidad de vida del paciente. Es muy efectiva la ventilación no invasiva; los pacientes con enfermedad pulmonar obstructiva crónica se benefician con ella. El objetivo de este trabajo es

analizar cómo estos enfermos pueden beneficiarse con la ventilación no invasiva y mejorar los estilos de vida de los pacientes al disminuir las exacerbaciones de la enfermedad.

Palabras clave: enfermedad pulmonar obstructiva crónica; ventilación no invasiva; principal indicación.

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INTRODUCTION

Noninvasive mechanical ventilation (NIMV) has been used successfully for more than two decades in the treatment of patients with acute respiratory failure, mainly for the exacerbation of chronic obstructive pulmonary disease (COPD), acute cardiogenic pulmonary edema, immunosuppressed patients; including also neuromuscular diseases and numerous other conditions.[1,2]

There are numerous modes of non-invasive ventilation, some of the most used today are the use of biphasic ventilation (BIPAP), as well as continuous positive airway pressure (CPAP). More recently, neurally adjusted ventilatory assistance (NAVA) has been introduced with the aim of improving the patient's synchronization with the ventilator through neural stimulation of the diaphragm.[3] The volume-assured support pressure is a mode of noninvasive ventilatory therapy of interest that has been used in the management of exacerbation of COPD.[4,5]

By promoting continuous positive airway pressure (CPAP), the reduction of intrapulmonary shunt is favored through the recruitment of collapsed alveoli, thus improving gas exchange, oxygenation and decreasing the work of the respiratory musculature.

The use of non-invasive ventilation with positive pressure has been progressively extended to encompass numerous diseases, from its classic application in patients with chronic respiratory failure, to acute respiratory failure of any cause. As more scientific evidence has been collected the efficacy of non-invasive ventilation in COPD, there is now sufficient evidence that the use of non-invasive ventilation in the exacerbation of

chronic obstructive pulmonary disease (COPD) is therapeutically positive.[6] The objective of the work is to analyze how these patients can benefit from this type of ventilator support and improve their lifestyle by decreasing the periods of exacerbation.

DEVELOPMENT

Chronic obstructive pulmonary disease (COPD) is a disease characterized by high morbidity and mortality, where up to 10 % of Spaniards are affected according to the EPI-SCAN study in Spain.[7] It is estimated that COPD exacerbation constitutes 20 % of emergency department visits in this country. The treatment of COPD exacerbation consists of the use of pharmacological treatment and respiratory support. Studies of the benefits of NIV (non-invasive ventilation) in hypercapnic acute respiratory failure in patients with COPD have been amply demonstrated by the scientific literature and also reflected in clinical practice guidelines, resulting in a NIV boom in recent years.[8]

In a study carried out in hospitals in the United States during the 1998-2008 period on the use of non-invasive ventilation in patients with COPD exacerbation showed a progressive increase in the use of NIV (from 1 % to 4.5 % of admissions), with a concurrent 42 % decrease in the use of invasive ventilation (from 6 % to 3.5 % of all admissions).[9] The European continent, in 2008, a study on the application of non-invasive ventilation was undertaken, where it was the main treatment modality for hypercapnic acute respiratory failure (48 %).[10]

Along with patients with chronic obstructive pulmonary disease, NIV therapy is primarily used for the treatment of Obstructive Sleep Apnea and nocturnal hypoventilation. NIV avoids respiratory complications, improves quality and lifestyle, as well as increases survival rates.[11,12,13,14]

Noninvasive ventilation not only tries to achieve better ventilation and oxygenation in patients with chronic obstruction of the airway, but also favors the strengthening of respiratory muscles; especially the diaphragm and internal intercostal muscles, which represents approximately 70 % maximum voluntary ventilation. Inspiratory muscles of the rib cage maintain tidal volume during rapid and superficial breathing.[15]

Evidence-based medicine is a fundamental link, allowing us to integrate the pathophysiology of an illness to daily medical practice helping us to see everything integrated as one. The results obtained from several primary studies, including

randomized controlled clinical trials, are characterized by an important methodological quality, with reliable and metaanalyzed results.[16]

Oxygenation at home is becoming more common in these patients with this type of disease.[17] We can argue that the application of non-invasive ventilation at home would represent in those people affected by COPD a better way of life for them, more comfortable, not necessary to stay long periods in the hospital, where they even run the risk of becoming infected and becoming more complicated. They can receive family support and the help of their loved ones. The respiratory function would improve without the need for aggression or the introduction of disproportionate treatments, which do not fit the patient's reality.

The most frequently used ventilatory modes are continuous positive airway pressure (CPAP) and bilevel positive airway pressure (BiPAP) modes, to treat chronic hypercapnic respiratory failure, which is often due to COPD exacerbation. NIV has also need to be well established for its use not only in hospitals but also at home, which is relatively new and its efficiency has been proved in countries such as Spain and France with very positive results. It is however, an irrefutable fact, that with this ventilatory modality, noninvasive ventilation at home is kind of expensive, which these people need in their home’s day by day, and represents a great economic burden. However, when considering that these patients can avoid hospitalization, as well hospital acquired pneumonias and the current use of expensive latest generation antibiotics, the use at home of NIV has to be considered, a cost effective therapy.[18]

A double-blind, randomized, multicenter trial published in the Lancet in 2014 on the use of Bilevel in patients with COPD with GOLD IV stage and chronic hypercapnia which included 195 patients, it showed a reduction in mortality per year from 33 % to 12 % with statistical significance (p= 0.0004).[19] The GOLD (Global Initiative for Chronic Obstructive Lung Disease) criteria in 2013 was able to reinforce and re-emphasize the importance of noninvasive ventilation treatment of patients with COPD exacerbations based on these high success rate (80 % to 85 %).[20]

Numerous studies in the world affirm that the establishment of non-invasive ventilation during the exacerbation of COPD allows an early and timely symptomatic and physiological improvement, which in turn strengthens the performance of the ventilatory mechanics and oxygenation of these types of patients. Usually, about 24

hours after the initiation of non-invasive ventilation, the patients show successful results as demonstrated by physiological and blood gas measurement.

Chronic obstructive pulmonary disease in patients who have survived an initial episode of exacerbation necessitating non-invasive mechanical ventilation have a high risk of recurrent admission in the future requiring the use this type of noninvasive ventilatory support.

NIV manages to overcome COPD exacerbation, by ensuring synchrony between the patient and the ventilator. The patient remains relaxed because he begins to breathe better and feels comfortable, allows the respiratory muscles to relax and then in turn the muscles strengthened, thereby avoiding excess work of breathing, thus allowing for and overall improvement and stabilization of the patient status. It is possible to stabilize or totally reverse the cause of then respiratory decompensation. It is necessary to see the NIV as a necessary alternative for the intensive care units in this kind of patients. In addition to the improvement in the patient, by promoting the use of NIV, there will be a significant positive economic effect to our country and resulting in new beneficial strategies and policies.

CONCLUSIONS

The degree of use and requirement of chronic obstructive pulmonary disease (COPD) of noninvasive mechanical ventilation varies greatly, depending on the level of severity and intensity of the illness. However, it is already a well established fact that the management of COPD is greatly improved with these modalities of ventilatory support. This therapy should be decided at the opportune moment, assuring that the patient will have a satisfactory and rapid recovery. Its high effectiveness and comfort guarantees its efficiency, improves the cost-benefit, reduces hospital stay and avoids the complications associated with more invasive methods. The success of NIV is strongly validated.

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Conflict of interests

The author affirms that there are not conflict of interests.