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Letter to the Editor

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Clarifying aspects of noninvasive mechanical ventilation in acute exacerbations of chronic obstructive pulmonary disease

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To the Editor:

The article in a recent issue of the *Turkish Journal of Medical Sciences* by Çakır Gürbüz et al. (1) is of high interest. It deals with a relevant and still current topic, considering the percentage of failure of noninvasive ventilation (NIV) related to poor interface tolerance (2).

There are few points of this study that need to be addressed.

The first point concerns the severity of the airways obstruction in the two groups. We can imagine that the level of obstruction was severe or very severe, according to the initial arterial blood gases reported, and that it was superimposable in the two groups. However, this is not specified and, if statistically different in the two groups, it might have had a role in the different response to NIV. Also, baseline characteristics of the patients such as chronic obstructive pulmonary disease (COPD) phenotypes, chronic treatments, and acute administration of antibiotics, which were not specified in the text, could have played an analogous crucial role. (Incidentally, in Table 1 the percentage of comorbidity in Group H is 64% and not 24%).

The second point refers to the ventilator setting. It is reported that pressure support was gradually increased during the first hour of ventilation "to observe adequate patient respiratory effort". As it is not described, we can deduce that balloon catheters were not used to estimate the inspiratory effort. Therefore, if the evaluation were only clinical, it would have been more appropriate to speak of respiratory rate reduction and accessory muscle activity disappearance, instead of effort change. Furthermore, it is described that, after the initial adjustment, the NIV setting was kept the same in the two groups. It was demonstrated previously (3,4) that if helmet and mask are used with the same pressure settings, the former induces a greater inspiratory muscle effort and significantly worse patient–ventilator asynchrony, which could lead to worse arterial blood gases outcomes. On the contrary, helmet-specific NIV settings were shown to improve inspiratory muscle unloading and asynchronies to the level obtained with the facemask (3).

Therefore, the higher initial partial carbon dioxide pressure (pCO_2) values in the helmet group are probably attributable more to a less efficient reduction of the inspiratory effort, due to a partial dissipation of the inspiratory pressure by the intrinsic elastic characteristics of the helmet, rather than to CO_2 rebreathing (5). This event appears particularly remarkable in the first hours of acute exacerbation of COPD, when the ventilatory demand is increased (6).

In our opinion it is not clearly expressed how the trend of respiratory rate (RR) and pCO_2 changed throughout the study period. Since neither data nor graphics concerning RR are reported, it is not evident if there were significant differences between the groups throughout the study period. Also, concerning the pCO_2 values, it is reported that "There was no difference between groups in terms of pCO_2 level among the whole study period" but, at the same time, that pCO_2 at 60 min of NIV was statistically different from the baseline in one group and not in the other.

The third point deals with the criteria to discontinue NIV. No criteria are supplied. Furthermore, pH at the discontinuation of NIV was rather low (according to Figure 3). Therefore, how can we interpret the affirmation "The NIMV success rate was quite high" in both groups? Are the authors only referring to a reduction in hospital mortality or length of ICU stay?

References

1. Çakır Gürbüz Ö, Alagöz A, Ulus F, Tunç M, Şahin Ş. Comparison of helmet and facial mask during noninvasive ventilation in patients with acute exacerbation of chronic obstructive pulmonary disease: a randomized controlled study. Turk J Med Sci 2015; 45: 600–606.

2. Navalesi P, Fanfulla F, Frigerio P, Gregoretti C, Nava S. Physiologic evaluation of noninvasive mechanical ventilation delivered with three types of masks in patients with chronic hypercapnic respiratory failure. Crit Care Med 2000; 28: 1785–1790.

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3. Vargas F, Thille A, Lyazidi A, Campo FR, Brochard L. Helmet with specific settings versus facemask for noninvasive ventilation. Crit Care Med 2009; 37: 2111–2113.

4. Antonaglia V, Ferluga M, Molino R, Lucangelo U, Peratoner A, Roman-Pognuz E, De Simoni L, Zin WA. Comparison of noninvasive ventilation by sequential use of mask and helmet versus mask in acute exacerbation of chronic obstructive pulmonary disease: a preliminary study. Respiration 2011; 82: 148–154.

5. Antonelli M, Pennisi MA, Pelosi P, Gregoretti C, Squadrone V, Rocco M, Cecchini L, Chiumello D, Severgnini P, Proietti R et al. Non-invasive positive pressure ventilation using a helmet in patients with acute exacerbation of chronic obstructive pulmonary disease: a feasibility study. Anesthesiology 2004; 100: 16–24.

