

Can Electrocardiography Predict Outcome in Severe Pulmonary Embolism?

Prognostic Value of Electrocardiography in Intermediate-High and High-Risk Pulmonary Embolism

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Background: Venous thromboembolism (VTE), including pulmonary embolism (PE), is associated with significant mortality. Prognostic assessment in PE remains challenging, and the role of electrocardiography (ECG) in current risk stratification is limited. Evidence regarding the prognostic value of ECG in intermediate-high and high-risk PE is scarce.

Aim: To investigate whether ECG signs of right ventricular (RV) strain, individual ECG signs, heart rate and heart rhythm can predict 30-day mortality and/or the need for reperfusion therapy in intermediate-high and high-risk PE.

Materials and Methods: Retrospective cohort study including patients with intermediate-high and high-risk PE treated at Danderyd Hospital 2021-2023. Patients with ECG signs of RV strain on admission were compared with those without such signs. Individual ECG-signs, heart rate and heart rhythm were also analyzed. The study outcome comprised 30-day mortality and/or need for systemic thrombolysis and/or catheter-directed thrombectomy.

Results: Of 172 included patients, 58% had ECG signs of RV strain. The presence of ECG signs on RV strain was associated with a higher risk of 30-day mortality and/or the need for reperfusion therapy, where ≥ 2 ECG signs on RV strain was associated with a threefold higher risk (adjusted OR 3.04; 95% CI 1.31-7.01). Also, individual ECG signs, including S1Q3T3, new-onset iRBBB, and right axis deviation, were associated with a 2-3-fold higher risk. Atrial fibrillation and heart rate ≥ 80 beats per minute (bpm) were also significantly associated with the outcome.

Conclusions: ECG signs of RV strain, heart rate ≥ 80 bpm and atrial fibrillation were associated with a higher risk of 30-day mortality and/or need for reperfusion therapy in intermediate-high and high-risk PE. These findings may therefore contribute to early risk assessment and help identify patients at higher risk of adverse outcomes.

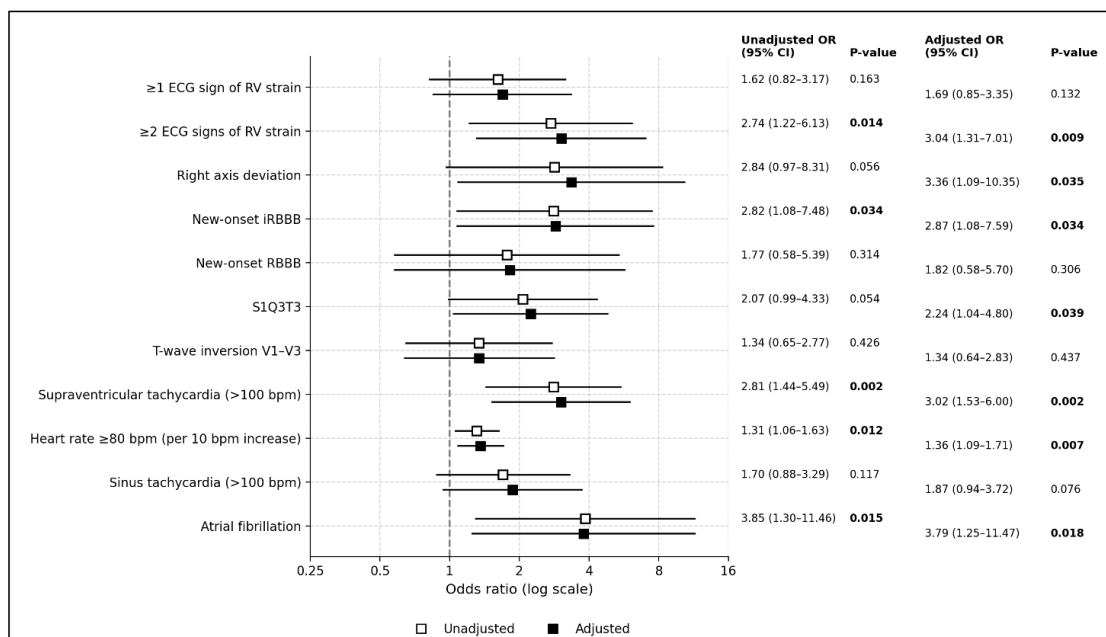


Figure 1. Association between ECG variables and 30-day all-cause mortality and/or the need of reperfusion therapy. Forest plot of unadjusted (open squares) and adjusted (filled squares) odds ratios with 95% confidence intervals from univariable and multivariable logistic regression analyses. All adjusted estimates were adjusted for age and sex. X-axis is logarithmic. P-values in bold are <0.05 . CI, confidence interval; iRBBB, incomplete right bundle branch block; OR, odds ratio; RBBB, right bundle branch block; RV, right ventricular; S1Q3T3, S wave in lead I, Q wave in lead III, inverted T wave in lead III.