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Editorial

Identification of normotensive patients with pulmonary embolism who may benefit from thrombolysis

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Pulmonary embolism (PE) is a life-threatening disease with high morbidity and mortality [1]. Rapid risk stratification in acute PE is crucial to identify PE patients with poorer prognosis and in deciding the appropriate therapy. While haemodynamic instability is associated with highest mortality rates, normotensive PE patients are a heterogeneous population with distinct differences regarding the occurrence of adverse events including short-term death [1]. The guidelines of the European Society of Cardiology (ESC) recommend a risk stratification of normotensive PE patients based on the Pulmonary Embolism Severity Index (PESI) [2], as well as imaging and blood markers of right ventricular (RV) dysfunction and subdivides the normotensive patients in low, intermediate-low and intermediate high-risk PE patients [1]. Beside the ESC guidelines risk stratification algorithm, several scores have been developed to identify normotensive patients who are at higher risk for adverse outcomes and mortality and might benefit from reperfusion treatments [1–4].

In their recent article "Derivation and external validation of the SHIeLD score for predicting outcome in normotensive pulmonary embolism", Freitas et al. [5] reported about a new risk stratification tool, the "SHIeLD score". The efficiancy of the "SHIeLD score" to predict 30-days PE-related mortality and/or rescue thrombolysis was compared to the ESC guideline risk stratification algorithm and established scores such as eStiMaTe score [4] and Bova model [3] [5]. The "SHIeLD score" was developed and validated in two retrospectively analyzed cohorts of two separate hospitals. Score development was proceeded in a cohort of 554 patients and the validation was demonstrated in a second cohort of 308 patients. The parameters shock index, hypoxaemia, lactate and cardiovascular dysfunction were identified as independent prognostic factors in the normotensive PE patients and included in the "SHIeLD score". The efficiency of the "SHIeLD score" to predict PE-related mortality and/or rescue thrombolysis was high with an area under the curve (AUC) of 0.90 in the derivation cohort and an AUC of 0.82 in the validation cohort [5]. The "SHIeLD score" revealed in comparison to the eStiMaTe score [4] and the BOVA score [3] a comparable prognostic performance; but as stated by Freitas et al. [5] as an important advantage of the "SHIeLD score", that the "SHIeLD score" could be calculated without performing echocardiography and/or lower limb ultrasound, since RV dysfunction was defined as RV/left ventricular ratio ≥ 1 in the computed tomography scan [5]. Although Freitas et al. [5] discussed the need to perform an echocardiography and/or a lower limb ultrasound as an important drawback regarding the eStiMaTe score and Bova model [3–5], echocardiography is currently and still the mainstay examination for the assessment of RV dysfunction in patients with acute PE [6,7]. Of course, the assessment of RV dysfunction on CT scan is established regarding the risk stratification of PE [1], but echocardiography present additional information regarding prognosis of patients with acute PE in comparison to the RV/left ventricular ratio in the CT scan [1,8,9]. Therefore, RV dysfunction detected on echocardiography, if available, might also be taken into account and under consideration when computing the "SHIeLD score".

The "SHIeLD score" is an interesting and promising tool to identify normotensive PE patients at higher risk to develop haemodynamic compromise and PE-related death, who might be monitored more intensively and treated with more aggressive therapy. According to current ESC guideline, reperfusion treatment is recommended for haemodynamically unstable high-risk PE patients, and should be considered as rescue treatment in selected normotensive patients, who are at risk of an imminent haemodynamically decompensation [1]. Several scores such as the Bova Score [3], the TELOS score [10] and now the SHiELD score [5] investigated different opportunities to use and weight parameters to improve risk stratification for normotensive PE patients. However, those risk stratification models assesses parameters at the moment of presentation only, little is known about risk

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factors developing over time during hospitalization. Therefore, a prospective study design is needed to identify parameters, which are assessed during the course of hospitalization and predict the risk of haemodynamic collapse and/or PE-related mortality. It remains to be seen, if the "SHIeLD score" might be an useable tool to identify normotensive PE patients, who might be treated with a reperfusion treatment before imminent haemodynamically decompensation.

Remarkably, although echocardiography is the mainstay examination for the assessment of RV dysfunction in patients with acute PE [6,7], the "SHIeLD score" is an interesting score without the need of echocardiography to predict 30-days PE-related mortality and/or rescue thrombolysis [5]. This is especially important in hospitals, where an echocardiographic examination is not readily and rapidly available (e. g. during the night hours) [5]. Thus, the "SHIeLD score" seems to be an useful adjuvant score in the risk stratification process of normotensive patients with acute PE in addition to the algorithm of the current ESC guidelines [1]. Nevertheless, additional prospective studies are needed to confirm the promising results of this present study and determine the role of the "SHIeLD score" in the risk stratification process in patients with a normotensive PE.

Disclosure of interest

The authors report no conflicts of interest.

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