

Frequency of Left Ventricular Thrombus in ST Elevation Myocardial Infarction patients Treated with Primary Percutaneous Coronary Intervention

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Abstract

Background: In current era mortality is very high due to ST-segment elevation myocardial infarction (STEMI) worldwide. one of the most dangerous complication is formation of left ventricular(LV) thrombus specially after STEMI and is considered major high risk factor for morbidity and mortality. Although nowadays with primary percutaneous coronary intervention its incidence is reduced but still significant.

Objective: To determine frequency of left ventricular thrombus in ST elevation myocardial infarction (STEMI) patients treated with primary percutaneous coronary intervention (PCI).

Methodology: This was cross sectional study done at Department of Cardiology, National Institute of Cardiovascular Disease (NICVD), Karachi from October 3, 2021 to April 2, 2022. Patients who fulfilled the inclusion criteria and able to give informed consent were enrolled. Primary PCI was performed by consultant cardiologist and post PPCI all the patients were observed, and transthoracic echocardiography (TTE) was performed to assess the left ventricular thrombus. The data was collected on predesigned proforma.

Results: Mean \pm SD of age was 59.39 \pm 14.79 years. In distribution of gender, 101 (73.7%) were male while 36 (26.3%) were female. Left ventricular thrombus was noted in 24 (17.5%) patients.

Conclusion: Ventricular thrombus is common (17.5%) after primary percutaneous coronary intervention for STEMI patients. Further large-scale work is recommended for validation of current findings.

Keywords: ACS, Left Ventricular Thrombus, PPCI, STEMI

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Introduction

Ischemic heart disease shares the major portion of morbidity and mortality around the globe. The prevalence of ischemic heart disease is more in males than females.¹ The number of ischemic heart disease is increasing in developing countries now a days.^{1,2} Myocardial ischemia due to atherosclerotic coronary artery disease may present itself either as acute myocardial infarction (AMI), unstable angina or stable angina.³ The mortality rate for myocardial infarction is decreased over the last decade but it still significant.⁴

In current era patients with ST-segment Elevation Myocardial Infarction (STEMI) needs timely intervention as time is muscle for them. So in these patients primary Percutaneous Coronary Intervention (PCI) is modality of management. Although patients with STEMI are at risk for developing catastrophic complications and formation of Left Ventricular (LV) thrombus is one of them.⁵ It's incidence is variable and as high

up to 20% in different studies. LV thrombus is more marked in patients with reduced left ventricular ejection fraction.⁵ Embolic complications in patients with LV thrombus are devastating specially stroke. So high risk patients needs proper and urgent diagnosis and expert management. Long term follow up is needed in post PCI patients with LV thrombus, as they are taking anticoagulant and antiplatelets for again developing any embolic complication as well as bleeding risk.⁶ The objective of this study was to determine frequency of left ventricular thrombus in ST elevation myocardial infarction patients treated with primary percutaneous coronary intervention.

Methodology

This was a cross sectional study, conducted at Department of Cardiology, National Institute of Cardiovascular Disease (NICVD), Karachi, Pakistan from October 2, 2021 to April 1, 2022. All patients who fulfilled the inclusion criteria and able to give informed consent were enrolled. Primary PCI was performed by consultant cardiologist and after the

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procedure, all the patients were observed clinically, and transthoracic echocardiography (TTE) was performed to assess the left ventricular thrombus. All the collected data was recorded on predesigned proforma.

The demographics were obtained which included registration number, admission number, gender, age, height and weight and risk factors (diabetes, cigarette smoking, hypertension, family history of heart disease). Relevant baseline investigations were done including cardiac enzymes. Primary PCI was performed by consultant cardiologist having > 5 years of experience.

Post Primary PCI, all the patients were observed, and transthoracic echocardiography (TTE) was performed after PPCI in order to assess the left ventricular thrombus (yes/no). Confounders, risk factors and biasness were controlled through strictly follow the inclusion criteria. All the collected data was recorded.

Data was entered and analyzed by using SPSS version-23. Mean and standard deviation were computed for normally distributed variables like age (years), weight (kg), height (cm) and BMI. Frequency and percentages were calculated for gender, hypertension, diabetic mellitus, family history of CAD and LV thrombus. Effect modifiers were controlled through stratification of age, gender, BMI, hypertension, smoking status, diabetes mellitus and family history of CAD and strict application of inclusion and exclusion criteria. Chi-square test applied and $P \leq 0.05$ was taken significant.

Results

We enrolled 137 patients of ST Elevation Myocardial infarction (STEMI) patients who had undergone primary percutaneous coronary intervention (PCI) to assess the frequency of left ventricular thrombus.

Mean age of patients included in this study was 65.9 ± 9.25 years. Minimum age was 30 years and maximum age was 80 years, while mean height was of 162.5 ± 14.6 cm, mean weight was 65.4 ± 10.4 in kg and mean body mass index was of 27.8 ± 6.3 kg/m² as shown in table-I.

