

THE VALUE OF SERUM PROTEIN C LEVEL IN MYOCARDIAL INFARCTION

(Received 9 November, 1992)

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SUMMARY

Plasma protein C (PC) levels were measured in 15 controls and 30 patients with myocardial infarction (MI). In 19 of them an additional examination of PC level was performed on the 10th day of MI. There was no significant difference between control and the patient group in the first assay. However PC levels were found to be higher than control in the patient group on the 10th day. These results confirm a significant involvement of blood clotting system in ischemic heart disease but exact mechanism remains

to be clarified.

Key Words: Protein C, Myocardial Infarction.

INTRODUCTION

Protein C (PC) is a vitamin K dependent serine zymogen which, when activated by thrombin and endothelial-cell cofactor thrombomodulin, is a potent anticoagulant that selectively inactivates coagulation Factor V and Factor VIII (Fig. 1) (1-4). PC also

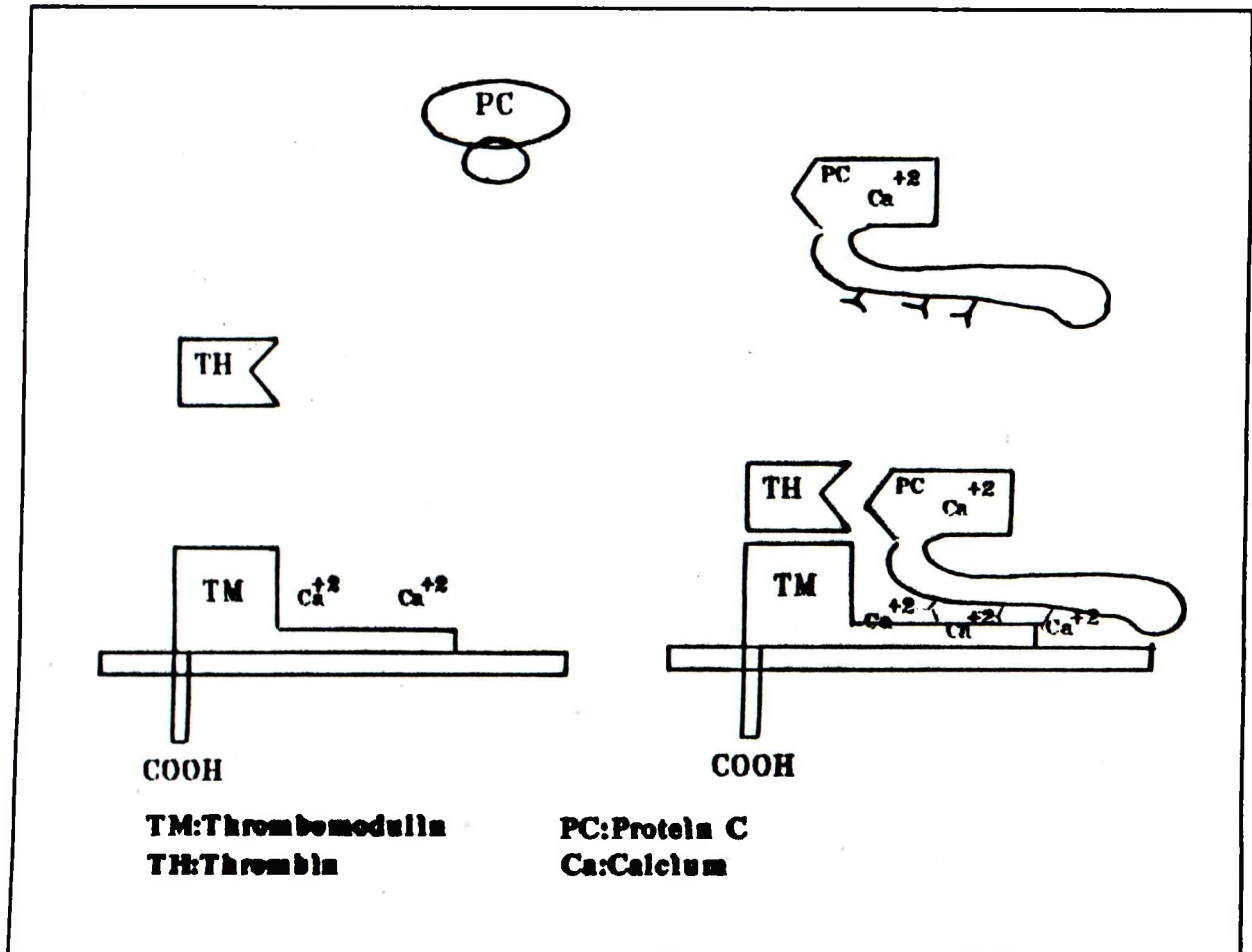


Fig.1. Activation of Protein C

generates potent fibrinolytic activity via directly neutralizing plasminogen activator inhibitor (5, 6). The clinical importance of PC has been established by demonstration of reduced PC antigen levels in patients with congenital thrombotic disease and in a number of acquired pathological conditions such as disseminated intravascular coagulopathy, adult respiratory distress syndrome and in the postoperative period, typically associated with in-vivo activation of coagulation mechanisms and excessive fibrin formation (3,6-8). Although the existence of a hypercoagulable state closely associated with myocardial ischemic episodes (unstable angina and myocardial infarction) is supported by many reports, only relatively little information is available on the behaviour of physiological blood clotting inhibitors in such clinical conditions (9).

This study has been designed to investigate PC concentration in plasma from patients with acute and chronic myocardial infarction in order to establish if modifications in PC levels could contribute to the activation of blood clotting system.

MATERIALS AND METHODS

Thirty patients (mean age 56.7) with acute MI were investigated. The diagnosis of ischemic heart disease was based on typical heart pain, CPK-MB levels, and ECG changes. Fifteen healthy persons (mean age

