

FREQUENCY OF LEFT VENTRICULAR THROMBUS ON PRE-DISCHARGE ECHOCARDIOGRAPHY OF PATIENTS WITH ACUTE ANTERIOR MYOCARDIAL INFARCTION

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Contribution

SNA, WM conceived the idea, planned the study and drafted the manuscript. KAH collected data. SA, SNA did statistical analysis, drafted the manuscript and critically reviewed manuscript. All authors contributed significantly to the submitted manuscript.

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ABSTRACT

Objective: To measure the frequency of left ventricular thrombus on pre discharge echocardiography of patients with acute anterior myocardial infarction.

Methodology: This cross sectional study was conducted at Chaudry Pervez Elahi Institute of Cardiology, Multan from 15th June 2013 to 14th Dec 2013. Patients of acute anterior wall myocardial infarction between 20-70 years of age of both genders were selected. Patients with previous myocardial infarction were excluded from the study. Detailed echocardiography examination was performed in all these patients to look for presence of LV thrombus and findings were noted. P-value < 0.05 was taken as significant.

Results: There were 219 patients in total. Males were 135 (61.6%) . Mean age of the patients was 49.56 + 10.21 years. Diabetes was present in 77 (35.2%), obesity in 82 (37.4%) and 123 (56.2%) were smokers. Left ventricular thrombus was found to be present in 21(9.6%). No significant relationship could be established with age, gender, smoking, diabetes and obesity.

Conclusion: The frequency of left ventricular thrombus after acute anterior wall myocardial infarction was found to be present in a significant proportion of patients but is lower than that previously reported in the literature.

Key Words: Left ventricular thrombus, Anterior wall myocardial infarction Echocardiography.

INTRODUCTION

Cardiovascular diseases are major causes of morbidity and mortality causing more than 25% of deaths in the Indian subcontinent.^{1,2} Atherosclerotic disease is expected to become the leading cause of global morbidity and mortality by 2020.¹ According to an estimate, nearly one hundred thousand individuals suffered an acute myocardial infarction in Pakistan in the calendar year 2002.³

Myocardial infarction is associated with number of complications; left ventricular thrombus (LVT) formation is a frequent complication in patients with acute anterior myocardial infarction (MI). Left ventricular thrombus is associated with increased risk of embolism. Higher mortality rates have been reported in patients with LVT after acute MI, especially when these develop within the first 48 hours after infarction.^{4,5} Although great majority of patients with LVT have large anterior infarcts with depressed global left ventricular systolic function, this is not the rule. Thrombi can also be found in some small apical infarcts with good global left ventricular systolic function and rarely in some inferior infarcts.⁶ Risk factors for developing left ventricular thrombus are infarct location (i.e., anterior myocardial infarction), infarct size and extent, and impairment in global or regional left ventricular function (i.e., ejection fraction < 40%). Most left ventricular thrombi are seen by 2 weeks after an acute myocardial infarction, often attached to the apex or in a discrete aneurysm or dyskinetic ventricular wall.⁷ Ventricular thrombus formation is rare in patients with normal ventricular function; however, they may occur in patients with coagulation disorders.

Streptokinase reduces the incidence of left ventricular thrombosis after acute myocardial infarction.⁸ Two-dimensional transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) are the most commonly used techniques for the clinical identification and follow up of left ventricular thrombi. In the modern era with improved treatment protocols and public awareness, the incidence of left ventricular thrombus is decreasing gradually. Historically, the incidence of LV thrombi complicating AMI had been reported to be 20–40%, and may reach 60% among patients with large anterior wall AMI while in other studies the incidence ranging from 5% to 23% after an acute myocardial infarction.⁹⁻¹¹ In 1999 studies were conducted showing incidence of left ventricular thrombus after acute anterior myocardial infarction was 60% which were reduce to 40 % in 2000 and in 2004 it was 5% to 23%, so there was gradual reduction of left ventricular thrombus formation after acute anterior myocardial infarction. The objective of the study was to measure the frequency of left ventricular thrombus on pre discharge echocardiography of patients with acute anterior myocardial infarction.

