

The degree of pulmonary congestion assessed by lung ultrasound is directly correlated with the red cell distribution width

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Topic(s):

Heart Failure with Reduced Ejection Fraction

Citation:

European Journal of Heart Failure (2018) 20 (Suppl. S1), 564

Background: Measurement of red cell distribution width (RDW) has emerged as a promising prognostic marker in patients with cardiovascular disease and heart failure. However, the mediating mechanism of this interaction remains controversial. We aimed to determine if the degree of pulmonary congestion is directly correlated with higher RDW in heart failure outpatients with reduced ejection fraction (HFREF). **Methods:** Cross-sectional study of HFREF outpatients. The outpatient evaluation included a complete clinical examination, NT-proBNP, echocardiogram and lung ultrasound (LUS) assessment. The degree of pulmonary congestion was obtained by LUS considering the sum of the number of B lines identified in 28 thoracic windows on the anterior and lateral sides of the right and left hemithorax.

Results: 97 patients (61% men, mean age 53 ± 13 years, 29% NYHA III-IV, average left ventricular ejection fraction $28 \pm 4\%$, and 54% with dilated cardiomyopathy) were evaluated. The RDW indices were significantly correlated ($p < 0.001$) with NT-proBNP ($r = 0.56$), LUS ($r = 0.6$); E/e' ($r = 0.4$); right atrial pressure ($r = 0.47$). Clinically significant pulmonary congestion by LUS (B lines = 15) was present in 68% of the patients, which presented a higher RDW values than non-congestive patients: 14% (13-16) vs 13.1% (12-14) $p < 0.0001$. Severely congested patients (B lines = 30) had an even higher RDW values: 15% (13-16) $p < 0.0001$. Was also observed that patients with RDW = 14.05% had significantly more extravascular lung water than patients with RDW $< 14\%$: 51 (30-96) vs 16 (7-31) B lines by LUS respectively ($p < 0.0001$). Conclusion: In an HFREF outpatient sample, RDW indices were proportionally higher as the number of B lines by LUS increased, suggesting that the degree of pulmonary congestion may contribute to the interaction mechanism of RDW as a prognostic marker.