TABLE I. Conditions that affect protein C level.

- 1- Congenital protein C deficiency,
- 2- Acquired protein C deficiencies
 - a- Disseminated intravascular coagulopathy,
 - b- Adult respiratory distress syndrome,
 - c- Malignancy,
 - d- Hepatic disease,
 - e- Chronic renal failure,
 - f- Acute leukemia,
 - g- Drugs,
 - h- Plasma exchange,
 - i- Postoperative period.

49.4) were selected as a control group. PC level was measured again in 19 of the 30 patients with MI on the 10th day. The patients whose PC levels could be effected due to various conditions were excluded from the study. Diseases that may affect PC levels are shown in table I. Venous blood samples were obtained from antecubital vein and conserved in one-tenth volume 0.129 trisodium citrate. Platelet poor plasma was obtained by centrifugation of 3000X G for 30 minutes, stored at - 20 °C for upto 1 month. PC levels in plasma were assessed by ELISA method using Asserachrom PC commercial kit (10).*

RESULTS

The mean PC level was found to be 0.62 in the patient group and 0.64 in the control. No statistically significant difference was found between these two groups ($p > 0.05$).

The PC levels of the 19 patients, whose PC levels had been studied again on the 10th day, were compared with the results of the 1st day of the patient group and with the results of the control group. It was found that there was statistically significant difference in both comparisons ($p < 0.05$) (Fig.2).

DISCUSSION

In our study the levels of PC in acute MI were found to be within normal range when compared with the control group. The levels of PC in patients with chronic MI were higher than the control and the acute MI group.

PC level does not increase in acute MI, because PC is not an acute phase reactant, but in chronic MI, PC level increases. It seems that high levels of PC in chronic ischemic heart disease should be viewed as a defense mechanism to compensate for hypercoagulopathy. These findings are in agreement with the previous studies by others.

Viganno and Mannucci studied PC, orosomucoid, prothrombin and fibrinogen in 340 patients, which were composed of ischemic heart disease (IHD), rheumatoid arthritis, diabetes mellitus, etc. (11). They found that the pattern of PC differed from that of the other acute stress or surgical procedures and the levels of PC in chronic ischemic heart disease were high.

