



Shock index for outcome and risk stratification in acute pulmonary embolism[☆]



Karsten Keller^{a,b,*}, Meike Coldewey^{a,b}, Martin Geyer^a,
Johannes Beule^c, Jörn Oliver Balzer^{d,e,f}, Wolfgang Dippold^{c,f}

^a Center of Cardiology, Cardiology I, University Medical Center Mainz (Johannes Gutenberg-University Mainz), Mainz, Germany

^b Center for Thrombosis and Hemostasis, University Medical Center Mainz (Johannes Gutenberg-University Mainz), Mainz, Germany

^c Department of Internal Medicine, St. Vincenz and Elisabeth Hospital Mainz (KKM), Mainz, Germany

^d Department of Radiology and Nuclear Medicine, Catholic Clinic Mainz (KKM), Mainz, Germany

^e Department of Diagnostic and Interventional Radiology, University Clinic, Johann Wolfgang Goethe-University Frankfurt/Main, Frankfurt (Main), Germany

Received 15 April 2016; received in revised form 6 May 2016; accepted 20 May 2016
Available online 7 June 2016

KEYWORDS

Shock index;
Tachycardia;
Blood pressure;
Thrombosis;
Embolism;
Right ventricular
dysfunction

Abstract *Introduction:* Risk stratification of patients with acute pulmonary embolism (PE) is crucial in deciding appropriate therapy management. Shock index (SI) is rapidly available and a reliable parameter. We aimed to investigate SI for short term outcome in acute PE.

Materials and methods: Data of 182 patients with acute PE were analysed retrospectively. SI was defined as heart rate divided by systolic blood pressure. Logistic regression models were calculated to investigate associations between SI and in-hospital-death, myocardial necrosis and presence of right ventricular dysfunction (RVD) respectively. Moreover ROC curves and cut-off values for SI predicting in-hospital death, myocardial necrosis and RVD were computed.

Results: 182 patients (61.5% female, mean age 68.5 ± 15.3 years) with acute PE event were included in the study. 5 patients (2.7%) died an in-hospital death.

Logistic regression models revealed an association between SI and respectively in-hospital death (OR 5.854, 95% CI 1.876–18.274, $P = 0.00234$), myocardial necrosis (OR 5.043, 95% CI 1.362–18.674, $P = 0.0154$) and RVD (OR 53.539, 95% CI 6.810–420.914, $P = 0.000155$).

[☆] The study was conducted in St. Vincenz and Elisabeth Hospital Mainz (KKM).

* Corresponding author. Center of Thrombosis and Hemostasis, University Medical Center Mainz, Johannes Gutenberg-University Mainz, Langenbeckstr. 1, 55131 Mainz, Germany. Tel.: +49 6131 17 8380; fax: +49 6131 17 8461.

E-mail address: Karsten.Keller@unimedizin-mainz.de (K. Keller).

^f Both authors were co-shared last authors.

ROC analysis for SI predicting in-hospital death, myocardial necrosis and RVD revealed an AUC of 0.806, 0.636 and 0.713 respectively with respectively SI cut-off values of 0.89, 0.75 and 0.54.

Conclusions: SI is a significant predictor of in-hospital death, myocardial necrosis and RVD. The effectiveness of SI to predict in-hospital death is high with an optimal cut-off value of 0.89 for differentiation between PE patients with lower and higher risk to die in hospital after acute PE event.

© 2016 Association for Research into Arterial Structure and Physiology. Published by Elsevier B.V. All rights reserved.

Introduction

Current guidelines emphasise the exceptional importance of early risk stratification of patients with an acute pulmonary embolism (PE).^{1–3} Risk stratification should help to identify PE patients with higher risk of early death, who could benefit from more intensive surveillance and especially more aggressive therapy.^{1,4,5}

Therefore, early risk stratification of patients with acute pulmonary embolism (PE) is crucial in deciding appropriate therapy management.

The Shock index (SI), defined as heart rate divided by systolic blood pressure, is a rapidly available and reliable parameter. Both parameters, heart rate and systolic blood pressure, are predictive for the outcome in PE on their own.^{3,6–11} Higher heart rate^{7,11–14} as well as lower systolic blood pressure^{6,8–11} were both predictive for poorer outcome in acute PE. Therefore heart rate and systolic blood pressure have been included in outcome scores such as pulmonary embolism severity index (PESI) as risk stratification parameters.^{9,11} Especially the systolic blood pressure is an important and powerful criterion in risk stratification and risk classification in patients with acute PE.^{3,9} Acute PE interferes with circulation, heart and lungs.^{2,15} If more than 30% of the pulmonary arterial bed is occluded by thrombus material, hemodynamic consequences of acute PE event occur.^{8,14} Severe obstruction of blood flow could result in right heart failure with insufficient maintenance of blood pressure and high risk of short term death.^{3,5,9,16} Hypotension with systolic blood pressure <90 mmHg was detected as one important prognostic factor in the International Cooperative Pulmonary Embolism Registry (ICOPER).⁶ In the PESI and the simplified PESI a systolic BP of <100 mmHg is one of the parameters to predict worse outcome.^{2,10,11} SI is a well-established and an independent predictor of short term mortality in acute PE (first 30 days after PE event),^{17,18} but limited data about optimal cut-off values for SI predicting short term outcome and especially in-hospital death in acute PE are available up to now.

The objective of this present study was to investigate SI as a risk stratification and outcome predicting parameter. We aimed to define optimal cut-off values for SI predicting in-hospital death, myocardial necrosis and right ventricular dysfunction (RVD) in patients with acute pulmonary embolism and to test the effectiveness of SI to predict these parameters.

Methods and patients

A retrospective analysis of the patients with a confirmed diagnosis of acute PE, who were treated in the Internal Medicine department of the St. Vincenz and Elisabeth Hospital in Mainz (Germany) between May 2006 and June 2011, was performed. We identified the PE patients with a search in the hospital information system database for the diagnostic code of PE (ICD-Code: I26). In Germany, diagnoses are coded according to ICD-10-GM (International Classification of Diseases, 10th Revision with German Modification).

Data were recorded and analysed anonymously, and were retrospectively collected from patient files. Studies in Germany involving a retrospective analysis of diagnostic standard data do not require an ethics statement.

Enrolled subjects

Patients were eligible for this study.

1. if diagnosis of acute PE was confirmed by identified filling defect in the pulmonary artery system in multi-detector spiral computed tomography with computed tomography angiography (CT) of the chest or positive venous ultrasound/phlebography of an extremity consistent with DVT in patients with typical symptoms of PE (chest pain or dyspnoea) and a detected positive D-Dimer or scintigraphic ventilation-perfusion scan of the lungs read as high probability for PE;
2. if the PE patients were treated in the Internal Medicine department of the hospital, and
3. if the patients were at least 18 years old.

All CT and scintigraphic images were analysed by experienced radiologists. If diagnosis of PE was not confirmed by the criteria above, patients were not included in this study.

Shock index

The SI was determined at the patients' admission to the hospital.

Definitions

Shock index

SI was defined as heart rate divided by systolic blood pressure.

Download English Version:

<https://daneshyari.com/en/article/2891357>

Download Persian Version:

<https://daneshyari.com/article/2891357>

[Daneshyari.com](https://daneshyari.com)