Noninvasive Ventilation for Acute Respiratory Failure: But How Severe?

Erik Garpestad and Nick Hill

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enormous need for research to improve the understanding and treatment of sleep disorders. Thus, the three societies strongly advocate for increased research support in this critical area. In addition, the societies support initiatives to enhance the number of well-qualified researchers in the broad area of sleep medicine. The societies have agreed to sponsor a workshop in the coming year, which will include representatives from all concerned specialties, to explore means to foster research and identify potential areas for cooperative research.

The field of sleep medicine is in a time of rapid growth and maturation. The ACCP, the ATS, and the AASM will continue to collaborate on initiatives that further the growth of the field, help our members and, above all, help our patients. The societies have agreed to explore ways to enhance quality of care and access, and to mount efforts to ensure adequate numbers of well-trained sleep technologists. We will also continue to discuss relevant issues in sleep medicine, and explore opportunities to enhance physician education and patient care. We urge all concerned with the future of sleep medicine to participate actively and collaboratively as we move forward together.

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Noninvasive Ventilation for Acute Respiratory Failure

But How Severe?

Over 15 years have passed since the publication of the initial report of noninvasive mechanical ventilation (NIV) to avoid endotracheal intubation in patients with acute respiratory failure (ARF). Since then, we have gained much knowledge supporting the use of NIV in a variety of clinical situations. NIV to treat patients with hypercapnic respiratory failure due to COPD is considered a “standard of care.”2,3 and there is general consensus that treatment with NIV should be strongly considered in patients with acute pulmonary edema (APE) and pneumonia in immunocompromised hosts,4 and is an option in a number of other clinical scenarios. Many questions remain, however, including the issue of whether there is a severity of ARF beyond which NIV should not be used.

In this issue of CHEST (see page 3916), the study by Honrubia et al5 asks how NIV efficacy compares to that of conventional mechanical ventilation (CMV) in patients with severe ARF of various etiologies who meet the standard criteria for intubation. Sixty-four patients were randomized, with 31 receiving NIV and 33 receiving CMV. In the NIV group, 18 patients (58%) were intubated, compared to all 33 patients (100%) in the CMV group (relative risk reduction, 43%; p < 0.001). The ICU mortality rate was 23% (7 patients) in the NIV group and 39% (13 patients) in the CMV group (p = 0.09). The hospital mortality rate was 32% in the NIV group and 42% in the CMV group (p = 0.30). Complication rates and ventilator durations were slightly but not significantly lower in the NIV group, and ICU and hospital lengths of stay were similar. Patients who did not respond to NIV fared no worse than those assigned to CMV from the start, which is an important observation considering that a recent NIV trial6 associated increased mortality in the NIV group with delayed intubation.

There are a number of limitations of the study. Although the inclusion criteria unquestionably selected patients who had severe respiratory failure, they did not preclude the use of NIV. Thus, it is not surprising that the authors significantly reduced the...
need for intubation in their NIV group, considering that the protocol assured a 100% intubation rate in the CMV group. Furthermore, it is disturbing that only 64 of 256 patients (25%) who met the inclusion criteria were eventually enrolled in the study, raising concerns about “cherry picking.” Did the attending physicians, who had “the final decision,” enroll only patients they thought likely to succeed with NIV, or did they withhold such patients so that they would not be randomly intubated? In addition, although the authors state that in their stratified analysis, NIV reduced endotracheal intubation independently of the type of ARF, the small number of patients and unequal distribution in some of the subgroups might have introduced bias. In the NIV group, 20 of 31 patients had either an exacerbation of COPD or cardiogenic APE, whereas in the CMV group 14 of 33 patients had received these diagnoses. It is well-known that COPD and APE patients respond favorably to NIV treatment, and this distribution could have favored the NIV group. Based on these concerns, the results should be generalized to other clinical settings with caution.

Other concerns raised by the study include the finding that patients with pneumonia fared poorly with NIV, with all patients requiring intubation. This is consistent with the results of other studies identifying pneumonia as a risk factor for NIV failure, with the study by Ferrer et al being one notable exception. Based on the preponderance of data, however, NIV should be used with great caution in patients with severe respiratory failure due to pneumonia, particularly in the absence of COPD. Also, the reason for the termination of this study raises concerns going forward. If other studies experience the same problem (ie, progressively declining enrollment because clinicians are so convinced of the benefits of NIV that they are reluctant to enroll patients), it will become impossible to perform randomized NIV trials.

What do the results of the study by Honrubia et al mean? It certainly does not mean that treatment with NIV can be used to replace treatment with CMV. NIV remains inappropriate for many patients with ARF such as those with ARDS and multiorgan system failure, who are unable to clear airway secretions or to cooperate with using the technique. On the other hand, the study supports the concept proposed by earlier investigators that NIV can be used in patients with severe respiratory failure, with the expectation that some patients will avoid intubation and its inherent complications. Further, as long as such patients are monitored closely at experienced centers and are intubated without undue delay if their condition fails to improve (ie, within the first 2 to 3 h), patients who ultimately do not respond to NIV do not appear to be harmed by this approach. However, the limitations of this study emphasize the need for future randomized controlled trials that focus on specific patient groups with ARF rather than on more heterogeneous populations.

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