Original Article

PRE-INFARCT ANGINA A PROTECTIVE FACTOR REGARDING POST-INFARCTION IN-HOSPITAL COMPLICATIONS

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ABSTRACT

OBJECTIVES:The objective of the study was to compare LV dysfunction in patients with and without pre-infarction angina.

MATERIALS AND METHODS: This Cohort study was conducted at Punjab Institute of cardiology emergency department from 30-06-2010 to 31-12-2010 (6 months). 400 patients presenting with first time ST-segment elevation myocardial infarction, were taken from the Emergency Department. Informed consent was taken from every patient. Patient's demographic information was collected. Patients were then divided into two groups, patients with pre-infarction angina (Group A) and patients without pre-infarction angina (Group B). Then every patient underwent echocardiography on 7th day after STEMI and their left ventricular function was assessed by a same consultant. Arrhythmias, shock and death was noted along with LV function on pre specified performa.

RESULTS: A total of 400 randomized patients were taken with first myocardial infarction and were examined for the effects of presence and absence of prodromal angina on short term basis. It was seen that patients with preinfarction angina had less chances of arrhythmias (2.0% vs 9.7%, p=0.00), cardiogenic shock (1.5% vs 9.2%, p = 0.00), re-infarction (1.0% vs 5.6% p =0.09) and in-hospital deaths (1.5% vs 5.1% p = 0.05). Similarly, left ventricular dysfunction was more common in patients without history of prodromal angina (37.28% vs 44.90%, p =0.00). Multivariate analysis made confirmation that the absence of angina before myocardial infarction was an independent predictor of in-hospital cardiogenic shock and death.

CONCLUSION:Prodromal angina a week before acute myocardial infarction protects against in-hospital complications and also preserves myocardial function.

KEY WORDS: Preinfarction angina, LV dysfunction, ST-elevation MI

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INTRODUCTION:

At the beginning of the 21st century, CVD accounts for nearly half of all deaths in the developed world and 25 percent in the developing world. By 2020, it is predicted that CVD will claim 25 million lives annually and that coronary heart disease (CHD) will surpass infectious disease as the world's number one cause of death and disability.

IHD is one of the leading cause of death worldwide even now in the developing countries and myocardial infarction is the commonest among them. Acute myocardial infarction is one of the commonest diagnosis occurring in hospitalized patients in the world, in the United States 1.5 million people suffer from acute myocardial infarction each year. There is 50% occurrence of pre infarction angina in patients with acute myocardial infarction.[1-5]

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MATERIAL AND METHODS:

This cohort study was conducted at emergency department, Punjab Institute of cardiology from 30-06-2010 to 31-12-2010 (6 months). 400 patients presenting with first time ST-segment elevation myocardial infarction were selected from emergency department and divided into two groups on the basis of presence or absence of preinfarction angina, group A and group B respectively. Informed consent was taken from every patient. Patient's demographic information was collected. Then every patient underwent echocardiography on 7th day after STEMI and their left ventricular function was assessed by a same consultant. Arrhythmias, shock and death was noted along with LV function on a pre specified performa.

OPERATIONAL DEFINITION:-

Pre infarction angina

Presence of resting or exercise induced typical chest pain lasting less than 30 minutes and relieved spontaneously or by nitrates during one

week before infarction.

Myocardial Infarction

Typical chest pain lasting more than 30 minutes not relieved by nitrates and having ST segment elevation of at least 0.2mV in at least two contiguous leads and serum CK-MB concentration more than two times the upper limit of the reference range(25IU/L) at 6-12 hrs after admission.

Left ventricular dysfunction

Defined as when ejection fraction was less than 40% on echocardiography after 7 days of ST-elevation myocardial infarction.

Patients between 30-70 years (both sexes) with-acute myocardial infarction within 12hrs as per operational definition were included.

Patients with cardiomyopathy, valvular heart disease and ventricular tachycardia and ventricular fibrillation, on history, ECG and echo cardiography. Patients with connective tissue diseases involving heart like SLE, arthritis, scleroderma from previous medical record and history.Patients having history of previous myocardial infarction or coronary bypass surgery(previous record, on history). Patients of diabetic nephropathy or having pregnancy were excluded.

STATISTICAL ANALYSIS:

The data was entered and analyzed using SPSS 19.0 (Statistical Package for Social Sciences). Mean± SD (standard deviation) was calculated for normally distributed quantitative variables (like age).Frequencies and percentages were calculated for qualitative variables (like gender and left ventricular dysfunction).Chi square test was used to compare frequency of left ventricular dysfunction in two groups.P value of ≤ 0.05 was considered as statistically significant.

RESULTS:

We took total 400 patients in which 200 patients (group A) were presented with history of pre-infarction angina and 200 patients (group B) had no history of pre-infarction angina.

