

ORIGINAL ARTICLE

LEFT VENTRICULAR THROMBUS IN PATIENTS WITH ACUTE ANTERIOR WALL MYOCARDIAL INFARCTION

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Background: Left ventricular thrombus (LVT) is a frequent and potentially dangerous complication of acute myocardial infarction and is associated with increased risk of systemic embolization. This study was conducted to determine the frequency of left ventricular thrombus in patients with acute anterior wall myocardial infarction. **Methods:** This descriptive cross-sectional study was conducted in departments of Medicine and Cardiology, Ayub Teaching Hospital, Abbottabad, from 15th April to 15th October, 2011. Patients diagnosed with acute anterior myocardial infarction (MI) of all ages and either gender were included in the study on the basis of non-probability consecutive sampling. The data was collected through a structured pro forma and analysed using SPSS-16. **Results:** A total of 85 patients with acute anterior wall MI were studied, 58(68.2%) were males and 27(31.8%) were females. The mean age for males was 58.72±12.13 years and for females it was 59.69±8.17 years. On echocardiography 29 patients had LVT (34.1%). Mean age of patients with LVT was 61.14±10.74 and those without LVT 57.93±11.05 years. Among the 65 ST-elevation MI (STEMI) patients 28 (43.1%) got LV Thrombus and in 20 non-ST-elevation MI (NSTEMI) patients only 1(5%) had LVT. In 52 patients who were diagnosed within 12 hours of onset of chest pain 8 (15.4%) developed LVT. While in 33 patients whose MI was diagnosed after 12 hours of onset of chest pain 21 (63.6%) were complicated with LV Thrombus. **Conclusion:** The incidence of LVT after acute anterior MI in our population is quite significant. Male patients, older than 50 years of age, suffering from STEMI may be at increased risk of post infarct LVT. Early hospitalization seems to lower the risk of LVT.

Keywords: Anterior Wall Myocardial Infarction Left Ventricular Thrombus, Acute Coronary Syndrome

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INTRODUCTION

Coronary heart disease is the leading cause of cardiovascular deaths which are responsible for almost one half of deaths in the US and for one fourth of deaths in the developing world. Half of the coronary heart disease deaths are directly related to acute myocardial infarction.¹ Ischemic Heart Disease is likely to become the most common cause of death worldwide by 2020.²

Left ventricular thrombus (LVT) is a frequent and potentially dangerous complication of acute myocardial infarction,³ and is associated with increased risk of systemic embolization and higher mortality rates after acute myocardial infarction.⁴

Localization of acute myocardial infarction and the size of myocardium damage remain the most important independent predictors of left ventricular thrombus formation irrespective of various treatments.⁵

The clinical significance of left ventricular thrombi lies on their potential risk of systemic embolization. In fact, left ventricular embolism after

myocardial infarction resulting in stroke, bowel, and limb ischemia has been reported in literature.⁶

In survivors of myocardial infarction with an LV mural thrombus, systemic embolization occurs in about 10%.⁷ Thrombo-embolism is considered to be an important contributing cause of death in 25% of patients with ST-elevation MI (STEMI) who die after admission to the hospital.⁸

Mural thrombosis with embolism typically occurs in the setting of a large (especially anterior) ST segment elevation acute MI. Thus, in patients with anterior ST segment elevation acute MI and in other high-risk patients, echocardiography should be performed during hospitalization.¹

Although considerable work has been done on this topic internationally, there is a great paucity of data locally. Therefore this study is designed to highlight the magnitude of left ventricular thrombus in patients suffering from acute anterior myocardial infarction in our population. The results of this study will be used to guide future recommendations for importance of diagnosis of this complication and guide treatment strategies in the post infarct patients, because significant

frequency of left ventricular thrombus warrant early diagnosis and management of this prognostic ally life threatening, yet silent complication of myocardial infarction.

MATERIAL AND METHODS

This was a hospital based descriptive cross-sectional study. 85 patients were included in the study that were admitted in the departments of Medicine and Cardiology, Ayub Teaching Hospital, Abbottabad, during the six months period from 15th April to 15th October 2011 and were diagnosed with acute anterior wall myocardial infarction. Sample size was calculated using the WHO software to calculate the sample size taking following parameters into consideration:

Sample size was calculated using WHO formula, taking confidence Level (1- α) at 95%, absolute precision 10, Frequency of left ventricular thrombus in acute anterior wall MI as 33%.¹⁰ Sample Size (n) came out to be 85. The sampling technique was nonprobability consecutive. The patients were of all ages and either gender. Prior approval from hospital ethical committee was taken. Use of data for research and publication was explained to the patients and/or their relatives, and informed consent was taken.

All patients fulfilling the inclusion criteria that have their diagnosis confirmed on electrocardiogram and cardiac enzymes were included in the study. Detailed history from the patients was taken and those with previous history of mural thrombus or systemic thrombo-embolism found on interview were excluded from the study.

Echocardiography was performed on every patient in the immediate post infarct period to detect left ventricular thrombus. The patients who had rheumatic heart disease or dilated cardiomyopathy detected on Echocardiogram were also excluded from the study.

