

Predictors of Left Atrial Stroke and Thrombi in Patients with Rheumatic Mitral Stenosis a Clinical and Echocardiographic Study

Ajay Sharma^{1*}, Harsha HB², Shashank Dixit³, Bhoopendra Bhadauriya⁴

¹Associate Professor, Department of Cardiology, Gandhi Medical College, Bhopal, India

²Resident, Department of General Medicine, Gandhi Medical College, Bhopal, India

³Consultant Cardiologist, Department of Cardiology, LBS Heart hospital, Bhopal, India

⁴Resident, Department of General Medicine, Gandhi Medical College, Bhopal, India

Original Research Article

*Corresponding author

Ajay Sharma

Article History

Received: 02.03.2018

Accepted: 10.03.2018

Published: 20.03.2018

DOI:

10.36347/sjams.2018.v06i03.019



Abstract: Rheumatic mitral stenosis is common clinical problem in India. Patients with mitral stenosis are associated with an increased risk of thromboembolism and are a major cause of morbidity and mortality. Spontaneous echo contrast formation in LA and left atrial appendage (LAA) is not an uncommon finding in these patients. The clinical implications of such LA/LAA spontaneous echo contrast reflect its association with LA/LAA thrombus formation and subsequent systemic embolic phenomenon. There are various factors which determine the individual risk for development of the left atrial clot/ spontaneous echo contrast and thromboembolism in patients with rheumatic mitral valve, which include AF, left atrial size, duration of symptoms, severity of mitral stenosis, and left atrial appendages function. Most of which are interrelated and their relative importance has been investigated in nonvalvular AF or in heterogeneous population of rheumatic heart disease. Hence this study was conducted on homogeneous population of 100 consecutive patients with mitral stenosis attending the department of cardiology and were studied by transthoracic and transoesophageal echo-Doppler techniques. The study concluded that not only severity of mitral stenosis but various clinical and echocardiographic variables influence the prevalence of left atrial spontaneous echo contrast and embolism independently, patients with mitral stenosis who develop embolic phenomenon have invariably, left atrial spontaneous echo contrast and/or left atrial clot. Detection of left atrial spontaneous echo contrast and/or left atrial clot by TEE will, per se, identify candidates, at high risk for thromboembolism, and thus for the treatment with oral anticoagulants or antiplatelets.

Keywords: LA-left atria, LAA- left atrial appendage, AF- atrial fibrillation, LASEC- left atrial spontaneous echo contrast, TEE- transthoracic echocardiography.

INTRODUCTION

Rheumatic mitral stenosis is common clinical problem in India. Patients with mitral stenosis are associated with an increased risk of thromboembolism and are a major cause of morbidity and mortality [1]. Spontaneous echo contrast formation in LA and left atrial appendage (LAA) is not an uncommon finding in these patients. The interest in left atrial spontaneous echo contrast and thrombi in mitral stenosis started in 1985. In 1986, the role of transoesophageal echocardiography for the detection of atrial appendage/left atrial thrombi was validated [2]. Spontaneous echo contrast is a low amplitude echogenic haze with slow repetitive movement in the cavity that typically disappears when flow increases [3]. These abnormal smoke-like shadows were initially described in situations of marked circulatory stasis. The

pathogenesis of spontaneous echo contrast is complex and multifactorial. Red blood cell aggregation is prerequisite of spontaneous echo contrast because the diameter of the aggregate increases and is closer to the wavelength of the transducer, thus allowing ultrasound reflection to occur. Hematocrit level has direct relationship with aggregation of red blood cells. Black *et al.* [4], showed a significant relationship between increased hematocrit level and presence of spontaneous echo contrast in patients with nonvalvular atrial fibrillation.

The occurrence of spontaneous of spontaneous echo contrast and thrombi has been linked to supraventricular arrhythmias, most commonly atrial fibrillation. It has been considered a potential marker of thromboembolic risk in these patients based on high

prevalence of spontaneous echo contrast in patients who had either thrombus or a prior history of thromboembolism. Left atrial spontaneous echo contrast, LA thrombi, and embolic events are closely related phenomena with several associated factors in these patients. The number of these factors has increased since introduction of transesophageal echocardiography. These factors which determine the individual risk for development of the left atrial clot/spontaneous echo contrast and thromboembolism in patients with rheumatic mitral valve diseases= include atrial fibrillation, left atrial size, duration of symptoms, severity of mitral stenosis and left atrial appendage functions. Most of these conditions are interrelated, and their relative importance has been mainly investigated in nonvalvular atrial fibrillation or heterogeneous population of rheumatic heart disease. The present study analyzes the factors independently associated with the development of left atrial spontaneous echo contrast and left atrial thrombi in a group of homogeneous population of consecutive patients with mitral stenosis.

