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Relationship of Lung Ultra-sound Score with oxygenation and pulmonary mechanics in mechanically ventilated patients in the intensive care unit

Ayushi Yadav
Lady Hardinge Medical College, New Delhi

Background and Aims: Lung ultra-sonography is a technique to recognise impaired alveolar air content and increased interstitial and alveolar fluid. The ultra-sound waves reflect lung aeration beyond parietal pleura, indicating underlying lung pathology. This study ascertains the relationship of Lung Ultra-sound Score (LUSS) with oxygenation and dynamic compliance.

Methods: One hundred and one lung ultra-sounds were performed in 50 patients aged 18–60 years, requiring mechanical ventilation in the intensive care unit for at least 24 hours to study the relationship between LUSS and PaO_2/FiO_2 and pulmonary mechanics. The twelve-region method was used; the number of B lines was counted in each inter-costal space, and the score was awarded. At the same time, ventilator parameters and arterial blood gases were noted. The correlation between variables was evaluated using the Spearman coefficient.

Table 1: Ventilatory characterstics

Parameters	No. of scans	Median (range)
SIMV/PS	91	
ASV	5	
PC	5	
FiO_2	101	0.5 (0.3-1)
PEEP (cm H_2O)		8 (5-14)
PIP (cm H_2O)		20 (12-32)
COMPLIANCE (ml/cm H_2O)		22 (7.4-42)
RESISTANCE (cm H_2O/l/sec)		2.2 (1-4.5)
Pplat (cm H_2O)		13 (6-20)
Pressure support (cm H_2O)		12 (8-14)

Table 2: Compliance, resistance, and LUSS by PaO_2/FiO_2			
	Ratio <200 Mean±SD median (range)	Ratio ≥200 Mean±SD median (range)	*P*
No. of USG	38	63	
Compliance (ml/cm H_2O) (7.4-42)	18.01±5.07	26.24±6.14	0.000
Resistance (cm H_2O/l/sec) (1-4.5)	2.94±0.91	1.95±0.74	0.000
LUSS	24.5 (12-36)	7 (0-11)	0.000

Results: LUSS showed a negative correlation with PaO_2/FiO_2 ratio ($R^2 = 0.607$, $p < 0.0001$) and lung compliance ($R2 = 0.354$, $p < 0.0001$) but a positive linear correlation with lung resistance ($R^2 = 0.406$, $p < 0.0001$).

Conclusion: LUSS is an easy and effective bedside tool to measure lung parameters in mechanically ventilated patients, and LUSS correlates significantly with oxygenation, lung compliance, and resistance.

References

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