European Respiratory Society
Annual Congress 2012

Abstract Number: 5053

Publication Number: P244

Abstract Group: 4.1. Clinical physiology and Exercise

Keyword 1: Respiratory muscle **Keyword 2:** Physiology **Keyword 3:** Spirometry

Title: Effects of abdominal binding on chest wall kinematics in tetraplegic individuals

Ms. Sabine K. 14613 Illi sabine.illi@hest.ethz.ch [1,2], Dr. Stefanie 14738 Hostettler stefaniehostettler@gmx.ch [1,2,3], Prof. Dr Andrea 14739 Aliverti andrea.aliverti@polimi.it [4], Mr. Robert 14740 Brown rbrown5@partners.org MD [5], Dr. Gabi 14741 Mueller gabi.mueller@paranet.ch [3,6] and Prof. Dr Christina M. 14751 Spengler christina.spengler@hest.ethz.ch MD [1,2]. [1] Exercise Physiology, Institute of Human Movement Sciences, ETH, Zurich, Switzerland ; [2] Institute of Physiology and Center for Integrative Human Physiology (ZIHP), University of Zurich, Switzerland ; [3] Biomedical Rehabilitation Sciences and Engineering, Swiss Paraplegic Research, Nottwil, Switzerland ; [4] TBMLab, Department of Bioengineering, Politecnico di Milano, Milan, Italy ; [5] Pulmonary and Critical Care Medicine Unit, Massachusetts General Hospital, Harvard Medical School, Boston, United States and [6] Clinical Trial Unit, Swiss Paraplegic Centre, Nottwil, Switzerland .

Body: Introduction: Tetraplegic individuals show a paradoxical inward motion of the ribcage during inspiration. Abdominal binding is supposed to decrease paradoxical breathing by decreasing abdominal compliance and increasing the zone of apposition of the diaphragm. We hypothesized that abdominal binding would reduce the paradox during quiet breathing (QB) as well as during different levels of hyperpnoea (HYP) and increase maximal voluntary ventilation (MVV). Methods: Chest wall kinematics were assessed by optoelectronic plethysmography in three male complete tetraplegics (C4-C7) during QB and during HYP at 40 and 100% MVV with and without abdominal binding. Tidal volume (V_T) was partitioned into the relative contribution of the pulmonary rib cage (ΔV_{RCP}), abdominal rib cage (ΔV_{RCA}), and abdomen (ΔV_{AB}). Inspiratory paradox time (IPT) was calculated as the percentage of inspiratory time (T_I) with a decrease in V_{RCP} and/or V_{RCA}. Results: Abdominal binding reduced IPT at all ventilatory levels. The reduction was higher in RCA than in RCP. At rest, abdominal binding increased ΔV_{RCA} more effectively than ΔV_{RCP}. MVV was larger with abdominal binding in all subjects (105.1±49.0 vs. 92.0±53.9 $l \bullet min^{-1}$ without abdominal binding).

Conclusion: The reduction in IPT and the increase in MVV in tetraplegic individuals suggest a functional benefit of abdominal binding which is mainly seen in the lower rib cage (RCA). Support: SNF grant no. 32-116777.