ORIGINAL ARTICLE

FREQUENCY OF LEFT VENTRICULAR THROMBUS IN ST ELEVATION MYOCARDIAL INFARCTION ON ECHOCARDIOGRAPHY

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ABSTRACT

Background: Left ventricular thrombus formation is a well-known complication of ST segment elevation myocardial infarction. The objectives of this study were to determine the gender and age distribution of acute myocardial infarction patients and to find out the frequency of left ventricular thrombus in acute myocardial infarction patients.

Material and Methods: This cross-sectional study was conducted in Cardiology Department, DHQ Teaching Hospital, D.I.Khan from October 2012 to April 2013. A sample of 119 patients with typical chest pain lasting >30 minutes with ECG changes of acute ST elevation myocardial infarction was included. Those with technically difficult windows for echocardiography and previous history of myocardial infarction were excluded. 2-D echocardiography was performed on day 1, 3 and 5 for detection of left ventricular thrombus. Categorical data was analyzed for frequency and percentage and numeric data for mean and SD.

Results: Out of 119 patients 83(70%) were males and 36(30%) females. The mean age was 59.5±11.0 years. Myocardial infarction was anterior in 66(55.46%), inferior in 43(36.13%), anterolateral in 6(5.04%) and antero-inferior in 4(3.36%) patients. On serial echocardiography left ventricular thrombus was found in 9(7.56%) patients; 6 patients with anterior myocardial infarction, 2 with anterolateral and 1 with antero-inferior myocardial infarction.

Conclusion: Left ventricular thrombus is important complication of acute myocardial infarction. The echocardiography is very sensitive and specific test in detection of LV thrombus in acute MI patients. Echo should be done of every patient presenting with acute MI at the time of admission and discharge.

KEY WORDS: Myocardial Infarction; Anterior Wall Myocardial Infarction; Left Ventricular Thrombus; Echocardiography.

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INTRODUCTION

Left ventricular (LV) thrombus is a common complication of myocardial infarction (MI).[1] Early data from the pre-thrombolytic and thrombolytic eras suggest that in the setting of acute myocardial infarction (AMI), LV thrombus was present in 7-46% of patients, most frequently in acute anterior or apical myocardial infarction.[2,4] Nowadays the reported incidence is lower. This is probably due to more aggressive anticoagulation therapies in the acute phase (e.g the use of heparin, bivalirudin), smaller infarctions and improved LV remodelling.[4]

Thrombus development is important because it can lead to arterial embolic complications such as stroke. Patients with LV thrombus or those at high risk should receive anticoagulation for at least three months.[5]

The likelihood of developing LV thrombus after an acute MI varies with infarct location and size. LV thrombus is most often seen in patients with large anterior ST-elevation infarctions (STEMI) with anteroapical aneurysm formation; the incidence is lower with smaller infarctions and those involving other myocardial regions.[6]

Anterior infarctions have large areas of poorly contracting left ventricular muscle; adjacent intracavitary blood movement is sluggish as compared to normal areas. This relative stasis of blood is thought to increase the risk of thrombus formation.[7] Two factors contribute to clot formation in this setting: stasis of flow in the aneurysm cavity and contact of blood with the fibrous tissue in the aneurysm rather than normal endocardium.[8]

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A well-recognized complication of acute myocardial infarction (AMI) is the development of a LV thrombus. Causes of LV thrombus include segmental dysfunction of the infarcted myocardium causing stasis, endocardial tissue inflammation providing a thrombogenic surface, and a hypercoagulable state.[9] There is evidence that LV thrombi usually develop within a few days after acute MI.[10]

The incidence of LV thrombi complicating acute MI is reported to be 20-40%.[11] Early thrombolytic therapy reduces this incidence.[9] However, there is a little data on the incidence of LV thrombus formation after primary percutaneous coronary intervention (PCI), with concurrent use of IIb/IIIa inhibitors for acute MI.[12] Ventricular thrombus formation has potential for systemic embolization. 2-D echo can help in identifying a subset of patients who are likely to develop left ventricular thrombus.[13] 2-D echo have a sensitivity of 95% and a specificity of 68% with a predictive value of 72% in detecting left ventricular thrombus comparing to autopsy studies.[14]

Echocardiographic examination is a noninvasive technique without biohazards and is greatly helpful in assessing anatomical and hemodynamic information and risk stratification of AMI patients. The prognosis of patients with AMI complications eg; mitral regurgitation, ventricular septal defect and pericardial effusion can be assessed with great accuracy.[15]

The wall motion abnormalities, poor ejection fraction and mitral regurgitation are significantly associated with left ventricular thrombus formation. Those patients who developed left ventricular thrombus, their ejection fraction (EF) were lower, the wall motion score index was higher and incidence of mitral regurgitation (MR) was 45% compared to those who had no LV thrombus.[16] The study supports the fact that greater degree of left ventricular dysfunction is associated with left ventricular thrombus formation.[17]

The objectives of this study were to determine the gender and age distribution of acute myocardial infarction patients and to find out the frequency of left ventricular thrombus in acute myocardial infarction patients.

MATERIAL & METHODS

It was a cross-sectional study conducted at Department of Cardiology, District Headquarter Teaching Hospital, Dera Ismail Khan, Pakistan from October 2012 to April 2013. A sample of 119 patients was selected by non-probability convenience sampling. All patients with acute myocardial infarction were included, while patients with technically difficult windows and with previous MI were excluded from the study.

