Pak Heart J

COMPARISON OF OUTCOME OF PATIENTS HAVING FIRST ACUTE MYOCARDIAL INFARCTION WITH OR WITHOUT PRE-INFARCT ANGINA

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Date Received: December 03, 2014
Date Revised: December 22, 2014
Date Accepted:January 19, 2015

Contribution
All the authors contributed significantly to the research that resulted in the submitted manuscript.

All authors declare no conflict of interest.

This article may be cited as: Javed K, Ali N, Sherwani M. Comparison of outcome of patients having first acute myocardial infarction with or without pre-infarct angina. Pak Heart J 2015;48(2): 107 - 110.

ABSTRACT

Objective: To compare outcome of patients having first acute myocardial infarction with or without pre infarct angina.

Methodology: This cross sectional study was done in department of cardiology in Chauhdary Pervaiz Elahi Institute of Cardiology Multan. Patients of acute myocardial infarction (divided in two equal groups) were included in the study. Based on the history of preinfarct angina, patients were stratified into two equal groups; group A patients who had pre-infarct angina and group B with no angina . Patients were admitted in the coronary care unit and were monitored with ECG for rhythm abnormalities, echocardiography for left ventricular systolic dysfunction and in-hospital mortality.

Results: There were 200 patients included in this study. Mean age of the patient population was 52.51 ± 6.37. There were 125 (62.5%) males and 75 (37.5%) females. Systolic dysfunction was identified in 6% in group A and 29% in group B ($p < 0.0001$, Odd's ratio of 6.399), arrhythmia in 12% patients in group A and 33% in group B ($p = 0.001$, Odd's ratio of 3.612), mortality was present in 5% patients in group A and in 15% in group B ($p = 0.032$ and an Odd's ratio of 3.353).

Conclusion: Preinfarct angina was associated with an improved outcome in patients with first MI as compared to those patients who never experienced angina. This improved outcome was significant in all the three variables which we studied, i.e. arrhythmias, systolic dysfunction and mortality.

Key Words: Acute Myocardial Infarction, Pre Infarct Angina

INTRODUCTION

One or more brief episodes of coronary occlusion have been shown to limit myocardial infarct size after a prolonged occlusion. Murry et al, called this phenomenon "preconditioning".[1,2] It is defined as a rapid adaptive response to a brief ischemic insult which slows the rate of cell death during a subsequent prolonged ischemia. It has been studied that pre-infarct angina has a potential to pre-condition the heart; pre-conditioning protects heart against a greater subsequent ischemic insult with less threat of infarction. It has been seen that patients with pre infarct angina may suffer from less severe infarction than those who undergo sudden coronary occlusion without the opportunity for pre-conditioning. In a study, ischemic preconditioning was elicited in 80% of patients and was associated with a significant reduction in the likelihood of in-hospital adverse cardiac events (IP group, 12.1%; non-IP group, 44.1%; $p < 0.0001$).[3]

Patients having the history of pre-infarct angina presenting with first episode of acute myocardial infarction (AMI) have the lower in-hospital incidence of sustained ventricular arrhythmias, pump failure and lower incidence of cardiac mortality, higher ejection fraction and smaller incidence of aneurysm formation. Left ventricular systolic dysfunction was (8% vs. 32%), rhythm abnormalities (8% vs. 32%), papillary muscle rupture (8% vs. 4%) and in-hospital mortality (4% vs. 24%) respectively in patients with and without pre-infarct angina.[4]

Thus preconditioning has the potential to reduces myocardial energy demands through different cellular mechanisms and thus limits the extent of myocardial injury as well as consequent risk of complications of acute myocardial infarction.

