

Severity of Right Ventricular Dysfunction and Risk of Clinical Deterioration in Intermediate-High-Risk Pulmonary Embolism

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Background: Patients with intermediate-high-risk pulmonary embolism (PE) represent a heterogeneous population with variable clinical outcomes. We investigated whether the severity of right ventricular (RV) systolic dysfunction, assessed by tricuspid annular plane systolic excursion (TAPSE), predicts in-hospital clinical deterioration.

Methods: We analyzed 151 patients with intermediate-high-risk PE. Patients were stratified according to TAPSE (≥ 16 mm, $10 - < 16$ mm, and < 10 mm). The primary endpoint was in-hospital cardiorespiratory deterioration, defined as respiratory worsening requiring high-flow nasal oxygen or non-invasive ventilation, or hemodynamic deterioration requiring vasopressor support. In-hospital mortality was evaluated as a secondary endpoint. Logistic regression assessed the association between TAPSE and deterioration, including adjustment for elevated lactate (> 2.2 mmol/L).

Results: Cardiorespiratory deterioration occurred in 39 patients (25.8%), and 11 patients (7.3%) died during hospitalization. Deterioration increased progressively with decreasing TAPSE (Table 1). TAPSE < 16 mm was associated with higher odds of deterioration compared with TAPSE ≥ 16 mm (OR 2.67, 95% CI 1.24–5.72; $p=0.015$). Each 5-mm decrease in TAPSE was associated with increased odds of deterioration (OR 2.07, 95% CI 1.22–3.51; $p=0.007$). After adjustment for elevated lactate ($n=124$), the association was attenuated (adjusted OR 1.70, 95% CI 0.95–3.05; $p=0.074$). Elevated lactate remained independently associated with deterioration (adjusted OR 4.53, 95% CI 1.85–11.08; $p<0.001$).

Conclusions: Greater TAPSE reduction was associated with progressively higher rates of clinical deterioration and in-hospital mortality. Although its association weakened after lactate adjustment, TAPSE may contribute to risk stratification alongside markers of systemic hypoperfusion.

Table 1. Clinical outcomes according to TAPSE

TAPSE	Patients, n	Deterioration, n (%)	Mortality, n (%)
≥ 16 mm	77	13 (16.9)	1 (1.3)
$10 - < 16$ mm	70	24 (34.3)	8 (11.4)
< 10 mm	4	2 (50.0)	2 (50.0)