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ORIGINAL ARTICLE

Frequency of left ventricular thrombi after acute ST-Segment elevation myocardial infarction.

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ABSTRACT… Objective: To determine the frequency of left ventricular thrombi after acute ST-Segment elevation myocardial infarction. **Study Design:** Case Series study. **Setting:** Cardiology Department, Lady Reading Hospital, Peshawar. **Period:** July 2018 to December 2018. **Material & Methods:** Patients were included in study were of both gender having age 30-65 year admitted with acute STEMI (under the treatment of ST-Segment elevation myocardial infarction). Routine examination like ECG (cardiofax) and transthoracic echocardiography (Siemens' Accuson CV-70) was done for all the patients who are already admitted and having treatment of acute ST-Segment elevation myocardial infarction. Left ventricular thrombus was measure on the basis of not contracting with systole, Wall motion near the structure is abnormal, color flow Doppler differentiates from stagnant flow after 2 weeks follow up. Any patients who lost to follow up were excluded from the study. **Results:** In this study a total of 120 patients were observed. The mean age was 48 years with standard deviation ± 11.45. Sixty two percent patients were male while 38% patients were female. More over 7% patients had Left ventricular thrombi while 93% patients didn't had Left ventricular thrombi. **Conclusion:** Our study concludes that the frequency of left ventricular thrombi was 7% after acute ST-Segment elevation myocardial infarction.

Key words: Antiplatelet, Anticoagulation, Acute ST-Segment Elevation Myocardial Infarction, Left Ventricular Thrombi.

INTRODUCTION

Myocardial Infarction (MI) is a lethal complication of coronary artery disease which occurred in about 15.9 million in 2015.[1] Non ST elevation myocardial infarction (NSTEMI) was more common than ST elevation myocardial infarction (STEMI) (more than 4 vs. 3 million).[2] STEMIs are more frequent in men.[3] Approximately, a million people suffer an MI every year in the United States.[4] In the developed countries the risk of mortality in STEMI patient is approx. 10%.[5] Incidence of MI for a specific age group have decreased worldwide between 1990 and 2010. Acute MI treatment was among the expensive treatment in admitted patients in the US, with a cost of about $11.5 billion for 612,000 hospital stays, in 2011.[6] Left ventricular (LV) thrombus is a common complication of acute MI that increases the risk of embolic event and needs anticoagulant therapy.[7] LV thrombus resulting in cerebrovascular accident is a catastrophic complication of anterior STEMI.[8] Contact of blood with the aneurismal fibrous tissue is thought to trigger clot formation. Searching for predictors of LV Thrombus, among risk factors identified are raised BMI, baseline platelet count, and infarct size as assessed by CMR (cardiac magnetic resonance imaging).[9] In most cases, these infarcts occur in the distribution of the left anterior descending (LAD) coronary artery.[10] These anterior infarcts have huge areas of poorly contracting LV muscle;[4] closest intracavitary blood movement is sluggish (stasis) compared with normal areas. This sluggish flow of blood is thought to raise the possibility of thrombus formation. Many patients will have an LV apical aneurysm with akinesia or dyskinesia. In most cases, thrombus is placed within or adjacent to the LV apex but can also happen with large inferolateral infarctions/ aneurysms.

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Cross-sectional echocardiography has been shown to have superior predictive accuracy than contrast left ventriculography and is therefore the preferred technique for the detection of intraventricular thrombi. The occurrence of LV thrombus has reduced in the primary PCI (percutaneous coronary intervention) era then in thrombolytic era (2.9% to 15%).[8] Warfarin therapy in patients of diagnosed LV thrombus decreases the danger of systemic embolization.[11] In the prethrombolytic era LV thrombus was more frequent than thrombolytic (40 vs. 28).[12,9] As the treatment of MI got sophisticated with primary PCI along with potent antiplatelet and antithrombin therapy, the frequency of LV thrombus has reduced drastically. Anterior STEMI patients have lower rates of thrombus in primary PCI era as compared to earlier regardless of LVEF (2.9% to 7.1%).[13,14,15] In a higher-risk group of anterior-wall MI (AWMI) patients treated with PCI enrolled in the Autologous Stem Cell Transplantation in Acute Myocardial Infarction (ASTAMI) trial, LV thrombus was diagnosed by serial echocardiography was 15% while ten percent of cases were picked during the first week.[16] The common risk factors for LV thrombus in STEMI are location (anterior), infarct size (large), and aneurysm. Left ventricular thrombus may deteriorate the post-infarct outcome due to thromboembolic events. The knowledge of the frequency may therefore guide us to appropriate use of antiplatelet and antithrombotic therapy after acute MI.[17]

