# Swallowing dysfunction in patients hospitalised due to a COPD exacerbation: correspondence



Received: 18 Aug 2021
Accepted: 21 Aug 2021

*To the Editor:*

We read with interest the study performed by Gonzalez Lindh *et al.* [1]. In this cross-sectional study, they reported that COPD patients, hospitalised with an acute exacerbation episode, exhibited significant self-reported and clinically screened swallowing dysfunction. These data are interesting, as they confirm previous physiopathological studies, which could also be of interest to the readers of *ERJ Open Research*. They aimed to understand the underlying mechanisms that may predispose COPD patients to pneumonia aspiration and exacerbation of COPD [2, 3], and to propose possible solutions to improve vulnerability to aspiration [4]. However, evidence is already available in the literature on these topics.

As previously demonstrated, the most prevalent pattern reported is exhale-swallow-exhale, and the second most common pattern is inhale-swallow-exhale [5, 6]. Both these patterns ensure a positive subglottic pressure during the swallow. The importance of a positive subglottic pressure during swallowing was first demonstrated in tracheostomy patients. Depending on the status of the tube (open or closed), air pressure below the true vocal folds can be greatly modified: aspiration was reduced or eliminated in subjects with indwelling tracheostomy tubes when the tube was closed. Swallowing physiology, frequency of aspiration, and symptoms of dysphagia are related to tube status [7, 8]. This is consistent with previous studies which observed a significantly longer duration of pharyngeal activity duration of deglutition for swallows produced at low lung volume (and subsequently low subglottic pressure) compared with swallows that occurred at higher lung volumes. These results allowed the conception of "subglottic pressure theory" suggesting that pressurised air during the swallow may play a role in the neuroregulation of swallowing function by stimulating subglottic mechanoreceptors [3, 9].

The pattern of exhalation after swallowing is also believed to protect the airway by preventing the inhalation of residual material left in the pharynx after swallowing [3, 10].

Disruptions in these patterns can be induced experimentally by increasing either respiratory-muscle elastic loading [10] or respiratory-centre carbon dioxide loading and occur clinically in patients with neuromuscular disease [7] or COPD patients [2], and may further increase the aspiration risk and eating difficulties, thereby inducing a vicious circle. In the present study [1], swallowing performance was evaluated through a timed water swallow test and a cookie swallow while the patient was sitting upright and associated with subjective dysphagia symptoms evaluated through a questionnaire. Therefore, the authors cannot detect micro-aspiration.

On the subject of the possible correction of these anomalies, we have recently performed an open-label interventional study in COPD patients admitted to the intensive care unit for an acute exacerbation of their disease requiring noninvasive ventilation (NIV) [4]. This physiological study showed that: 1) swallowing during NIV is feasible in COPD patients experiencing acute exacerbations of this disease, 2) swallowing efficiency and the breathing–swallowing pattern improve with NIV compared with spontaneous breathing, and 3) dyspnoea decreases during swallowing when using NIV. The COPD patients included in this study exhibited piecemeal deglutition with an increase in the time needed to swallow a water bolus, as well as the occurrence of inspiration after each swallow. NIV improved breathing–swallowing coordination and reduced dyspnoea. Moreover, when the ventilator device was equipped with a simple off-switch

Shareable abstract (@ERSpublications)
**This correspondence deals with physiopathological studies that aimed to understand the underlying mechanisms of breathing–swallowing interaction** https://bit.ly/3BKAwx3

**Cite this article as:** Terzi N, Prigent H, Lofaso F. Swallowing dysfunction in patients hospitalised due to a COPD exacerbation: correspondence. *ERJ Open Res* 2021; 7: 00490-2021 [DOI: 10.1183/23120541.00490-2021].

pushbutton, the patients routinely used this off-switch to stop the ventilator insufflations during swallows and to re-start the ventilator immediately after clearing the pharynx. Similar results were observed in neuromuscular patients [8].

Nicolas Terzi[1], Hélène Prigent[2] and Frédéric Lofaso[3]

[1]Univ. Grenoble Alpes, Inserm, U1042, CHU Grenoble Alpes, Medical Intensive Care Unit, Grenoble, France. [2]Service d'Explorations Fonctionnelles, Hôpital Raymond Poincaré, Garches, France. [3]INSERM Université de Versailles Saint Quentin en Yvelines, Versailles, France.

Corresponding author: Nicolas Terzi (nterzi@chu-grenoble.fr)

Provenance: Submitted article, peer reviewed.

Conflict of interest: N. Terzi reports personal fees from Pfizer outside the submitted work. H. Prigent has nothing to disclose. F. Lofaso has nothing to disclose.

## References

1 Gonzalez Lindh M, Janson C, Blom Johansson M, *et al.* Swallowing dysfunction in patients hospitalised due to a COPD exacerbation. *ERJ Open Res* 2021; 7: 00173-2021.
2 Cvejic L, Harding R, Churchward T, *et al.* Laryngeal penetration and aspiration in individuals with stable COPD. *Respirology* 2011; 16: 269–275.
3 Gross RD, Atwood CW, Ross SB, *et al.* The coordination of breathing and swallowing in chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 2009; 179: 559–565.
4 Terzi N, Normand H, Dumanowski E, *et al.* Noninvasive ventilation and breathing-swallowing interplay in chronic obstructive pulmonary disease. *Crit Care Med* 2014; 42: 565–573.
5 Martin BJ, Logemann JA, Shaker R, *et al.* Coordination between respiration and swallowing: respiratory phase relationships and temporal integration. *J Appl Physiol (1985)* 1994; 76: 714–723.
6 Perlman AL, Ettema SL, Barkmeier J. Respiratory and acoustic signals associated with bolus passage during swallowing. *Dysphagia* 2000; 15: 89–94.
7 Terzi N, Orlikowski D, Aegerter P, *et al.* Breathing-swallowing interaction in neuromuscular patients: a physiological evaluation. *Am J Respir Crit Care Med* 2007; 175: 269–276.
8 Garguilo M, Lejaille M, Vaugier I, *et al.* Noninvasive mechanical ventilation improves breathing-swallowing interaction of ventilator dependent neuromuscular patients: a prospective crossover study. *PLoS One* 2016; 11: e0148673.
9 Gross RD, Carrau RL, Slivka WA, *et al.* Deglutitive subglottic air pressure and respiratory system recoil. *Dysphagia* 2012; 27: 452–459.
10 Kijima M, Isono S, Nishino T. Coordination of swallowing and phases of respiration during added respiratory loads in awake subjects. *Am J Respir Crit Care Med* 1999; 159: 1898–1902.