

### Prognostic value of a new lung ultrasound score in pediatric cardiac surgery

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Background: Lung ultrasound (LUS) is gaining consensus for the diagnosis and prognosis of pulmonary disease. However, although pulmonary complications are common in the post-operative (post-op) of pediatric cardiac-surgery, the use of LUS is still limited. We sought to evaluate if LUS evaluation of lung congestion after post-op extubation could predict intensive care unit length of stay (ICU-LOS) and if it's reflect conventional biomarkers in this setting.

Methods: LUS was performed in the 24 hours (13±6h) after extubation in 132 patients who underwent pediatric cardiac surgery (median age:0.9 year, IQ: 0.22;4.4). For each hemithorax, 3 areas (anterior/lateral/posterior) have been evaluated in the upper and lower halves of the chest (for a total of 6 scanning sites per side).

Pulmonary congestion score was assessed as percentage of B-lines and atelectasis. For each site a score was calculated as follow: score: 0 normal aeration, absence of b-lines; Score1 (mild congestion): 10-30% B-lines; Score 2 (moderate congestion): 40-60% B-lines; Score 3 (severe congestion): 70-100% B-lines; Score 4 (complete loss of aeration): lung consolidation. Total LUS-score was calculated as a sum of all sites score. Demographic, surgical data and Biomarkers (brain natriuretic peptide: BNP- and cystatin-C) were recorded.

Results: The total LUS-score (13±6) correlates inversely with age:  $r:-0.38$ ,  $p<0.001$  and positively with both BNP and Cystatin-C (respectively  $r:0.29$ ,  $p=0.01$  and  $r: 0.38$ ,  $p<0.001$ ) as well as with a surgical complexity score ( Aristotle score) ( $r:0.22$ ,  $p=0.01$ ) and by-pass time ( $r:0.24$ ,  $p<0.001$ ).

Moreover there was a good correlation also with ICU-LOS: ( $r: 0.4$ ,  $p<0.001$ ). At multivariate analysis: the LUS-Score was identified as an independent variables for InICU LOS (beta: .22, 95% CI: 0.01-0.058,  $p=0.005$ ) together with Cystatin (beta: .34, 95% CI: 0.52-1.265,  $p<0.01$ ), age (beta: -.14, 95% CI: -.086- -0.01,  $p=0.047$ ) and Aristotle score (beta: 0.13,95% CI: 0.073-0.205,  $p<0.01$ )

Conclusions: We demonstrated the prognostic values of LUS-score as an independent associated factor with ICU-LOS after pediatric cardiac surgery. LUS score increases with the complexity of surgical procedure, and its trend reflects that of other prognostic biomarkers such as BNP and Cystatin-C. Further studies are required to validate and reinforce these data.