ORIGINAL ARTICLE

Comparison of Frequencies of Left Atrial Thrombus in Patients of Severe Mitral Stenosis with and Without Atrial Fibrillation Undergoing Transesophageal Echocardiography for Percutaneous Transv-septal Mitral Commissurotomy

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ABSTRACT

Background: Left atrial (LA) thrombus formation and embolisation is common in patients with mitral stenosis (MS) and atrial fibrillation. Mitral stenosis can lead to enlargement of the left Atrium leading to increased risk of thrombus formation. The factors influencing the left atrial thrombi in rheumatic heart diseases include atrial fibrillation and severity of mitral stenosis.
Aims: To compare the frequency of left atrial thrombus in patients of severe mitral stenosis with versus without atrial fibrillation undergoing transesophageal echocardiography (TEE) for percutaneous trans-septal mitral commissurotomy (PTMC).
Methods: One hundred and nineteen consecutive patients with MS meeting the inclusion and exclusion criteria and attending the outpatient department were included in the study after taking informed consent. Every patient was evaluated by an ECG to document the presence or absence of atrial fibrillation and all the patients had TEE before undergoing PTMC for visualization of LA thrombus.
Results: In our study atrial fibrillation was present in 65/119 (54.6%) while normal sinus rhythm was present in 54/119 (45.4%). Left atrial thrombus was present in 37/119 (31.1%) while it was absent in 82/119 (68.9%). Left atrial thrombus was found in 28/65 (43.07%) while in patients without atrial fibrillation left atrial thrombus was present in 9/54 (16.6%) (p =0.003).
Conclusion: Left atrial thrombus is more common among patients with MS who have atrial fibrillation than among those with mitral stenosis without atrial fibrillation having normal sinus rhythm.
Keywords: Mitral stenosis, left atrial thrombus, atrial fibrillation

INTRODUCTION

Left atrial thrombus formation and embolization is common in patients with mitral stenosis. Left atrial thrombus formation occur in patients with mitral stenosis having atrial fibrillation as well as sinus rhythm. Mitral stenosis can lead to enlargement of the left atrium leading to increased risk of thrombus formation. The frequency of left atria thrombi is 20-33% in different studies. The factors influencing the left atrial thrombi in rheumatic heart disease include atrial fibrillation and severity of mitral stenosis. Nearly every fifth patient of mitral stenosis presents with thrombi in left atrium and therefore has remarkable therapeutic consequences. Most thrombi are located in left atrial appendage, but atrial appendage thrombus can also extend to the left atrial cavity[1].

Shahzeb et al studied 176 consecutive patients of severe mitral stenosis for PTMC, which were divided in to two groups, normal sinus rhythm and patients with atrial fibrillations, found that frequency of left atrial thrombus in patients of mitral stenosis with atrial fibrillation undergoing TEE for PTMC were 48.48% as compare to patients without atrial fibrillation i.e., 26.36%[2,7,8]. Ali et al demonstrated that atrial fibrillation was more significantly associated with thrombus formation with 23(60.5%) patients having thrombi as compared to 15(39.5%) patients in sinus rhythm having thrombus ($p<0.0001$)[3].

Hassan et al stated that 1 out of every three patients with severe mitral stenosis and atrial fibrillation will have an LA thrombus. Thrombus was detected in even smaller left atrial size in patients with atrial fibrillation as compared to in sinus rhythm (45.9±3.8 mm vs. 46.3±3 mm).

It means lager the left atrial size greater the chances of the presence of left atrial thrombus in patient with severe mitral stenosis with A.Fib[4]. Kaymaz et al examined that 101(96%) out of the 105 patients have left atrial thrombus. Among these, in 13 patients, thrombi were found to be located in the left atrial main cavity, in 62 thrombi were limited to the appendage, and in 26 patients, thrombi were located in both the left atrium and appendage cavities with atrial fibrillation undergoing TEE for PTMC[5].

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Silaruks et al established that left atrial thrombi were more frequent in patients of mitral stenosis with atrial fibrillation as compare to without atrial fibrillation undergoing TEE for PTMC 85.7% vs. 57.6% (p=0.038)[6]. PTMC is effective for symptomatic patients with moderate to severe MS in the absence of left atrial thrombus and has become mainstay of management.

The purpose of this study is to compare the frequency of the left atrial thrombus in patients of severe mitral stenosis with and without atrial fibrillation undergoing TEE for PTMC. As there is no much local data available regarding this and once a thrombus is detected in LA, the treatment plan, strategies, surgical and interventional techniques are greatly altered.