METHODOLOGY

This cross sectional study was conducted at emergency department of Chaudary Pervaiz Elahi Institute of Cardiology from 15th June to 14th Dec 2013. After approval from ethical committee and taking informed consent, patients with first acute anterior wall myocardial infarction between 20-70 years of age and both genders admitted were included in the study. The objective of the study was to measure the frequency of left ventricular thrombus on pre discharge echocardiography of patients with acute anterior myocardial infarction. Non probability consecutive sampling technique was used for sampling. Patients with previous myocardial infarction, valvular heart disease, heart failure and those already taking anticoagulation were excluded from study. All patients underwent echocardiography after two days of post anterior myocardial infarction and the findings of echocardiography especially the outcome variable i.e. presence of left ventricular thrombus defined as blood clot located in left ventricle as hyperechoic area in the left ventricle were noted. The collected information was entered and analyzed through SPSS (Version 16.0). Effect modifier like age, gender, diabetes, smoking and obesity were controlled by stratification and Chi-square test was applied to see the effect of these on outcome. p-Value \leq 0.05 was taken as significant.

RESULTS

There were 219 patients in total. Males were 135 (61.6%) while females were 84 (38.4%). Mean age of the patients was 49.56 \pm 10.21 years (25- 70) years. Diabetes was present in 77 (35.2%), obesity in 82 (37.4%) while 123 (56.2%) were smokers. Left ventricular thrombus was found to be present in 21 (9.6%) patients.

When the effect of gender was noted it was found that among 135 males, mean age was 47.64 \pm 10.24 years, diabetes was present in 52 (38.5%), smoking in 73 (54.1%) and obesity was present in 43 (31.9%). Left ventricular thrombus was found to be present in 15 (11.1%) patients. Among females mean age was found to be 52.65 \pm 9.42 years. Diabetes was found to be present in 25 (29.8%), smoking

Table 1: Comparison of Various Characteristics Among Males and Females in the Study Population (n= 219)

	Males (135) n(%)	Females (84) n(%)	p-Value
Mean age (years)	47.64 \pm 10.24	52.65 \pm 9.42	
Diabetes	52 (38.5%)	25 (29.8%)	
Smoking	73 (54.1%)	50 (59.5%)	
Obesity	43 (31.9%)	39 (46.4%)	
LV thrombus	15 (11.1%)	06 (7.1%)	0.480

was present in 50 (59.5%) and obesity in 39 (46.4%). Left ventricular thrombus was found to be present in 6 (7.1%) patients. The p-value was found out to be 0.480 (Table 1).

About 40 patients had age ≤ 40 years . Males were 31 (77.5%) and females 9(22.5%) with diabetes was present in 15 (37.5%), smoking in 24 (60%), obesity in 13 (32.5%) and LV thrombus was found in 4 (10%) patients. In those with age 41-50 years there were 111 patients, males were 73 (65.8%). Diabetes was present in 35 (31.5%), smoking in 59 (53.2%), obesity in 35 (31.5%), left ventricular thrombus was found in 11 (9.9%). In those with age > 50 there were 68 patients, 31(45.6%) were males, diabetes was present in 27 (39.7%), smoking in 40 (58.8%), obesity in 34(50%) and left ventricular thrombus was present in 6 (8.8%) patients (p= 0.432) [Table 2].

Table 2: Comparison of Various Characteristics Among Patients with Different Age Groups in study population (n=219)

	Age ≤ 40 n(%)	Age 41-50 n(%)	Age > 50 n(%)	p-Value
Males	31(77.5%)	73(65.8%)	31 (45.6%)	
Females	09 (22.5%)	38(34.2%)	37 (54.4%)	
Diabetes	15(37.5%)	35 (31.5%)	27(39.7%)	
Smoking	24(60%)	59(53.2%)	40(58.8%)	
Obesity	13(32.5%)	35 (31.5%)	34(50%)	
LV thrombus	04(10%)	11(9.9%)	06(8.8%)	0.432

When the effect of diabetes was noted that there were 77 patients who had diabetes . Among those with diabetes 9 (11.68%) had evidence of left ventricular thrombus while among those who had no diabetes 12 (8.45%) had evidence of left ventricular thrombus (p = 0.437). When the effect of smoking was noted that there were 123 patients who were smokers . Among smokers 8 (6.51%) had evidence of left ventricular thrombus while among non-smokers 13 (13.54%) had evidence of left ventricular thrombus (p=0.079). When the effect of diabetes was noted that there were 82 patients who were obese . Among those with obesity 7 (8.53%) had evidence of left ventricular thrombus while among those who had no obesity 14(10.22%) had evidence of left ventricular thrombus (p-value = 0.682) { Table 3}.

