THE ROLE OF ELECTRICAL CARDIOMETRY AS AN INDICATOR OF MECHANICAL VENTILATION IN PATIENTS PRESENTING WITH COMMUNITY ACQUIRED PNEUMONIA

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INTRODUCTION

Community acquired pneumonia (CAP) is life threatening condition that require immediate management that differ from mild to sever which needs intensive care unit admission.

CAP had different etiological causes which include bacterial, viral, and fungal. Each etiological cause indicates specific management as early as possible to avoid pulmonary or extra pulmonary complications.

Several scoring systems are used to assess the severity of pneumonia using chest radiographs and laboratory investigations.

Electrical cardiometry is a noninvasive technique that can be used to detect intrathoracic changes or impedance by using thoracic fluid content (TFC)as a parameter.

TFCis a parameter that represents the whole (extravascular, intravascular, and intrapleural) fluid component within the thorax.

AIM OF THE WORK

The aim of this work was to assess the role of electrical cardiometry as an indicator of mechanical ventilation in patients presenting with community acquired pneumonia.

PATIENTS AND METHODS

The study included 45 adult patients of both sexes with severe community acquired pneumonia admitted to Critical Care Medicine Department in Alexandria University Hospitals and were not on mechanical ventilation at the beginning of the study. The patients were followed up till need of mechanical ventilation or discharge from ICU.

Patients younger than 18 years, with pleural effusion, pneumothorax, decompensated liver failure, decompensated heart failure, on renal replacement therapy and pregnant female are excluded from the study.

All patients included to the study were subjected to complete physical assessment and laboratory investigations, also chest x-ray and echocardiogram were done.

Then measurements of thoracic fluid content was recorded on admission and every 24 hours till patient needed invasive mechanical ventilation or discharged from ICU.

RESULTS

Table 1: Comparing among 2 studied groups according to TFC

TFC$k\Omega^{-1}$	Total	group I	group II	p
On admission	(n=45)	(n=22)	(n=23)	
(day 1)				
Min. – Max.	35.0 – 52.0	37.0 – 49.0	35.0 – 52.0	0.001*
Mean ± SD.	43.27 ± 4.25	41.23 ± 3.13	45.22 ± 4.32	
Day2	(n=43)	(n=22)	(n=21)	
Min. – Max.	34.0 – 53.0	34.0 – 48.0	36.0 – 53.0	<0.001*
Mean ± SD.	42.81 ± 5.35	39.59 ± 3.79	46.19 ± 4.65	
Day3	(n=35)	(n=22)	(n=13)	
Min. – Max.	29.0 – 50.0	29.0 – 48.0	41.0 – 50.0	<0.001*
Mean ± SD.	40.74 ± 6.17	37.45 ± 5.04	46.31 ± 3.15	
Day4	(n=19)	(n=12)	(n=7)	
Min. – Max.	33.0 – 52.0	33.0 – 47.0	41.0 – 52.0	0.001*
Mean ± SD.	42.47 ± 6.54	39.08 ± 5.25	48.29 ± 3.90	
Day5	(n=9)	(n=8)	(n=1)	
Min. – Max.	33.0 – 53.0	33.0 – 47.0		0.064
Mean ± SD.	41.56 ± 6.71	40.13 ± 5.51	53.0	
Day6	(n=4)	–	–	
Min. – Max.	33.0 – 42.0	–	–	–
Mean ± SD.	36.0 ± 4.08	–	–	
Day7	(n=2)	–	–	
Min. – Max.	35.0 – 41.0	–	–	–
Mean ± SD.	38.0 ± 4.24	–	–	
Day8	(n=1)	–	–	
Min. – Max.		–	–	–
Mean ± SD.	40.0	–	–	

SD: **Standard deviation**
p: p value to compare among **two studied groups.**
*: Statistically significant at $p \leq 0.05$
#: Excluded from (**Comparison**) because ofa small number of cases (n = 1)

- TFC on admission (day 1) can predict invasive mechanical ventilation With AUC 0.766 (statically significant), probability value 0.002 (statically significant), Confidence Intervals (0.611 – 0.921), cut off point more than 43 $k\Omega^{-1}$, sensitivity 82.61, specificity 86.36, positive predictive value 86.4 and negative predictive value 82.6.
- TFC on admission (day 1) can predict 28 days mortality With AUC 0.759 (statically significant), probability value 0.007 (statically significant), Confidence Intervals (0.606 – 0.984), cut off point more than 44 $k\Omega^{-1}$, sensitivity 77.78, specificity 69.44, positive predictive value 38.9 and negative predictive value 92.6.

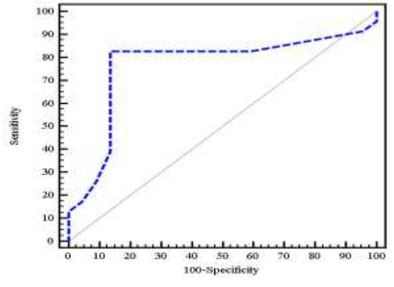

Figure 1: ROC curve for TFC on admission (day 1) to predict mechanical ventilation.

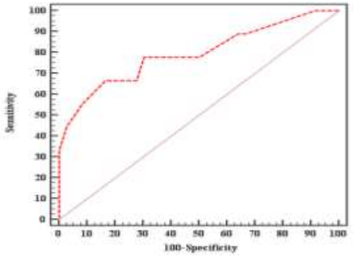

Figure 2: ROC curve for TFC on admission (day 1) to predict mortality in the total sample.

CONCLUSION

In conclusion, the analysis results in this study concluded that rapid assessment of fluid load in CAP patients has important clinical value for early screening of potential individuals at risk of need of mechanical ventilation and early intervention. Given the advantages of electrical cardiometry examination in assessing fluid volume load, TFC could be used clinically as a helpful predictor of need of mechanical ventilation in CAP patients.

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