The increase of PC in patients with chronic IHD is therefore very unlikely to be non-specific in response to tissue damage; it seems conceivable that the elevation of PC plasma concentration in chronic IHD indicates an increased synthesis with hypercompensation of PC consumption due to activation of the blood clotting system.

Gensini investigated fibrinopeptid A and PC levels in 55 patients with IHD. He showed that fibrinopeptid A and the levels of PC of the patient group were higher than the control group (9). Hiroyasu also showed that the levels of PC were higher than control group in 136 patient with IHD (12). However, until turnover studies are available it is only speculative to postulate the mechanism responsible for PC increment in our patients.

In our study only PC concentration (not the activity) was evaluated. For this reason the possibility that the elevated findings of PC concentration may be due to the coexistence of free active PC complexed with its inhibitor in the circulating blood cannot be ruled out. More detailed studies are needed to arrive at definitive conclusion in the determination of the role

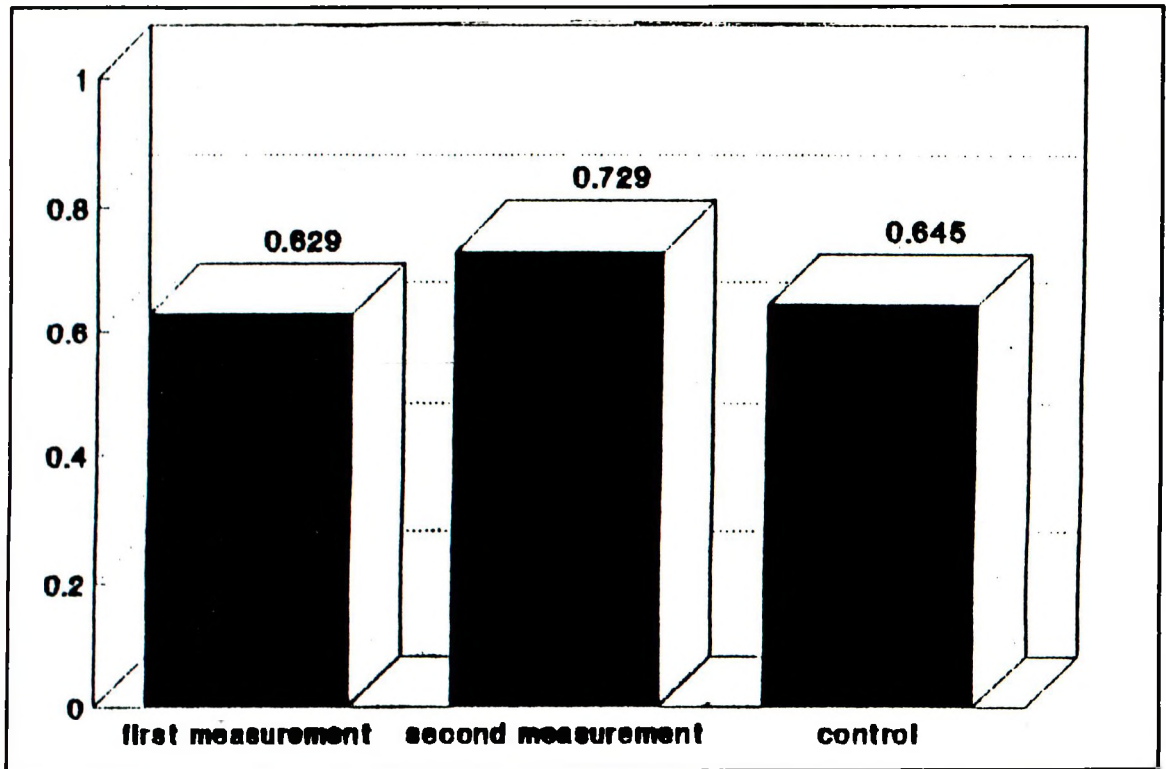


Fig.2. The mean values of protein C in the patient group and in the control group

of plasma PC concentrations in haemostasis network, including plasminogen activator inhibitor and antithrombin 3.

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