There was no remarkable difference in mean age of the two group populations i.e. 45.69 (group A) vs 45.08 (group B) p value 0.59 (Table-1). Although males (n=239) are more in numbers as compared to females (n=161) presenting with myocardial infarction but their p value was not significant (0.12). The number of patients which were having history of hypertension was almost equal in both the groups and had the p value of 0.31 which was also not significant. Diabetic patients were more in group B (n=56) with no antecedent angina as compared to the group A (n=39), this indicated prevalence of diabetic neuropathy in these patients and p value was also significant i.e. 0.02. There was also marked difference in percentages of patients with history of smoking in both groups (group A 37.6% and group B 27.2% with p value of 0.02 which is significant) (Table-1).

No significant difference in number of patients with family history of IHD in both groups (96 vs 100) with p value of 0.37. The patients with preinfarction angina had less number of hypercholesterolemia as compared to the group B with significant p value (Table. 1)

Patients with anterior wall MI were highest in numbers in both groups(A & B). After that its anteroseptal wall MI which was more in number (n=56). Patients with lateral wall MI were almost equal in number in both groups. No remarkable difference was noted in number of patients with acute inferior wall MI in two groups (16 vs 11) and overall p value was not significant (0.36). Of 400 patients, 181 of group A and 170 of group B were given the thrombolytic therapy in less than 12 hours, having p value of 0.73 which was also not significant. Although the mean CK-MB in group A is 375.60 which was less than the group B but the p value of both groups was not significant which was 0.08 (Table.2)

In group A, 87.2% patients were given the thrombolytic therapy and in group B 88.3% patients were thrombolysed. So, it was concluded that more patients without preinfarction angina were thrombolysed.

In group A, mean% of EF was 44.90 as compared to the group B which was 37.28% with p value of 0.00 which was remarkably significant. That means EF in group A was significantly better because of pre-infarction angina indicating that EF was better in patients with pre-infarction angina than in patients without it. There was only one patient in group A and 10 patients in group B who's EF were less than 30%. Similarly, there were more patients in group A (n=18) as compared to group B (n=01) whose EF were >50%. The patients in group A (n=144) had EF between 40-50% while in patients of group B had EF between 40-50% (n=39). So, the percentage of EF was more in patients with pre-infarction angina as compared to patients with non preinfarction angina (Table.3)

In-hospital complications of patients with and without pre-infarction angina were arrhythmias (n=23), 4(2%) in group A and 19(9.7%) in group B, with P value (0.00). About 1.5% patients in group A and 9.2% patients in group B, went into cardiogenic shock with p value of 0.00 which was

Table.1. Baseline characteristics of patients

Characteristics of Patient		Group A (with pre-infarction angina)	Group B (without pre-infarction angina)	TOTAL	P-VALUE
Age in years ±sd		45.69 ± 6.7	45.08 ± 5.9	45.40 ± 6.4	0.59
Gender	Male	130(63.4%)	109(55.9%)	239(40.3%)	0.12
	Female	75(36.6%)	86(44.1%)	161(59.8%)	
Diabetes mellitus		39(19.0%)	56(28.7%)	95(23.8%)	0.02
Hypertension		97(47.3%)	102(52.3%)	199(49.8%)	0.31
Smoking		77(37.6%)	53(27.2%)	130(32.2%)	0.02
Family history of IHD		96(46.8%)	100(51.3%)	196(49.0%)	0.37
Hypercholesterolemia		80(39.0%)	112(57.4%)	192(48.0%)	0.00

Table.2. Site of myocardial infarction

	Group A (with pre-infarction angina)	Group B (without pre-infarction angina)	Total	P value
Anterior wall MI	162(79.0%)	147(75.4%)	309(77.3%)	0.36
Anteroseptal wall MI	23(11.2%)	33(16.9%)	56(14.0%)	0.36
Inferior wall MI	16(7.8%)	11(5.6%)	27(6.8%)	0.36
Lateral wall MI	04(2.0%)	04(2.0%)	08(2.0%)	0.36
Tharombolytic therapy given in <12hrs	181 (88.3%)	170 (87.2%)	351 (87.8%)	0.73
CK-MB(mean ±sd)	375.60 ± 183.06	749.55 ± 277.81	557.90 ± 299.47	0.08

Table 3: Percentage groups of ejection fraction

Ejection Fraction	Group A (with pre-infarction angina)	GroupB (without pre-infarction angina)	Total	P-value
Mean %	44.90%	37.28%	41.19%	0.00
<30%	01(0.5%)	10(5.1%)	11(2.8%)	
30-40%	42(20.5%)	145(74.4%)	187(46.8%)	
40-50%	144(70.2%)	39(20.0%)	183(45.8%)	
>50%	18(8.8%)	01(0.5%)	19(4.8%)	

Table 4: In-hospital comlications of patients

Characteristics of Patient	Group A (with pre-infarction angina)	Group B (without pre-infarction angina)	Total	P-Value
Arrhythmia	04(2.0%)	19(9.7%)	23(5.8%)	0.00
Cardiogenic Shock	03 (1.5%)	18 (9.2%)	21 (6.2%)	0.00
Re-Infarction	02 (1.0%)	11 (5.6%)	13 (3.3%)	0.009
Mechanical Comlications	VSD 01(0.5%) MR 01 (0.5%)	VSD 05(2.6%) MR 07 (3.6%)	06 (1.5%) 08 (2.0%)	0.01
Deaths	03(1.5%)	10(5.1%)	13(3.8%)	0.005

very much significant.