MATERIALS AND METHODS

This study was conducted in the department of cardiology at Gandhi Medical College and LBS Hospital Bhopal. 100 consecutive patients with moderate to severe mitral stenosis attending the department of cardiology were studied by transthoracic and transesophageal echo-Doppler techniques. Patients below 12 years, previous mitral commissurotomy, previous percutaneous mitral valvuloplasty, significant mitral regurgitation (>grade1), associated rheumatic fever, renal failure (Sr. creatinine >2.5mg/dl), severe hepatic disease, history of dysphagia or esophageal pathology, atrial fibrillation with slow heart rate (<50/min), pulmonary edema with shock, and patient on anticoagulation therapy were excluded from the study. Study populations following parameters were recorded age, sex, duration of symptoms, history of previous

thrombotic events, NYHA class, heart rate, detailed physical, cardiovascular examination, ecg, and chest x-ray. Initially transthoracic echocardiography was performed in all patients. All measurements were carried out as per recommendations of the American Society of Echocardiography. Then transesophageal echocardiography was done within 24 hours. Data are presented as mean ±SD. Statistical significance of differences between means was assessed by the students unpaired t test. The significance of differences between the proportions was assessed using the chi-square test. A p value of <0.05 was considered significant.

RESULTS AND DISCUSSION

Present study was undertaken to correlate the information provided by transthoracic and transesophageal echo-Doppler studies with left atrial spontaneous echo contrast, left atrial thrombi, and embolic phenomenon in patients with moderate to severe mitral stenosis with or without atrial fibrillation. Our study comprised of a homogeneous high risk group of 100 patients which was in contrast to previous studies where in a heterogeneous population were studied. In our study no significant effect of gender was observed on the prevalence of left atrial spontaneous echo contrast and left atrial clot. These results are consistent with the various other studies [5,6].

The mean age of the patients was 34.8±9.7 years and mean mitral valve area was 0.86±0.14cm. LASEC was present in 52% of patients. LA clot was found in 21% of present, atrial fibrillation was present in 69% and embolic phenomenon was observed in 19% of patients. In our study 49 patients (64.4%) with severe mitral stenosis had LASEC compared to 3 patients (12.5%) with moderate mitral stenosis (p<0.001). 19 (25%) having severe MS had LA clot while 2 (8.33%) patients having LA clot had moderate MS(p<0.01).

Table-1: Effect of severity of Mitral Stenosis on Prevalence of LASEC and LA clot.

Parameter	Moderate MS (N=24)	Severe MS (N=76)	P value
LASEC	3(12.5%)	49(64.4%)	<0.001
LA clot	2(8.33%)	19(25%)	<0.01

We observed that the duration of symptoms had significant positive correlation with the presence of left atrial spontaneous echo contrast (p<0.005) and left atrial clot (p<0.05). Similarly, patients with left atrial spontaneous echo contrast and LA clot had more frequent atrial fibrillation (60.8% vs .32.2%, p<0.05 and 23.1% vs. 16.1%, p<0.01), respectively.

Systemic embolization is the most dreaded complication of left atrial spontaneous echo contrast and LA clot. In our study systemic embolization was found in 19 patients. Out of these 19 patients 18(94.73%) had LASEC and 9(47.3%) had LA clot. This correlation of LASEC and LA clot with systemic embolization was statistically significant p<0.001 and p<0.01 respectively. Our observation is consistent with that of Acarturk *et al.* [7]

Table-2: Embolic events in patients with LASEC and LA clot

Parameter	With embolic event N=19	Without embolic event N=81	P value
LASEC	18(94.73%)	34(41.97%)	<0.001
LA Clot	9(47.3%)	12(14.8%)	<0.01

The incidence of LASEC in MS varies from 21 to 67 % [8]. In our study LASEC was found in 52% of patients. These patients with spontaneous echo contrast were (37.4±12.2 vs.32.2±7.2 years, p<0.05), had longer duration of symptoms (42.2±30.0 vs. 30.8±21.2 months, p<0.01), larger left atrial area and diameter (38.7±9.2 vs. 1.05±0.14 cm², p<0.01 and 55.2±7.4 vs. 44.0±6.2 mm, p<0.01, respectively), had more frequent atrial fibrillation and clot (80.76% vs. 56.25%, p<0.05 and 40.38% vs.0.0%. p<0.001, respectively) as compared to patients without spontaneous echo contrast. However, there was no significance difference with respect to ventricular ejection fraction and mean diastolic pressure gradient between these groups. Similar observation have been reported by other studies [5,9]. Likewise atrial clot was found in 21 patients and had direct correlation with age, duration of symptoms mitral valve area, left atrial area, and presence of LASEC (100% vs 39.24%, p<0.001.) as compared to patients without

clot(table 3). Similar observations have been reported [5, 10].

