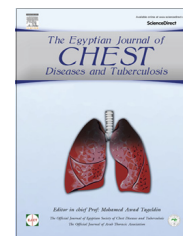


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ORIGINAL ARTICLE

Assessment of weaning failure in chronic obstructive pulmonary disease patients under mechanical ventilation in Zagazig University Hospitals

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Received 20 January 2016; accepted 26 January 2016

KEYWORDS

Weaning failure;
 COPD exacerbation

Abstract Background: It was reported that nearly twenty percent of all initial weaning trials in mechanically ventilated chronic obstructive pulmonary disease patients failed, which may lead to prolonged mechanical ventilation and expose the patient to hazardous complications such as ventilator associated pneumonia, critical illness neuromuscular abnormalities and ICU psychosis rather than the complications of mechanical ventilation itself.

Methods: This study was carried out at the Respiratory Intensive Care Unit of Chest Department, Zagazig University Hospitals from May 2013 to May 2015. It included Mechanically ventilated chronic obstructive pulmonary disease patients due to acute respiratory failure who underwent first weaning trial using two hours of spontaneous breathing trial through T piece. They were 60 patients, 44 males and 16 females with an age range from 41 to 65 years and a mean age of 54.23 ± 6.41 years. At the end of the first weaning trial, patients were classified into two groups according to weaning outcome: Group I: (successful weaning) as a control group they were (20) patients and Group II: (failed weaning) they were (40) patients. Various risk factors were assessed including electrolyte imbalance, nutritional state, delirium, weaning induced myocardial ischemia and impaired thyroid function beside calculation of APACHE II score to assess illness severity.

Results: This study reported significant risk factors for weaning failure including: malnutrition (62.5%), electrolyte imbalance (42.5%), myocardial ischemia (37.5%), hypoalbuminemia (32.5%), hypothyroidism (25%), delirium (20%) and overfeeding (17.5%) while in 5% of the studied patients no identified risk factor was observed. In this work, multiple regression analysis isolated two independent risk factors for weaning failure in COPD patients including, TSH level > 2.65 mIU/ml and impaired nutritional status, with P value = (0.018, 0.048) respectively.

Conclusions: 1-Myocardial ischemia, delirium, hypomagnesemia, hypophosphatemia and VAP could be considered as important risk factors for weaning failure, however high TSH level > 2.65 mIU/ml and abnormal nutritional state were the most valuable independent predictors for weaning failure. 2-An increase in the degree of severity of illness on ICU admission (guided by

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Peer review under responsibility of The Egyptian Society of Chest Diseases and Tuberculosis.

<http://dx.doi.org/10.1016/j.ejcdt.2016.01.013>

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APACHE II score), previous mechanical ventilation and longer duration of mechanical ventilation could intensify the risk for weaning failure. 3-RSBI below 85 breaths/min/L may increase the rate of weaning success.

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Introduction

Exacerbation of chronic obstructive pulmonary disease (COPD) is an event in the natural course of the disease characterized by a change in the patient's baseline dyspnea, cough and/or sputum beyond day-to-day variability sufficient to warrant a change in management [1]. In most patients, mechanical ventilation (MV) can be discontinued as soon as the underlying reason for acute respiratory failure has been resolved. However, 20% to 30% of patients are considered difficult to wean [2]. The difficulty, ICU physicians still have, in discontinuing mechanical ventilation, evidenced by the fact that 40% of the time that a patient spends receiving mechanical ventilation is devoted to weaning and increase up to, 59% in COPD patients [3–5]. There are innumerable factors responsible for the failure of weaning from MV. Factors that should be considered in all patients include misadjusted ventilator settings, infections, airway patency and respiratory muscle performance [6]. Malnutrition, which is common in ventilator dependent patients has detrimental effects on the respiratory system. Heart failure or coronary ischemia can be induced by the reduction of ventilatory support which causes weaning failure [7]. A number of electrolyte imbalances and psychological problems can be an impediment to successful weaning [8]. Hence, the purpose of this study is to identify risk factors associated with weaning failure in mechanically ventilated COPD patients.

Patients and methods

This study was carried out at the Respiratory Intensive Care Unit of Chest Department, Zagazig University Hospitals in the period from May 2013 to May 2015.

Written informed consent was obtained from all patients' relatives.

Patients

This study included 60 Chronic Obstructive Pulmonary Disease patients with acute exacerbation diagnosed according to Gold (2013) [9] as having acute respiratory failure necessitating mechanical ventilation. Weaning procedures were started after fulfilling weaning criteria according to Osler (2014) [7].

Checklist for identifying patients who can be considered for a trial of spontaneous breathing [7].

#Respiratory criteria

- PaO₂ ≥ 60 mmHg on Fio₂ ≤ 40–50% and PEEP ≤ 5–8 cm H₂O.

- PaCO₂ normal or baseline (except for permissive hypercapnia).
- Patient is able to initiate an inspiratory effort.

#Cardiovascular criteria

- No evidence of myocardial ischemia.
- Heart rate ≤ 140 beats/min.
- Blood pressure normal without vasopressors or with minimum vasopressor support (e.g., dopamine < 5 µg/kg/min).

#Adequate mental status

- Patient is arousable or Glasgow coma score ≥ 13.

#No correctible comorbidity

- Patient is afebrile.
- There are no significant electrolyte abnormalities.

Inclusion criteria

Mechanically ventilated COPD patients due to acute respiratory failure underwent first weaning trial using two hours of spontaneous breathing trial (SBT) through T piece according to Osler (2014) [7]. They were 60 patients, 44 males and 16 females with an age range from 41 to 65 years and a mean age of 54.23 ± 6.41 years.

Exclusion criteria

Mechanically ventilated patients due to acute respiratory failure secondary to causes rather than acute exacerbation of COPD e.g.:

- 1- Cerebrovascular accidents.
- 2- Post arrest.
- 3- Primary metabolic disorders (renal failure, DKA, lactic acidosis).
- 4- Chest trauma.

*At the end of the first weaning trial, patients were classified into two groups according to weaning outcome

Group I: (successful weaning) as a control group.

They were 20 patients, 14 males and 6 females with an age range from 44 to 65 years and a mean age of 55.15 ± 6.44 years.

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