

THE RELATIONSHIP BETWEEN FIBRIN DEGRADATION PRODUCTS AND PROGNOSIS IN ACUTE MYOCARDIAL INFARCTION

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SUMMARY : *In this study, we planned to investigate fibrin degradation products (FDP) and the relationship between the levels of FDP, mortality rate and the complications in acute myocardial infarction (AMI).*

We investigated FDP with D-dimer method on 25 patients with AMI, and 25 healthy control individuals. It was found that the ratio of D-dimer positive result was higher in patients with AMI than the control group ($p < 0.05$). Eleven patients in AMI group had no complications and in this group D-dimer (+) rate was not different from the control group ($p > 0.05$). In 14 patients with AMI, one of the following complications, such as arrhythmia; cardiogenic shock, heart failure and embolus was seen and in this group D-dimer positivity rate was significantly higher than that of the AMI group without any complication ($p < 0.05$).

In AMI group, mortality rate was 86 % in D-dimer positive group and 17 % in D-dimer negative group. When these groups were compared, the difference was significant ($p < 0.05$).

In conclusion, we believe that plasma D-dimer levels may be useful in the prognosis of the patients with AMI.

Key Words : *Acute Myocardial Infarction, Fibrin Degradation Products, Prognosis.*

INTRODUCTION

As it is known that coronary arterial thrombosis usually plays an important role in the pathogenesis of AMI; fibrin and FDP call for attention. In AMI, fibrinogen increases as an acute phase reactant (3). After fibrin is formed, fibrinolytic enzyme system starts working and tries to eliminate the thrombus. Thus, the amount of FDP increases. Serum level of FDP may indirectly reflect the extent of the thrombotic process (3). The relationship between AMI and FDP has been studied for 30 years. Until recently, owing to the difficulty in measuring the quantity of FDP, it was impossible to get an exact re-

sult, since, while measuring FDP by means of the current methods, fibrinogen and FDP were also being measured. However, by means of a novel method improved recently, the D-dimer method (5), which is a specific marker of thrombolysis using monoclonal antibody, it is now possible to measure only FDP.

In this study, we have planned to investigate the relationship between FDP levels, mortality rate and complications of AMI in 25 patients.

MATERIALS AND METHODS

Twenty five patients with AMI (diagnosis has

been made according to ECG, high serum enzyme levels and patients' history) hospitalized in the Department of Internal Medicine of Cumhuriyet University Hospital, were included in the study. Nineteen of them were male and 6 were female, aged between 25-76 years with a median age of 56.64 ± 2.63 . All the outcomes were assessed during their stay of 1-3 weeks in the hospital. None of them received fibrinolytic therapy. They were classified into two groups; the first group with complications (such as; arrhythmia, cardiogenic shock, heart failure, acute pulmonary oedema and embolus) and the second without.

In AMI, in order to investigate whether FDP levels are different from those of normal individuals we included 25 age and sex matched healthy subjects as the control group. FDP were evaluated by D-dimer method (7), obtaining blood samples (at two different times) the moment they arrived at the hospital, and 48 hours following hospitalization.

We investigated whether there was a difference between the D-dimer (+) and D-dimer (-) groups statistically through "The significance test between two percentages of difference".

RESULTS

Statistically, the ratio of D-dimer positivity in AMI patients was significantly higher when compared to that of the control group ($p < 0.05$) (Table 1).

No complications have been found in eleven of the patients with AMI, and no difference has been noted in the ratio of D-dimer (+) incidence both in this group and the control group ($p > 0.05$) (Table 2).

	n	D-dimer (+)	%	Result
Control group	25	1	4	$p > 0.05$
AMI group without any complication	11	0	0	

Table 2 : The distribution of ratio of D-dimer positivity in control groups and in patients with AMI without any complications.

	n	D dimer (+)	%	Result
Complicated AMI group	14	7	50	$p < 0.05$
AMI group without any complication	11	0	0	

Table 3 : The distribution of D-dimer positivity between patient group having AMI without any complications and the patient group having AMI with complication.

	n	Mortality number	%	Result
D-dimer (+) group	7	6	86	$p < 0.05$
D-dimer (-) group	18	3	17	

Table 4 : The comparison of patients having AMI with D-dimer (-) and with D-dimer (+) according to mortality.

	n	D-dimer (+)	%	Result
AMI group	25	7	28	$p < 0.05$
Control group	25	1	4	

Table 1 : D-dimer (+) distribution in patients having AMI and control groups.

The D-dimer (+) incidence ratio among the 14 patients having AMI with complications was 50 % and D-dimer (+) that of patients having AMI without any complications was 0 %. The difference between the two groups was found to be statistically significant ($p < 0.05$) (Table 3).

As the mortality ratio of the patients having AMI with D-dimer (+) was 86 %, and that of the patients with AMI with D-dimer (-) was 17 %, the difference between the death ratios of the two groups was found to be statistically significant ($p < 0.05$) (Table 4).

