

VALVULAR HEART DISEASE

CASE REPORT: CLINICAL CASE

Mitral Balloon Commissurotomy Prolonging the Outcome of Surgical Commissurotomy in a Patient With Rheumatic Heart Disease



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ABSTRACT

Rheumatic heart disease is a serious global health issue that requires early detection and proper secondary prophylaxis. It is critical that governments play an active role in preventive campaigns and ensure access to recommended antibiotics. For symptomatic rheumatic heart disease cases, particularly those with rheumatic mitral stenosis, careful consideration of age and timing of surgical valve replacement is necessary, with a preference for noninvasive interventions when possible. Decision-making should involve a multidisciplinary heart team that assesses patient risks and valve morphology. (JACC Case Rep. 2024;29:102633) © 2024 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

HISTORY OF PRESENTATION

A 50-year-old woman presented with fatigue on slight exertion (NYHA functional class III) but had no recent hospitalizations due to decompensation of heart failure (HF). The patient had no chest pain,

palpitations, or fever. On physical examination, there was an absence of pathologic jugular turgor or hepatjugular reflux. The cardiac examination found a normolocalized cardiac impulse, no impulse of the right ventricle, regular heart rhythm, normophonic heart sounds, opening snap, and presence of diastolic murmur (+3/+6) and systolic murmur (+2/+6) at the mitral focus. Pulmonary auscultation produced no signs of congestion. No lower limb edema was found, and there was a controlled double product.

TAKE-HOME MESSAGES

- Patients with rheumatic heart disease can undergo multiple surgical procedures during their lifetime.
- Balloon mitral commissurotomy, as well as other percutaneous procedures under development, may be useful to delay the need for surgical mitral valve replacement and should always be considered.

MEDICAL HISTORY

The patient had rheumatic heart disease (RHD), was prediabetic, and had bronchial asthma. Rheumatic fever (RF) was diagnosed in childhood, requiring surgical mitral commissurotomy at 11 years of age for

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**ABBREVIATIONS
AND ACRONYMS****ARF** = acute rheumatic fever**HF** = heart failure**PMBC** = percutaneous mitral
balloon commissurotomy**RF** = rheumatic fever**RHD** = rheumatic heart disease

symptomatic mitral stenosis. Twelve years later, a new intervention was necessary with percutaneous mitral balloon commissurotomy (PMBC), followed by another procedure 4 years later. The patient was not on monthly prophylaxis with benzathine penicillin G.

DIFFERENTIAL DIAGNOSIS

Given the onset of valvular disease in childhood, congenital diseases that can also manifest exclusively with valvular involvement should be considered as an important differential diagnosis.

INVESTIGATIONS

For clinical investigation, the following examinations were performed. Electrocardiogram showed sinus rhythm, heart rate around 70 beats/min, normal cardiac axis, normal PR interval, narrow QRS complex, and nonspecific repolarization changes. A transthoracic echocardiogram showed biatrial enlargement, preserved biventricular systolic function with an ejection fraction of 72% (Teicholz), thickened mitral valve with significant opening restriction and mild regurgitation, estimated area of 0.9 cm² by planimetry, and a mean gradient of 5 mm Hg and maximum of 13 mm Hg. The Wilkins-Block score was 10 (valve thickening = 3, leaflet mobility = 2, calcification = 2, subvalvular apparatus involvement = 3). Mild tricuspid regurgitation and a pulmonary systolic arterial pressure of 40 were also found ([Figures 1A and 1B](#), [Videos 1 to 4](#)).

MANAGEMENT

The patient was taking bisoprolol 5 mg once daily, furosemide 40 mg twice daily, simvastatin 40 mg once daily, metformin 500 mg twice daily, and warfarin according to the international normalized ratio. Warfarin and metformin were discontinued because of possible cardiac surgery in the days to come. Anticoagulation with enoxaparin (1 mg/kg twice daily) was initiated after international normalized ratio fell below 2.0, and glucose was controlled with subcutaneous regular insulin according to institutional protocols.

Given the patient's diagnosis of severe mitral stenosis with advanced HF (NYHA functional class III), a new mitral valve procedure was indicated. However, this time, the unfavorable anatomy and multiple previous commissurotomies (1 surgical and 2

percutaneous) led to the decision to submit the patient to mitral valve replacement surgery.