Table 3: Comparison of Various Characteristics Among Those with Diabetes, Smoking and Obesity (n=219)

		LV Thrombus		p-Value
		Present n(%)	Absent n(%)	
Diabetes	Present	9/77 (11.68%)	68/77 (88.31%)	0.437
	Absent	12/142 (8.45%)	130/142 (91.5%)	
Smoking	Present	8/123 (6.51%)	115/123 (93.5%)	0.079
	Absent	13/96 (13.54%)	83/96 (86.46%)	
Obesity	Present	7/82 (8.53%)	75/82 (91.5%)	0.682
	Absent	14/137 (10.22%)	123/137 (89.78%)	

DISCUSSION

Left ventricular (LV) mural thrombus is a well-recognized complication of acute myocardial infarction. In survivors of infarction, two-dimensional (2-D) echocardiography suggests a mural thrombus in 20-30%.^{10,11} It occurs commonly (i.e. in 30-50%) in those with large anterior Q-wave infarctions and resultant anteroapical asynergy, and relatively uncommonly (i.e. in < 10%) in those with inferior Q-wave and non-Q-wave infarctions.¹²

Echocardiographic studies have shown that the likelihood of LV mural thrombus formation following myocardial infarction is related to the size and severity of the infarction-induced wall motion abnormality, so that a mural thrombus most likely forms in the subject with anteroapical akinesis or dyskinesis and associated inflamed surface^{13,14} Transthoracic 2-D echocardiography is the method of choice for assessing the presence, size, and shape of LV mural thrombus.^{14,15} Transesophageal echocardiography is an alternative method echocardiography does not provide information about whether the thrombus is (a) old and static or (b) relatively new and dynamic.¹⁵⁻¹⁷

After myocardial infarction systemic embolic event occurs in two-thirds in 90% within 2 weeks. Risk factors include 1) severe heart failure, (2) diffuse LV dilatation and dysfunction. (3) previous embolization, (4) atrial fibrillation, and (5) echocardiographic evidence of a mobile thrombus that protrudes far into the LV cavity.¹⁸ Stasis within the LV aneurysm favors mural thrombus formation and sustenance, but LV contraction does not occur in close proximity to the thrombus. As a result, the likelihood that a portion of the thrombus will dislodge and embolize is low.^{19,20}

In a study conducted by Perdigão et al 193 patients who died successively of acute myocardial infarction 88 (43%) had thrombus in at least one of the ventricular cavities, 38 (26%) only in left ventricle, 15 (8%) only in right ventricle and 35 (18%) in both ventricles.²³ In the group with left ventricular thrombi, the anterior infarct was more frequent and in the group with right ventricular thrombi the right ventricular infarct was also more frequent. The systemic embolism was uncommon in this group (1 case in 193 patients).

In a 6-year period study conducted by Osheroy et al, 642 patients with anterior wall AMI and echocardiography were treated with PPCI (n = 297), thrombolysis (n = 128), or conservative treatment (n = 217). The rate of LVT among anterior wall AMI was 6.2%.²⁴

In the study conducted by Zielińska et al there were 3158 patients who had underwent successful primary PCI within 12 hours from onset of AMI were retrospectively analyzed.²⁵ LVT was detected in 79 pts (2.5%). LVT strongly associated with anterior AMI (odds ratio OR = 25), male gender (OR = 2.21), EF < 40% (OR = 2.19) and previous hypertension (OR = 2.2).

In our study there were 219 patients in total. LVT was more common in males 15/135 (11.1%) than among females 6/84 (7.1%). However the difference was not statistically significant with p-value of 0.480. LVT in different age groups has no statistical significance ≤ 40 years 4/40 (10%), between 41-50 years found to be present in 11/111 (9.9%) while was present in 6/68 (8.8%) in those with age > 50 years as the p-value was 0.432. In diabetics and smokers, also no significant difference was noted found in 9/77 diabetics (11.68%) as compared to 12/142 (8.45%) among non-diabetics with a statistically non-significant difference with a p-value of 0.437, and 8 of 123 (6.5%) smokers had evidence of LVT as compared to 13/96 (13.54%) among non smokers with a p-value of 0.079 which was not statistically significant.

CONCLUSION

The frequency of left ventricular thrombus after acute anterior wall myocardial infarction was found to be present in a significant proportion of patients, which is lower than that previously reported in the literature. Therefore pre discharge echocardiography should be part of CCU protocol.

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