METHODOLOGY

After taking an approval from hospital ethical committee, a total of 119 patients were enrolled in this study. Both men and women aged >18 years and < 60 years diagnosed with severe mitral stenosis were included. Patients with significant aortic valve disease, mitral regurgitation (MR), previous PTMC, closed mitral valvotomy (CMV) and patients taking antiplatelet or anticoagulation, patients with ischemic heart disease, thyrotoxicosis, hypertension, chest infections and prior cardiopulmonary surgery therapy were excluded from study.

After written and informed consent following data was collected; patient characteristics i.e., age, sex and echocardiographic characteristics i.e. LA thrombus. Every patient with severe mitral stenosis presented to cardiology unit for PTMC was evaluated with TEE before undergoing PTMC for visualization of left atrial (LA) thrombus. LA spontaneous echo contrast was diagnosed by the presence of dynamic smoke like echoes in the LA cavity and LA appendage with swirling motion distinct from white noise artifact after adjusting the gain setting properly. LA thrombus was visualized on at least two different planes. TEE was performed by using 5-MHz; Hewlett-Packard Imaging System transducer multiplane probe. All patients were given local pharyngeal anesthesia (1% lidocaine spray) and intravenous midazolam. During the study, pulse rate, blood pressure, pulse oximetry and single lead ECG were monitored. TEE probe was introduced with the patient lying supine in left lateral position. The LA was scanned in short axis view and bicaval view. With a counterclockwise rotation of the probe at the level of aortic valve, the LA appendage was visualized.

Data was analyzed using SPSS (Statistical Package for Social Sciences) version 16.0. Quantitative variables like age was presented as mean ± standard deviation. Categorical variables like gender and presence of LA thrombus were presented as frequencies and percentages. For the comparison of left atrial thrombus, Chi-square test was used. P-value ≤0.05 was considered significant. Stratification was done on different effect modifiers like age, gender to see the effect of these modifiers on study outcome. Post stratification chi-square test was applied and p-value $\leq$ 0.05 was taken as statistically significant.

RESULTS

In our study there were 119 patients. Mean age of the patients was 36.45$\pm$9.48 years ranging from a minimum of 18 to a maximum of 60 years. There were 57/119 (47.9%) males while 62/119 (52.1%) were females. Atrial fibrillation was present in 65/119 (54.6%) while normal sinus rhythm was present in 54/119 (45.4%) patients. Left atrial thrombus was present in 37/119 (31.1%) while it was absent in 82/119 (68.9%) patients. The comparison of frequencies of left atrial thrombus in those with or without atrial fibrillation showed that among 65 patients in whom atrial fibrillation was present, left atrial thrombus was found in 28/65 (43.07%) while in 54 patients without atrial fibrillation, left atrial thrombus was present in 9/54 (16.6%) patients. P=0.003 (Table 1) (Graph 1,2).

When the effect of gender was noted on the frequency of left atrial thrombus it was found that among 57 male patients atrial fibrillation was present in 30/57 (52.6%) and left atrial thrombus was present in 14/30 (46.6%) patients having atrial fibrillation while 27/57 (47.4%) had normal sinus rhythm and left atrial thrombus was present in 5/27 (18.5%) patients (p=0.029). On the other hand among 62 female patients in the study, atrial fibrillation was present in 35/62 (56.45%) and left atrial thrombus was diagnosed in 14/35 (40%) females with atrial fibrillation. Among 27/62 (43.5%) female patients with normal sinus rhythm left atrial thrombus was diagnosed in 4/27 (14.8%). p= 0.047.

Table 1: Characteristics of the study population

Total number	119
Males	57/119 (47.9%)
Females	62/119 (52.1%)
Mean age	36.45 + 9.48
Atrial fibrillation	65/119 (54.6%)
Left Atrial Thrombus	37/119 (31.1%)

Table 2: Frequencies of thrombus in the left atrium in patients with or without atrial fibrillation

