

# Frequency of Left Ventricular Thrombus after Acute Anterior Wall Myocardial Infarction at Karachi

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## ABSTRACT

**Background:** The left ventricular problem is a prominent acute myocardial infarction (AMI) complication. It has been demonstrated that rapid reperfusion reduces mortality and improves left ventricular (LV) function. There is a dearth of information on left ventricular thrombus (LVT) in the current era of primary percutaneous coronary intervention (PPCI).

**Aim:** To estimate the frequency of left ventricular thrombus in patients who have experienced an acute anterior wall myocardial infarction at Karachi's leading cardiac hospital.

**Study design:** Cross-sectional study

**Place and duration of study:** Department of Cardiology, National Institute of Cardiovascular Disease, Karachi from 1<sup>st</sup> July 2021 to 31<sup>st</sup> December 2021.

**Methodology:** Three hundred and fifty five patients of both genders age between 40 and 80 years were diagnosed with acute anterior wall myocardial infarction and underwent percutaneous coronary intervention were enrolled.

**Results:** There were 286 (80.6%) males and 69 (19.4%) females. The mean age was 56.29±11.04 years. Two patients (6%) experienced in-hospital mortality, while 56 patients (15.8%) had left ventricular thrombus.

**Conclusion:** Acute ST-elevation myocardial infarction frequently results in the development of left ventricular thrombus.

**Keywords:** Myocardial infarction, Left ventricular thrombus, Frequency

## INTRODUCTION

Around the world, cardiovascular disease continues to be the main cause of death.<sup>1</sup> Since the development of primary percutaneous coronary intervention (PCI), which has demonstrated superiority to thrombolytic therapy by demonstrating a decrease in acute myocardial infarction (AMI), mortality rates, and a reduction in clinical side effects<sup>2</sup>. Post-infarct effects continue to be a leading source of morbidity and mortality despite these advancements<sup>3</sup>. With an estimated prevalence of up to 15% in the post-PCI period, left ventricular (LV) thrombus following a MI is still very common and presents special issues in terms of detection, prevention, and therapy<sup>4</sup>. The development of a left ventricular thrombus is one of the primary effects of acute myocardial infarction (AMI)<sup>5</sup>. Up to 60% of patients with severe anterior wall myocardial infarctions were found to have LV thrombi in the thrombolytic era<sup>6</sup>. The systemic thrombolysis reduces the development of LV thrombus, even though this condition is frequently seen in individuals with severe anterior wall myocardial infarctions<sup>7</sup>. Up to 20% of AMI patients have been documented to have LV thrombi that have been embolized<sup>8</sup>. Forty out of 642 anterior wall STEMI patients, or 6.2 percent, had early LVT<sup>9</sup>.

Rehan et al<sup>10</sup> analysis found that 37 AMI patients had left ventricular thrombus in 11% of them. Similar findings were made by 17% of 114 patients with anterior myocardial infarction had left ventricular thrombus, according to the findings of Nayak et al<sup>11</sup>. Rapid reperfusion has been demonstrated to reduce mortality and improve LV function recovery<sup>12</sup>. The American College of Cardiology advises combining dual antiplatelet therapy with oral anticoagulation (OAC). American Heart Association (AHA)/ Foundation recommendations for the management and, in some situations, prevention of LV thrombus<sup>13</sup>. In comparison to people with apical aneurysms or dyskinesia, patients with apical akinesia typically have less thrombus<sup>6</sup>.

Although acute anterior wall myocardial infarction is significantly related to left ventricular thrombus (LVT), which is associated with significant morbidity and mortality, no current study examining the incidence of LVT in Pakistan has been published<sup>4</sup>. This study's goal is to raise awareness of the incidence of left ventricular thrombus in our population's patients with acute anterior myocardial infarction. The high incidence of left ventricular

thrombus necessitates early detection and treatment of this potentially fatal but silent complication of myocardial infarction. The results of this study will be used to inform future recommendations for the significance of diagnosing this complication and treatment strategies in post-infarct patients. A decrease in thromboembolic and bleeding events, hospital stay duration, and hospitalization costs overall are additional trial results.

The purpose of this study was to determine the prevalence of left ventricular thrombus in Pakistani patients who visited the National Institute of Cardiovascular Disease in Karachi after suffering an acute anterior wall myocardial infarction.

