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Research Article

FREQUENCY OF LEFT ATRIAL AND APPENDAGE THROMBUS IN PATIENTS PRESENTING WITH SEVERE MITRAL STENOSIS

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Abstract:

Objective: To determine the frequency of left atrial and appendage thrombus in patients with severe mitral stenosis.

Methodology: The study design was descriptive cross sectional. A total of 142 patients meeting our inclusion criteria were enrolled through nonprobability sampling technique in this research study. A well-designed questionnaire was used for data collection of admitted patients.

Results: Out of 142 patients, 111 (78.16%) male patients were recorded, and 31 (21.83%) female patients were recorded. Mean and SDs for age was 54 ± 5.68 . Mean and SDs for height was 5.8 ± 0.08 . Mean and SDs for weight was 90 ± 5.03 . Mean and SDs for BMI was 31.12 ± 1.74 . Mean and SDs for LA&LAA Size was 42 ± 0.56 . 122 (85.91%) patients were recorded with LA & LAA Thrombus.

Conclusion: The frequency of left atrial and appendage clots on trans-esophageal echocardiography in patients with severe mitral stenosis is common and more frequent in patients with AF and LA size $> \text{ or } = 45 \text{ mm}$.

Keywords: Mitral valve stenosis (MS), LA thrombus, Left Atrial Appendage (LAA)

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INTRODUCTION:

Mitral valve stenosis (MS) is a narrowing of the mitral valve orifice that increases resistance to blood flow from the left atrium (LA) to the left ventricle (LV). MS usually occurs as a result of rheumatic fever but there are other less common causes as well¹. MS does not usually cause symptoms unless it is severe with mitral valve area less than 1.5 cm². In MS, blood flow through the diseased valve is reduced which results in enlargement of LA because of the volume and pressure overload^{2,3}. These patients are at high risk of developing LA thrombus due to blood stasis.⁴ Left Atrial Appendage (LAA) is the common site for thrombus formation.⁵ LA and LAA Thrombus may lead to cerebrovascular events, coronary embolization, renal emboli and infarction because of thromboembolic phenomenon.⁶

The management approach to the individual with mitral stenosis depends upon symptomatic status, degree of stenosis and suitability of valve for percutaneous balloon mitral valvuloplasty. The technique of percutaneous balloon dilatation of the mitral valve by the trans-septal approach has been generally accepted as an alternative to mitral valve replacement or surgical commissurotomy in a subgroup of patients with symptomatic mitral stenosis. Mitral stenosis is frequently associated with LA and LAA thrombi and systemic emboli are a well-known complication of balloon dilatation of the mitral valve.⁶ Adverse events are believed to be caused primarily by embolization of LA and LAA thrombi, when a thrombus is dislodged during the procedure. So, the presence of LA and LAA thrombi is a contraindication to balloon dilatation of the mitral valve. Therefore, Trans-esophageal echocardiography (TEE) is used routinely before percutaneous trans-septal mitral commissurotomy (PTMC) to detect LA and LAA thrombus to avoid the risk of embolic complications.^{7,8} The reported prevalence of left atrial thrombus in patients with mitral stenosis is 26.1% (with AF) and 13.5% in normal sinus rhythm group, 40%⁹, 14.5%¹⁰, 43.07%¹¹ (with AF) and 16.6% (in normal sinus rhythm)¹², 8.4%¹³ and 27%¹⁴.

Aim of this study is to determine the frequency of left atrial and appendage thrombus on transesophageal echocardiography in patients with severe mitral stenosis undergoing PTMC. As treatment strategy changes with presence of LA or LAA thrombus. Moreover, if not detected with trans-thoracic echocardiography (TTE) can result in adverse event in the form of stroke or other cardiovascular accidents during PTMC. As no such study has been conducted in our population for the last five years so this study

will provide us the latest and updated information regarding frequency of left atrial and appendage thrombus in patients with severe mitral stenosis. The results of this study will be shared with other health professionals and will be used for other research work.

METHODOLOGY:

This was a descriptive cross-sectional study carried out on 142 patients meeting our inclusion criteria were enrolled through nonprobability consecutive sampling technique from Cardiology OPD of our hospital in this research study. A well-designed questionnaire was used for data collection of admitted patients. The study was performed at the Department of Cardiology, Hayatabad Medical Complex, Peshawar, and Islamabad from 12 Jul, 2019 to 12 Jan, 2020. The study was conducted after approval from hospitals ethical and research committee. The purpose and benefits of the study were explained to all patients and a written informed consent was obtained. Detailed history, complete routine examination, baseline investigations including INR, ECG and TTE was performed for the confirmation of severe mitral stenosis. All the patients were subject to TEE before undergoing PTMC. All patients were given local pharyngeal anesthesia (1% lidocaine gargles). TEE probe was introduced with the patient lying supine in left lateral position. After completion of TEE, Left Atrial Thrombus was evaluated. Left Atrial and Appendage thrombus was considered positive if the presence of well-defined echogenic mass in the LA and LAA on transesophageal echocardiography. All the echocardiography procedures were done by single experienced cardiologist having minimum of five years of experience.