Fibrillation	Thrombus		Total
	Yes	No	
Yes	28	37	65
No	9	45	54

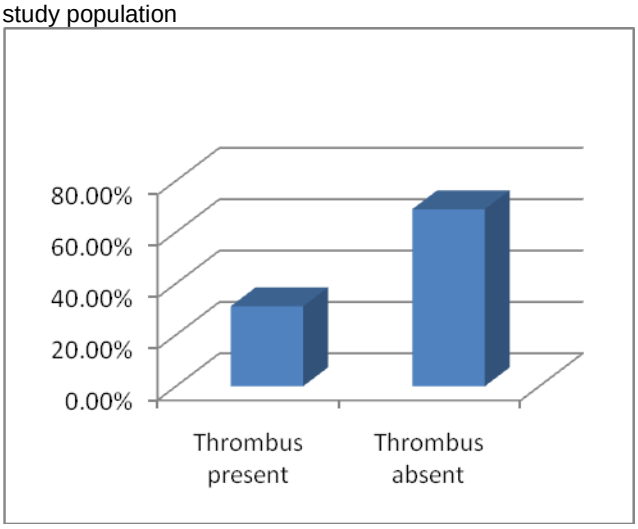
P-value: 0.003
*Fibrillation * Thrombus Cross tabulation*

Table 3: Frequencies of left atrial thrombus in male patients with or without atrial fibrillation

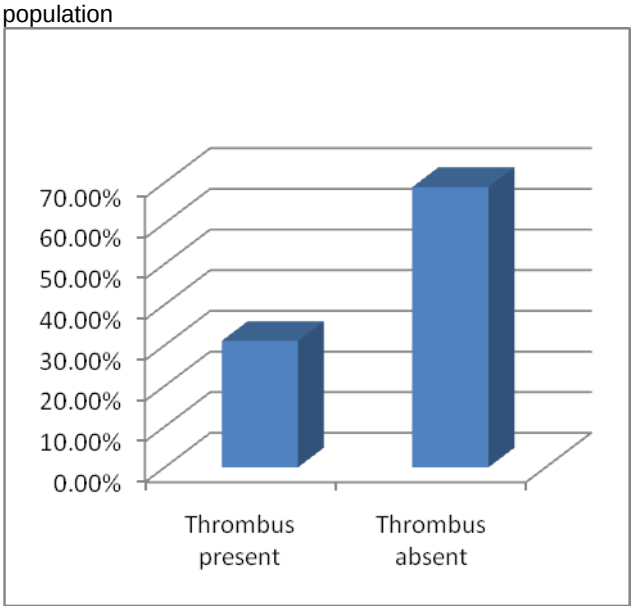
Fibrillation	Thrombus		Total
	Yes	No	
Yes	16	14	30
No	22	5	27

P-value: 0.029
*Fibrillation * Thrombus Cross tabulation among males*

Graph 1: Frequency of patients with atrial fibrillation in the study population



Graph 2: Frequency of left atrial thrombus in the patient population



DISCUSSION

In an Indian study, 490 patients with severe rheumatic mitral stenosis and atrial fibrillation were assessed by transesophageal echocardiography.[97] Those with left atrial body or left atrial appendage clots were anticoagulated with oral warfarin alone. Transesophageal echocardiography was then repeated in patients on anticoagulation who were on regular follow-up, and in whom percutaneous transvenous mitral commissurotomy could be considered. Of the 490 patients studied, 163 had left atrial body or left atrial appendage clots. A repeat transesophageal echocardiographic examination was done in 50 patients who had optimal anticoagulation for a period of 6 months. Only 2 of the 17 patients who had left atrial body clots had successful clot dissolution after long-term anticoagulation, while the left atrial appendage clots disappeared in 31 of 33 patients ($p<0.001$).

In our study there were 119 patients. Mean age of the patients was 36.45 ± 9.48 years. There was a female predominance with 52.1% patients being females as compared to 47.9% being males. This is probably due to the fact that valvular heart diseases especially rheumatic mitral valve disease is more common among females. Atrial fibrillation was present in 54.6% patients while 45.4% patients had normal sinus rhythm. Left atrial thrombus was present in 31.1% patients while it was absent in 68.9% patients. It was seen that left atrial thrombus was more frequent among those with atrial fibrillation as compared to those with normal sinus rhythm 43.07% vs.16.6% and the difference was found to be statistically significant ($p=0.003$). These results are similar to those observed in other studies[9,10,11].

When the effect of gender was noted on the frequency of left atrial thrombus it was found that among male patients left atrial thrombus was present in 46.6% patients with atrial fibrillation as compared to 18.5% in those with a normal sinus rhythm. The p-value was found out to be statistically significant ($p=0.029$). Similarly among female patients left atrial thrombus was diagnosed in 40% in those with atrial fibrillation as compared to 14.8% in those with a normal sinus rhythm ($p=0.047$). This signifies that atrial fibrillation predisposes to the development of left atrial thrombus without any difference among males and females.

