Journal of Cardiology Cases 20 (2019) 99–102

Contents lists available at ScienceDirect

Journal of Cardiology Cases

journal homepage: www.elsevier.com/locate/jccase

Case Report

Sudden death as a first manifestation of left atrium thrombus in rheumatic severe mitral stenosis

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ARTICLE INFO

Article history:
Received 18 November 2018
Received in revised form 30 April 2019
Accepted 14 June 2019

Keywords:
Mitral stenosis
Left atrium
Thrombus
Atrial fibrillation
Anticoagulation

ABSTRACT

Left atrium and left atrial appendage thrombus is common in patients with mitral stenosis, causing significant morbidity and mortality. We described a case of rheumatic mitral stenosis, a 48-year-old female patient, who had undergone percutaneous transvenous mitral commissurotomy 26 years back. She presented with an episode of palpitations and breathlessness on mild exertion. She found to have rapid atrial fibrillation and heart failure. Her echocardiography showed severe mitral stenosis and large left atrial thrombus intermittently obstructing the mitral valve. While she was prepared for urgent valve replacement she had cardiac arrest and died. The echocardiogram showed the thrombus was stuck and closed the mitral valve orifice. From this events we did a review in our institution about the mitral stenosis patients who found to have left atrium thrombus by routine transthoracic echocardiography in five years period. Looking for factors contributing to thrombus formation and outcome predictor, as to outline management plan.

<**Learning objective:** Our aim is to give more attention to the factors contributing for left atrium thrombus formation and thrombus character in mitral stenosis patients and its clinical impact to prevent miserable events in such high risk patients.>

Introduction

Worldwide, rheumatic heart disease it is a major health problem, and in Saudi Arabia remains the leading cause of mitral valve stenosis (MS) and valve replacement in adults. The natural history is characterized by the development of valve stenosis, with varying degrees of regurgitation, atrial dilation, arrhythmias such as atrial fibrillation (AF) and ventricular dysfunction.

A fearful complication of MS is the development of left atrium (LA) or left atrial appendage thrombus with an incidence up to 33% [1] which is related to significant complications such as stroke, peripheral emboli and sudden death. Several factors besides MS severity can be responsible of LA clot formation like LA size, AF, advanced age, inflammation and prothrombotic state. In fact although thrombus formation is relatively common in patients with atrial fibrillation and mitral stenosis it can be found also in sinus rhythm patients.

Here we present a case report of a pedunculated LA thrombus ending in fatal cardiac arrest and a 5 years retrospective analysis of MS with LA thrombus detected by chance in transthoracic echocardiogram (TTE) in our institution.

Case report

A 48-year-old lady, who was known to have rheumatic heart disease, and had undergone percutaneous transvenous mitral commissurotomy 26 years back, presented at the emergency department for palpitation and breathlessness on mild exertion for 2 weeks duration. One day before admission started to have abdominal pain, no fever, no vomiting or change in bowel habits. On general physical examination she was conscious and alert. Cardiovascular examination revealed features suggestive of mitral stenosis. The jugular venous pulse was raised, her pulse rate was 136 beats/min irregular, blood pressure was 130/80 mmHg and all peripheral pulses were intact. She had no neurological deficits. Her electrocardiogram (ECG) revealed rapid atrial fibrillation. Her

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https://doi.org/10.1016/j.jccase.2019.06.003
1878-5409/

transthoracic echocardiogram (TTE) showed rheumatic severe mitral stenosis characterized by peak/mean gradients of 30/12 mmHg at heart rate of 128 bpm and the MVA by planimetry was 0.93 cm^2. The left atrium severely dilated with large thrombus wedging into the stenotic mitral valve appeared attached partially to the lateral wall of the LA (Fig. 1, Video 1). There was normal biventricular function and mild pulmonary hypertension. Patient planned for emergency surgery for removal of LA thrombus and mitral valve replacement so Transesophageal echocardiography (TEE) decided to be done preoperatively. Abdominal CT scan was requested to roll out mesenteric ischemia. In the meanwhile the patient had cardiac arrest and a bedside TTE showed the LA thrombus was totally occluded the mitral valve orifice.

