Intensive Care Medicine Experimental
a SpringerOpen Journal

POSTER PRESENTATION Open Access

Assessment of respiratory mechanics and respiratory muscles of difficult to wean critically ill patients

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From ESICM LIVES 2015
Berlin, Germany. 3-7 October 2015

Introduction

Weaning from mechanical ventilation represents the period of transition from total ventilator support to spontaneous breathing. Patients who are difficult to wean from mechanical ventilation represent a clinical problem which is usually multifactorial.

Objectives

To analyze parameters of respiratory system mechanics and to assess diaphragmatic function in ventilator-dependent patients, with normal cardiac function, after repeated unsuccessful weaning trials.

Methods

In this observational study, 20 stable intubated patients with normal cardiac function undergoing prolonged ventilation (>10 days) in whom 3 attempts of spontaneous breathing trials failed, were evaluated. Diaphragmatic muscle function was assessed invasively by the tension-time index of the diaphragm (TTdi), an indicator of diaphragm endurance time. Additional physiologic measurements of respiratory system were obtained using esophageal balloon catheter.

Results

The frequency to tidal volume ratio (f/Vt), measurement of rapid shallow breathing, was 125.84 (± 111.75) breaths/L, whereas 30% of the patients were above the standard "cut off" value of 105 breaths/L. Dynamic lung compliance and pulmonary resistance at midinspiratory volume were 0.09 (± 0.07)L/cmH2O and 16.48 (± 7.16) cmH2O/L/s respectively. Of the patients studied, 15 (75%) had increased pulmonary resistance (>10cmH2O/L/s) and 20% of the patients had reduced dynamic lung compliance. The dynamic intrinsic positive end-expiratory pressure (PEEPi, dyn) was 2.11 ± 1.58 cmH2O. Additionally, 30% of the patients had decreased respiratory muscle strength, maximum inspiratory pressure (MIP) < -25cmH2O (-37.16 ± 15.06 cmH2O) whereas 50% of the patients presented limited diaphragm endurance time, TTdi > 0.16 (0.13 ± 0.07). The study group increased the Pdiswing/Pdimax ratio (tidal transdiaphragmatic pressure over maximum transdiaphragmatic pressure) (0.46 ± 0.6), in order to compensate the increased load of respiratory system mainly due to elevated pulmonary resistance. The respiratory time fraction (Ti/TTOT) remained normal (0.30 ± 0.11).

Conclusions

Weaning from mechanical ventilation continues to be an area of significant interest. Difficult - to- wean patients with normal cardiac function, after prolonged mechanical ventilation, are characterized by reduced diaphragmatic endurance and dysfunction and alterations in respiratory mechanics, as characterized mainly by increased airway resistance.

Grant Acknowledgment

None of the authors has any conflicts of interest.

Published: 1 October 2015

References

1. Daniel Martin A, *et al*: **Mechanical ventilation, diaphragm weakness and weaning: a rehabilitation perspective.** *Respir Physiol Neurobiol* 2013, **189(2)**:377-83, Nov 1. doi: 10.1016/j.resp.2013.05.012.

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2. Nozawa E, *et al*: **Assessment of factors that influence weaning from long-term mechanical ventilation after cardiac surgery.** *Arq Bras Cardiol* 2003, **80(3)**:301-10, Mar.

doi:10.1186/2197-425X-3-S1-A313
Cite this article as: Marouli *et al.*: Assessment of respiratory mechanics and respiratory muscles of difficult to wean critically ill patients. *Intensive Care Medicine Experimental* 2015 **3**(Suppl 1):A313.