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Association of PC and AT levels in the early phase of STEMI treated with pPCI with LV systolic function and 6-month MACE

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ABSTRACT

Objectives: To examine a relationship between protein C (PC) and antithrombin III (AT III) activities with ejection fraction of left ventricle (EFLV), in the early phase of acute ST-elevation myocardial infarction (STEMI) treated with primary percutaneous coronary intervention (pPCI), and to investigate whether PC and AT III are associated with major adverse cardiovascular events (MACE) within 6 months following from pPCI.

Patients and methods: The research had a prospective character and included 357 patients who had, following the diagnosis of the STEMI, undergone pPCI at the Clinic of Cardiology and Emergency Internal Medicine, Military Medical Academy, Belgrade, Serbia, from January 2010 until April 2019.

Results: The EFLV positively correlated with PC values (rho = 0.229). There was a statistically significant increase in the PC values between patients with MACE compared with those without MACE at 6 months' follow-up evaluation ($p < 0.0001$). Also, significant difference in PC values between patients who died in hospital and those who were alive at 6 months' follow-up ($p < 0.01$) was observed. PC values were different across different EFLV groups ($p < 0.001$), increasing from the 1st to the 4th EFLV quartiles: the median and the interquartile values for the 1st, 2nd, 3rd and 4th quartiles were 1.0400IU/l ± 0.15, 1.1400IU/l ± 0.15, 1.1350IU/l ± 0.16 and 1.2200IU/l ± 0.14, respectively.

Conclusion: Increased PC activity in the early phase of STEMI is associated with higher EFLV 5 days after the pPCI as well as with MACE at 6 months after the pPCI.

KEYWORDS
Protein C; ST-elevation myocardial infarction; percutaneous coronary intervention; antithrombin III; left Ventricle

1. Introduction

Protein C (PC) is a vitamin K-dependent serine protease which is synthesized as a single polypeptide chain of 62 kilodaltons (kD). It circulates as a zymogen and exerts its anticoagulant function after activation to activated PC (aPC) [1]. Thrombin binding to thrombomodulin results in activation of PC into aPC which has the ability to inactivate activated factor V and activated factor VIII. These events are enhanced by the presence of Ca^{2+}, phospholipids, and a cofactor, protein S [2]. APC has the ability to inhibit the plasminogen-1 activator inhibitor; therefore, it also has an effect on the fibrinolysis process [3]. Protein S serves as a cofactor of the aPC in the inactivation of factors V and VIII. The inhibitory effect of the aPC is enhanced by protein S, another vitamin K-dependent anticoagulant protein. Inherited PC deficiency can lead to thrombophilia. Sex differences in the PC level have not been documented [3,4].

Antithrombin III (AT III) inhibits serine proteases. Its anticoagulant activity is mainly due to the inhibition of thrombin, activated factor X (FXa) and, to a lesser degree, other activated clotting factors (FIXa, FXIa, and FXIIa) [4]. It has been established that heparin potentiates AT III effect [5]. The most common manifestations caused by the deficiency of PC, protein S, AT III and aPC are deep vein thrombosis of the lower extremities, accounting for approximately 90% of all venous thrombotic episodes and pulmonary embolism [6]. Furthermore, deficiency of PC, protein S and AT III significantly increase the risk of venous thromboembolism (VTE) only in the presence of other risk factors (immobilization, surgery, trauma, pregnancy). AT III values are decreased after administration of heparin due to degradation of the ternary complex [4]. Only few studies and case reports have discussed the implications of thrombophilic defects in arterial thrombosis. The

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Supplemental data for this article can be accessed here.