A retrospective analysis from our institution, from May 2013 up to April 2018, on the presence of LA thrombus by TTE in native rheumatic mitral valve with severe MS (MVA area <1.5 cm^2) was done. The aim was to determine the prevalence of clot by routine TTE study in these, risk factors and the complications associated. We found 8 patients age between 20 and 59 years, to have LA thrombus and mitral stenosis (valve area <1.5 cm^2), out of 612 patients with a prevalence of 1.3%. General characteristics of the groups are reported in Table 1. Four patients with LA thrombus (50%) were known to have AF on warfarin with the INR sub-therapeutic in 30% of them and in the other two cases the diagnosis of atrial fibrillation was done at the same time of the LA thrombus was detected. The other 2 patients were in sinus rhythm (SR) (Table 1). CT brain was done in 3 patients, all studies showed evidence of cerebral infarct and 2 out of them had clear clinical stroke. Of the 3 patients with positive CT brain, 2 were on AF and 1 on SR. Two patients (25%) passed away before intervention during the first 24 h from diagnosis, one due to valve obstruction and the other to septic shock. The other patients underwent successful mitral valve replacement. The 8 patients had a wide range of LA dimension, but in all patients the LA is severely dilated. We assessed the LA function by measuring left atrium emptying fraction by 2D TTE which was significantly reduced (Table 1) in either sinus rhythm or atrial fibrillation patients. Mitral

Table 1 Clinical and Echocardiographic Characteristics of 8 Patients with Mitral Stenosis and Left Atrium Thrombus.

Variables Clinical characteristics	Values
Age (years)	20–59
Male/female	4/4
Systolic BP (mmHg)	112 ± 13.4
Diastolic BP (mmHg)	69 ± 10
Height (cm)	162 ± 6.5
Weight (Kg)	77 ± 27
BSA (m^2)	1.8 ± 0.3
Atrial fibrillation (known) (n patients)	4
Atrial fibrillation (recent) (n patients)	2
Sub-therapeutic INR (%)	30%
Stroke (n patients)	2
Mortality (n patients)	2
Echocardiographic characteristics	Mean ± SD
Peak gradient (mmHg)	19 ± 5
Mean gradient (mmHg)	11 ± 4
Mitral valve area (cm^2)	0.9 ± 0.14
LA volume (ml/m^2)	73 ± 37
LA emptying fraction (%)	16.3 ± 10
Mitral regurgitation (severity degree 0 to 4)	0–1
Thrombus characteristics (n patients)	Related events
Stratified (4)	No events
Ball like floating (2)	2 stroke
Partially fixed/pedunculated (2)	1 mortality

BP, blood pressure; BSA, body surface area; INR, international normalized ratio; LA, left atrium.