METHODOLOGY

After permission from hospital ethical committee and informed consent, 200 patients of acute myocardial infarction (divided in two equal groups) who had preinfarct angina were included in the study via non-probability purposive sampling. They were admitted through emergency ward of Chudhary Pervaiz Ellahi (CPE) Institute of Cardiology. Pre-infarct Angina was defined as typical chest pain occurring during exertion and relieved by rest or sub-lingual nitroglycerine, present at least two weeks before onset of AMI. Acute myocardial infarction was diagnosed based on typical history of chest pain and ECG findings. Patients excluded from study include who had evidence of old MI as evident by history and ECG and patients not clear about their past history of angina. After establishing the diagnosis, a careful history was taken for the absence or presence of pre-infarct angina. Based on this history, patients were stratified into two equal groups; group A patients who were exposed to pre-infarct angina and group B patients who were not exposed to pre-infarct angina. Outcome was defined and recorded in three ways: Left Ventricular systolic dysfunction (ejection fraction < 40%) as assessed by Echocardiograph, arrythmias (atrial fibrillation, ventricular fibrillation, ventricular tachycardia) diagnosed on ECG or continuous cardiac monitoring during hospital stay.

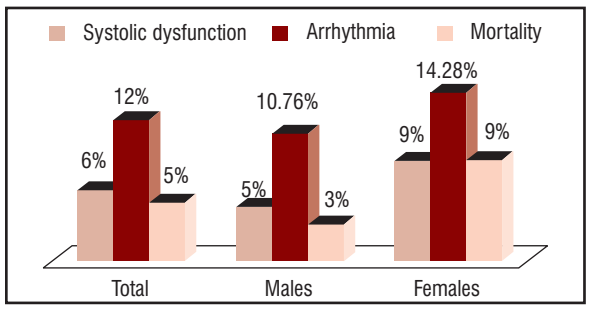
Data was entered and analyzed by using SPSS version 10. Descriptive statistics were used to calculate Mean SD for age of the patients. Frequencies and percentages were calculated for outcome variable i.e. Left Ventricular Systolic Dysfunction, rhythm abnormalities, and in-hospital mortality. Chi square test was used to compare these complications in two groups. p-value < 0.05 were considered significant. Relative risk was also calculated. Effect modifiers like age, gender and these complications were controlled by stratification.

RESULTS

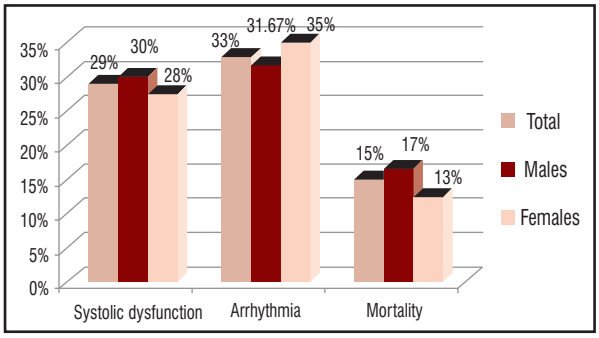
There were 200 patients included in our study. Mean age of the patient population was 52.51 ± 6.37 ranging from a minimum of 36 to a maximum of 63 years. There were 125 (62.5%) males and 75 (37.5%) females in the study population (Table 1). The patients were divided into two equal groups A and B, each of 100 patients, based on the presence or absence of pre-infarct angina respectively. Mean age for group A patients was 51.90 ± 6.36 ranging from a minimum of 37 to a maximum of 61 years. Females were 35 (35%) while males were 65 (65%). In group B patients without any history of preinfarct angina, mean age was 53.12 + 6.35 years ranging from a minimum of 36 to a maximum of 63 years. Males were 60 (60%) whereas females were 40 (40%).

In 100 patients in group A with history of pre-infarct angina systolic dysfunction was identified in 6 (6%) patients, males were 3/65 (4.61 %) and females were 3/35 (8.57 %). Arrhythmia was found in 12 (12%) patients, 7/65 (10.76 %) were males and 5/35 were females (14.28%). Mortality was present in 5 (5%) patients, 3/35 (8.57 %) were females while 2/65 (3.08 %) were males (Graph 1).

