

The Effect of Pre-Infarct Angina on Post-Myocardial Infarction Left Ventricular Ejection Fraction in Patients of Acute ST-Elevation Myocardial Infarction Treated With Streptokinase

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ABSTRACT

Objective: To determine the effect of pre-infarct angina on post-MI left ventricular function in patients with acute STEMI.

Study Design: Comparative study

Place and Duration of Study: This study was conducted at the Department of Cardiology, Bahawal Victoria Hospital, Bahawalpur, from May 2018 to October 2018.

Materials and Methods: Two hundred and thirty patients admitted to the Cardiology Department with the diagnosis of acute STMI who subsequently received thrombolytic therapy were enrolled in the study. The data were recorded on a performa which included demographic characteristics, history of risk factors for coronary artery disease, time from symptom onset to presentation; and the presence or absence of pre-infarction angina. All the enrolled patients underwent 2-dimensional echocardiography to assess left ventricular ejection fraction before discharge. The data was entered and analyzed with SPSS version 20. The patients were divided into two groups depending upon the presence or absence of pre-infarct angina. The categorical variables were compared between the two groups with chi-square test. The left ventricular ejection fraction was compared between the two groups with two-tailed t-test. A p value of <0.05 was considered to be significant.

Results: Pre-infarct angina was present in 58.7 % of the patients. There were no significant differences with regards to baseline characteristics in patients who experienced pre-infarct angina as compared to those who didn't have pre-infarct angina. Post-MI ejection fraction was significantly higher in patients who experienced pre-infarct angina.

Conclusion: The patients with pre-infarct angina have better post-MI left ventricular ejection fraction.

Key Words: Pre-infarct angina, Post-MI left ventricular ejection fraction

Citation of article: Ahmad S, Ali A, Hasan A. The Effect of Pre-Infarct Angina on Post-Myocardial Infarction Left Ventricular Ejection Fraction In Patients of Acute ST-Elevation Myocardial Infarction Treated With Streptokinase. Med Forum 2019;30(10): 117-120.

INTRODUCTION

Transient myocardial ischemic episodes are supposed to protect the myocardium against a subsequent prolonged episode of myocardial ischemia; this is termed ischemic preconditioning (IP).¹ IP is the most potent mechanism of myocardial protection described so far. It has been established by the results of several studies conducted earlier that the pre-infarct angina has an ischemic preconditioning effect.²⁻⁴

This ischemic pre-conditioning effect as a result of pre-infarct angina, plays an important role in preserving left ventricular function, improving microvascular reperfusion, limiting infarct size and enhancing survival.⁵⁻¹⁰ One possible mechanism of this ischemic preconditioning is that it stimulates adenosine receptors and simultaneously decreases the influx of calcium into the myocardial cells; this leads to reduction in myocardial energy demands and hence limits the extent of myocardial injury.¹¹ Some authors have suggested that ischemic preconditioning increases the likelihood of successful thrombolytic therapy, which results in earlier reperfusion and hence limits myocardial damage.¹² Others have concluded that increases in pressure distal to a subtotal occlusion during episodes of unstable angina likely result in opening and development of thin-walled coronary collateral vessels.¹³ This mechanism apparently plays an important role among diabetic individuals.¹⁴ However, even in the absence of significant collateral circulation, some studies have documented the protective role of

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Received: August, 2019

Accepted: September, 2019

Printed: October, 2019

pre-infarct angina. These functional effects in turn result in better post –myocardial infarction left ventricular function, greater regional and global left ventricular functional recovery and account for the favorable clinical outcomes in patients who have experienced pre-infarct angina. In this clinical background, we planned a study to determine the effects of pre-infarct angina on post-myocardial infarction left ventricular function.

MATERIALS AND METHODS

This comparative study was conducted in the department of Cardiology, Bahawal Victoria Hospital, Bahawalpur, from 1st May 2018 to 31st October 2018. The objective of the study was to determine the effect of pre-infarct angina on post-MI left ventricular ejection fraction in patients with acute ST-segment elevation myocardial infarction (STEMI) who underwent thrombolytic therapy with streptokinase given as an infusion of 150,000 Units over one hour. Two hundred and thirty patients admitted to the Cardiology Department with the diagnosis of acute ST-segment elevation myocardial infarction who subsequently received thrombolytic therapy were enrolled in the study. STEMI was defined as chest pain of more than 30 minutes duration with ST-segment elevation ≥ 2 mm in precordial leads V₂ and V₃, or ≥ 1 mm in all other leads except aVR in at least two leads of a contiguous lead group. Pre-infarct angina was defined as intermittent chest pain or other chest discomfort lasting less than 20 minutes that had occurred within 60 days before presentation to the emergency department for acute myocardial infarction (AMI). This included the patients who had chest pain only within 24 hours before AMI. Patients with valvular heart disease, previous myocardial infarction, cardiomyopathy, contra-indications to thrombolytic therapy, cognitive impairment or diagnosed renal or hepatic impairment were excluded from the study. Contra-indications to thrombolytic therapy included intracranial tumor, previous intracranial hemorrhage, ischemic CVA within three months of admission, recent major surgery within 3 weeks, active bleeding, and severe uncontrolled hypertension refractory to emergency anti-hypertensive therapy. Informed consent was taken from the enrolled patients. The data were recorded on a performa which included demographic characteristics of the patients like age and gender; history of risk factors for coronary artery disease like diabetes mellitus, hypertension, smoking, and family history of ischemic heart disease; time from symptom onset to presentation; and the presence or absence of pre-infarct angina. All the enrolled patients underwent 2-dimensional echocardiography to assess left ventricular ejection fraction before discharge. The data was entered and analyzed with SPSS version 20. The patients were divided into two groups; one comprising