## MATERIALS AND METHODS

After getting permission from Institutional Ethical Review Board, this observational, prospective, cross-sectional study was conducted at National Institute of Cardiovascular Disease in Karachi from 1<sup>st</sup> July to 31<sup>st</sup> December 2021. A total of 355 patients, 40 to 80 years old, of both sexes, with acute anterior wall MI according to the operational definition, underwent percutaneous coronary intervention (PCI). Prior inferior wall MI in patients with chronic renal insufficiency, defined as serum creatinine >1.5 mg/dl, acute inferior wall MI treated at THI within 24 hours without a right-sided ECG, post-CABG patients, or those who had undergone PCI, were excluded.

All participants gave their free, prior informed permission after being made aware of the study's purpose. The patients were assessed, and the selection was made following the inclusion/exclusion standards. After managing the MI, the patient's demographic information, including age (years), height (cm) (measured using a wall scale), and weight (kg) (measured using an electronic scale), will be noted. The body mass index (BMI) kg/m<sup>2</sup> will then be calculated using the formula (weight in kg)/(height in m)<sup>2</sup>. Then the researcher will help a consultant cardiologist with more than five years of expertise as they do PCI. After PCI, all patients will be monitored by the lead investigator, and on the fifth day after PCI, transthoracic echocardiography (TTE) will be done to determine whether or not there is a left ventricular thrombus. Constant adherence to the inclusion criteria will help control confounders, risk factors, and bias. As per ICH-GCP guidelines, all the collected data will be entered into a CRF that has already been created. Data was examined utilizing Data will be processed using SPSS-25. Effect modifiers will be kept in check by stratifying subjects by age, gender, BMI, hypertension, smoking status, and diabetes mellitus to see how these factors affect the results. The appropriate Chi-square or Fisher's Exact

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test will then be used to determine significance, with P 0.05 being considered significant.

## RESULTS

There were 286(80.6%) males and 69 (19.4%) females with mean age 56.29±11.04 years. Fifty six patients (15.8%) had left ventricular thrombus, and 2 patients (6%), had hospital mortality (Table 1). The association of left ventricular thrombus with clinical features and comorbidities is mentioned in Table 2.

Table 1: Clinical characteristics of study participants (n=355)

Variable	No.	%
<b>Gender</b>		
Male	286	80.6
Female	69	19.4
Age (years)	56.29±11.04	
<b>Left Ventricular Thrombus</b>		
Yes	56	15.8
No	299	84.2
<b>Diabetes Mellitus</b>		
Yes	117	33.0
No	238	67.0
<b>Hypertension</b>		
Yes	187	52.7
No	168	47.3
<b>Smoking Status</b>		
Yes	102	28.7
No	253	71.3
<b>Hyperlipidaemia</b>		
Yes	10	2.8
No	345	97.2
<b>Heart Failure</b>		
Yes	30	8.5
No	325	91.5
<b>In-hospital mortality</b>		
Yes	2	0.6
No	353	99.4

Table 2: Association of left ventricular thrombus with clinical features and comorbidities (n=355)

Characteristics	Left ventricular thrombus		P value
	Yes	No	
<b>Gender</b>			
Male	37 (12.9%)	249 (81.9%)	*0.003
Female	19 (27.5%)	50 (72.5%)	
<b>Diabetes</b>			
Yes	23 (19.7%)	94 (80.3%)	0.159
No	33 (13.9%)	205 (86.1%)	
<b>Hypertension</b>			
Yes		158 (84.5%)	0.884
No	27 (16.1%)	141 (83.9%)	
<b>Smoking Status</b>			
Yes	15 (14.7%)	87 (85.3%)	0.726
No	41 (16.2%)	212 (83.8%)	
<b>Age (years)</b>			
21-50	15 (12.4%)	106 (87.6%)	0.209
51-90	41 (17.5%)	193 (82.5%)	
<b>Hyperlipidaemia</b>			
Yes	2 (20%)	8 (80%)	0.71
No	54 (15.7%)	291 (84.3%)	
<b>Heart Failure</b>			
Yes	3 (10%)	27 (90%)	0.364
No	53 (16.3%)	272 (83.7%)	
<b>In hospital mortality</b>			
Yes	-	2 (100%)	0.539
No	56 (15.9%)	297 (84.1%)	