Table-I: Descriptive Statistics of Demographics among Patients

Variables	Left Ventricular Thrombus		P value
	Yes	No	
Age			
30 – 60	15 (10.9%)	65 (47.4%)	0.653
>60	9 (6.6%)	48 (35.0%)	
Gender			
Male	20 (14.6%)	81 (59.1%)	0.179
Female	4 (2.9%)	32 (23.4%)	
M			
Yes	4 (2.9%)	38 (27.7%)	0.078
No	20 (14.6%)	75 (54.7%)	
Hypertension			
Yes	11 (8.0%)	57 (41.6%)	0.682
No	13 (9.5%)	56 (40.9%)	
Smoker			
Yes	11 (8.0%)	41 (29.9%)	0.381
No	13 (9.5%)	72 (52.6%)	
Positive family history			
Yes	6 (4.4%)	24 (17.5%)	0.686
No	18 (13.1%)	89 (65.0%)	

Table-II: Risk Factors among the Patients

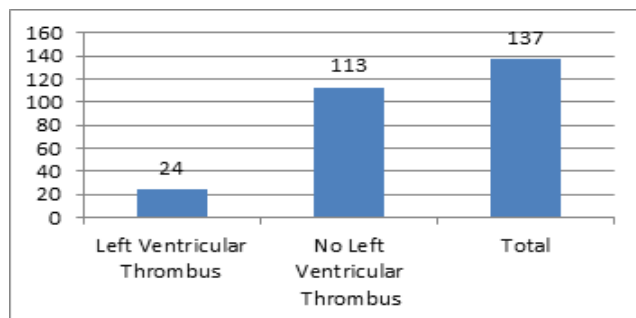
Variables	Range	Mean±SD
Age (years)	30-80	65.9±9.25
Weight(kg)	48-99 kg	65.4±10.4
Height (cm)	160-170	162.5±14.6
BMI	27-35	27.8±6.3

Table-III: Left Ventricular Thrombus in ST Elevation Myocardial Infarction patients and stratification with different variables.

Variables	Frequency	Percentage
Gender		
Male	101	73.7%
Female	36	26.3%
DM	42	(30.7%)
Hypertension	68	49.6%
Smoker	52	38.0%
Positive family history	30	21.9%
	24	17.5%

In distribution of gender, 101 (73.7%) were male while 36 (26.3%) were female. Hypertension was found to be in 68 (49.6%) patients. Diabetes was documented in 42 (30.7%) patients. Out of 137 patients, 52 (38%) were smoker while 85 (62%) were non-smoker. Positive family history of CAD was noted in 30 (21.9%) patients. Left ventricular thrombus was noted in 24 (17.5%) patients as shown in table-II. Stratification of age group, gender, hypertension, smoking status, diabetes mellitus and family history of CAD was done with respect to left ventricular thrombus patients is shown in table-III.

Figure-I: Frequency of Left Ventricular Thrombus in ST elevation myocardial infarction (STEMI) patients treated with primary percutaneous coronary intervention (PCI).



Discussion

In current era mortality is very high due to acute coronary syndrome (ACS) worldwide and among them major portion is with ST-elevation myocardial infarction (STEMI).^{5,6} Intervention of STEMI is different compared with non ST elevation myocardial infarction as here we have door to balloon time approach comparison to other components of ACS.^{7,8} Patients with ST segment elevation MI (STEMI) are vulnerable to many complication among which formation of Left ventricular (LV) thrombus is of more concern as these patients are vulnerable to not only embolic complication like stroke and re-infarction but also the side effects like bleeding and cost burden of long term use anticoagulant and dual antiplatelets for at least one year and may need to increase duration after risk factor stratification.^{9,10}

We have observed in our study incidence around 17.5% similar figure was reported by Bulluck H et al,¹¹ they found incidence of 19% , while another study,¹² reported less up to 8.8% it may due fairly preserved LV function and more younger patients with mean age of 56 ± 9 years as compared to our study where it was 65.9 ± 7.25 years. Poss et al,¹² found 3.5%, early use of intracoronary or intravenous glycoprotein IIb/IIIa inhibitor abciximab may be responsible to this low although they include large sample size. This may be related to the early use of the potent glycoprotein IIb/IIIa inhibitor abciximab (intracoronary or intravenous).^{9,10} In this study more smoker patients developed LV thrombus then diabetic patients 8% vs 2.9% similar observation were made in study by Bulluck H et al,¹¹ who found that incidence of thrombus was more in smoker patients than diabetic patients. In our study LV thrombus was seen in 8% patients with

hypertension same figure was also quoted by some previous studies.^{13,14} We have also observed that LV thrombus formation was more with anterior STEMI. This may be due to large area involvement and more reduction in LV function, same findings was seen in previous reported studies.^{12,13} We have also observed that more LV thrombus formation in males in comparison with female 14.6% vs 2.9% with an insignificant p value of 0.179, this may be because of more number of male patients were enrolled in the study in comparison with female patients 73.7% vs 26.3%.¹⁴ We have also observed that LV thrombus formation was more in patients with anterior STEMI. This may be due to large area involvement and more reduction in LV function, same findings was seen by Poss et al,¹² who observed that thrombus formation was more in patients with larger MI size, reduced LV function that resulted in increased risk of re-infarction and heart failure development in previous reported studies.¹¹⁻¹³ So timely diagnosis remained important tool for risk assessment and prevention of stroke, new onset of heart failure, re-infarction and cardiac mortality in patients with LV thrombus formation after primary PCI. Some limitations of our study that we only included patient with STEMI who under gone primary PCI, small sample size and single centre study. Moreover, we used only echocardiography for assessment of LV thrombus and not included new modalities like Cardiac Magnetic Resonance Imaging.

Conclusion

It is to be concluded that ventricular thrombus is quite (17.5%) in STEMI patients who undergone primary percutaneous coronary intervention. Further large-scale and multicentre work is recommended for validation of current finding

Authors Contribution: MQK: Design of work and Conception of work. **RU:** Design of work, Acquisition, and analysis of data and Drafting. **AF:** Interpretation of data and Revising. **AWB:** Interpretation of data and drafting. **MAS:** Data entry, Acquisition and drafting. **FA:** Data entry and drafting. All authors critically revised and approved its final version.

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