When the effect of age was noted it was found that in age group < 40 years left atrial thrombus was present in 16/35 (45.7%) among those with atrial fibrillation and 6/33 (18.2%) in those with normal sinus rhythm($p=0.020$). Similarly among those in age group $\geq$ 40 years left atrial thrombus was identified in 12/30 (40%) patients in those with atrial fibrillation as

compared to 3/21 (14.3%) patients in those with normal sinus rhythm (p=0.047). This indicates that atrial fibrillation is associated with higher chances of left atrial thrombus development among both in the young and elderly patients. Age of the patients in AF rhythm in our study was significantly higher than the group in NSR.

In a study in China,[10] the presence of a left atrial clot in mitral stenosis patients with small valve area, large valve gradients, and no mitral regurgitation revealed a moderate to strong statistical relation, but did not reveal a relation to left atrial size. Another result of this study was the comparison of clot frequency in patients in sinus rhythm with those in atrial fibrillation. Clotting was more common in the atrial fibrillation group, with the difference being significant, as could be expected.

In another study[11], there were 21.3% males. Median age was 44.8 years. Of the patients studied, 88 patients (43.4%) had pure MS, 47 patients (23.2%) had MS plus MR, and 68 patients (33.5%) had MS associated with other valvular abnormalities. One hundred and seven of the total number of patients (52.7%) had NSR and 96 patients (47.3%) had AF. In the patients with NSR, 14 patients (13.5%, group A) had a clot in the left atrium and the remainder (group B) had no clot. The prevalence of left atrial clot in the AF group was 26.1% (23 patients), and 13.5% (14 patients) in the NSR group; this difference was significant (p = 0.02).

CONCLUSION

Left atrial thrombus is more common among patients with mitral stenosis who have atrial fibrillation than among those with mitral stenosis having normal sinus rhythm. This difference is statistically significant among males and females and in different age groups.

REFERENCES

1. Rost C, Daniel WG, Schmid M. Giant left atrial thrombus in moderate mitral stenosis. Euro J Echocardiograph. 2009;10:358-9
2. Shahzeb AJ, Shah I, Gul AM, Hafizullah M. Interrelationship between rhythm, left atrial size and thrombus formation in patients with mitral stenosis. Pak Heart J. 2012;45(03):160–5.
3. Ali M, Abid AR, Mallick NH, Sheikh SS, Ahmad S. Clinical and Echocardiographic Predictors of Left Atrial Thrombus in Rheumatic Mitral Stenosis. Annals. 2009;15(2):75-9.
4. Hassan M, Hussain C, Gul AM, Jan HU, Hafizullah M. Frequency of left atrial and appendage clot in patients with severe mitral stenosis. J Ayub Med Coll Abbottabat. 2010;22(2):40-2.
5. Kaymaz C, Ozdemir N, Kirma C, Sismanoglu M, Daglar B, Ozkan M. Location, size and morphological characteristics of left atrial thrombi as assessed by echocardiography in patients with rheumatic mitral valve disease. Eur J Echocardiography. 2007;2.270–6.
6. Songkwan S, Bandit T, Wirote W, Chaiyasith T, Pyatat, Virat K. A prognostic model for predicting the disappearance of left atrial thrombi among candidatesfor percutaneous transvenous mitral commissurotomy. JACC. 2007;39(5)886-91.
7. Aurakzai HA, Hameed S, Shahbaz A, Gohar S, Qureshi M, Khan H, et al. Echocardiographic profile of rheumatic heart disease at a tertiary cardiac centre. J Ayub MedColl Abbottabad. 2009;21:122-6.
8. Alkhalifa MS, Elhassan HHM, Suliman FA, Ali IA, Elsadig TE, Awad Gasim MK. Percutaneous transmitral balloon commissurotomy [PTMC] procedural success and immediate results at Ahmed Gasim Cardiac Center.Sudan J Med Sci. 2006;1:115-20.
9. Srimannarayana J, Varma RS, Satheesh S, Anilkumar R, Balachander J. Prevalence of left atrial thrombus in rheumatic mitral stenosis with atrial fibrillation and its response to anticoagulation: a transesophageal echocardiographic study. Indian Heart J. 2003;55(4):358-61.
10. Li YH, Hwag JJ, Ko YL. Left atrial spontaneous echo contrast in patients with rheumatic mitral valve disease in sinus rhythm: Implication of an altered left atrial appendage function in its formation. Chest. 1995;108:99–103.
11. Saidi SJ, Motamedi MHK. Incidence and factors influencing left atrial clot in patients with mitral stenosis and normal sinus rhythm. Heart. 2004;90(11):1342–3.