

Oxygenation response to positive end - expiratory pressure in patients with Helmet CPAP: a prospective observational study

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Argomento: Insufficienza respiratoria acuta e ventilazione meccanica

Background

Continuous Positive Airway Pressure (CPAP) with helmet provides a known and constant inspiratory fraction of oxygen and a constant positive end expiratory pressure (PEEP). The objective of this study is to evaluate among patients with helmet CPAP, how many of them benefit in terms of oxygenation when PEEP is applied.

Materials and Methods

We conducted a prospective observational single-center study enrolling patients admitted to the ICU with clinical indication for treatment with helmet CPAP. Patients were evaluated at three different time points: before the application of the helmet (PRE); after the application of the helmet without PEEP (ZEEP); after the application of PEEP (PEEP). Blood gas data and vital parameters were recorded at each step. We defined a patient "PEEP responder" when, after the application of PEEP, we observed an improvement in the ratio of arterial oxygen tension to inspiratory oxygen fraction (pO_2/FiO_2) of more than 10%, compared with the baseline value.

Results

To date, 15 patients have been enrolled. Helmet CPAP was used in 13 patients after extubation, while in 2 cases it was used in the acute non-intubated patient. Before helmet CPAP oxygen was delivered predominantly by Venturi mask (n.11, 73%), whereas 4 patients were treated with high-flow nasal cannula. The most frequent diagnosis among enrolled patients was COVID-19 pneumonia (n.11, 73%).

The pO_2/fiO_2 ratio improved during helmet CPAP and the difference compared to "PRE" was significant at the "PEEP" step ($p=0,01$). The percentage of "PEEP responders" was 37%.

Conclusions

In a population mainly characterized by patients with COVID-19 pneumonia in the post-extubation setting, oxygenation was significantly improved with helmet CPAP. A relatively low percentage (37%) of "PEEP responders" was recorded. The improvement in oxygenation secondary to helmet

application might also be due to the increase of the effective oxygen fraction inspired from the patient

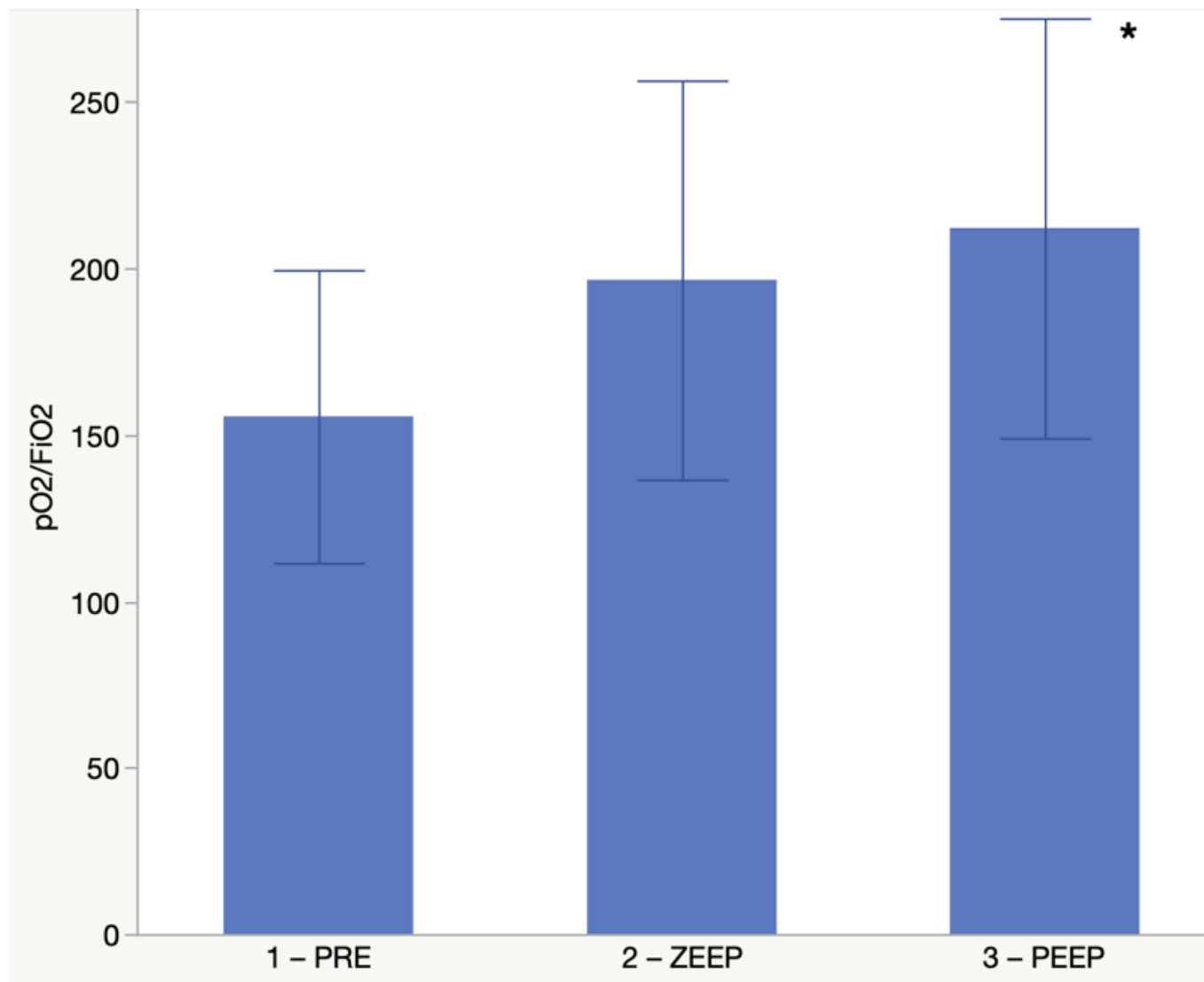


Figure 1. Variation of pO₂/F_iO₂ ratio in different steps. *p<0.05 vs step 1- PRE.