Fine-tuning of risk prediction in PE: GFR and sPESi combined– powerful predictor of survival in patients with pulmonary embolism

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Abstract

Background : The PESI score is an established prognostic score of the severity of the acute -pulmonary embolism (PE). A recent randomized trial established the identification of low-risk PE (PESI classes I and II), as possible criteria for outpatient treatment of acute PE.

Purpose : To investigate whether adding biomarkers such as brain natriuretic peptide (BNP) and cardiac troponin (cTn) blood concentrations, echocardiographic parameters or glomerular filtration rate to sPESI can improve the prognostic value of acute PE.

Methods : The source of data was the Serbian multicenter PE registry which successively included 8 hospitals (7 university hospitals and one general hospital) during the period from 2014 to 2020. The study included 1201 consecutive patients with PE which was confirmed using MDCT. All patients underwent echocardiography examination on admission and blood samples were collected for troponin I (TnI), B-type natriuretic peptide (BNP), creatinine and other routine laboratory analyses. Renal function, or the glomerular filtration rate (GFR), was estimated using the Cockroft Gault formula : {(140 - Age) x wt (kg) x F} / Serum Creatinine (µmol), where F = 1.23 if male, and 1.04 if female.

Results : Intra-hospital mortality rate was 11.5%. Comorbidities such as chronic lung disease, prior stroke, diabetes, coronary artery disease, history of cancer in the last six months (p<0.05), chronic heart failure, abnormal liver function and kidney injury (p<0.001), were significantly more associated with lethal outcome. In the group of patients with in-hospital death, sPESI ≥2 was more prevalent (p<0.001), as expected. In the group of patients who survived, sPESI 0, sPESI 1 and sPESI ≥2 are almost equally present. Using three levels sPESI model: sPESI 0, sPESI 1 and sPESI ≥2, patients were divided into three groups. All-cause mortality and mortality rate due to pulmonary embolism only, were statistically significant different between three groups based on sPESI score (p<0.0001). Patients with sPESI≥2 were treated with systemic thrombolytics more frequently than patients with sPESI 1 and sPESI 0, as expected (p<0.0001) Analysis of the values of routine laboratory markers such as BNP, TnI, estimated GFR and right ventricular dysfunction across the groups based on sPESI score, revealed statistically significant differences of all mentioned parameters between groups of patients with sPESI0, sPESI 1 I sPESI ≥2 (p<0.001). The most important fact was that the statistically significant difference of all-cause mortality rate between the groups of patients with sPESI 0, sPESI 1 and sPESI ≥2 was ((HR 0.127 (CI 0.071-0.226); p <0.0001; (HR 0.330 (CI 0.219-0.498); p <0.0001), respectively.

Conclusion : Troponin, BNP, right ventricular dysfuncton are widely used for risk stratification and for guiding therapy regimen. Another marker that is still underused is estimated GFR. In our study, estimated GFR was, among biomarkes such as TnI, BNp and RVD, the only prognostic marker for 30-days all-cause mortality.

Biography

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