MI was diagnosed by typical chest pain lasting for more than 30 minutes and typical ECG changes of acute STEMI. Written informed consent was taken. Detailed history and clinical examination was carried out at admission. In addition to Troponin T, rise in CKMB level were considered as diagnostic of acute myocardial infarction. Echocardiography (MEDISON SONOACE X6 Model, Seoul, South Korea) was done with 3.5 MHz and 5 MHz phased array transducer using both continuous wave (CW) and pulsed wave (PW) Doppler modalities on day 1, 3 and 5 for detection of LV thrombus. Images were obtained in long axis left parasternal, short axis parasternal view, at level of mitral valve tips, papillary muscle level and at left ventricular apex. Apical four chambers and apical two chamber views were also taken to document presence of left ventricular clot in different views. The criteria for diagnosis of LV thrombus was; acoustically different mass attached to left ventricular walls, associated with adjacent wall motion abnormalities, and documentation of mass in at least two different echocardiographic views.

The demographic variables were gender, age in years and age grouping. The research variables were type of MI and presence of LV thrombus. Age grouping was as; up to 50 years, 51-75 years and more than 75 years. Frequency and percentage for categorical variables like gender, type of MI and LV thrombus were given. Mean and SD were calculated for numeric variable like age in years. Data was analysed using SPSS version 10 (SPSS Inc., Chicago, IL, USA).

RESULTS

Out of 119 patients with acute myocardial infarction (AMI), 83 (70%) were male and 36 (30%) were female. The mean age of patients was 59.5±11.0 (29-85) years. Thirty (25%) patients were in age group of up to 50 years, 70 (59%) were in age group of 51-75 years and 19 (16%) were in age group of more than 75 years.

The type of myocardial infarction was anterior in 66 (55.46%) cases, inferior in 43 (36.13%), anterolateral in six (5.04%) and anteroinferior in 4 (3.36%) cases.

Left ventricular thrombus (LVT) was found in nine (7.56%) patients out of 119 cases of AMI. Out of these nine cases of LVT, six were in anterior MI, two in anterolateral MI, one in anteroinferior MI and zero in inferior wall infarction. The incidence of left ventricular thrombus was higher among anterior myocardial infarction patients. Out of these nine, two were found on day 1, zero on day 3 and seven on day 5.

DISCUSSION

In a study by Rathi et al, left ventricular thrombus was detected in 50/280 (17.86%) patients by 2-D echo. Most of the thrombi were located in the left ventricular apex and almost all were detected within the first week after infarction[18]. The overall incidence of left ventricular thrombus (LVT) was 17.86%, higher among patients of acute anterior myocardial infarction 45/138 (32.6%). In this study mean age was 54.08 ± 11.9 SD. LVT was present in 40/214 (18.7%) in male and 10/66 (15.1%) female. Results from our study showed left ventricular thrombus formation more with anterior MI and these were detected within first week of MI similar to study by Rathi et al and mean age was comparable to that study.

In a study by Osherov et al, left ventricular thrombus formation was present on the first echocardiogram in 6/296 patients. Another 8/289 patients displayed thrombus only on their second echocardiogram (4.7%, 14/296).[19] The first echocardiogram was performed within 1.2 ± 0.9 days of admission and the second after 5.8 ± 3.6 days. A total of 296 patients (mean age 61 ± 13 years, range 29-92; 82% males) were included. Twenty-seven of them (9%) had past history of MI (14 anterior and 13 inferior), while this was the first MI for the other 269 study patients. LV thrombus was found only on the second echocardiographic examination in another eight patients (2%), totaling 14 patients whose second echocardiographic examination demonstrated thrombus formation (4.7%, 14/296). Incidence of LV thrombus in our study was similar to above mentioned study. We did not include patients with previous infarction, while Osherov et al included patients with previous MI. Mean age was similar to our study.

Ninety-two consecutive patients with ST elevation AMI were enrolled in the study conducted by Arshad et al.[20] Fifty-seven men and 35 women were studied, with a mean age of 60 (30-87) years. Gender differences were similar to our study because female patients are protected from MI due to ovarian hormones.

Relationship between the type of MI and thrombus formation was noted in the study done by Arshad et al: forty one patients (41/92) had an inferior MI, 37 had an anterior MI,12 patients presented with postero-inferior MI, only one with lateral MI. Four patients, all with an anterior MI (4.3% of the total, 10.8% of the anterior MI group), had a LV thrombus. The thrombus was located in the LV apex in all 4 cases. All 4 were men, with a mean age of 71(52-81) years. In this study no LV thrombus was found in other types of MI. Our study also showed most patients with anterior MI. Similar to this study LV thrombus was the most frequent in our study.

Delewi et al have evaluated for ventricular thrombus among 529 patients of acute myocardial infarction. The incidence of left ventricular thrombus in his series was 71/529 (13.4%).[21]

CONCLUSION

Left ventricular thrombus is important complication of acute myocardial infarction. The echocardiography is very sensitive and specific test in detection of LV thrombus in acute MI patients. Echo should be done of every patient presenting with acute MI at the time of admission and discharge.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.