LATE-BREAKING ABSTRACT, ERS 2018, PARIS

# Effects of a new Airway Clearance Technology versus manual physiotherapy in COPD

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## Introduction

Chronic obstructive pulmonary disease (COPD) is an umbrella term used to describe progressive lung diseases including emphysema and chronic bronchitis. COPD patients often experience dyspnea, cough, sputum and chest tightness which may worsen during acute exacerbation of COPD (AECOPD).

Airway clearance techniques (ACTs) are safe and enhance mucus clearance in COPD (Holland et al Chronic Respiratory Disease 2006, Osadnik et al Cochrane Database of Systematic Reviews 2012). Performing ACTs reduce during an AECOPD the likelihood of needing mechanical ventilation, as well as the length of time for which it was required. There are a few evidences to suggest some benefits of ACTs on pulmonary exacerbation and health-related quality of life (Mascardi et al J Thorac Dis 2016, Nicolini et al Clinical Resp J 2017).

## Aim

Study objective was to evaluate the effects of a new ACT technology (Simeox, Physio-Assist, France) in hospitalized COPD patients suffering of chest congestion compared to manual physiotherapy.

## Methods

10 COPD patients (FEV1>20%) with AECOPD who reported excessive mucus congestion and difficulties to clear airways despite bronchodilator therapy were treated 5 days (2 sessions of 20-min/day) during hospitalization with either Simeox technology or manual physiotherapy (5 patients in each group).

Simeox device generates a vibratory pneumatic signal in the bronchial tree during relaxed exhalation by disseminating a succession of very short air depressions of constant volume at a frequency similar to that of the vibratory cilia of the bronchial epithelium.

By this way, the signal mobilizes mucus in the distal tracts to change its rheology and transport it to the proximal tract for expectoration. Patients were excluded if they had recent pneumothorax, severe cardiac health issues, recent haemoptysis or inability to perform spirometry.

Spirometry, symptoms, CAT score, usability and safety were compared between the 2 groups.

## Results

Age 65±8ys, 7 men and 3 women, 7 with bronchiectasis and 8 had lung crackles, BMI 27.1±6.1kg/m2, Borg scale 4.5±1.8, SpO2 96.3±1.7%, FEV1% 42±19.

Baseline characteristics

| Variables | Global Group values (N=10) | SIMEOX group values (N=5) | Manual physiotherapy group values (N=5) |
|---|---|---|---|
| Age (years) mean ± SD | 65±8 | 65.8±7.3 | 64.2±9.4 |
| Male (N / %) | 7 (70%) | 4 (80%) | 3 (60%) |
| Body mass index (kg/m²) mean ± SD | 27.1±6.1 | 28.1±6.1 | 26.1±6.6 |
| CAT score mean ± SD | 21.6±5.9 | 20.2±6.4 | 17.2±5.4 |
| Dyspnea (BORG scale) mean ± SD | 4.5±1.8 | 3±0.7 | 6±1.2 |

All the patients of device group acquired quickly autonomous usage.
No adverse event nor pain was reported.

Improvement of mucus clearance and symptoms were similar between groups.

FEV1(L) improved by +0.15±0.10L (FEV1% +5±2%)

FEV1/FVC increased from 52.5±2.4% to 58.0±12.8% in the device (Simeox) group but remained stable in the manual physiotherapy group.