Graph1: Distribution of Outcome Characteristics in Group A patients.



Graph 2: Distribution of Outcome Characteristics in Group B



In group B patients with no previous history of angina, systolic dysfunction was present in 29/100 (29%) patients, females were 11/40 (27.5%), males were 18/60 (30%). Arrhythmia were identified during hospital stay in 33/100 (33%) patients, females were 14/40 (35%) while males were 19/60 (31.67%). Mortality was encountered in 15/100 (15%) patients, males were 10/60 (16.67%) whereas females were 5/40 (12.5%) (Graph 2).

When the two groups were compared (Table 2), systolic dysfunction was identified in 35/200 (17.5%) patients, 6 (17.1%) had a history of pre-infarction angina and 29 (82.8%) patients had no history of angina. This difference was found to be significant with a p-value < 0.0001 and an Odd's ratio of 6.399. Among 45/200 (22.5%) patients who experienced arrhythmia, 12 (26.6%) belonged to the group having preinfarction angina whereas 33 (73.3%) belonged to the group with no prior history of angina. This difference was also found to be significant with a p-value of 0.001 and an Odd's ratio of 3.612. Among 20/200 (10%) total mortalities in the study population, 5/20 (25%) were observed in the group exposed to preinfarction angina whereas 15/20 (75%) were found in those without previous history of angina. This difference was found to be significant with a p-value of 0.032 and an Odd's ratio of 3.353.

DISCUSSION

The preponderance of males in our study population is consistent with higher prevalence of myocardial infarction in middle aged males as compared to females. The male and female ratio was similar in the subgroups A and B of the study population.

Table 1: Characteristics of the Study Population

Characteristic	Total	Group A	Group B
Mean age	52.51 + 6.37	51.90 + 6.36	53.12 + 6.35
Males	125 (62.5%)	65 (65%)	60 (60%)
Females	75 (37.5%)	35 (35%)	40 (40%)

Table 2: Comparison of Outcomes in Group A and B

	Total	Group A	Group B	P-Value	Odd's Ratio
Systolic Dysfunction	35/200 (17.5%)	6 (17.1%) Males=3 Females=3	29 (82.8%) Males=18 Females=11	< 0.0001	6.399
Arrhythmia	45/200 (22.5%)	12 (26.6%) Males=7 Females=5	33 (73.3%) Males=19 Females=14	< 0.001	3.612
Mortality	20/200 (10%)	5/20 (25%) Males=3 Females=2	15/20 (75%) Males=10 Females=5	0.032	3.353

In group A patients all of these outcome variables were found slightly more frequently among the female patients as compared to the male patients. In group B patients, arrhythmia was the most frequently encountered outcome and was slightly more common in the females. Systolic dysfunction and mortality were more common among the male patients.

Systolic dysfunction and arrhythmia were encountered more frequently among those with age > 55 years, although there was no significant difference in the mortality between the two age groups. This concludes that for patients with history of pre-infarction angina, increasing age is a risk factor for development of complications, though it does not affect mortality to a greater extent. In group B patients, all three of the outcomes including systolic dysfunction, arrhythmia and mortality were more common among the patients in age group < 55 years. This suggests that younger age is a risk factor for increasing complications in the outcome as well as for mortality in patients who do not have a history of pre-infarct angina. This supports the concept, that preconditioning with ischemia and development of collateral circulation has a protective effect on the outcome of patients with myocardial infarction. The younger patients have a low likelihood of any collateral circulation and preconditioning, thus putting them at higher risk of complications and mortality.

