ROLE OF MEASUREMENT OF PLASMA PROTEINS IN DIAGNOSIS OF WEANING INDUCED PULMONARY OEDEMA, A RANDOMIZED BLIND STUDY

Thesis

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List of Abbreviations

ABG	**:** Arterial Blood Gases
ACV	**:** Assist Control Ventilation
ATC	**:** Automatic Tube Compensation
BIPAP	**:** Bi-level Positive Airway Pressure
BMI	**:** Body Mass Index
BNP	**:** Brain Natriuretic Peptide
BP	**:** Blood Pressure
COPD	**:** Chronic Obstructive Pulmonary Disease
CPAP	**:** Continuous Positive Airway Pressure
DBP	**:** Diastolic Blood Pressure
E/A ratio	**:** The ratio of E wave to mitral peak velocity of late filling (A)
ECG	**:** Electrocardiogram
EF	**:** Ejection Fraction
ETT	**:** Endo Tracheal Tube
FC	**:** Forced Capacity
FiO_2	**:** Fraction of Inspired Oxygen
HB	**:** Hemoglobin
HF	**:** Heart Failure
HR	**:** Heart Rate
ICU	**:** Intensive Care Unit
IMV	**:** Intermittent Mandatory Ventilation
ITP	**:** Intrathoracic Pressure
LV	**:** Left Ventricle
MIP	**:** Maximum Inspiratory Pressure
MV	**:** Mechanical Ventilation
NPPV	**:** Noninvasive Positive-Pressure Ventilation
NT-PrpBNP	**:** N-Terminal pro b-type Natriuretic Peptide
NWIPO	**:** Non Weaning Induced Pulmonary Edema
O2	**:** Oxygen
PaCO2	**:** Partial Pressures of Carbon Dioxide
PaO2	**:** Partial Pressures of Oxygen
PAOP	**:** Pulmonary Artery Occlusion Pressure
PE	**:** Pulmonary Edema
PEEP	**:** Positive End-Expiratory Pressure
PEEPi	**:** Intrinsic Positive End-Expiratory Pressure
PH	**:** Potential of Hydrogen
PSV	**:** Pressure Support Ventilation

PVO2	**:** Normal Mixed Venous Oxygen Tension
PVR	**:** Peripheral Vascular Resistance
ROC	**:** Receiver Operating Curve
RR	**:** Respiratory Rate
RV	**:** Right Ventricle
SaO2	**:** Arterial Oxygen Saturation
SBP	**:** Systolic Blood Pressure
SBT	**:** Spontaneous Breathing Trial
ScVO2	**:** Central Venous Oxygen Saturation
SVO2	**:** Mixed Venous Oxygen Saturation
TTE	**:** Transthoracic Echocardiogram
VC	**:** Vital Capacity
VT	**:** Tidal Volume
WIPO	**:** Weaning Induced Pulmonary Edema
WO	**:** Weaning Outcome

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Abstract

Background and Purpose: to study the relationship between weaning induced pulmonary oedema and the change in plasma proteins concentration so it can be used as non-invasive diagnostic tool of weaning induced pulmonary oedema. **Aim of Work:** to confirm the relationship between the changes in plasma protein concentration during a weaning trial and the diagnosis of weaning-induced pulmonary oedema. **Methods:** patients will be admitted in intensive care department of Ain shams University, from April 2017 to May 2018 after approval of ethical committee, with diagnosis of weaning induced pulmonary oedema will be subjected to full clinical assessment with history and examination and APACHE3 score at time of admission, echocardiographic criteria were used to diagnose weaning induced pulmonary oedema, data were collected and analyzed by SPSS program, using T- test, chi square and ANOVA. **Results:** increase of plasma protein level can be used as diagnostic tool for weaning induced pulmonary oedema. **Conclusion:** Haemoconcentration occurring during weaning induced pulmonary oedema lead to increase in plasma protein level which can be considered in diagnosis of weaning induced pulmonary oedema as an alternative to other invasive methods.

Keywords: Role; measurement; plasma; protein; diagnosis; weaning; pulmonary oedema; blind study

INTRODUCTION

Mechanical ventilation generally exerts negative hemodynamic effects in patients with normal cardiac function mainly because of the reduction in venous return induced by positive intrathoracic pressure at each insufflation. By contrast, positive pressure ventilation exerts beneficial effects in patients with cardiogenic pulmonary edema such that it is routinely used as a therapy in this category of patients. Conversely, cardiac consequences of spontaneous breathing may be responsible for weaning failure in patients with left heart disease, even though the mechanical ventilation was required for respiratory failure of non-cardiac origin (***Lamia et al., 2009)***.

Acute cardiac dysfunction and cardiogenic pulmonary edema may occur during weaning from mechanical ventilation, especially in patients with a history of left heart disease and chronic obstructive pulmonary disease. Among the complex and intricate mechanisms, myocardial ischemia, excessive increased left ventricle (LV) afterload, and increased cardiac preload play predominant contributing roles there is no codified treatment for weaning-induced pulmonary edema. Use of diuretics and/or nitrates should be considered after careful analysis of the main contributing mechanisms ***(Papanikolaou et al., 2011).***

Measuring the elevation in pulmonary artery occlusion pressure using right heart catheterization was first proposed as a means of diagnosing weaning failure of cardiac origin ***(Gerbaud et al., 2012).***

Right heart catheterization procedure has many complications. The most frequent complications were related to venous access (e.g., hematoma, pneumothorax), followed by arrhythmias and hypotensive episodes related to vagal reactions or pulmonary vaso-reactivity testing. ***(Hoeper et al., 2006).***

Less invasive tools, such as transthoracic echocardiography or change of plasma protein concentration, have recently been proposed as valuable alternative diagnostic methods for weaning-induced pulmonary edema ***(Cabello et al., 2010)***.

Aim of the work

The aim of this work is to study the relationship between the changes in plasma protein concentration during a weaning trial and the diagnosis of weaning-induced pulmonary oedema.

Weaning From Mechanical Ventilation

Definition of weaning

Weaning is the process of decreasing the amount of support that the patient receives from the mechanical ventilator, so the patient assumes a greater proportion of the ventilator effort. The purpose is to assess the probability that mechanical ventilation (MV) can be successfully discontinued. Weaning may involve either an immediate shift from full ventilator support to a period of breathing without assistance from the ventilator or a gradual reduction in the amount of ventilator support ***(Funk et al., 2010).***

Classification of weaning by duration:

- **Simple**: patient was successfully disconnected from ventilator after first spontaneous breathing trial (SBT).
- **Difficult** : patient failed first SBT and ventilator discontinued from 2–7days after initial assessment
- **Prolonged**: ventilator discontinued in >7days after initial assessment ***(Branson, 2012).***

Weaning criteria:

The following are an important criteria we have to full fill before weaning:

Adequate cough, Absence of excessive tracheobronchial secretion and resolution of disease acute phase for which the patient was intubated ***(Lamia et al, 2005).***

Stable cardiovascular status (i.e. heart rate (HR) <140 beats/min, mean arterial pressure 65-90 mmHg, no or minimal vasopressors), also stable metabolic status, adequate oxygenation (SaO_2) >90% on 40% fraction of inspired oxygen (FIO_2) (or partial pressure of arterial oxygen (PaO_2) /FIO_2 >200 mmHg) positive end expiratory pressure (PEEP) <8 cmH_2O, adequate pulmonary function (respiratory rate (RR) <35 breaths/min, no significant respiratory acidosis, adequate mentation and no sedation or adequate mentation on sedation (or stable neurologic patient) ***(MacIntyre, 2012).***