When the relationship between the increase in D-dimer quantity and ratio of death was assessed, it was determined that the quantity of D-dimer increased directly proportional to the ratio of death.

DISCUSSION

As seen in the autopsies performed on patients dying of AMI, coronary arterial thrombus exists in most of the cases and is usually located on the atherom plaque (8). It has been shown in patients with AMI and on experimental MI in laboratory animals that fibrinolytic system becomes active during acute MI (9, 16). By the help of the new methods, FDP in plasma can be easily measured in a very short pe-

riod of time (5).

A group of investigators have claimed that fibrinolytic activity is a general reaction against stress regardless of damage and character of the tissue. On the other hand, many other researchers have claimed that complications and mortality increase with level of FDP that increased in AMI (1, 3).

In AMI patients minimally increased FDP indicates that the thrombin activity has increased but the spontaneous fibrinolysis which is dependent on plasmin is not enough. In some studies, it is pointed out that FDP levels increasing minimally can't be used in the diagnosis of AMI (6), since only in a few cases of the patients with AMI, high FDP levels were found (10, 13, 16).

Arya et al (1) have found the ratio of FDP (+) to be 30 % in 40 patients with AMI and 0 % in the control group. Rogers et al (11) have found that plasma D-dimer values were higher in 30 patients with AMI when compared with the age and sex matched control group.

Simank et al (12) in a study of 11 patients with AMI and 11 patients with deep vein thrombosis have found that D-dimer was (+) in 7 of the patients with AMI, (only in 2 patients (18 %) the increase of D-dimer positivity was relatively significant (more than 1 µg/ml)) and high D-dimer levels were present in 10 patients with deep vein thrombosis. According to this study, D-dimer values were less in patients with AMI than the patients with deep vein thrombosis.

The determined frequency of FDP positivity in the WHO reports is between 3.4 % and 47.8 % (14). Also in the studies made by Eisenberger et al (4) in Washington University, the level of D-dimer positivity was found to be higher in cases with AMI than that of the control group. In the studies made by two different groups, the ratio of D-dimer positivity was found higher than that in the control groups (6).

Also in our study, in seven of the 25 patients with AMI, D-dimer positivity has been determined, and D-dimer positivity has been found only in one patient in the control group. The difference between the two groups was significant ($p < 0.05$). These findings are in accordance with the literature (1, 3, 11).

Soria et al (15) have found the difference between the ratio of FDP in patients having AMI without any complications and normal healthy controls to be statistically insignificant. Also in our study, the-

re wasn't any difference between the frequencies of FDP seen in patients having AMI without any complications and the control group. Our results are in harmony with some other studies (1, 10, 13, 14).

No complications were observed in 11 (44 %) of our patients with AMI. But in 14 patients one or more complications such as; arrhythmia, acute pulmonary oedema, and embolus were determined. When the group with complications was compared in respect of the ratio of D-dimer positivity with the group without any complications; the difference between the two groups was found to be significant ($p < 0.05$).

Arya et al (1) have reported the ratio of FDP positivity as 91.7 % in the group having AMI with complications, and 21.4 % in the group without any complications. Probably this may depend on FDP being studied with protamine sulphate being administered everyday. Later, in the studies made by the D-dimer method in 1985 (3) and 1987 (15), it has been proven that the ratio of D-dimer positivity increases in patients who have AMI with complications.

Eisenberger et al (4) have reported that the ratio of D-dimer positivity was clearly higher in the group having AMI with complications than that in the patients without any complications.

Brenner et al (2) have obtained D-dimer values before and after the thrombolytic treatment in patients with AMI. They have showed that D-dimer reflects degradation products of cross linked fibrin polymers more than coronary arterial thrombosis. They showed that this method can be used in predicting lysis of a great thrombus.

Seifried et al (12) have claimed that increased FDP wasn't a specific marker for lysis of intracoronary thrombus. They have also claimed that, not only did increased FDP levels arise from lysis of systemic fibrin but it also includes lysis of local fibrin. But Allan et al (6) have determined that D-dimer measurement after streptokinase in patients having AMI can be useful in following fibrinolysis during thrombolytic treatment. This subject is controversial and there are also some publications not supporting this point of view (11, 12).

In our study, when the mortality rates of D-dimer (+) and D-dimer (-) groups were compared, it has been observed that the mortality ratio in D-dimer(+) group increased ($p < 0.05$). In our cases with

AMI, two patients with the highest D-dimer levels died of cardiogenic shock. Since the number of the cases was not enough, we had no chance of comparing plasma D-dimer levels and the type of complications. However we observed both in our study and in studies (1, 3, 7, 15) performed earlier that, whenever FDP increases, mortality and complication ratio ratios increase as well.

In conclusion, we believe that plasma D-dimer level is a noninvasive and rapid method both in follow up and determination of the prognosis in patients with AMI. But in order to say something strict, further studies performed on larger population groups are necessary.

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