CAT score improved in the device (Simeox) group only from 20.2±6.4 to 17.0±4.6

Clinical characteristics

| Variables | SIMEOX group values (N=5) | | Manual Physiotherapy group values (N=5) | |
|---|---|---|---|---|
| | Baseline | EOS** | Baseline | EOS* |
| CAT score Mean ± SD | 20.2±6.4 | 17.0±4.6 | 17.2±5.4 | 18.6±4.0 |
| Drainage improvement (N, %) | 5 (100%) | | 4 (80%) | |
| Dyspnea improvement (N, %) | 4 (80%) | | 4 (80%) | |
| Fatigue improvement (N, %) | 4 (80%) | | 4 (80%) | |
| Autonomy in execution | 5 (100%) | | 4 (80%) | |

* End of Study (EOS) : 2 sessions of 20 minutes per day, for 5 days
** End of Study (EOS) : 2 sessions of 20 minutes per day, intensity 50-75%, for 5 days

PFTs characteristics

| Variables | Groupe values (N=10) | SIMEOX group values (N=5) | | Manual Physiotherapy group values (N=5) | |
|---|---|---|---|---|---|
| | | Baseline | EOS** | Baseline | EOS* |
| FVC (L) | 1.97±0.89 | 2.01±0.82 | 2.19±0.77 | 1.93±1.05 | 1.99±0.90 |
| FVC (%) | 55.7±17.5 | 55.5±18.4 | 60.6±15.9 | 55.9±18.7 | 60.2±18.0 |
| FEV1 (L) | 1.14±0.59 | 1.12±0.44 | 1.27±0.54 | 1.16±0.77 | 1.12±0.66 |
| FEV1 (%) | 42.2±19.0 | 39.5±13.5 | 44.6±15.8 | 45.0±24.8 | 44.8±24.9 |
| FEV1/FVC% | 53.2±7.5 | 52.5±2.4 | 58.0±12.1 | 55.4±10.7 | 51.7±14.1 |

All parameters ▲ ▲in FVC; ▼in FEV1, FEV1/FVC%
FEV1 ▲ with 150±100ml and 5.2±2.3% FEV1 ▼with 40±110ml and 0.02±0.08%

* End of Study (EOS) : 2 sessions of 20 minutes per day, for 5 days
** End of Study (EOS) : 2 sessions of 20 minutes per day, intensity 50-75%, for 5 days

## Conclusions

These preliminary data suggest safety and additional benefits of Simeox airway clearance technology for COPD with severe chronic bronchitis symptoms or bronchiectasis.

There is a need in further randomised studies including more patients for a longer follow-up.

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# Effects of a new Airway Clearance Technology versus manual physiotherapy in COPD

Physiotherapy care, COPD - management, Bronchiectasis

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## Introduction

COPD patients with bronchiectasis or chronic bronchitis report more severe symptoms, purulent sputum expectoration and acute exacerbation. Airway Clearance Techniques (ACTs) may improve quality of life and reduce morbidity and mortality.

## Aim and objectives

Study aim was to evaluate the effects of a new ACT in hospitalized COPD patients suffering of chest congestion compared to manual physiotherapy.

## Methods

10 COPD patients with AECOPD who reported excessive mucus congestion despite bronchodilator therapy were treated 5 days (2 sessions of 20-min/day) during hospitalization with either ACT device (Simeox, Physio-Assist) or manual physiotherapy (5 patients in each group). This device facilitates mucus clearance by generating successive low-frequency depressions during passive exhalation. Spirometry, symptoms, CAT score, usability and safety were compared between the 2 groups.

## Results

Age 65±8ys, 7 men and 3 women, 7 with bronchiectasis and 8 with lung crackles, BMI 27.1±6.1kg/m2, Borg scale 4.5±1.8, FEV1% 42±19. All the patients of device group acquired quickly autonomous usage. No adverse event nor pain was reported. Improvement of mucus clearance and symptoms were similar between groups. FEV1(L) improved by +0.15±0.10L (FEV1% +5±2%) and FEV1/FVC increased from 52.5±2.4 to 58.0±12.8% in the device group but remained stable in the manual physiotherapy group. CAT score improved in the device group only from 20.2±6.4 to 17.0±4.6.

## Conclusions

These preliminary data suggest safety and additional benefits of low-frequency airway clearance technology for COPD with severe chronic bronchitis symptoms or bronchiectasis. There is a need in further randomised studies including more patients for a longer follow-up.



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