Pre-Infarct Angina patients have a smaller infarct area limited impairment of coronary arteriolar dilation, less arteriolar injury, and less endothelial dysfunction.[5] Preservation of the vasodilatory response of arterioles and small arteries produces an adenosine-induced increase in coronary flow during ischemic preconditioning independent of baseline coronary flow velocity and distribution of the epicardial coronary artery.[6-8] Patients with Pre-Infarct Angina had better survival, less pump failure, fewer arrhythmias, and lower peak cardiac serum enzyme levels. Furthermore, these patients experienced enhanced recovery of cardiac contractile function and had reduced left ventricular remodeling.[9,10]

Preinfarction angina was associated with decreased arrhythmias which is in accordance with the findings of other authors.[11] Our echocardiographic results also confirmed the beneficial effect of Pre infarct angina on cardiac contractility as has been reported elsewhere.[12] There was also a significant benefit in the mortality rates.

Because we observed patients who had experienced Preinfarct angina over a longer-than-usual period of time before an acute event, we cannot exclude the contributions of other mechanisms to these protective phenomena. Our results need to be confirmed in future studies in order to provide a better insight into this protective effect of Preinfarct angina and its clinical significance.

In addition to the modest size of our patient population, our study was limited by relatively weak documentation of previous angina episodes (testimonials from patients, supplemented by available records. Patients who experience pre infarct angina are probably more likely to take nitrates or ß-antagonists, which in itself could contribute to the reduction of ischemic injury.

CONCLUSION

In our study, ischemic episodes that patients experienced before myocardial infarction were associated with an improved in-hospital outcome as compared to those who never experienced angina. This improved outcome was significant in all the three variables which we studied, i.e. arrhythmias, systolic dysfunction and mortality.

REFERENCES

1. Murry CE, Jennings RB, Reimer KA. Preconditioning with ischemia: a delay of lethal cell injury in ischemic myocardium. Circulation 1986;75:1124-36.
2. Schott RJ, Rohman S, Braun ER, Schaper W. Ischemic preconditioning reduces infarct size in swine myocardium. Circ Res 1990;66:1133-42.
3. Laskey WK, Beach RND. Frequency and clinical significance of ischemic preconditioning during percutaneous coronary intervention. J Am Coll Cardiol 2003;42:998-1003.
4. Nadeem MA, Waseem T, Shah SMA, Khan AH. Comparison of in-hospital course of patients having first acute myocardial infarction with or without pre-infarct angina. Esculapio J Services Inst Med Sci 2007;3:20-5.
5. Ottani F, Galvani M, Ferrini D, Sorbello F, Limonetti P, Pantoli D, et al. Prodromal angina limits infarct size. A role for ischemic preconditioning. Circulation 1995;91:291-7.
6. Loke KE, Woodman OL. Preconditioning improves myocardial function and reflow, but not vasodilator reactivity, after ischaemia and reperfusion in anaesthetized dogs. Clin Exp Pharmacol Physiol 1998;25:552-8.
7. DeFily DV, Chilian WM. Preconditioning protects coronary arteriolar endothelium from ischemia-reperfusion injury. Am J Physiol 1993;265:700-6.
8. Stepp DW, Nishikawa Y, Chilian WM. Regulation of shear stress in the canine coronary microcirculation. Circulation 1999;100:1555-61.
9. Solomon SD, Anavekar NS, Greaves S, Rouleau JL, Hennekens C, Pfeffer MA, et al. Angina pectoris prior to myocardial infarction protects against subsequent left ventricular remodeling. J Am Coll Cardiol 2004;43:1511-4.
10. Kosuge M, Kimura K, Kojima S, Sakamoto T, Ishihara M, Asada Y, et al. Effects of preinfarction angina pectoris on infarct size and in-hospital mortality after coronary intervention for acute myocardial infarction. Am J Cardiol 2003;92:840-3.
11. Christenson RH, Leino EV, Giugliano RP, Bahr RD. Usefulness of prodromal unstable angina pectoris in predicting better survival and smaller infarct size in acute myocardial infarction. Am J Cardiol 2003;92:598-600.
12. Colonna P, Cadeddu C, Montisci R, Ruscazio M, Selem AH, Chen L, et al. Reduced microvascular and myocardial damage in patients with acute myocardial infarction and preinfarction angina. Am Heart J 2002;144:796-803.