As no such study has been conducted in our population on this topic for the last five years that is why this study will provides us the latest and updated information regarding frequency of left ventricular thrombi after acute STEMI. More over the results of this study will be share with other health professional and cardiologist for up graduation of their knowledge as well as this study will be used for other research work.

MATERIAL & METHODS

This Case series study was carried out at Cardiology Department, Lady reading hospital, Peshawar from 1st July 2018 to 30 December 2018. Sample size was calculated 120, taking in account 15% enrolled population had LV thrombus of STEMI[8] with 95% confidence interval and 5% margin of error according to WHO formula for sample size. Non-probability consecutive sampling technique was used. Patients were included in study were of both gender having age 30-65 year admitted with acute STEMI (under the treatment of ST-Segment elevation myocardial infarction). Following patients were excluded: Patients having previous history of STEMI, patients with congestive cardiac failure (on the basis of history and clinical examination) Patients with Cardiogenic shock, Patients with rheumatic heart disease, Patients with Valvular heart disease, Patients with Thrombophilias, Patients with previous history of LV clot, Patients with chronic comorbid conditions including chronic liver disease and chronic kidney disease. The study was started, once approval from hospital ethical committee was obtained.

All patients fulfilling the inclusion criteria were included in the study through emergency and cardiology Department. The study purpose and benefits was explained to all the patients, and a written informed consent was taken from all the patients. Routine examination like ECG (cardiofax) and transthoracic echocardiography (Siemens' Accuson CV-70) was done for all the patients who are all ready admitted and having treatment of acute STEMI. Left ventricular thrombus was measure on the basis of not contracting with systole, Wall motion near the structure was abnormal, color flow Doppler differentiates from stagnant flow after 2 weeks follow up. Patients were excluded if they were lost in follow up. All the above mentioned information like age, gender, duration of MI, obesity, type of MI were recorded in pre design proforma. Exclusion criteria had strictly used to control biases. The data was analysed in SPSS version 20. Mean and standard deviation was computed for continuous variables like age, duration of MI. Frequency and percentages were computed for categorical variables like gender, Obesity, type of MI and left ventricular thromb. Left ventricular thrombi was stratified with age, gender, duration of MI, obesity and type of MI to see effect modification. Post stratification chi square test was applied in which $P \leq 0.05$ was considered significant. All results

were presented in the form of tables and graphs.

RESULTS

In this study, age distribution among 120 patients was analyzed as 34(28%) were in age range 30-45 years while 86(72%) patients were in age range 46-65 years. Mean age was 48 years with standard deviation ± 11.45. Gender distribution among 120 patients was analyzed as 74(62%) patients were male while 46(38%) patients were female. Duration of MI among 120 patients was analyzed as 90(75%) patients had MI ≤24 hours and 30(25%) patients had MI >24 hours. Mean duration of MI was 24 hours with standard deviation ± 2.34. Status of Obesity among 120 patients was analyzed as 70(58%) patients were obese with BMI ≤25 and 50(42%) patients were non obese with BMI >25. Mean BMI was 29 Kg/m^2 with standard deviation ± 3.14. Type of STEMI among 120 patients was analyzed as 72(60%) patients had anterior wall MI, 48(40%) patients had inferior wall MI. Left ventricular thrombi among 120 patients was analyzed as 8(7%) patients had Left ventricular thrombi while 112 (93%) patients didn't had Left ventricular thrombi (as shown in Table-I) Stratification of Left ventricular thrombi with age, gender, duration of MI, obesity and type of MI is given in Table-II,III,IV,V,VI.

