

Preinfarction Angina Associates with Absence of Right Ventricular Infarction after First Acute Inferior Myocardial Infarction

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ABSTRACT

Objective: We sought to examine the association between preinfarction angina and a lower risk of right ventricular infarction (RVMI) in patients with first acute inferior myocardial infarction (MI).

Methods: One hundred seventy patients who were admitted to cardiac care unit after first acute inferior MI with ST segment elevation and symptom duration < 12 hours and received thrombolysis were studied. Preinfarction angina within 24 hours prior to MI was present in 62 patients (Angina group) whereas the remaining 108 patients (Cohort group) had no chest pain preceding acute MI. The course of the in-hospital phase of MI was analyzed. The outcomes studied were presence of RVMI together with inferior MI, major complications and in-hospital mortality.

Results: In angina group 15 (24.2%) patients had RVMI, while in control group 70 (64.8%) patients suffered from RVMI (adjusted odds ratio, 0.32, confidence interval, 0.09 to 0.86 $P=0.01$). Absence of preinfarction angina was predictor of development of RVMI ($P< 0.001$), complete atrioventricular block; ($P< 0.01$), cardiogenic shock ($P< 0.001$) and in-hospital mortality ($P = 0.02$).

Conclusion: Patients with Preinfarction angina, occurring within 24 hours of acute MI, have a lower rate of right ventricular infarction and better in-hospital outcome than patient without antecedent angina. These results may be attributed to the protective effects of ischemic preconditioning. (Rawal Med J 2008;33:43-46).

Key words: Preinfarction Angina, right ventricular myocardial infarction, outcome.

INTRODUCTION

Brief episode of ischemia (short-lasting and transient anginal pain) before sustained coronary occlusion protects the heart by delaying lethal injury and limiting the size of the infarct, an effect known as ischemic preconditioning. Clinical studies have confirmed that angina shortly before the onset of acute myocardial infarction (AMI) is associated with a smaller infarct size and better short and long-term outcomes.^{1,2} But there is insufficient data about incidence of right ventricular myocardial infarction (RVMI) in setting of inferior MI with the presence of preinfarction angina. We hypothesized that preinfarction angina occurring within 24 hours prior to the onset of acute inferior MI may reduce the extension of MI and incidence of RVMI and improve the clinical outcome in patients with acute inferior MI.

METHODS

We prospectively studied 170 consecutive patients admitted to our coronary care unit of Madani Heart Hospital in Tabriz-Iran between January 2006 and March 2007 with first acute inferior MI. Patients were eligible for inclusion in the study if they had acute inferior MI on the basis of electrocardiography, including the use of right precordial leads, performed within 12 hours after the onset of infarction.

Acute inferior MI was defined as the presence of typical chest pain lasting for more than 30 minutes; ST-segment elevation of more than 0.1 mV in two or more of leads II, III, and aVF; and a serum creatine kinase more than twice the upper limit of the normal range. Standard 12-lead and right precordial electrocardiograms were obtained immediately after admission. Right ventricular infarction was defined as ST-segment elevation of more than 0.1mV in lead

V_{4R}. Patients who met the inclusion criteria were divided into two groups according to the presence (Angina group) or absence (Control group) during 24 hours before infarction. Preinfarction angina was defined as one or more episodes of typical chest pain lasting less than 30 minutes during 24 hours before infarction. All patients received streptokinase.

We compared the rate of in-hospital mortality, and incidence of major complications (right ventricular infarction, complete atrioventricular block and cardiogenic shock) in the both groups. Chi-square test or Fisher's exact test was used to examine the differences of the categorical variables between the two groups. The mean values for continuous variables were compared by using Independent Samples *t*-test. Odds ratios were calculated with corresponding 95 percent confidence intervals. A $p \leq 0.05$ was considered significant.

RESULTS

Of 170 patients, 62 had preinfarction angina (Angina group), and 108 (Control group) did not. There were no significant differences in age, gender, coronary risk factors, preadmission medications and reperfusion therapy between two groups (table 1).

Table 1. Baseline characteristics of patients.