All the data was collected on the pro forma. Data was entered and analysed using SPSS-16. Continuous variables (e.g. age, time between onset of chest pain and ECG diagnosis of MI) were described in terms of Mean and Standard Deviation and categorical variables (e.g. gender, left ventricular thrombus, ECG appearance) were described as frequencies and percentages. Left ventricle thrombus was stratified among age, gender, time interval between onset of chest pain and ECG diagnosis of MI and ECG appearance of MI to see the effect modifications.

RESULTS

A total of 85 patients with acute anterior wall MI were inducted in this study. There were 58(68.2%) males and 27 (31.8%) females. The mean age was 59.02 \pm 10.99 years. 18 (21.2%) patients aged from 32 to 49 years, while 67 (78.8%) were older than 50 years. STEMI was found in 65 (76.5%) patients. There were 20 (23.5%)

patients with non-ST-elevation MI (NSTEMI). 52 (61.2%) of the patients presented to the hospital before 12 hours of the onset of chest pain, diagnosed as MI and were given definitive treatment, while in 33 (38.8%) patients the time was more than 12 hours. The mean time between the onset of symptoms and diagnosis of AMI was 10.15 \pm 5.75 hours.

On echocardiographic examination, 29(34.1%) patients had LVT, 23(79.3%) were male and 6 (20.7%) were female. 39.7% of the total 58 males developed LV thrombus while 22.2% of the 27 females developed the complication. Majority of the patients who developed LVT were from more than 50 years age group (24/82.7%) (Table-1).

Of the patients who were more than 50 years of age 24 (35.8%) were found to have LVT. In the 32–49 year age group 5 had LV thrombus (27.8%).

Among those 65 patients who were categorized into STEMI 28 (43.1%) got LV Thrombus and in 20 NSTEMI patients only 1 (5%) had LV Thrombus. (Figure-1)

Among the total of 52 patients who were diagnosed within 12 hours of onset of chest pain 8 (15.4%) developed LV Thrombus. While in 33 patients whose MI was diagnosed after 12 hours of onset of chest pain 21 (63.6%) were complicated with LV Thrombus.

Table-1: Left ventricular thrombus and gender of the patient

Gender	Left Ventricular Thrombus		
	Present	Absent	Total
Female	6 22.2%	21 77.8%	27 100.0%
Male	23 39.7%	35 60.3%	58 100.0%
Total	29 34.1%	56 65.9%	85 100.0%

Table-2: Left ventricular thrombus in different age groups

Age Group	Left Ventricular Thrombus		
	Present	Absent	Total
32–49 years	5 27.8%	13 72.2%	18 100.0%
>50 years	24 35.8%	43 64.2%	67 100.0%
Total	29 34.1%	56 65.9%	85 100.0%

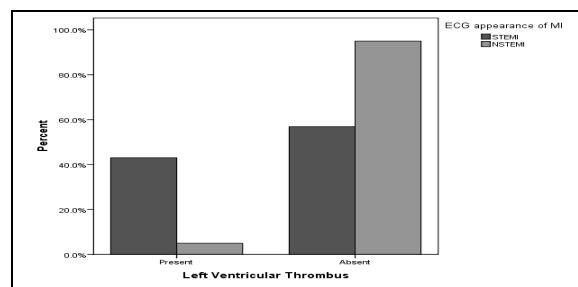


Figure-1: Percentage of ECG appearance of MI with LV Thrombus

DISCUSSION

Coronary Heart Disease is an important medical and public health issue throughout the world. It is likely to become the most common cause of death worldwide by 2020.²

The development of left ventricular thrombi is one of the more common complications of myocardial infarction (MI). Thrombi are important clinically because they can lead to serious embolic complications, including stroke. Left ventricular thrombi are the major sources of embolic stroke after ST segment elevation myocardial infarction.⁹

There is an even greater problem in developing countries like Pakistan where on one hand coronary heart disease are on the rise and on the other hand lack of early diagnosis and intervention in the form of primary PCI/Thrombolysis is deficient in most of the health care centres.

Our study included 85 cases of diagnosed acute anterior wall Myocardial Infarction. Gender distribution of our study matched with the local studies among which Rathi *et al*¹⁰ demonstrated a male preponderance in acute MI with 66.8% males and 33.2% females and Chaudhry *et al*¹¹ 70% males and 30% females. Jafary *et al*¹² and Hafeez *et al*¹³ also showed a similar proportion of male preponderance.