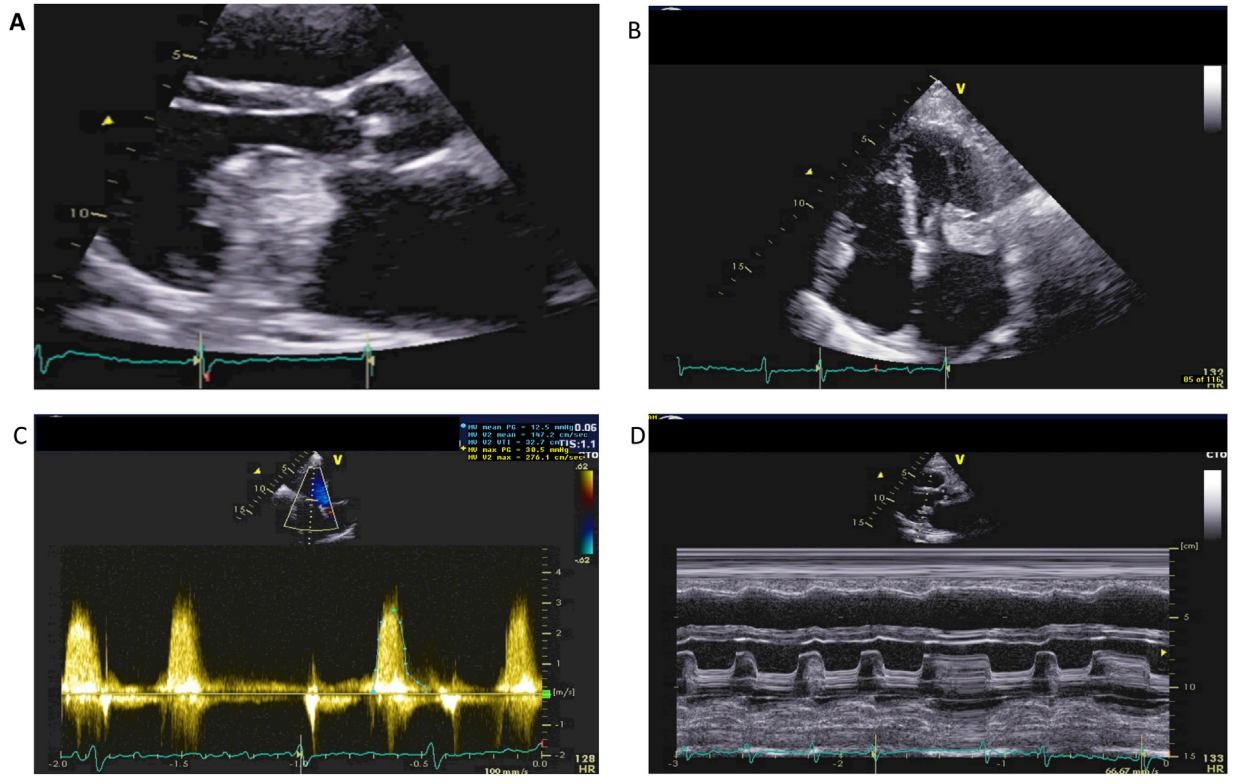

Fig. 1. Echocardiographic presentation of left atrium thrombus in patient with severe mitral stenosis. (A, B) Left parasternal view and 4chambers views showed MS with LA thrombus stuck to the MV. (C) MV peak/mean gradient 30/12 mmHg at HR 128 bpm. D: M-mode of the MV showed intermittent obstruction of the valve orifice. (MS: mitral stenosis, LA: left atrium, MV: mitral valve, HR: heart rate).

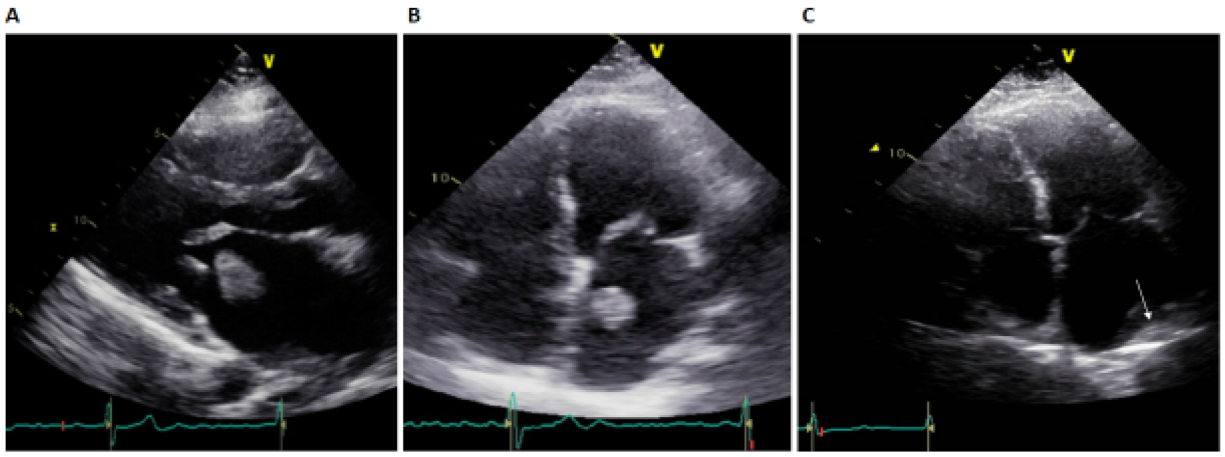

Fig. 2. Character of left atrium thrombus in patients with severe mitral stenosis by echocardiography. Examples of floating thrombus (A), partially fixed (b) and stratified thrombus (c) in the left atrium in patients with mitral stenosis.

valve area and gradients were constantly within the severity interval range. No significant concomitant mitral regurgitation (Table 1). In the present data-set, there were 4 cases of stratified thrombus and 4 cases of ball shape thrombus, 2 partially fixed and 2 floating thrombi. The 2 main type of thrombus (Fig. 2) had the same percentage of sinus rhythm. The risk of the stroke and death were counted on patients with the ball shape thrombus, while all patients who had stratified thrombus had no clinical events.

