PREDICTION OF WEANING FAILURE FROM MECHANICAL VENTILATION IN COPD PATIENTS USING THORACIC FLUID CONTENT PARAMETER OF ELECTRICAL CARDIOMETRY

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Introduction

Mechanical ventilation is defined as a technique by which gas exchange from and to the lung can be achieved through external device. The main goal of mechanical ventilation in COPD exacerbation is to improve pulmonary gas exchange and to rest compromised respiratory muscles sufficiently to recover from the fatigued state. Weaning of patients from mechanical ventilation remains a challenge in ICU. Earlier patient weaning from mechanical ventilation is recommended to avoid complications of prolonged mechanical ventilation. Evaluation of volume status by various parameters are measured to be used in order to predict failure of extubation before SBT in COPD patients. Thoracic fluid content is a parameter that represents the whole (extravascular, intravascular, and intrapleural) fluid component with in the thorax, and could be assessed through the changes in the impedance of thoracic tissue to the electric current by using electrical cardiometry.

Aim of the work

The aim of the work is to study the role of electrical cardiometry as a predictor of weaning failure from mechanical ventilation in COPD patients through measurement of thoracic fluid content (TFC).

Patients

Thirty four patients with acute exacerbation of chronic obstructive lung disease who required mechanical ventilation.

Methods

a prospective observational cohort study was conducted

The following data were recorded for all patients on admission : patients criteria , vital signs , laboratory and radiological parameters , ECHO and modified DECAF score calculation during ICU stay .

The thoracic fluid content was observed and recorded; 5 minutes before starting SBT, 1 hour after extubation. Normal value of TFC < 50 kΩ . Patients were followed up for 48 hours following weaning from mechanical ventilation.

Results

Table (1):TFC of the studied patients

		Success (n=16)	Failed (n=18)	P value
TFC- 5min before extubation ($kOhm^{-1}$)	Mean ± SD	31.63 ± 4.35	36.83 ± 4.63	0.002*
	Range	25 - 39	31 - 45	
TFC- after 1h of extubation ($kOhm^{-1}$)	Mean ± SD	32.13 ± 4.59	47.78 ± 6.25	<0.001*
	Range	26 - 40	36 - 60	

TFC: Thoracic fluid content.

Table (2) : Role of TFC- 5min before extubation in prediction of weaning failure from mechanical ventilation in COPD patients

Cut-off	Sensitivity	Specificity	PPV	NPV	AUC	P value
>31 kOhm-1	77.78%	50%	63.6%	66.7%	0.792	<0.001*

PPV: positive predictive value, NPV: negative predictive value, AUC: area under the curve

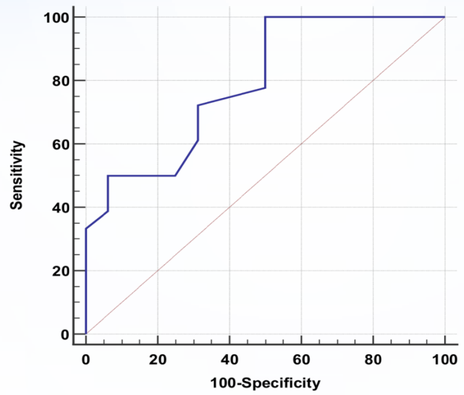

Figure (1) : ROC curve of TFC- 5min before extubation in prediction of weaning failure from mechanical ventilation in COPD patients

Table (3): Role of TFC- after 1h of extubation in prediction of weaning failure from mechanical ventilation in COPD patients

Cut-off	Sensitivity	Specificity	PPV	NPV	AUC	P value
>36 $kOhm^{-1}$	94.44%	75%	81%	92.3%	0.981	<0.001*

PPV: positive predictive value, NPV: negative predictive value, AUC: area under the curve

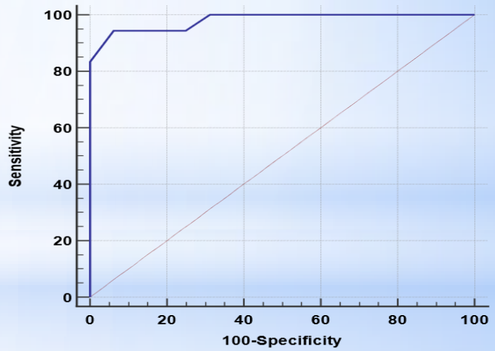

Figure (2): ROC curve of TFC- after 1h of extubation in prediction of weaning failure from mechanical ventilation in COPD patient

Conclusion

Electrical cardiometry may be used in prediction of weaning failure from mechanical ventilation in COPD patients through measurement of thoracic fluid content (TFC).