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## Letter to the Editor: "Feasibility of non- invasive respiratory drive and breathing pattern evaluation using CPAP in COVID-19 patients"

Dear editor,

We read with interest the innovative study by Dargent *et al* [1]. Their analysis of the feasibility of non-invasive quantification of respiratory drive by measuring airway occlusion pressure at 0.1 s (P0.1) and of breathing pattern during either continuous positive airway pressure (CPAP) or high-flow nasal cannula (HFNC) by assessing diaphragmatic excursion and thickening in coronavirus disease 2019 (COVID-19) patients shows promise in the diagnosis as well as management of patients suffering from acute hypoxemic respiratory failure (AHRF). Some minutiae perhaps warrant further discussion to optimally interpret the outcomes described.

The correlation between the value of positive end expiratory pressure (PEEP) applied with HFNC, and its equivalence with a specific level of CPAP is not completely clear. Similarly, the effect of the flow applied with HFNC and the "real" value of achieved PEEP are difficult to equate precisely [2]. We know from the previous studies that the degree of equivalence of achieved PEEP, if we compare between HFNC and CPAP, are incomparable [3]. The stability and comparison of the generated positive pressure, and reliability of the measured P0.1 are also nebulous, or at least incomplete to some extent during use of HFNC [2].

Also, the measurement of the diaphragmatic muscle strength is another aspect that could explain why the ultrasound-guided diaphragmatic evaluation could not fully identify this. This necessitates further evaluation [4].

Another important consideration is that many patients with COVID-19 during the initial phase of AHRF present with hyperventilation and that induced hypocapnia. The mechanism underpinning this is quite complex. In this cohort, the patients who were treated with HFNC presented with a partial pressure of arterial carbon dioxide value of 34 [32–36] mmHg, tending towards hypocapnia range. It remains unknown how this can impact upon the measurement of P.01. This, however, is known to be affected by the use of CPAP or HFNC, which have been already described [5].

While we applaud this innovative effort by the authors to predict the earlier failures of CPAP or HFNC using non-invasive measures, nonetheless, we feel that further well-powered clinical trials are possibly needed to evaluate the potential role of P.01 in evaluating the respiratory drive in this setting.

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- Dr. Brian O'Brien: Was involved in analysis of the article, writing, and editing the letter.
- Dr. Mohanchandra Mandal: Was involved in analysis of the article, writing, and editing the letter.

### Conflict of interest

The authors report no conflicts of interest.

### References

- [1] Dargent A, Hombreux A, Rocca H, Argaud L, Cour M, Guérin C. Feasibility of non-invasive respiratory drive and breathing pattern evaluation using CPAP in COVID-19 patients. *J Crit Care*. 2022 Mar 17;69:154020. <https://doi.org/10.1016/j.jcrr.2022.154020>. Epub ahead of print. PMID: 35306443; PMCID: PMC8929539.
- [2] Guia M, Alpay N, Gerardo A, Madney Y, Abdelrahim M, Saeed H, et al. High-flow nasal oxygen therapy in acute hypoxemic respiratory failure: concise review on technology and initial methodology. *Turk Thorax J*. 2021;22(6):494–500.
- [3] Tverring J, Åkesson A, Nielsen N. Helmet continuous positive airway pressure versus high-flow nasal cannula in COVID-19: a pragmatic randomised clinical trial (COVID HELMET). *Trials*. 2020;21(1):994.
- [4] Perrone A, Quacquarelli ME, Barbarossa A, Cargoni A, Magliocco C, Masciangelo V, et al. Possibili effetti della ventilazione meccanica non invasiva su drive e muscolatura respiratoria [Possible effects of non invasive mechanical ventilation on respiratory drive and muscles]. *Clin Ter*. 2007;158(1):11–6. Italian.
- [5] Morais CCA, Koyama Y, Yoshida T, Plens GM, Gomes S, Lima CAS, et al. High positive end-expiratory pressure renders spontaneous effort noninjurious. *Am J Respir Crit Care Med*. 2018;197(10):1285–96.

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