ASSESSMENT OF DIAPHRAGMATIC MOBILITY BY CHEST ULTRASOUND IN COPD PATIENTS ON DIFFERENT MODES OF MECHANICAL VENTILATION

Thesis
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بسم الله الرحمن الرحيم

وَقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ

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List of Abbreviations

ARDS	:	Acute respiratory distress syndrome
BIPAP	:	Bi-level positive airway pressure
DD	:	Diaphragmatic dysfunction
DE	:	Diaphragmatic excursion
DVT	:	Deep venous thrombosis
EF	:	Ejection fraction
ER	:	Emergency room
GOLD	:	Global initiative for chronic obstructive lung disease
ICU	:	Intensive care unit
MV	:	Mechanical ventilation
NIV	:	Non invasive
OSA	:	Obstructive sleep apnea
PDI	:	trans-diaphragmatic pressure
PIMAX	:	maximum inspiratory pressure

PS	**:**	**Pressure support**
RSBI	**:**	**Rapid shallow breathing index**
SBT	**:**	**Spontaneous breath trial**
TV	**:**	**Tidal volume**
VC	**:**	**Volume control**
VIDD	**:**	**Ventilator induced diaphragmatic dysfunction**

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INTRODUCTION

COPD is mainly defined as a disease characterized by airway obstruction and air trapping that is not fully reversible. Studies dealing with inspiratory muscle weakness in COPD patients focus mostly on diaphragm since it are the principal generator of tidal volume ***(Kang et al., 2011)***.

The diaphragm is the principal respiratory muscle, and its dysfunction predisposes to respiratory complications and can prolong the duration of mechanical ventilation ***(Tobin et al., 2009)***.

Serve as a bedside screening test for investigating postoperative diaphragmatic dysfunction and detect synchronization of spontaneous breathing efforts with the ventilator, potentially allowing an optimized adjustment of the ventilator settings ***(Lerolle et al., 2009)***.

Bedside ultrasonography has become a valuable tool in the management of intensive care unit patients .This is especially true in emergency situations where an adequate imaging technique is frequently limited by a variety of factors, including difficulty of patient transportation to the radiology department due to illness severity. Ultrasonography is a noninvasive technique, which has proved to be an accurate, safe, easy to use bedside modality, overcoming many of the standard limitations of imaging techniques ***(Beaulieu et al., 2005)***.

Diaphragmatic sonography can provide valuable information in the evaluation of patients during partial ventilatory support. Simultaneous recordings of diaphragmatic sonography and airway pressures waveforms can allow visualizing that each patient's inspiratory effort triggers the ventilator appropriately .Therefore, real-time hemi-diaphragmatic sonography could be used in the evaluation of patient–ventilator interactions in clinical practice, in order to detect cases of patient–ventilator asynchrony .In these cases, diaphragmatic sonography could even allow a proper adjustment of the ventilator settings in order to optimize synchronization of the patient's inspiratory effort with the assisted mechanical breath. This hypothesis, however, needs to be prospectively tested. Mechanical ventilation in controlled mode and possibly with high levels of partial ventilatory assist can also result in ventilator-induced diaphragm dysfunction (***Petrofet al., 2010)***.

AIM OF THE WORK

To assess diaphragmatic mobility by chest ultrasound in COPD patients on different modes of mechanical ventilation and to distinguish which mode has the best diaphragmatic excursion with detection of its role as an independent noninvasive tool for predicting successful weaning .

CHAPTER ONE

CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Chronic Obstructive Pulmonary Disease (COPD) is a common preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases. The chronic airflow limitation that is characteristic of COPD is caused by a mixture of small airways disease (e.g., obstructive bronchiolitis) and parenchymal destruction (emphysema), the relative contributions of which vary from person to person ***(GOLD, 2018).***

Prevalence

The lowest estimates of prevalence are usually those based on self-reporting of a doctor diagnosis of COPD or equivalent condition. For example, most data show that less than 6% of the population has been told that they have COPD these estimates may have value, however, since they may most accurately reflect the burden of clinically significant disease that is of sufficient severity to require health services ***(Halbert et al., 2006)***.

The third National Health And Nutrition Examination Survey (NHANES 3) a large national survey conducted in the US between 1988 and 1994, the prevalence of respiratory symptoms varied markedly by smoking status (current > ex-smoker > never).