



ABSTRACT TITLE

Estimation of intrinsic PEEP from plethysmographic alveolar pressure tracing in COPD patients

KEYWORDS

COPD, Intrinsic PEEP, Plethysmography, Expiratory flow limitation

INTRODUCTION

Patients affected by chronic obstructive pulmonary disease (COPD) often exhibit intrinsic positive end-expiratory pressure (PEEPi) and dynamic hyperinflation. These phenomena, that are often secondary to tidal expiratory flow limitation (TEFL), cause a significant increase in the work of breathing and adverse hemodynamic effects. In spontaneously breathing patients, the only currently available method to estimate PEEPi is the esophageal balloon technique but, due to its invasiveness, this is not routinely performed in clinical practice.

OBJECTIVES

The present study aims at developing a new non-invasive method for PEEPi assessment in stable spontaneously breathing COPD patients, using a commercially available plethysmograph.

METHODS

To this purpose, 42 healthy young and elderly subjects and 60 COPD patients were recruited. All performed spirometric and plethysmographic tests, and TEFL assessment with the negative expiratory pressure technique. PEEPi was assessed at the end of a spontaneous tidal expiration with a purposefully designed algorithm, based on the specific characteristics of the alveolar pressure tracing obtained from the plethysmograph. To check whether the algorithm could detect PEEPi variations after bronchodilation (BD), COPD patients repeated the tests after salbutamol administration. Values are expressed as median (interquartile range).

RESULTS

PEEPi was not detected in controls except for one elderly subject. Before BD, PEEPi was present in most flow-limited (34/35) and in some non flow-limited subjects (11/25). Among patients with PEEPi, it was higher in flow-limited than in non flow-limited patients (3.8 (1.8) versus 2.0 (1.4) cmH₂O, P=0.007, respectively). BD caused a significant decrease in patients who experienced PEEPi in both groups (Δ =-1.1 (2.0) cmH₂O, P<0.001 in flow-limited and Δ =-0.9 (2.0) cmH₂O, P=0.033 in non flow-limited). Similarly to studies using the esophageal technique, PEEPi correlated with FEV₁ %p (RS -0.665, P<0.001), and with RV %p (RS 0.556, P<0.001); however, the PEEPi decrease after BD, despite significant in both groups, was lower than previously reported.

DISCUSSION AND CONCLUSIONS

Even if further investigations are needed to validate the present method, results show that a commercially available plethysmograph could provide a non-invasive PEEPi assessment in spontaneously breathing COPD patients. Including PEEPi evaluation in a multivariable assessment strategy could allow a better phenotypization and, possibly, a tailored management of COPD patients.