of those who had pre-infarct angina and the other comprising of those who didn't have pre-infarct angina. The categorical variables were compared between the two groups with chi-square test. The left ventricular ejection fraction was compared between the two groups with two-tailed t-test. A p value of <0.05 was considered to be significant.

RESULTS

A total of 230 patients were enrolled in the study, out of which 150 (65.2%) were males. The most common risk factor for coronary artery disease encountered in our study population was hypertension which was found in 162 patients (70.4 %), followed by smoking in 140 patients (60.8 %), diabetes mellitus in 50 patients (21.7 %), and family history of ischemic heart disease in 50 patients (21.7 %). Pre-infarct angina was reported in 58.7 % of the patients (Table 1). There were no significant differences with regards to baseline characteristics including age, gender, risk factors for coronary artery disease like diabetes mellitus, hypertension, smoking, as well as time to presentation in patients who experienced pre-infarct angina as compared to those who didn't have pre-infarct angina (Table 2). Post-MI ejection fraction was significantly higher in patients who experienced pre-infarct angina (Table 3).

Table No 1: Frequency of Pre-infarct angina

Pre-infarct angina	No. of patients	Percent
Yes	135	58.7
No	95	41.3
Total	230	100.0

Table No 2: Baseline characteristics of the patients

Variable	Pre-infarct angina (n=135)	No Pre-infarct angina (n=95)	p Value
Age (yrs)	49.24 \pm 10.45	50.64 \pm 9.88	0.301
Males	85	65	0.392
Diabetes Mellitus	30	20	0.832
Hypertension	97	65	0.575
Smoking	80	60	0.551
Family history	30	20	0.832
Time to presentation (hrs)	4.5 \pm 2.2	4.7 \pm 1.9	0.532

Table No 3: Left ventricular ejection fraction in patients of STEMI with and without pre-infarct angina

	Pre-infarct angina	No pre-infarct angina	p Value
LVEF (%)	44.0 \pm 6.5	35.2 \pm 5.6	0.000

DISCUSSION

The protective role of pre-infarct angina on myocardium is well established. A number of studies¹⁵⁻¹⁷ have reported significantly lesser infarct size, better left ventricular function, and a protective effect on arrhythmias after acute myocardial infarction. Mladenovic et al¹⁵ reported that there was no significant difference in baseline left ventricular ejection

fraction (LVEF) and wall motion score index (WMSI) between the patients having pre-infarct angina as compared to those without pre-infarct angina. However, the recovery of LVEF after a period of 7-12 months was significantly greater in those who had experienced pre-infarct angina. In this background of established importance of pre-infarct angina, its frequency has widely varied between different studies. In Itoh et al,¹⁷ it was 66.36%, while 32.24% in Reiter et al,¹⁶ 45.57% in Kiziltunc et al,¹⁸ and 58.7% in Mladenovic et al.¹⁵ The frequency of pre-infarct angina in our study matches that of Mladenovic et al.¹⁵

Reiter et al¹⁶ reported decreased infarct size as measured with peak creatine kinase level, and greater LVEF assessed by echocardiography within 48 hours of admission in patients who had a history of pre-infarct angina. The results of our study support the results of Reiter et al¹⁶ in that post-MI LVEF was significantly higher in patients who had pre-infarct angina. However, our study differs from that done by Reiter et al¹⁶ because we included the patients who had ischemic chest pain at any time during 60 days prior to admission for acute myocardial infarction, while the study conducted by Reiter et al¹⁶ considered pre-infarct angina as chest pain occurring within 24 hours before admission. Moreover, our study focused on LVEF only, and creatine kinase level was not taken into account.

Our study was limited by the problems in retrieving the proper documentation of previous angina episodes as well as the treatment record. There is a possibility that the drugs prescribed for previous angina episodes may contribute to better LVEF after acute myocardial infarction. Secondly, our study did not take into account the presence of silent ischemia. It is possible that silent ischemia may be present in some of the patients who were labeled not to have pre-infarct angina and may have pre-conditioning effect.

CONCLUSION

The patients with pre-infarct angina have better post-MI left ventricular ejection fraction as compared to those who do not have pre-infarct angina..

Author's Contribution:

Concept & Design of Study:	Shezad Ahmad
Drafting:	Asif Ali
Data Analysis:	Anwaar ul Hasan
Revisiting Critically:	Shezad Ahmad Anwaar ul Hasan
Final Approval of version:	Shezad Ahmad

Conflict of Interest: The study has no conflict of interest to declare by any author.

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