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Modified CT-based Bova score may improve the classification of patients with acute pulmonary embolism at risk of adverse events

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Background: Whether the Bova score with right ventricle dysfunction (RVD) assessed is computed tomography (CT) may be used for prognosticating adverse events (AE) in normotensive patients with acute pulmonary embolism (PE) is not fully determined.

Aim: To determine: (1)the optimal cut-off for RVD in CT for AE;(2)whether CT-assessed RVD may accurately substitute TTE-assessed RVD and improve the Bova score for risk assessment in PE.

Methods: Post-hoc analysis of a prospective study of 171 consecutive normotensive pts (93F, mean age 64.7 y.o. ±19) with at least segmental APE confirmed in CT. BP, HR, hsTnT and TTE for RVD were assessed within the first 24-hours from admission. CT-RVD was measured from a diagnostic angio-CT using the RV/LV transverse-axis diameter ratio. The Bova score was calculated from patient records. The combined endpoint (PCE) included PE-related death and/or hemodynamic deterioration requiring catecholamines i.v., rescue thrombolysis, cardio-pulmonary resuscitation; the secondary combined endpoint (SCE) included PE and non-PE events as above and hemorrhagic events. Proposed CT-RVD cut-offs and subsequent CT-based Bova vs TTE-based scores were compared using AUROCs and net reclassification improvements (NRI).

Results: 70 (41%) low-risk patients and 101 (59%) intermediate-risk pts classified according to the ESC algorithm. The PCE occurred in 5 pts, the SCE in 23 pts. TTE-Bova showed AUROC=0.918 (0.806–1.0; p=0.000) for the PCE, and 0.623 (0.545–0.696; p=0.000) for the SCE. The NRIs for the investigated cut-offs for CT-Bova vs TTE-Bova for the PCE are presented in the Table. AUROCs for SCE for CT-Bova vs TTE-Bova are presented in the Figure.

Conclusion: CT-based Bova with RV/LV>1.0 for RVD is non-inferior to TTE-based score in the prediction of PE-related in-hospital adverse events in normotensive patients and might improve the stratification of the occurrence of any adverse event. A modified score with a two-step cut-off for RV/LV (1 point for >1.0 and 2 points for >1.2) may more accurately predict PE-related events.

Comparison of CT-Bova and TTE-Bova

RV/LV cut-off	No of points	NRI (SE)	p	CT-Bova AUROC (95% CI)
>0.9	2	0.02 (0.03)	0.58	–
>1.0	2	0.17 (0.04)	0.00	0.948 (0.903–0.976)*
>1.1	2	0.06 (0.20)	0.75	–
when >1.0 and >1.2	1; 2	0.20 (0.04)	0.00	0.927 (0.877–0.961)*

AUROC for TTE-Bova 0.918 (0.806–1). AUROC, area under the receiver-operator curve; NRI, net reclassification improvement; SE, standard error. *Denotes no significant differences in AUROCs for CT-based Bova with investigated cut-offs.
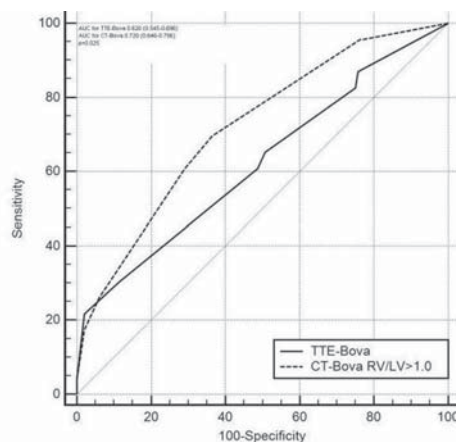
AUROC for CT-Bova RV/LV>1.0 and TTE-Bova