Left Ventricular Thrombi	Frequency (%)
Yes	8 (7%)
No	112 (93%)
Total	120 (100%)

Table-I. Left ventricular thrombi. (n=120)

Left Ventricular Thrombi	30-45 years	46-65 years	Total
Yes	2	6	8
No	32	80	112
Total	34	86	120

Table-II. Stratification of left ventricular thrombi WRT age distribution. (n=120)
Chi square test = P Value was 0.8285

Left Ventricular Thrombi	Male	Female	Total
Yes	5	3	8
No	69	43	112
Total	74	46	120

Table-III. Stratification of left ventricular thrombi WRT gender distribution. (n=120)
Chi square test =P Value was 0.9599

Left Ventricular Thrombi	<24hr	>24hr	Total
Yes	6	2	8
No	84	28	112
Total	90	30	120

Table-IV. Stratification of left ventricular thrombi WRT duration of MI. (n=120)
Chi square test = P Value was 1.0000

Left Ventricular Thrombi	Obese	Non Obese	Total
Yes	5	3	8
No	65	47	112
Total	70	50	120

Table-V. Stratification of left ventricular thrombi WRT obesity. (n=120)
Chi square test=P Value was 0.8045

Left Ventricular Thrombi	Anterior wall MI	Inferior wall MI	Total
Yes	5	3	8
No	67	45	112
Total	72	48	120

Table-IV. Stratification of left ventricular thrombi WRT type of MI. (n=120)
Chi square test = P Value was 0.8812

DISCUSSION

Our study shows that mean age was 48 years with standard deviation ± 11.45. Sixty two percent patients were male while 38% patients were female. In this study, 7% patients had Left ventricular thrombi while 93% patients didn't had Left ventricular thrombi. In one study conducted by Bulluck H et al[18], the frequency of LV thrombus using CMR as a diagnostic modality was 6.3% in STEMI patients. Among this cases, 96% of LV thrombus was found in patients of anterior STEMI (12.2% incidence). In case of anterior STEMI with impaired LV function (n = 447), LV thrombus was present in 19.2%. The sensitivity and specificity of TTE to identify LV thrombus was 29% and 98%, respectively. In patients with anterior STEMI and impaired LV function, the TTE is more sensitive 70% to pick LV thrombus. LV thrombus is not visible in 88% of patients by 3 to 6 months. The embolic events were the same at 1.5% (P = 0.25) at 1to 2 year follow-up but the bleeding risk was drastically higher (8.8% versus 0.5%, P < 0.001)

in the LV thrombus category on three antiplatelet drugs as compared to the no LV thrombus group on two antiplatelet therapy.

In another study conducted by Mao TF et al[19], LV thrombus was diagnosed in 28 (1.6%) patients. A multivariable logistic regression model suggested that LAD intervention was alone related to LV thrombus, TIMI III (thrombolysis in myocardial infarction) flow was slightly linked with less LV thrombus and good LVEF was linked with less LV thrombus. LV thrombus frequency has reduced significantly in primary PCI patients as compare to thrombolytic patients (2.9% vs 15%).[8] Warfarin therapy in patients with LV thrombus decreases the danger of systemic embolization.[8]

In the prethrombolytic era LV thrombus was more frequent than thrombolytic (40 vs. 28).[12,9] As the treatment of MI got sophisticated with primary PCI along with potent antiplatelet and antithrombin therapy, the occurrence of LV thrombus has reduced drastically. Anterior STEMI patients have lower rates of thrombus in primary PCI era as compared to earlier treatment era regardless of LVEF (2.9% to 7.1%).[13,14,15] In ASTAMI trial, LV thrombus was present in 15% of patients by serial echocardiography, while ten percent of patients were picked during the first week.[16] The common risk factors for LV thrombus in STEMI are location (anterior), infarct size (large), and aneurysm. Left ventricular thrombus may deteriorate the post-infarct outcome due to thromboembolic events. The knowledge of the frequency may therefore guide us to appropriate use of antiplatelet and antithrombotic therapy after acute MI.[17]

CONCLUSION

Our study concludes that the frequency of left ventricular thrombi was 7% after acute ST-Segment elevation myocardial infarction.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Naveed Ahmad	Concept & Design of study, Revising critically, Final approval of version.	
2	Syed Tahir Shah	Drafting, Data analysis, Revising critically.	
3	Noor ul Hadi	Drafting, Data analysis.	
4	Umair Ali	Drafting, Revising critically.	
5	Sanaullah	Data analysis, Revising critically.