OUTCOME AND FOLLOW-UP

After counseling the patient on the risks and benefits of each type of prosthesis, she opted for a metal mitral valve. The patient underwent mitral valve replacement surgery with implantation of a metal prosthesis (St. Jude Medical #31) and closure of the left atrial appendage. The patient had a satisfactory postoperative evolution and an echocardiogram with a normal functioning prosthesis and normal ventricular function ([Video 5](#)).

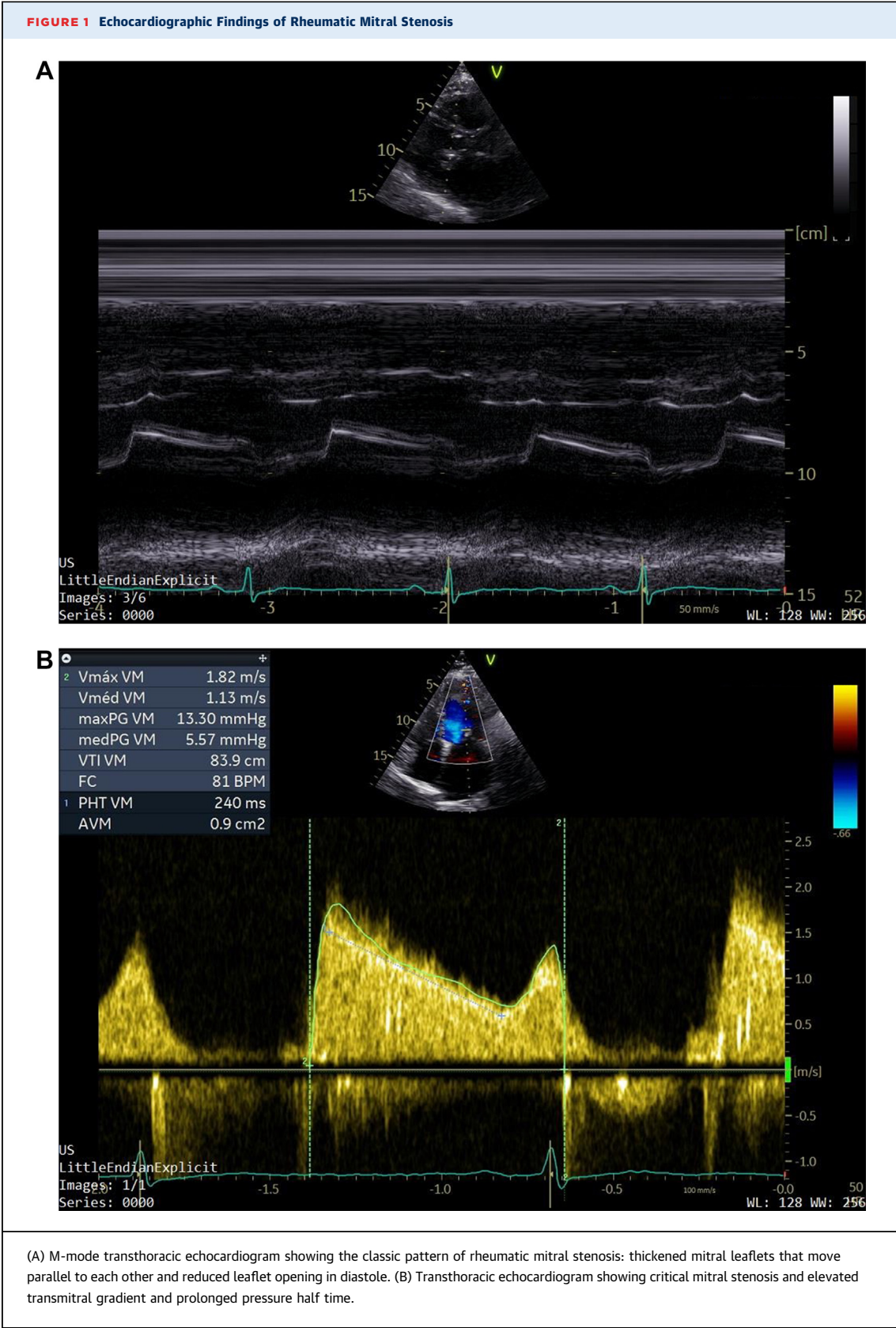
DISCUSSION

Despite major advances in medicine, RF and RHD are still highly prevalent in underdeveloped or developing countries with a significant impact on cardiovascular mortality.¹ Acute RF (ARF) is the leading cause of valvular involvement in the young population after repeated outbreaks of streptococcal pharyngitis caused by *Streptococcus pyogenes* in genetically predisposed individuals.¹ In Brazil, the prevalence of ARF is estimated at 7 cases per 1,000 schoolchildren, with one-third of these patients requiring cardiac surgery because of disease sequelae.²

Diagnosis of the first episode of ARF, despite the existence of the Jones criteria, is not easy. Therefore, most patients are diagnosed in adulthood when they already have rheumatic carditis and often symptoms of HF.¹

The treatment of the first episode of streptococcal infection and secondary prophylaxis with intramuscular benzathine penicillin G are essential to prevent the progression of rheumatic carditis.^{1,2} In addition, current guidelines recommend maintaining secondary prophylaxis in cases of moderate to severe rheumatic carditis until 40 years of age or lifelong, including when valve replacement surgery is performed.^{3,4} However, resistance to receiving medication every 21 days and the difficulty of supply by the Unified Health System (in Brazil) leads many patients without receiving secondary prophylaxis and developing late complications of RHD (valve regurgitation and stenosis, HF, atrial fibrillation, stroke, infective endocarditis) requiring intervention.^{1,2}

The clinical treatment of valvular lesions is only palliative, and at some point in life, the patient will need valve replacement. Delaying surgical valve replacement and performing a less-invasive



procedure becomes interesting in the young population, as choosing the type and size of prostheses is complex, especially in women of childbearing age, and surgical approaches throughout life increase the risk of complications with each new procedure.¹