Data was entered and analyzed using SPSS version 23. Mean \pm SD was calculated for numerical variables like age, height, weight, BMI, size of left atrium and appendage. Frequencies and percentages were calculated for categorical variables like gender, history of hypertension, diabetes, LA and LAA thrombus. LA and LAA thrombus were stratified with age, gender, BMI, left atrial size, appendage size, history of hypertension, diabetes at presentation to see the effect modifications using chi square test with p value of ≤ 0.05 as significant. All results will be presented in the form of tables and graphs.

RESULTS:

A total of 142 patients were included in the study. Mean and SDs for age was 54 \pm 5.68. Mean and SDs for height was 5.8 \pm 0.08. Mean and SDs for weight was 90 \pm 5.03. Mean and SDs for BMI was 31.12 \pm 1.74. Mean and SDs for LA&LAA Size was 42 \pm 0.56.

(Table No. 1). 30 (21.26%) patients were recorded in 18-45 years age group. 112 (78.87%) patients were recorded in 46-60 years age group. 111 (78.16%) male patients were recorded, and 31 (21.83%) female patients were recorded. 104 (73.23%) patients were hypertensive, and 38 (26.72%) patients were

normotensive.

108 (76.02%) diabetic patients were recorded. 122 (85.91%) patients were recorded with LA & LAA Thrombus. (Table No. 2). LA & LAA was stratified with age, gender, BMI, hypertension, diabetic mellitus and size of LA & LAA at Table No. 3.

Table No. 1: Descriptive Statistics of Study (n=142)

Continuous Variables	Mean	SDs
Age	54	5.68
Height	5.8	0.08
Weight	90	5.03
BMI	31.12	1.74
LA & LAA Size	42	0.56

Table No. 2: Demographic Data (n=142)

Age Groups	Frequencies	Percentages
18-45 Years	30	21.26%
46-60 Years	112	78.87%
Gender	Frequencies	Percentages
Male	111	78.16%
Female	31	21.83%
Hypertension	Frequencies	Percentages
Hypertensive	104	73.23%
Normotensive	38	26.72%
Diabetes Mellitus	Frequencies	Percentages
Yes	108	76.02%
No	34	23.94%
LA & LAA Thrombus	Frequencies	Percentages
Yes	122	85.91%
No	20	14.08%

Table No. 3: Stratification of LA& LAA Thrombus with gender, age, BMI, hypertension, diabetes mellitus and size of LA & LAA (n=142)

GENDER	LA & LAA THROMBUS	FREQUENCIES	PERCENTAGES	P VALUE
Male	Yes	95	66.90%	0.830
	No	16	11.26%	
Female	Yes	27	19.01%	
	No	04	2.81%	
AGE	LA & LAA THROMBUS	FREQUENCIES	PERCENTAGES	P VALUE
18-45 Years	Yes	28	19.71%	0.188
	No	02	1.40%	
46-60 Years	Yes	94	66.19%	
	No	18	12.67%	
BMI	LA & LAA THROMBUS	FREQUENCIES	PERCENTAGES	P VALUE
≤ 30 kg/m ²	Yes	41	28.87%	0.065
	No	11	7.74%	
> 30 kg/m ²	Yes	81	57.04%	
	No	09	6.33%	
Hypertension	LA & LAA THROMBUS	FREQUENCIES	PERCENTAGES	P VALUE
Hypertensive	Yes	90	63.33%	0.724
	No	14	9.85%	
Normotensive	Yes	32	22.53%	
	No	06	4.22%	
Diabetes Mellitus	LA & LAA THROMBUS	FREQUENCIES	PERCENTAGES	P VALUE
Diabetic	Yes	91	64.08%	0.311
	No	17	11.97%	
Non-Diabetic	Yes	31	21.83%	
	No	03	2.11%	
LA & LAA SIZE	LA & LAA THROMBUS	FREQUENCIES	PERCENTAGES	P VALUE
≤ 42 mm	Yes	79	55.63%	0.982
	No	13	9.15%	
> 42 mm	Yes	43	30.28%	
	No	07	4.92%	

DISCUSSION:

Mitral valve stenosis (MS) is a narrowing of the mitral valve orifice that increases resistance to blood flow from the left atrium (LA) to the left ventricle (LV). MS usually occurs as a result of rheumatic fever but there are other less common causes as well¹. MS does not usually cause symptoms unless it is severe with mitral valve area less than 1.5 cm². In MS, blood flow through the diseased valve is reduced which results in enlargement of LA because of the volume and pressure overload^{2,3}. These patients are at high risk of developing LA thrombus due to blood stasis.⁴ Left Atrial Appendage (LAA) is the common site for

thrombus formation.⁵ LA and LAA Thrombus may lead to cerebrovascular events, coronary embolization, renal emboli and infarction because of thromboembolic phenomenon.⁶

In my study, as per descriptive statistics, mean and SDs for age was 54±5.68. Mean and SDs for height was 5.8±0.08. Mean and SDs for weight was 90±5.03. Mean and SDs for BMI was 31.12±1.74. Mean and SDs for LA&LAA Size was 42±0.56. (Table No. 1). 30 (21.26%) patients were recorded in 18-45 years age group. 112 (78.87%) patients were recorded in 46-60 years age group. 111 (78.16%) male patients were

recorded, and 31 (21.83%) female patients were recorded. 104 (73.23%) patients were hypertensive, and 38 (26.72%) patients were normotensive. 108 (76.02%) diabetic patients were recorded. 122 (85.91%) patients were recorded with LA & LAA Thrombus. (Table No. 2).

The management approach to the individual with mitral stenosis depends upon symptomatic status, degree of stenosis and suitability of valve for percutaneous balloon mitral valvuloplasty. The technique of percutaneous balloon dilatation of the mitral valve by the trans-septal approach has been generally accepted as an alternative to mitral valve replacement or surgical commissurotomy in a subgroup of patients with symptomatic mitral stenosis. Mitral stenosis is frequently associated with LA and LAA thrombi and systemic emboli are a well-known complication of balloon dilatation of the mitral valve.⁶ Adverse events are believed to be caused primarily by embolization of LA and LAA thrombi, when a thrombus is dislodged during the procedure. So the presence of LA and LAA thrombi is a contraindication to balloon dilatation of the mitral valve. Therefore, Trans-esophageal echocardiography (TEE) is used routinely before percutaneous trans-septal mitral commissurotomy (PTMC) to detect LA and LAA thrombus to avoid the risk of embolic complications.^{7,8}

The reported prevalence of left atrial thrombus in patients with mitral stenosis is 26.1% (with AF) and 13.5% in normal sinus rhythm group, 40%⁹, 14.5%¹⁰, 43.07%¹¹ (with AF) and 16.6% (in normal sinus rhythm)¹², 8.4%¹³ and 27%¹⁴ however, in our study, 22 (85.91%) patients were recorded with LA & LAA Thrombus. This means that rheumatic mitral stenosis with atrial fibrillation is a common health problem in our part of the world and associated with increased morbidity and mortality accounting for embolic events which is greater in affected groups.⁵ The increasing severity of mitral stenosis is significantly correlated with increased incidence of thrombus in the LA and LA appendage.⁶ Fifty percent of LA thrombi in patients with rheumatic valvular disease, and nearly 90% of LA thrombi in patients with non-valvular AF are limited to the LA appendage. This was in consistent to the results of this study where 22 (85.91%) patients were recorded with LA & LAA Thrombus as TEE is superior to TTE in the evaluation of LA thrombi and also TEE is superior to TTE in the evaluation of LA thrombi. TTE does not demonstrate the majority of LA appendage thrombi, since the appendage is frequently not well seen on transthoracic echo. TEE, on the other hand, is a very sensitive tool for detection of LA thrombi.⁷

Saidi SJ et al in a prospective study of 26 patients of mitral stenosis with LA thrombus observed that 18 (70%) patients were in AF. This was almost in consistent to the findings of this study where 122 (85.91%) patients were recorded with LA & LAA Thrombus. They observed that TEE is superior in detecting thrombi in LA appendage, however 26 of their cases had thrombi clearly visible in LA cavity on TTE and TEE was not needed in those cases for the purpose of study.⁹ which as compared to my study, 122 (85.91%) patients were recorded with LA & LAA Thrombus.

Shah SD¹⁰ et al reported in their study that out of 490 patients undergoing TEE noted that LA thrombi were present in 163 (33.2%). Isolated LA appendage thrombi were found in 88 (18%) patients which was in consistent to the findings of this study where, 122 (85.91%) patients were recorded with LA & LAA Thrombus.¹⁴

LIMITATIONS:

The limitation of this study was its study design, small sample size and selective nature. Large multi centered randomized control trials should be encouraged to get better results so that it can be applied on overall population.

CONCLUSION:

The frequency of left atrial and appendage clots on trans-esophageal echocardiography in patients with severe mitral stenosis is common and more frequent in patients with AF and LA size > or = 45 mm.

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