Letters to the Editor

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Right ventricle remodelling and elevated D-dimer concentration in patients 6 months after first episode of acute pulmonary embolism

We read with the great interest the paper by Stevinson et al., indicating that patients 6 months after the first episode of submassive acute pulmonary embolism (APE) show high rate of persistent right ventricular (RV) abnormalities on echocardiography, and significant functional limitations. On the basis of animal studies, the authors suggested that APE causes initial ischaemic and structural RV injury followed by an inflammatory response. Similar data were reported in our recently published study, which revealed that patients with elevated serum concentrations of troponin T (TnT, > 0.03 ng/mL) in the acute phase of APE tended to have larger RV diastolic area and presented significantly decreased RV systolic function after 6 months of guideline-consistent treatment. To our knowledge, our observation on diminished RV systolic function assessed by decreased systolic velocity of tricuspid annulus at Doppler tissue imaging is a novel finding and can potentially explain observations of Stevinson et al. The cardiopulmonary dysfunction at 6 months after APE can also be related to incomplete recanalization of pulmonary arteries thrombo-emboli. Even residual thrombi can lead to exercise-induced ventilation–perfusion mismatch. Incomplete recanalization of pulmonary arteries thromboemboli can be detected in approximately 60% of patient anticoagulated for 6 months after the first episode of APE. Importantly, RV dysfunction at the presentation and elevated D-dimer after 6 months anticoagulation significantly predicted incomplete recanalization pulmonary circulation after first episode of APE. All patients with D-dimer concentration > 500 ng/mL at follow-up had residual pulmonary arteries thrombi. All these observations indicate that both clinicians and researchers should be focused not only on acute phase of pulmonary embolism, but also on pathophysiology and clinical aspects of recovery after several months of treatment.

References


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apparent although less prominent (mean ± SD = 5.6 ± 5.8 years) compared with patients without insulin (4.5 ± 5.7 years; P = 0.016). Aware of this potential confounder, we did, as outlined in the statistics section of our article, apply a propensity score model to control for diabetes duration in a stepwise logistic regression. Other variables in this model were heart failure, hypertension, blood glucose, and the use of lipid-lowering drugs. Although a propensity score model cannot completely rule out some remaining influence of the included confounders ‘the influence of chronic hyperglycaemia’ was taken in consideration. Consequently, this is not a likely explanation of the increased likelihood of subsequent cardiovascular morbidity, especially not in patients with newly instituted insulin.

We do also agree that the formation of advanced glycation endproduct (AGE) may stand behind with untoward consequences of longstanding hyperglycaemia and as such responsible for part of the vascular damage related to diabetes.2 Hopefully, this may be counteracted by the early institution of glucose-lowering therapy and one remedy for this is insulin. We share the opinion that, if oral glucose-lowering therapy fails to normalize blood glucose, and the use of lipid-lowering drugs.

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The cardiopulmonary dysfunction at 6 months after APE can also be related to incomplete recanalization of pulmonary arteries thrombo-emboli. Even residual thrombi can lead to exercise-induced ventilation–perfusion mismatch. Incomplete recanalization of pulmonary arteries thromboemboli can be detected in approximately 60% of patient anticoagulated for 6 months after the first episode of APE. Importantly, RV dysfunction at the presentation and elevated D-dimer after 6 months anticoagulation significantly predicted incomplete recanalization pulmonary circulation after first episode of APE. All patients with D-dimer concentration > 500 ng/mL at follow-up had residual pulmonary arteries thrombi. All these observations indicate that both clinicians and researchers should be focused not only on acute phase of pulmonary embolism, but also on pathophysiology and clinical aspects of recovery after several months of treatment.
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We appreciate and endorse the work of Dr Pruszczyk et al. in the study of cardiopulmonary damage inflicted by pulmonary embolism (PE). We share the interest in quantifying the relationship between systemic inflammation and persistent right ventricular (RV) damage from PE. In the clinical study that provided the data for the report by Stevinson et al., we did not obtain blood specimens at follow-up. However, we will do so in our upcoming randomized, controlled trial of tenecteplase in submassive PE. A secondary objective in this trial will be to test whether persistent elevation of inflammatory biomarkers, including D-dimer, C-reactive protein, and monocyte chemoattractant protein, predict the persistence of RV dysfunction 3 months after PE.

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Erratum

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Regrettably, on page 1591, in the list of author names, the name of Fatih Bayrak was incorrectly quoted as ‘Bayrak Fatih’. The publisher wishes to apologize for this error.