Title: Sex Differences in Pulmonary Perfusion Blood Volume from Dual Energy Computed Tomography (DECT) in Acute Pulmonary Embolism: Correlation with Clinical Severity.

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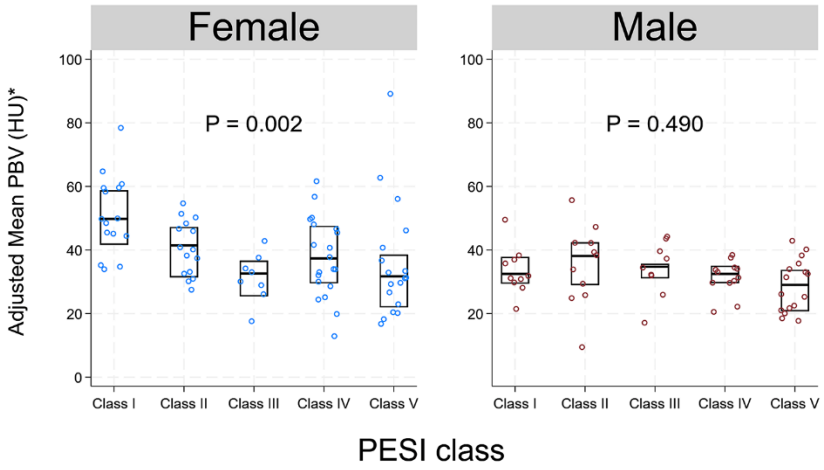
Abstract

Objective: To investigate the association between whole lung PBV, as measured by DECT, with the pulmonary embolism severity index (PESI) and simplified PESI (sPESI) clinical risk stratification systems as a surrogate for clinical severity and prognostic value.

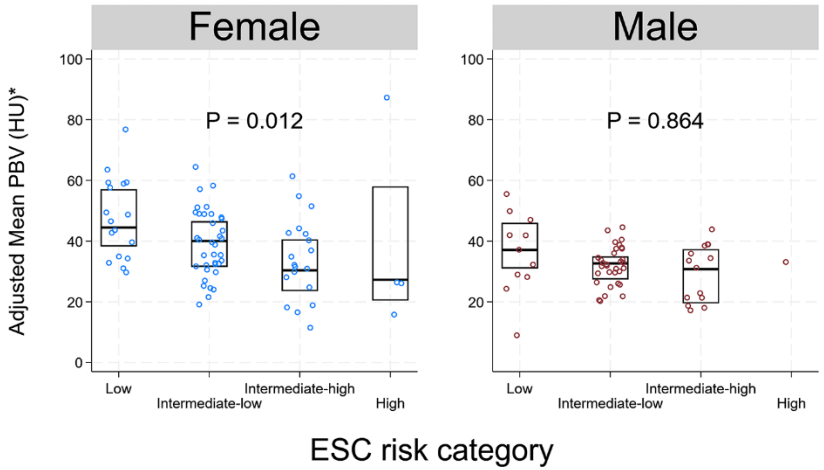
Methods: Retrospective chart review of 136 patients presenting with acute PE from August 2020 – February 2021 was conducted. Presenting symptoms, hemodynamic status, laboratory values and imaging findings were used to calculate PE severity according to European Society of Cardiology (ESC) classification, PESI and sPESI scores. Automated lung PBV was then quantified using the SyngoVia software system by Siemens (Erlangen, Germany). Ordered logistic regression analysis was utilized to investigate the associations between PE risk categories and the mean and standard deviation PBV values. $P<0.05$ was considered statistically significant.

Results: Mean age was 61 years, and 56% were females. There was a statistically significant decreasing trend in mean PBV in PESI classes I through V (39HU, 40.5HU, 34HU, 32.5HU and 32HU, $P_{difference} = 0.005$, $P_{trend} = 0.0002$) and ESC PE risk categories (39.5HU, 35HU, 30HU and 33HU for low, intermediate-low, intermediate-high and high risk, respectively; $P_{difference} = 0.012$, $P_{trend} = 0.001$). In multivariate ordered logistic regression analysis mean PBV was significantly associated with both PESI class and ESC risk category in females only (odds ratio (95% confidence interval): 0.86 (0.78 – 0.95), P = 0.002 and 0.90 (0.83 – 0.98), P = 0.012, respectively).

Conclusions: Pulmonary perfusion indices from DECT are associated with PE severity in females but not in males. Algorithms to detect severity of acute pulmonary embolism using DECT data should consider effect modification from sex differences.



A



B

Age- and body mass index-adjusted mean pulmonary blood volume in the categories of pulmonary embolism severity index (PESI) (A) and the European Society of Cardiology pulmonary embolism (ESC PE) risk (B) by patients' sex.