

The effect of Simeox Airway Clearance Technology on resting hyperinflation in Cystic Fibrosis patients

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INTRODUCTION

Bronchial drainage is a key component of chest physiotherapy performed in patients with cystic fibrosis (CF) to prevent recurrent pulmonary exacerbations and lung function decline. Evaluation of new airway clearance techniques (ACTs) is required to understand their physiological effects on respiratory function.

Inspiratory Capacity (IC) reduction is a suitable indicator of static hyperinflation and trapped air, and may reveal sub-clinical worsening of lung function in CF (ref: Vilozni et al, The Value of Measuring Inspiratory Capacity in Subjects With Cystic Fibrosis, Respir Care 2018;63(8):981–987).

AIM

Aim of this study was to assess the effects of Simeox technology on resting IC in clinically stable CF patients during one bronchial drainage session.

METHODS

Adult CF patients receiving prophylactic chest physiotherapy with Simeox device (Physio-Assist, France) assisted by respiratory physiotherapists were included consecutively in 2 centers. Patients performed under physiotherapist supervision 3 valid measurements (mean coefficient of variation <5%) of resting IC with a computerized stand-alone spirometer (Spirolab, MIR) before and 15-30 min after one single 20-min drainage session with Simeox. Change in IC was analyzed for each patient.

Data were compared using non-parametric paired or unpaired test (Man-Whitney-Wilcoxon or Wilcoxon signed rank test). All analyses will be performed using XLSTAT 2019.4.2 (Addinsoft) software for Mac. A p-value <0.05 will be considered statistically significant.

RESULTS

21 CF patients with stable condition were included consecutively: 10 males (26.7±6.3y) and 11 females (26.9±8.1y). After device session, change in mean IC was increased by 110±140 ml and 4±5% pred. (fig 1, p<0.005). 11 patients (52%) had an increase of IC% pred ≥ 5% (fig 2: 220±90 ml; 9±4%, p<0.005). Evolution of IC was similar according to gender, age or center.

The change in IC was higher in patients with lower IC (fig 3: negative correlation between relative % change in IC and baseline IC% pred., p<0.05).

CONCLUSION

Inspiratory capacity at rest was improved in CF patients with low baseline IC after one single drainage session with Simeox technology suggesting a direct effect on static lung hyperinflation reduction. This physiological mechanism may have significant impact on the evolution of lung function in CF, and should be confirmed with long-term data.

Fig 1: Evolution of resting IC after Simeox therapy in global CF cohort

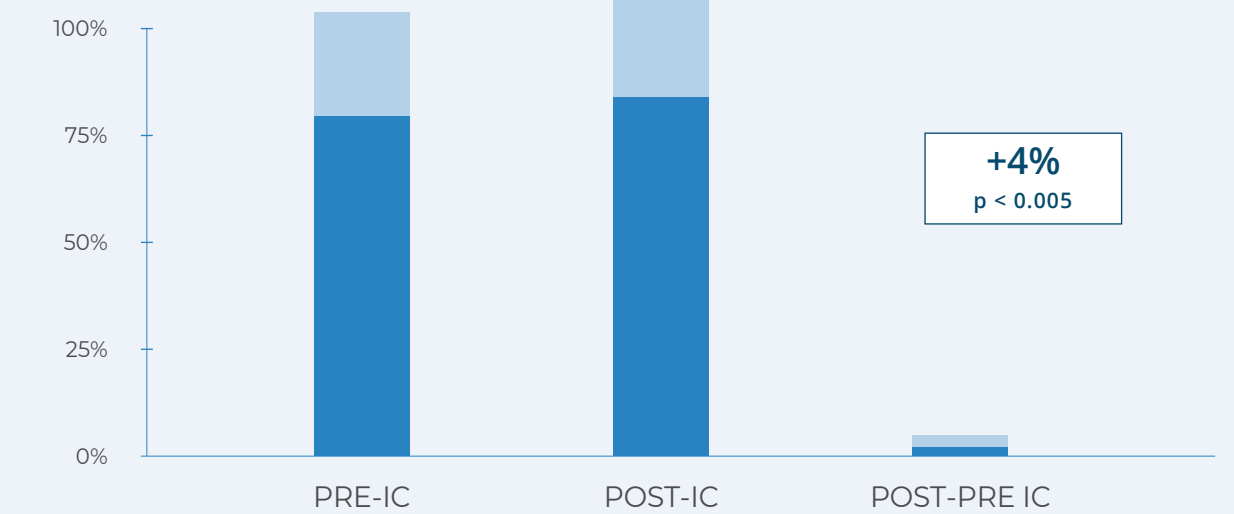


Fig 2: Evolution of resting IC after Simeox therapy in responder CF patients

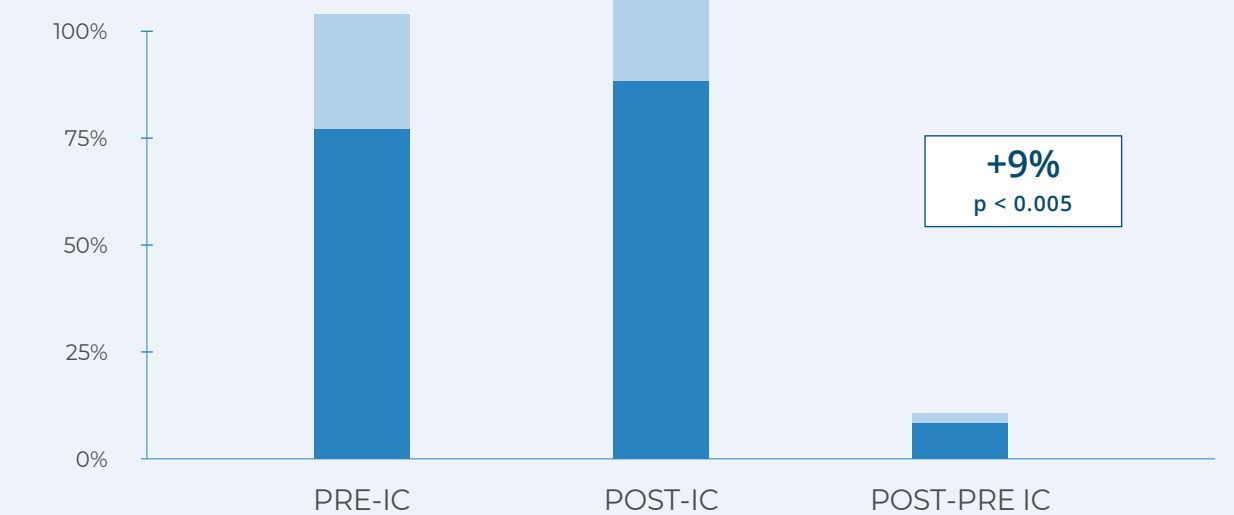


Fig 3: Evolution of IC after Simeox therapy