Discussion

In the present data from our institute, all the patients with LA thrombus had severe mitral stenosis by planimetry and gradients, 76% of them were in AF while atrial dimension varied among patients.

The major concern of the thrombus are the complications that could be the first manifestation, as it happened in 37.5% of our patients with mobile thrombus either floating or pedunculated. Thrombus formation occurs along a pathogenesis of continuum that starts with spontaneous echo contrast (SEC) (erythrocyte rouleaux formation indicative of blood stasis), progresses to sludge then later thrombus formation and possible systemic embolization [3]. The free-floating ball thrombus is reported to be more frequent with the combination of these factors, in addition giant thrombi are soft, fragile and poorly organized and are more prone to cause systemic thromboembolism. The highly mobile thrombus can cause obstruction. In our review the patients with free floating thrombus had the same proportion of AF as the stratify one, the left atrium was larger but the LVEF was higher. Impaired Left atrium function also appeared to be strong contributing factor for thrombus formation.

It well documented that even in sinus rhythm, such clots are predisposed to emboli, and so anticoagulation with VKA is recommended (recommendation class I, level of evidence C). Nevertheless, when patients are in sinus rhythm, oral anticoagulation should be considered when TTE or TEE shows dense spontaneous echocardiographic contrast or an enlarged LA (M-mode diameter >50 mm or LA volume >60 mL/m^2) (recommendation class IIa, level of evidence C) [4].

Isolated left atrial appendage clots in patients with rheumatic mitral stenosis and atrial fibrillation can disappear with long-term anticoagulation, while thrombi that extend into the left atrial body may persist despite optimal anticoagulation [5]. Although non-VKA oral anticoagulants (NOAC) are not yet reccomanded in rheumatic mitral stenosis, some experience on the use of NOAC in severe MS are reported. In the case described by Yuechun Li et al. [6]. There is no standardized indication for surgical management for LA thrombus in MS patients but in case of life threatening conditions such as ball thrombus, is necessary to prevent complications like peripheral embolization or total occlusion of the mitral valve orifice resulting in sudden death [7,8].

Conclusion

In our series of LA thrombus found by routine TTE, we found that all the patients had severe MS (MVA less than 1 cm^2) while the LA enlargement and AF were not a constant. Left atrium function playing major role in thrombus formation, more data and recommendations for measuring atrial function are needed. Although LA thrombus was an uncommon complication, it carries high risk of morbidity and mortality especially for the large floating type, so we think in such cases surgical intervention is advisable regardless of symptoms. We recommended stratifying the patient risk also according to the character of LA thrombus and LA function.

To avoid thrombus formation and its complications even in patients with severe mitral valve stenosis and sinus rhythm but severely dilated, stunning LA, would be reasonable to think of anticoagulation therapy.

Uncited references

[2].

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.jccase.2019.06.003.

References

[1] 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;55:358–61.

[2] Manjunath CN, Srinivasa KH, Panneerselvam A, Prabhavathi B, Ravindranath KS, Rangan K, et al. Incidence and predictors of left atrial thrombus in patients with rheumatic mitral stenosis and sinus rhythm: a transesophageal echocardiographic study. Echocardiography 2011;28:457–60.
[3] Saric Muhamed, Armour Alicia C, Samir Arnaout M, et al. Guidelinesfor the use of echocardiography in the evaluation of a cardiac source of embolism. J Am Soc Echocardiogr 2016;29:1–42.
[4] Baumgartner H, Falk V, Bax JJ, De Bonis M, Hamm C, Holm PJ, et al. ESC/EACTS guidelines for the management of valvular heart disease. Euro Heart J 2017;38:2739–91.
[5] 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;55:358–61.
[6] Li Yuechun, Lin Jiafeng, Peng Chen. Resolution of massive left atrial appendage thrombi with rivaroxaban before balloon mitral commissurotomy in severe mitral stenosis: a case report and literature review. Medicine (Baltimore) 2016;95(49):e5577.
[7] Kaneda Toshio, Iemura Junzo, Michihata Iwao, Zhang Zhi-Wei, Oka Hiroshi, Otaki Masaki, et al. Two cases of a free-floating ball thrombus in the left atrium. Circ J 2002;66:869–71.
[8] Blanche C, Chaux A, Kass RM, Helfenstein J, Sugarman G. Free-floating ball thrombus in the left atrium after mitral valve replacement: successful surgical management. Ann Thorac Surg 1985;39:566–8.