Recent or previous peripheral embolism occurred in 19 (19%) patients and had significant correlation with age (36.9±11.6 vs. 31.8±7.2 years, p<0.05), duration of symptoms (42.8±33.5 vs. 30.7±24.1 months, p<0.05), mitral valve area(0.66±0.19 vs.1.04±0.11 cm², p<0.01), left atrial diameter (55.8±6.3 vs. 45.7±3.4 mm, p<0.01), left atrial area (37.8±9.2 vs.29.4±6.2. cm², p<0.01), presence of left atrial spontaneous echo contrast and clot (94.73% vs 41.97%, p<0.01 and 47.36% vs. 14.81%,p<0.01, respectively). However peripheral embolization had no significant correlation with age, left ventricular ejection fraction and diastolic gradient. Our results support the observation of the other studies showing the independent association between LASEC/Clot and the history of embolic phenomenon [11, 9]

Table-3: Characteristic of patients with and without embolism

Variables	With embolism	Without embolism	P vale
Age	36.9±11.6	31.8±7.2	<0.05
Duration of symptoms Months	42.8±33.5	30.7±24.1	<0.05
Men/women	6/13	34/47	NS
LA area cm ²	37.8±9.2	29.4±6.2	<0.01
MVA cm ²	0.66±0.19	1.04±0.11	<0.001
LVEF %	69.4±7.4	70.1±2.3	NS
LASEC	18(94.73%)	34(41.97%)	<0.01
Clot	9(47.36%)	12(14.81%)	

CONCLUSION

According to our study we conclude that left atrial spontaneous echo contrast predicts the formation of left atrial clot in mitral stenosis. Various clinical and echocardiography variables influence the prevalence of the atrial spontaneous echo contrast and embolism independently, in addition to severity of mitral stenosis. Patients with mitral stenosis who develop embolic phenomenon have invariably, left atrial spontaneous echo contrast and/or left atrial clot. Detection of left atrial spontaneous echo contrast and/or left atrial clot by TEE will, per se, identify candidates, at high risk for thromboembolism, and thus for the treatment with oral anticoagulants or antiplatelets.

REFERENCES

1. Rowe JC, Bland EF, Sprague HB, White PD. The course of mitral stenosis without surgery: ten-and twenty-year perspectives. *Annals of Internal Medicine*. 1960 Apr 1;52(4):741-9.
2. Beppu S, Nimura Y, Sakakibara H, Nagata S, Park YD, Izumi S. Smoke-like echo in the left atrial cavity in mitral valve disease: its features and significance. *Journal of the American College of Cardiology*. 1985 Oct 1;6(4):744-9.
3. Wolverson MK, Nouri S, Joist JH, Sundaram M, Heiberg E. The direct visualization of blood flow by real-time ultrasound: clinical observations and underlying mechanisms. *Radiology*. 1981 Aug;140(2):443-8.
4. Black IW, Chesterman CN, Hopkins AP, Lee LC, Chong BH, Walsh WF. Hematologic correlates of left atrial spontaneous echo contrast and thromboembolism in nonvalvular atrial fibrillation. *Journal of the American College of Cardiology*. 1993 Feb 1;21(2):451-7.

5. Goswami KC, Yadav R, Rao MB, Bahl VK, Talwar KK, Manchanda SC. Clinical and echocardiographic predictors of left atrial clot and spontaneous echo contrast in patients with severe rheumatic mitral stenosis: a prospective study in 200 patients by transesophageal echocardiography. *International journal of cardiology*. 2000 May 31;73(3):273-9.
6. Yi-Heng L, Juey-Jen H, Jiunn-Lee L, Yung-Zu T, Wen-Pin L. Importance of left atrial appendage function as a risk factor for systemic thromboembolism in patients with rheumatic mitral valve disease. *The American journal of cardiology*. 1996 Oct 1;78(7):844-7.
7. ACARTÜRK E, Usal A, Demir M, AKGÜL F, ÖZEREN A. Thromboembolism risk in patients with mitral stenosis. *Japanese heart journal*. 1997;38(5):669-75.
8. Wang XF, Liu L, Cheng TO, Li ZA, Deng YB, Wang JE. The relationship between intracardiovascular smoke-like echo and erythrocyte rouleaux formation. *American heart journal*. 1992 Oct 1;124(4):961-5.
9. González-Torrecilla E, García-Fernández MA, Pérez-David E, Bermejo J, Moreno M, Delcán JL. Predictors of left atrial spontaneous echo contrast and thrombi in patients with mitral stenosis and atrial fibrillation. *American Journal of Cardiology*. 2000 Sep 1;86(5):529-34.
10. Kronzon I, Tunick PA, Glassman E, Slater J, Schwinger M, Freedberg RS. Transesophageal echocardiography to detect atrial clots in candidates for percutaneous transseptal mitral balloon valvuloplasty. *Journal of the American College of Cardiology*. 1990 Nov 1;16(5):1320-2.
11. Hwang JJ, Kuan P, Chen JJ, Ko YL, Cheng JJ, Lin JL, Tseng YZ, Lien WP. Significance of left atrial spontaneous echo contrast in rheumatic mitral valve disease as a predictor of systemic arterial embolization: a transesophageal echocardiographic study. *American heart journal*. 1994 Apr 1;127(4):880-5.