As far as mechanical complications were concerned, more patients in group B (6.2% vs 1.0%) had these complications and more common was MR as compared to VSD, with significant p value (0.01). 11 patients in group B got re-infarction during hospital stay and only 02 patients in group A had this complication showing the p value of 0.009. We also compared the number of deaths in both groups, 10 patients in group B died as compared to just 03 in group A with p value of 0.005 which was again highly significant. It was clearly indicated that all of the mentioned complications were more common in patients without history of pre-infarction angina than patients with pre-infarction angina (Table.4)

DISCUSSION:

There are number of clinical and experimental studies which have shown the role of preinfarction angina in protecting myocardium, decreasing infarct size, improving contractility of myocardium, decreasing the in-hospital complications and in preventing the damage of the microcirculation [6-13]. While other reported a lower mortality rate in patients with previous history of angina and when thrombolytic therapy was also given.[6] There are other trials which compared the outcome of the patients with history of MI and had antecedent exertional and resting or sleep angina and showed that stable angina offered more benefit to the patients than exertional angina[10]. On the other hand there are also some studies where they compared the both groups and had shown that there is no remarkable difference in outcome of the patients presented with and without preinfarction angina.[7] Different study protocols and differences in patients selection as well as inconsistency in definition of preinfarction angina can lead to the different results.

Both the Thrombolysis In Myocardial Infarction(TIMI)-4 and (TIMI)-9 thrombolytic trails showed that the angina within 48 hrs before myocardial infarction might reduce infarct size, improve survival, increase ventricular function and decrease chances of arrhythmia.[14,15]

In our study, we mainly compared the left ventricular dysfunction in patients with and without preinfarction angina and also covered the comparison of other complications between these two groups. We concluded that those patients who had preinfarction angina a week before myocardial infarction had less left ventricular dysfunction and better ejection fraction than those patients who had no antecedent preinfarction angina. This was previously reported in another study that presence of angina, a week before myocardial infarction had good impact on left ventricular function and less remodeling [16,17]. This effect can be explained on the basis of ischemic preconditioning which is much related with preinfarction angia. Ischemic preconditioning is actually the short periods of ischemia which makes the myocardium more resistant to next episode of sustained ischemia. This term was firstly used by Murry, et al[18], who found in a canine model that 4 periods of coronary occlusion of 5 minutes were able to reduce the infarction size caused by a subsequent period of occlusion of 40 minutes by 75%. In preconditioned

myocardium, brief episodes of ischemia and then reperfusion gets structural signs of lethal ischemic injury more slowly than control myocardium. The cellular structure preservation is due to reduce myocardial energy demand and a slow rate of ATP utilization. Either ATP stores preservation or reduce catabolite accumulation or both may be the mechanism by which a reduced energy demand maintains cell viability in the preconditioned heart during ischemia[19,20].

This is why, preconditioned myocardium has better reperfusion and microcirculation after revascularizition.[10,21] Ischemic preconditioning is also associated with prolonged opening of the K-ATP channels which ultimately will lead to increase conductivity of K ions, resulting in hyperpolarization of smooth muscle membranes. Thus producing vasodilatation and improving perfusion[22] and increasing myocardial contraction. So, our study was in line with the above mentioned studies. The preservation of microcirculation is the strong possible mechanism by which preinfarction angina gives protection to the ischemic myocardium.[7]

In the past studies, it has been reported that angina before myocardial infarction is associated with less chances of arrhythmia and heart blocks and that in turn led to increased chances of survival [6,23]. In the present study, arrhythmias were less common in those patients who had myocardial infarction with prodromal angina than patients without angina.

If we look at the previous studies, patients with myocardial infarction having no antecedent angina, cardiogenic shock and other mechanical complications were more common.[6] Same results were noted in our study.

In past studies, it had been seen that CK-MB was not too much raised in those patients who had history of preinfarction angina while it was significantly higher in patients without preinfarction angina.[13,17,23]

Similarly, previous experimental studies had shown that death rate in patients with history of preinfarction angina was less than those patients who had no history of prodromal angina.[23,24] If we compare the given studies to the present study, same conclusion was seen in our study.

As for as reinfarction is concerned, it had been seen in previous studies that it was higher in those patients who had no history of prodromal angina than with it [6]. The results of our study matched with past international studies.

CONCLUSION:

Prodromal angina a week before acute myocardial infarction protects against in-hospital complications and also preserve myocardial function.

Author's Contribution

SRB: Collected the data and conducted the study. AS: Helped in collecting reference studies.SZ: Helped in analysis of data.

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