6. Krieger BP. Hyperinflation and intrinsic positive end-expiratory pressure: less room to breathe. Respiration 2009; 77: 344–350.

Reply to Letter to the Editor

"Clarifying aspects of noninvasive mechanical ventilation in acute exacerbations of chronic obstructive pulmonary disease" by Schreiber and Esquinas

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To the Editor:

We want to thank to Schreiber and Esquinas for their interest and careful analysis of our recent study comparing the helmet and facial mask during noninvasive ventilation (NIV) in patients with acute exacerbation of chronic obstructive pulmonary disease (COPD) (1). NIV is an option for the treatment of COPD exacerbation. NIV via nasal-facial mask or helmet is a choice of therapy for the treatment of acute COPD exacerbation (2).

Regarding severity of the airway obstruction and patients' characteristics, we evaluated the acute obstruction level and treatment plan according to the Global Initiative for Chronic Obstructive Lung Disease criteria (3). In patients with severe acute respiratory failure (pH < 7.25), the rate of NIV failure was inversely related to the severity of respiratory acidosis. This indicates that severe acidosis resulting from acute exacerbation is a relevant predictor for treatment failure of NIV (4). In the present study, overall pH values were higher than 7.25 in both groups. Although we evaluated the baseline characteristics of the patients during admission to the intensive care unit, it would be better to specify these data in the text as Schreiber and Esquinas stated.

Regarding adequacy of inspiratory effort for the ventilatory setting, respiratory rate and accessory muscles activity were used in evaluating the inspiratory effort during NIV (2,5). In this study we followed the diminishing of respiratory rate and accessory muscle activity by observing adequate patient respiratory effort. Even if evaluation of respiratory rate and accessory muscle activity were performed, we agree with Schreiber and Esquinas about clearly using these parameters in our text. We meant that the pCO_2 level was not different when we compared the groups, but in the face-mask group the pCO_2 level was significantly decreased according to baseline values.

Antonelli et al. (2) performed a study in which they used pressure support at 15–20 cmH_2O in acute exacerbation of COPD patients. We applied a similar pressure support level to achieve reduced respiratory rate and accessory muscle activity in the first hour, and we achieved the desired target effect in terms of reducing inspiratory effort in both groups.

Regarding discontinuation of NIV, it was continued until patients were discharged from the intensive care unit, even if the study was terminated 48 h after it began. The pH level was low at the 48th hour of study, but it was higher in both groups according to baseline values. Success of the NIV was evaluated by using pH, pCO_2, and PO_2 levels; clinical findings and observations; and requirements for invasive mechanical ventilation.

Thanks again to Schreiber and Esquinas for their valuable comments and contributions to our study.

References

1. Çakır Gürbüz Ö, Alagöz A, Ulus F, Tunç M, Şahin Ş. Comparison of helmet and facial mask during noninvasive ventilation in patients with acute exacerbation of chronic obstructive pulmonary disease: a randomized controlled study. Turk J Med Sci 2015; 45: 600–606.

2. Antonelli M, Pennisi MA, Pelosi P, Gregoretti C, Squadrone V, Rocco M, Cecchini L, Chiumello D, Severgnini P, Proietti R et al. Noninvasive positive pressure ventilation using a helmet in patients with acute exacerbation of chronic obstructive pulmonary disease: a feasibility study. Anesthesiology 2004; 100: 16–24.

3. GOLD. NHLBI/WHO Global Initiative for Chronic Obstructive Lung Disease (GOLD) Workshop Report. Global Strategy for the Diagnosis, Management and Prevention of Chronic Obstructive Pulmonary Disease. Washington, DC, USA: GOLD; 2009.

4. Plant PK, Owen JL, Elliott MW. Non-invasive ventilation in acute exacerbations of chronic obstructive pulmonary disease: long term survival and predictors of in-hospital outcome. Thorax 2001; 56: 708–712.

5. Tunç M, Öztürk G, Pehlivanoğlu P, Kokulu S, Şipit T, Şavkılıoğlu E. Noninvasive positive pressure ventilation by the helmet in respiratory failure due to acute exacerbation of chronic obstructive pulmonary disease. J Turk Anaesth Int Care 2011; 39: 326–333.

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