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Feasibility and benefits of an innovative airway clearance device in COPD patients hospitalized for acute exacerbation

Ivan Solovic[1,2] Alena Bodnarova[1] Laurent Morin[3]

INTRODUCTION

Airway clearance devices (ACDs) may improve symptoms and lung function in Chronic Obstructive Pulmonary Disease (COPD) with mucus hyperproduction or bronchiectasis but innovation needs to be evaluated.

AIM

Aim of study was to assess feasibility and effects of a new ACD in hospitalized COPD patients suffering from chest congestion despite optimal medical treatment.

METHODS

32 patients with AECOPD and symptoms of excessive mucus congestion were treated during 6 days with medical treatment, pulmonary rehabilitation and airway clearance with either manual chest physiotherapy (control; n=13) or new ACD (Simeox, Physio-Assist; n=19) that facilitates bronchial drainage by generating pulses of negative air pressure during relaxed exhalations. Usability, spirometry, CAT score, safety and tolerance were evaluated.

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

Baseline: age 67.3±6.7, 69% male, GOLD II/III/IV: 19%/31%/50%, GOLD B/C/D: 3%/19%/78%, 31% bronchiectasis (BE), 66% had ICS/LABA/LAMA, CAT score 29.0±3.3. Control and device group have similar baseline data, except more ICS therapy in control (Table 1, 92% vs 58%).

Patient training required 15 min during the first session. No adverse event nor pain was reported.

FEV1 increased by 19±10% and 14±5% in device and control group (NS), respectively. However, improvement of CAT score was higher in device group (Fig 1a and b: -34±9% vs control: -24±4%; p<0.001).

In very severe COPD (GOLD 4D), FEV1 (Fig 2a: +24±10% vs control: +15±5%, p<0.05) and CAT Score (Fig 2b: -33±9% vs control: -24±4%; p<0.05) were improved significantly with device therapy.

COPD with bronchiectasis seemed to benefit the most from device therapy (Fig 3a and b: FEV1: +28±6%, CAT -38+9%).

CONCLUSION

These results confirmed the feasibility of this new technology to manage mucus problems in COPD and suggested that it may contribute to improve respiratory symptoms and quality of life in the most severe patients.

[1] National Institute for TB, Lung Diseases and Thoracic Surgery, Vysne Hagy ; [2] Catholic University Ruzomberok, Slovakia ; [3] Physio-Assist, Aix-en-Provence, France

	N	Gender (F)	Age, y	GOLD stage			GOLD ABCD			FEV1 (l)	mMRC	CAT score	Medication			Comorbidity	
				II	III	IV	B	C	D				LABA+ LAMA	LABA +ICS	LABA +LAMA+ICS	Asthma	Bronchiectasis
Control	13	4	68.2±5.8	1	4	8	1	0	12	1.27±0.33	2.4±0.5	30.3±2.6	1	2	10	12	2
Simeox	19	6	66.6±7.3	5	6	8	0	6	13	1.30±0.39	2.7±0.7	28.2±3.6	8	0	11	11	7
P value		NS	NS		NS			0.04		NS	NS	NS		0.04		0.05	NS

Fig 1a: CAT evolution (global cohort)

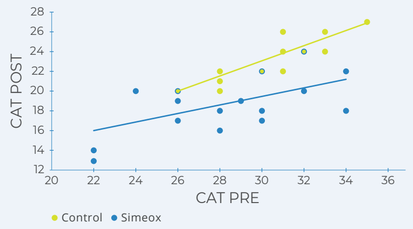

Fig 1b: CAT evolution (global cohort)

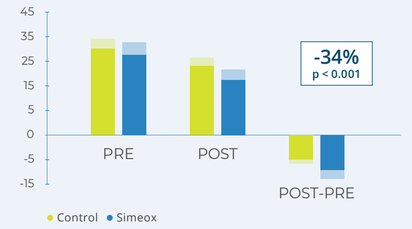

Fig 2a: FEV1 evolution in GOLD 4D subgroup (very severe COPD)

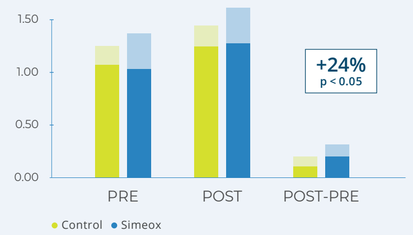

Fig 2b: CAT evolution in GOLD 4D subgroup (very severe COPD)

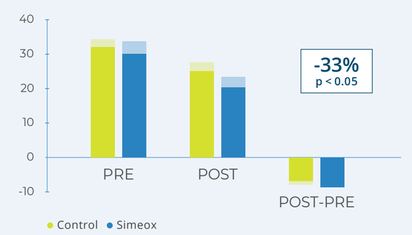

Fig 3a: FEV1 evolution in severe COPD+BE (Simeox group)

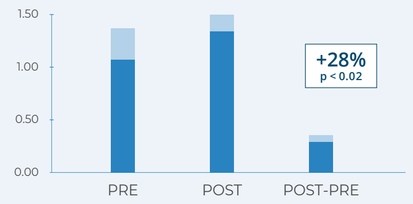

Fig 3b: CAT evolution in severe COPD+BE (Simeox group)