The mean age of the patients presented with MI in Hafeez *et al*¹³ study was 58±11 years which was comparable to our study of 59.02±10.99. It was compared to 52±10.8 in the study reported by Maqbool Jafary *et al*¹² while in the COURAGE trial¹⁴ conducted in USA, the mean age was 62±5. This signifies that Pakistani patients are relatively younger as compared to the West. Another recent study compared the ACS in South Asians and Caucasians. It showed that Asians were at least 10 years younger to the Caucasians at the time of presentation of ACS.¹⁵

76.5% of our patients were diagnosed as STEMI while 23.5% were grouped into NSTEMI. Two multicenter, international surveys published in 2002, the Euro Heart Survey and the GRACE registry, determined the relative frequency of these disorders in approximately 22,000 patients admitted with an ACS.^{16,17} STEMI occurred in 30–33 percent, NSTEMI in 25 percent while rest of the patients included in this study were grouped into Unstable Angina. Rathi's study yielded similar results as our study (76.4% vs 23.6%) but Rathi included all modalities of MI, they didn't restrict their study to anterior wall. The international studies also included the cases of Unstable Angina which was not the case in our study.

The mean time of onset of chest pain and diagnosis of MI was 10.15±5.75 hours in our study which was comparable to Jafary's study (13.2±6.2 hours). 61.2% presented to the hospital before 12 hours of onset of chest pain and got diagnosed with MI while 38.8% were in the more than 12 hours group. It was also interesting to note that in our study more males presented to the hospital earlier (earlier than 12 hours) than females (62.1% vs 59.3%).

All of the 85 patients included in our study were echocardiographically examined in the immediate post infarct period. LV Thrombus was detected in 29 (34.1%) patients. There is varying data on the frequency in local and international studies. The best incidence data is known to be the GISSI-3 database¹⁸ of 8326 patients, only 11.5% of the anterior wall MI patients developed LV Thrombus. However, this analysis may have underestimated the true incidence as patients at high risk for LV thrombus (severe heart failure and systolic blood pressure below 100 mmHg) were excluded from this study. Porter *et al*¹⁹ found in their study that 23.5% of the patients suffering from acute anterior wall MI developed LVT while this incidence was 42.8% in a study done by Okuyan *et al* in Turkey.⁴ The lower incidence in the Porter's study may be due to the availability of early reperfusion therapies which was not analyzed in our study. In Pakistan Chaudhry *et al*¹¹ and Wasim *et al*²⁰ conducted two different studies on anterior wall MI and the incidence was similar (26.66%). While Rathi and his colleagues who didn't restrict their study to anterior wall MI found that 17.8% of the patient of all MI groups developed LV Thrombus. In their study out of 138 anterior wall MI patients 45 (32.6%) developed LV Thrombus.¹⁰ These results were comparable with our results. A further reduced incidence of LV Thrombus was found by Rehan *et al* (11%)²¹ and Kalra *et al* (10%).²² This reduced incidence was reported to be due to early treatment by primary PCI in these patients. Kambery *et al* in a recent study concluded that in patients in whom PCI was administered as the primary therapy, the frequency of LVT was 5.6% in anterior MI while in the non PCI group the frequency was as high as 44.4%.²³

There was a difference of mean age of patients presenting with LVT and without LVT (61.14±10.74 vs 57.93±11.05) while the difference in mean ages was not seen when the either gender were compared in the LVT group. The mean age of males was 61±11.36 years while that of females was 61.67±8.82 in the patients who developed LVT.

In our study 21.2% of patients were in the age group 32–49 years and 78.8% were in more than 50 years age group. Increased occurrence of LVT

was found in the more than 50 year group than in the 32–49 year group (35.8% vs 27.8%).

Chudhary *et al* and Rathi *et al* found no difference in mean ages in those who developed LVT and those who didn't. The same finding was observed by Zelinska and his colleagues⁵. While an increased incidence of the complication was found by them in higher ages, when the higher and lower age groups were studied separately, which was similar to our study.

There was a slight male preponderance in the LVT group as 39.7% of the males and 22.2% of the females developed the complication. Zelinska *et al* also found increased formation of LVT in males.⁵

76.5% of the patients included in our study were categorized into STEMI while 23.5% were in the NSTEMI group. Among the STEMI group 43.1% developed LVT while in the NSTEMI group 5% developed LVT, showing a high propensity of developing LVT with STEMI. Similar results were observed by Rathi and his colleagues but their study included MI involving all regions of myocardium.

There was also a difference seen in the development of LV Thrombus of those patients who were diagnosed more than 12 hours after the onset of symptoms than those who were diagnosed earlier. There was markedly increased incidence of LVT seen in those who were diagnosed late (63.6% vs 15.4%). This finding was comparable with Toth²⁴ and his colleagues. In their study prevalence of LVT was compared in patients who were admitted to hospital after 24 hours to those who were admitted before 24 hours this was found to be 50% vs 17%.

This change in frequency is said to be due to early administration of fibrinolytic therapy. But when the fibrinolytic therapy was studied in various studies against the development of LVT there were variable results proving to be beneficial in some^{10,24,25} while of no significance^{11,18} in other studies in terms of development of LVT.

CONCLUSION

LV Thrombus is a common complication in acute anterior wall MI in our population. Male patients, those who are more than 50 years of age and those who suffer from STEMI seem to be at a higher risk of developing this complication. Early hospitalization was found to lower the risk of LV Thrombus.

Echocardiography should be routinely carried out in patients with acute anterior wall MI so that this potentially life threatening complication may be detected and treated timely.

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