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EDITORIAL

Non-invasive respiratory support switching strategies for the initial management of hypoxemic respiratory failure. How much do we know?

Estrategias de alternancia de dispositivos de asistencia respiratoria no invasiva para el tratamiento inicial de la insuficiencia respiratoria hipoxémica. ¿Cuánto sabemos?

Invasive mechanical ventilation (IMV) is a critical intervention in managing acute hypoxemic respiratory failure (AHRF). Proper use of this life support allows the respiratory muscles to rest and improve oxygenation and ventilation until the cause of its need is managed or resolved. However, like any intervention, IMV can lead to undesirable side effects, including those associated with tracheal intubation and positive pressure.[1]

In some settings, and when patients are appropriately selected, non-invasive respiratory support has reduced the need for IMV. Non-invasive ventilation (NIV) and high-flow nasal cannula (HFNC) have shown varying levels of success when used as an initial strategy for managing AHRF.[2,3] Most published studies have focused on the isolated use of either NIV or HFNC. Additionally, it has sometimes been considered a failure of HFNC when a patient switches to NIV.[4]

Switching from NIV to HFNC when the patient does not tolerate NIV and switching from HFNC to NIV when the patient worsens are strategies that seem logical when avoiding the use of IMV. This scenario is particularly relevant in contexts like the SARS-CoV-2 pandemic, where the demand for invasive ventilatory support often surpasses the availability of mechanical ventilators. The alternating use of different non-invasive respiratory support devices (NIV and HFNC) is expected but has yet to be widely studied and reported.

In the current issue of the journal Medicina Intensiva, Parrilla-Gomez et al. publish their retrospective observational study aimed at investigating the patterns of alternation between NIV and HFNC, or vice versa, as an initial strategy in the management of AHRF in adults. They also explored the reasons for the switches between NIV and HFNC, and the clinical outcomes of the study participants.[5] Sixty-three patients admitted to the intensive care unit (ICU) of a Spanish hospital who used NIV and HFNC alternately were analyzed. These patients were classified into two groups depending on the first change of noninvasive respiratory support device performed. Some patients were initially managed with HFNC and switched to NIV (HFNC-to-NIV group; n = 37; 58.7%), and other patients initially used NIV and then switched to HFNC (NIV-to-HFNC group; n = 26; 41.3%). Switches between NIV and HFNC were made according to the physician's decision.

As expected, 100% of patients who used HFNC initially switched to NIV because their respiratory function worsened or did not improve. On the other hand, 77% of patients who switched from NIV to HFNC did so because of improved respiratory function. One noteworthy result from the study by Parrilla-Gómez et al. is that one out of two patients in the HNFC-to-NIV group failed and was intubated and managed with IMV after the first change.[5] Considering that delayed intubation is associated with poor clinical outcomes,[6] must identify these patients early.

However, Parrilla-Gómez et al. suggest that conducting an NIV trial when the patient's respiratory function worsens while connected to HFNC may result in better clinical outcomes, such as lower mortality, compared to patients who do not undergo the NIV trial.[5] Because the ICU of the Hospital del Mar (Barcelona, Spain) had a system for monitoring and storing different clinical variables of patients every hour, something that all ICUs should aim to have, Parrilla-Gómez et al. were able to reconstruct the history of patients as if it were a prospective study. In the case of the HFNC-to-NIV group, the researchers classified the patients into two

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hypothetical groups: those who switched from HFNC to NIV and did a trial of NIV (NIV trial-like group; *n* = 14; 37.8%) and those who did not do a trial of NIV (non-NIV trial-like; *n* = 23; 62.2%).[5] The technology and methodology allowed the authors to reach this conclusion, but prospective studies must confirm these results.

On the other hand, patients in the HFNC-to-NIV group required significantly more IMV than those in the NIV-to-HFNC group. This might have been expected since switching from HFNC to NIV occurred when patients did not improve or worsened. However, there was no difference in mortality between the groups.[5] I would hypothesize that mortality was not higher in the HFNC-to-NIV group, despite a higher rate of non-invasive respiratory support failure, because the connection to IMV was not delayed. This could be visualized in that this group of patients was on non-invasive respiratory support for 40 h less than the NIV-to-HFNC group.[5]

The study by Parrilla-Gómez et al. again highlights the need for strict monitoring of non-invasive respiratory support as an initial strategy to manage AHRF. Different tools have been proposed to predict HFNC or NIV failure in AHRF.[7,8] However, most of these tools have not been tested using HFNC and NIV as a joint non-invasive respiratory support strategy to prevent IMV. Considering the failure of HFNC to switch to NIV is common.[4,9] However, using NIV does not have the same complications as IMV. The authors report that the switch from HFNC-to-NIV or NIV-to-HFNC occurred in one out of three patients,[5] showing that it is a strategy that could be prevalent in clinical practice.

Despite the vital contribution made by the study by Parrilla-Gómez et al.,[5] the evidence on using different non-invasive respiratory support devices alternately is still scarce and inconclusive. Future studies should help determine which variables should be monitored and under what circumstances these HFNC-to-NIV or NIV-to-HFNC switches should occur safely and not delay intubation and use of IMV. In addition, clinicians should critically evaluate the findings of future studies and validate the performance of future predictive tools for failure to use non-invasive respiratory support in patients in their ICUs.

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Competing interests

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Data availability statement

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