European Respiratory Society
Annual Congress 2013

Abstract Number: 2623

Publication Number: P5077

Abstract Group: 9.2. Physiotherapists

Keyword 1: Physiotherapy care **Keyword 2:** Cough **Keyword 3:** Mechanical ventilation

Title: Laryngeal response patterns to mechanical insufflation-exsufflation

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Body: Introduction: Mechanical insufflation-exsufflation (MI-E) is used to assist cough in neuromuscular diseases. Clinically, the application of MI-E may be challenging in patients with bulbar amyotrophic lateral sclerosis (ALS), possibly related to laryngeal dysfunction. Aims: To visualize laryngeal response patterns to MI-E in healthy individuals and in ALS patients. Methods: Video recorded transnasal fiberoptic laryngoscopy was applied in 18 healthy individuals and in 18 ALS patients while performing MI-E using Cough Assist® (Respironics, USA) according to a standardized protocol applying pressures of ±20 to ±50 cmH_2O. Clinical examination by the neurologist determined the bulbar symptoms in ALS patients. Results: The laryngeal response to MI-E is heterogenic. Healthy (n=18) and non-bulbar patients (n=6) had the expected and good laryngeal coordination during MI-E. Spastic bulbar patients (n=5) had acceptable coordination, both at glottic and supraglottic levels. Hypotone bulbar patients (n=7) had acceptable coordination at the glottic level, but not at the supraglottic level, resulting in laryngeal adduction during insufflation. In two patients, esophageal opening was observed during supraglottic adduction. Backward movements of epiglottis and the base of the tongue during insufflation and hypopharyngeal obstruction during exsufflation, could be observed in all subgroups. Conclusions: Laryngeal dysfunction may compromise the effect of MI-E, particularly if hypotonic bulbar paresis is present. Laryngeal adduction severely reduce the size of the laryngeal inlet, potentially with severe consequences for airflow and thereby the effect of MI-E.