Regarding the interventional treatment of severe symptomatic mitral stenosis in isolated young rheumatic populations, surgical commissurotomy and PMBC are treatment options before attempting surgical valve replacement in selected cases with favorable anatomy and an experienced team.^{1,3,4} More recently, prostheses for percutaneous mitral valve implantation are being studied, but the current recommendation occurs in cases of bioprosthesis or ring annuloplasty failure, especially in patients at high surgical risk. More studies need to be done in this area, and it may be a promising strategy in the future in similar cases like this, postponing cardiac surgery and long-term anticoagulant use and its numerous complications.⁵

In the case presented, the patient underwent initial surgical commissurotomy at age 11 years and PMBC at ages 23 and 27 years, with relief of HF symptoms for 39 years and no need for surgical valve replacement until then. PMBC can be performed in patients who have restenosis after surgical commissurotomy or PMBC previously, but the results are usually not satisfactory because of the intense deformity and valve calcification.³ A previous commissurotomy (surgical or percutaneous) may discourage a new procedure of this type; however, we have seen in this case that once the anatomical conditions are maintained, the PMBC can be successfully repeated and have a long duration.

Finally, 39 years after her first cardiac surgery, the patient had once again symptomatic mitral stenosis and a Wilkins-Block score not favorable for a new balloon approach. These factors indicated surgical mitral valve replacement (Videos 6 to 8).

CONCLUSIONS

RHD remains a public health issue in economically disadvantaged countries. The training of healthcare professionals in early diagnosis from the first ARF outbreak and correct guidance on secondary prophylaxis with benzathine penicillin G for the necessary duration, along with timely intervention for mitral valve stenosis, are paramount. It is also necessary for the government to play an active role in the process, promoting access to antibiotics for the treatment and prophylaxis of RF. In addition, it is estimated that improving the human development index is an important factor in reducing cases of RF.

Regarding intervention in symptomatic and/or complicated cases of established RHD, particularly in rheumatic mitral stenosis, consideration should be given to the age at onset. In addition, surgical valve replacement should be postponed when possible because of the inherent complications of the procedure and long-term anticoagulation requirements, especially with metal prostheses. However, the decision regarding the approach and which method to choose must be individualized and shared with the heart team and the patient. This should take into account the experience of the interventional team, valvular morphology and subvalvular apparatus, and surgical risks for the patient.

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APPENDIX For supplemental videos, please see the online version of this paper.