

European Respiratory Society Annual Congress 2012

Abstract Number: 4779

Publication Number: P1183

Abstract Group: 9.2. Physiotherapists

Keyword 1: Rehabilitation **Keyword 2:** Physiotherapy care **Keyword 3:** Exercise

Title: Comparison of incentive spirometers on thoracoabdominal mechanics and inspiratory muscular activation in morbidly obese

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Body: Morbid obesity causes restriction on chest wall and increases work of breathing. Incentive spirometry has been widely used in clinical practice for lung expansion; however, the effect of volumetric (VIS) and flow-oriented IS (FIS) on thoracoabdominal mechanics and respiratory muscular activity in morbidly obese are poorly known. Objectives: To compare the distribution of pulmonary volumes and inspiratory muscular activity during use of VIS and FIS in morbidly obese. Methods: Thoracoabdominal mechanics (optoelectronic plethysmography) was evaluated in 17 morbidly obese (43 ± 11 yrs, $BMI = 45 \pm 5 \text{ Kg/m}^2$) simultaneously with respiratory muscular activity (electromyography) during quiet and deep breathes either using VIS or FIS (randomized sequence). Lung volume was evaluated in total chest wall (CW) and its compartments: abdominal (ABD) and upper (URC) and lower (LRC) ribcage. Muscular activity was evaluated in the sternocleidomastoid (SCM), upper (UIC) and lower intercostal (LIC) muscles. One way repeated measures ANOVA with post hoc Newman Keuls test were used and significance level was set at 5%. Results: A greater chest wall volume was achieved using VIS compared with FIS (respectively, $1.98 \pm 0.7 \text{ L}$ vs $1.62 \pm 0.5 \text{ L}$; $p = 0.02$); however no difference was observed in all inspiratory evaluated muscles ($SCM = 21 \pm 19$ vs $28 \pm 23 \cdot 10^{-3} \text{ mV}$; $UIC = 9 \pm 5$ vs $12 \pm 12 \cdot 10^{-3} \text{ mV}$; $LIC = 6 \pm 2$ vs $6 \pm 3 \cdot 10^{-3} \text{ mV}$; $p > 0.05$). Furthermore, thoracoabdominal asynchrony was observed during use of FIS (phase angle = 37 ± 38 vs 31 ± 36 ; $p < 0.001$) compared to VIS. Conclusions: VIS induces greater chest wall volume with lower thoracoabdominal asynchrony in morbidly obese; however, without difference in the inspiratory muscular activity.