From the authors:

We thank P.S. Santos and co-workers for their interest in our study [1], and appreciate the opportunity given to us to further discuss our data.

First, we fully agree that fibre-optic bronchoscopy with bronchoalveolar lavage (FB-BAL) carries the risk of worsening hypoxaemia. This is precisely why we thought to investigate the potential for high-flow nasal cannula (HFNC) oxygen in this specific context. Its mechanisms of action have been discussed [2]: the high flow rates generate a mild positive expiratory pressure, with a high inspiratory oxygen fraction (F\text{\textsubscript{iO}}\text{\textsubscript{2}}).

In hypoxaemic respiratory failure, its use improved intensive care unit (ICU) and day 90 survival rate in comparison to low-flow oxygen therapy or combined with noninvasive ventilation (NIV) [3]. We therefore considered HFNC as an interesting tool to ensure procedure safety.

Second, P.S. Santos and co-workers underline the severity of the subjects included in our study in terms of hypoxaemia, with a median arterial oxygen tension (PaO\text{\textsubscript{2}}) of 68 (57–90) mmHg in the failure group. However, these were baseline values. When the procedure was actually performed, all patients had a pulse oximetry of >92% under HFNC, in line with published guidelines [4]. In addition, it is our experience to use HFNC in very hypoxaemic patients, such as those with acute respiratory distress syndrome patients [5] in whom median PaO\text{\textsubscript{2}}/FiO\text{\textsubscript{2}} was of 137 (88.5–208.5) mmHg. Furthermore, these levels of hypoxaemia, when related to the administered FiO\text{\textsubscript{2}}, compare fairly to the PaO\text{\textsubscript{2}}/FiO\text{\textsubscript{2}} ratios reported by MAITRE et al. [6] and CRACCO et al. [7] in ICU hypoxaemic patients requiring FB-BAL. Finally, although baseline PaO\text{\textsubscript{2}} and PaO\text{\textsubscript{2}}/FiO\text{\textsubscript{2}} were lower in the procedure failure group, this difference did not reach significance. The question that remains unanswered is whether or not NIV performs better than HFNC in the most severe patients. Although our results do not answer this question, they provide interesting data in feasibility of FB-BAL under HFNC. The study by SIMON et al. [8] does not fully answer the question for two reasons: there was no difference in intubation rate between NIV; and high-flow patients and high-flow may have been disadvantaged for reasons detailed in our study.

Identification of high-risk patients is a difficult task and, although it would be intuitively appealing to consider that the profounder the hypoxaemia, the greater the risk of oxygenation deterioration during BAL, this has not been confirmed. CRACCO et al. [7] found that only chronic obstructive pulmonary disease or immunosuppression were significantly associated with the need for intubation in the multivariable analysis of their study of 169 fibre-optic bronchoscopy in critically ill patients whereas none of the baseline physiological parameters, including the PaO\text{\textsubscript{2}}/FiO\text{\textsubscript{2}} ratio, was associated with intubation [7]. During long-term use of high flow, reasons for HFNC failure in hypoxaemic acute respiratory failure have been recently discussed [9] and some may be applicable to FB-BAL.

Obviously, had we already made a diagnosis, we wouldn’t have performed BAL in the first place.

We are convinced that HFNC offers a major advantage of simplicity, tolerance and possibility of use in the ICU for the most severe patients, and outside the ICU. Several studies are currently ongoing, for patients undergoing bronchoscopy (e.g. NCT02606188, NCT02253706, NCT01650974) and are detailed in table 1. We look forward to having the results of these studies.

References


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HFNC: high-flow nasal cannula $SpO_2$; pulse oxygen saturation; $FiO_2$: inspiratory oxygen fraction; $PaO_2$: arterial oxygen tension.