## DISCUSSION

The current study investigates the frequency of LVT development after STEMI in actual clinical practice in a leading tertiary care hospital in Karachi. We found that the left ventricular thrombus was reported in 56(15.8%) patients. In terms of morbidity and mortality, PCI is superior to thrombolytic treatment<sup>2</sup>. In recent years, this has

become the therapy of choice in numerous locations throughout the world<sup>4</sup>. In this study, we do not have data for TT treatment, however, in the study, in-hospital mortality was reported in 2(6%) patients treated with PCILV function before reperfusion therapy. In the era of thrombolysis, previous observational studies suggest that the occurrence of LVT correlates with the severity of myocardial injury<sup>14</sup>. Multiple studies demonstrate that TT lowers thrombus load, most likely through protecting at-risk myocardium<sup>11,12,14,15</sup>.

These studies ascribed the reduced frequency of LVT to the reduction in infarct size with thrombolytics and, to a greater extent, to the extended anticoagulation treatment administered concurrently. Rehan et al<sup>12</sup> investigated 92 STEMI patients who had had PCI and been given GP IIb/IIIa inhibitors. A diagnosis of LVT was made in 4.3% of the cases. Unexpectedly, their investigation found that using echo contrast did not increase the diagnostic accuracy of traditional TTE. Only four of the 92 patients in the study had LVT diagnoses, making for a very small sample size. Additionally, the study was conducted before the most recent contrast-specific imaging modalities were available.<sup>10</sup> In previous studies and meta-analyses, anticoagulation with heparin and warfarin resulted in improved outcomes and fewer cerebral emboli in patients with LVT following STEMI<sup>9-12,14,15</sup>.

Despite the lack of controlled research, late thromboembolism was reduced in post-infarction patients with LV aneurysms who were treated with warfarin<sup>16</sup>. Warfarin treatment was related to increased mortality and reduced morbidity in post-MI patients with LV failure, according to a cohort analysis from the SOLVD trial.<sup>17</sup> A Cochrane review support and recommend warfarin for this indication<sup>18</sup>.

In accordance with American College of Cardiology/ American Heart Association guidelines, patients with cardiogenic sources of embolism, such as atrial fibrillation, LVT, or an akinetic segment of the LV myocardium, should take moderate doses of aspirin and warfarin (international normalised ratio 2-3)<sup>13</sup>. In the study by Oshero et al<sup>19</sup>, 642 patients with anterior wall AMI with echocardiogram received conservative therapy (n=217), PPCI (n=297), or thrombolysis (n=128). LVT was seen in 6.2% of anterior wall AMI patients<sup>19</sup>. Patients who had successfully had primary PCI within 12 hours of the beginning of AMI were retrospectively examined in the Zieliska et al<sup>20</sup> research (n=3158). LVT was found in 79 locations (2.5%). LVT is significantly correlated with anterior AMI (adjusted ratio OR = 25), male gender (OR=2.21), EF 40% (OR=2.19), and prior hypertension (OR = 2.2).

Shacham et al<sup>20</sup> assessed the prevalence and risk factors for LVT development in 429 STEMI patients who had PCI. 18 out of 429 patients (4%) who were hospitalized had LVT. Patients with LVT exhibited significantly lower EFs, poorer pre-PCI flow during thrombolysis in myocardial infarction, and longer times between the onset of symptoms and PCI. In their small cohort of 72 patients with MI who received successful PCI, Kalra et al<sup>21</sup> also noted a 4% incidence of LVT. At current, 286 (80.6%) were males with acute anterior wall MI and had percutaneous coronary intervention (PCI). There were 355 subjects recruited, with a mean age was 56.29±11.04. LVT was more prevalent in males 286 (80.6%) than females. Additionally, the association of left ventricular thrombus with comorbidities are statistically significant difference between diabetics and smokers in 9/77 diabetics (11.68%) and 12/142 smokers (8.45%). However, more study involving bigger patient populations is necessary because of the lack of clarity regarding the relationships related to the risk of LVT development.

## CONCLUSION

Left ventricular (LV) thrombus following a MI is still very common and presents special issues in terms of detection, prevention, and therapy. Despite prompt treatment. Acute ST-elevation myocardial infarction frequently results in the development of left ventricular thrombus.

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