	Angina group n = 62	Control group n = 108
Age(Year)	60±16	63±18
Male	43(69.3%)	69(63.9%)
Hypertension	30(48.4%)	53(49.1%)
Diabetes Mellitus	22(35%)	32(30%)
Cigarette Smoking	19(31%)	34(31.5%)
Serum Cholesterol level> 200mg/dl	21(34%)	42(38.9%)
Serum TG level > 250mg/dl	22(35%)	34(31.5%)
Aspirin	40(65%)	67(62%)
Nitrates	30(48.4)	57(52.2%)
Beta blockers	37(59.7%)	65(60.2%)
ACE inhibitors	30(48.4%)	43(39.8%)
Ca Channel blockers	9(15%)	20(18.5%)

RVMI was found in only 85 of 170 patients. As shown in Table 2 ST-segment elevation in lead V_{4R} was noted less frequently in Angina group than in Control group (24.2% vs. 27.8%, $P < 0.001$). Angina 24 hours before infarction was most strongly associated with lower rates of RVMI (adjusted odds ratio, 0.32; 95% confidence interval, 0.09 to 0.86; $P = 0.01$). In addition, patients with angina were less likely than those without angina to have complete atrioventricular block (14.5% vs. 35.2%, $P < 0.01$), cardiogenic shock (8.1% vs. 27.8%, $P < 0.001$) and in-hospital mortality (5% vs. 10.2%, $P = 0.02$) (table 2).

Table 2. Clinical outcomes, according to presence or absence of preinfarction angina.

Variable	Angina group n=62	Control group n=108	P
ST-segment elevation In lead V _{4R}	15(24.2%)	70(64.8%)	0.01
Complete atrioventricular block	9(14.5%)	38(35.2%)	0.01
Cardiogenic Shock‡	5(8.1%)	30(27.8%)	0.01
In-hospital mortality	3(5%)	11(10.2%)	0.02

‡ Cardiogenic shock was defined as a systolic pressure of less than 80mmHg at the time of admission to the hospital.

DISCUSSION

In our study, the absence of preinfarction angina was an important predictor of the occurrence of RVMI in patients with acute inferior MI. In general, the incidence of RVMI is lower than would be expected on the basis of the frequency of proximal occlusion of the right coronary artery.³ As compared with the left ventricle, the right ventricle has a lower oxygen requirement due to its smaller muscle mass and workload that may protect it from ischemia.³ These factors may limit the size of RVMI but do not fully explain the distinct differences in the pathological findings and for the relative infrequency of right ventricular infarction. According to our results, presence or absence of preinfarction angina may help to explain the relative infrequency of right ventricular

infarction and may also be associated with a better early outcome. ST-segment elevation in lead V_{4R} has been considered the most sensitive and specific diagnostic marker of right ventricular infarction.^{4,5}

In our Study, the patients without preinfarction angina were 2.5 times as likely to have complete atrioventricular block as those with angina. An association between complete heart block and overall infarct size has been shown.⁶ Therefore, the lower incidence of complete atrioventricular block in our patients with angina may reflect the smaller infarcts in these patients. Furthermore, preinfarction angina may have provided some protection against the subsequent ischemic burden on the atrioventricular node.

The incidence of combined hypotension and shock was also substantially lower in the patients with preinfarction angina than in those without angina. Previous studies showed that cardiac output was influenced more by the magnitude of right ventricular dysfunction than by that of left ventricular dysfunction.⁷ Therefore, the lower incidence of right ventricular infarction in patients with preinfarction angina seems to be associated with a lower incidence of hypotension and shock in such patients. Complete atrioventricular block leading to bradycardia and loss of atrioventricular synchrony accounts in part for development of hypotension and shock.⁷

Many authors have suggested that preinfarction angina has a favorable rather than a harmful effect on the clinical outcome. A smaller infarct size,⁸ better preservation of left ventricular function,¹ a lower incidence of shock,⁹ less frequent reocclusion after thrombolysis¹ and more rapid reperfusion¹⁰ have been reported in patients with preinfarction angina as compared with those without angina. Myocardial ischemia induced by gradual coronary occlusion may facilitate the development of collateral circulation.¹¹ In previous studies,^{11,12} the patients with preinfarction angina had more extensive development of collateral circulation than those without angina, although in some studies the difference was not statistically significant. Therefore, it remains possible that collateral circulation is responsible in part for the infrequency of right ventricular infarction in patients with preinfarction angina.

RVMI has been reported as an independent predictor of the short-term outcome in patients with inferior myocardial infarction.¹³ In our

study, the absence of preinfarction angina was the most powerful independent predictor of the three chief complications of inferior myocardial infarction, because the development of right ventricular infarction itself was also closely associated with preinfarction angina, as were complete atrioventricular block, shock and in-hospital mortality. In conclusion, our results establish the importance of preinfarction angina as a predictor of the absence of right ventricular infarction in patients with acute inferior myocardial infarction. Moreover, preinfarction angina is associated with better short-term outcomes in patients with acute inferior myocardial infarction.

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