THREE-DIMENSIONAL RIGHT-VENTRICULAR EJECTION FRACTION FOR PRAGMATIC TRIAGE AFTER PULMONARY EMBOLISM

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Background: Persistent symptoms after acute pulmonary embolism (PE) are frequent, while access to advanced chronic thromboembolic disease work-up is limited. Three-dimensional echocardiography (3DE) provides a direct quantification of right-ventricular (RV) systolic performance and may support post-PE triage.
Purpose: To describe 3DE-derived RV ejection fraction (3D-RVEF) at ≥3–6 months after PE and its association with functional status and NT-proBNP.
Methods: In 104 PE survivors evaluated ≥3–6 months after the index event, 3D-RVEF was measured when feasible and categorised as impaired (<45%) and severely reduced (<35%). Functional limitation was assessed using NYHA class and Post-VTE Functional Status (PVT). NT-proBNP was analysed using non-parametric comparisons and clinically relevant thresholds.
Results: 3D-RVEF showed wide dispersion (mean 35.5±12.2%; median 36.25 [IQR 25.75–44.0]; range 11.6–58.0). Impaired 3D-RVEF (<45%) was present in 80 (72.7%) and severe reduction (<35%) in 47 (42.7%). Patients meeting a severe RV dysfunction profile dominated by 3D-RVEF <35% exhibited higher NT-proBNP (median 149 [IQR 50–436.5] vs 89.5 [50–146.8] pg/mL; p=0.031), with more frequent elevations >125 pg/mL (58.3% vs 29.0%; p=0.003) and >300 pg/mL (33.3% vs 12.9%; p=0.019). Differences in functional indices were directionally unfavourable but not statistically significant (PVT≥3: 61.4% vs 51.9%, p=0.415; NYHA≥III: 35.6% vs 23.7%, p=0.199).
Conclusion: 3D-RVEF is feasible in routine follow-up and identifies a high prevalence of residual RV systolic impairment after PE. Severe 3D-RVEF reduction enriches for higher biomarker burden despite only modest separation by functional class. 3DE-based thresholds may provide a pragmatic first-line triage step to prioritise patients for intensified follow-up and advanced investigation.
Keywords: Pulmonary embolism; 3D right-ventricular ejection fraction (3D-RVEF); Right-ventricular dysfunction; NT-proBNP; Functional capacity; NYHA class; Post-VTE Functional Status (PVT); Risk stratification; Clinical triage
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