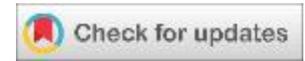




(CASE STUDY)



Decades of silence: Massive left atrial remodeling in elderly rheumatic mitral stenosis A case report and literature review

Khaoula Aboubakr *, Amal Baicha, Najat Mouine and Aatif Benyass

Department of cardiology, Military Hospital Mohammed V, Rabat, Morocco.

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Abstract

Rheumatic mitral stenosis (MS) has markedly declined in high-income regions but remains a major cause of valvular disease in low- and middle-income countries. Although MS classically presents in young to middle-aged adults, late presentation in the elderly is uncommon and may be obscured by long-standing compensatory mechanisms, particularly progressive left atrial enlargement.

In this paper, we describe the case of a 75-year-old woman without cardiovascular risk factors who presented with progressive exertional dyspnea after years of subtle, overlooked symptoms. Her evaluation revealed severe rheumatic mitral stenosis with profound left atrial enlargement, a compensatory adaptation that likely contributed to the delayed onset and under recognition of symptoms. A multidisciplinary Heart Team recommended mitral valve replacement. Postoperative recovery was uneventful, with complete symptomatic improvement.

This case illustrates how left atrial remodeling can mask the clinical onset of severe rheumatic mitral stenosis, leading to delayed diagnosis in elderly patients. Heart Team guided therapeutic decision making whether to repair or to replace the valve can achieve excellent outcomes even in advanced disease, underscoring the importance of early recognition and adherence to guideline-directed management.

Keywords: Rheumatic mitral stenosis; Left atrial enlargement; Heart Team; Elderly patient; Case report

1. Introduction

Rheumatic heart disease remains a global health challenge, disproportionately affecting low- and middle-income countries where access to primary prevention and early treatment is limited.

Although its prevalence has declined in developed regions, rheumatic mitral stenosis continues to present across a broad age spectrum, reflecting variability in disease progression and healthcare accessibility.

In clinical practice, older adults diagnosed with severe mitral stenosis represent a distinct and often underrecognized population. Their presentations illuminate the long-term natural history of rheumatic valvular disease and the remarkable compensatory mechanisms such as progressive left atrial remodeling and adaptive pressure accommodation that may delay symptom onset for decades. These compensatory adaptations, while initially protective, ultimately contribute to the development of atrial fibrillation, pulmonary hypertension, and right-sided cardiac dysfunction.

* Corresponding author: Khaoula Aboubakr

Recognition of these mechanisms underscores the need for ongoing surveillance, early detection, and guideline-driven management to prevent irreversible structural and hemodynamic deterioration.

- **Patient Information:** A 75-year-old woman, with no significant past medical history and no modifiable cardiovascular risk factors, presented with progressively worsening exertional dyspnea over several weeks. She reported a history of recurrent tonsillitis during childhood, though no episodes of documented rheumatic fever. For many years, her mild exertional intolerance had been attributed to aging, which likely contributed to a prolonged delay in diagnosis.
- **Clinical Findings:** Upon arrival, she was hemodynamically stable, with an oxygen saturation of 95% on room air. Physical examination revealed mild bilateral lower-limb edema. Cardiac auscultation demonstrated: an irregular rhythm, and a low-pitched diastolic rumble at the apex, consistent with mitral stenosis. An ECG found an atrial fibrillation.
- **Timeline of current episode:** Over several years, the patient had mild exertional dyspnea that went largely uninvestigated. In the 2–3 months preceding her first consultation, her dyspnea progressively worsened, and the development of peripheral edema ultimately led her to seek care. Initial evaluation included clinical examination and ECG, followed by echocardiography to assess the diagnosis of severe mitral valve stenosis and associated complications.
- **Diagnosis assessment:** A comprehensive transthoracic echocardiographic examination revealed classic features of severe rheumatic mitral stenosis, characterized by marked leaflet thickening, restricted mobility, and commissural fusion, with a calculated mitral valve area of 0.7 cm^2 (Figure 1) and a mean transmitral gradient of 17 mmHg . The left atrium was massively enlarged, with an area of 101 cm^2 (figure 2), which may account for the patient's unusually prolonged asymptomatic phase, and no thrombus was detected in the left atrium. The right ventricle was non-dilated with preserved systolic function, while the tricuspid valve showed moderate functional regurgitation. The estimated systolic pulmonary artery pressure was 50 mmHg , consistent with secondary pulmonary hypertension. findings that were highly suggestive of advanced rheumatic valvular disease with significant hemodynamic repercussions.



Figure 1 Echocardiographic assessment showing the mitral valve area measured by planimetry, calculated at 0.7 cm^2 , consistent with severe mitral stenosis

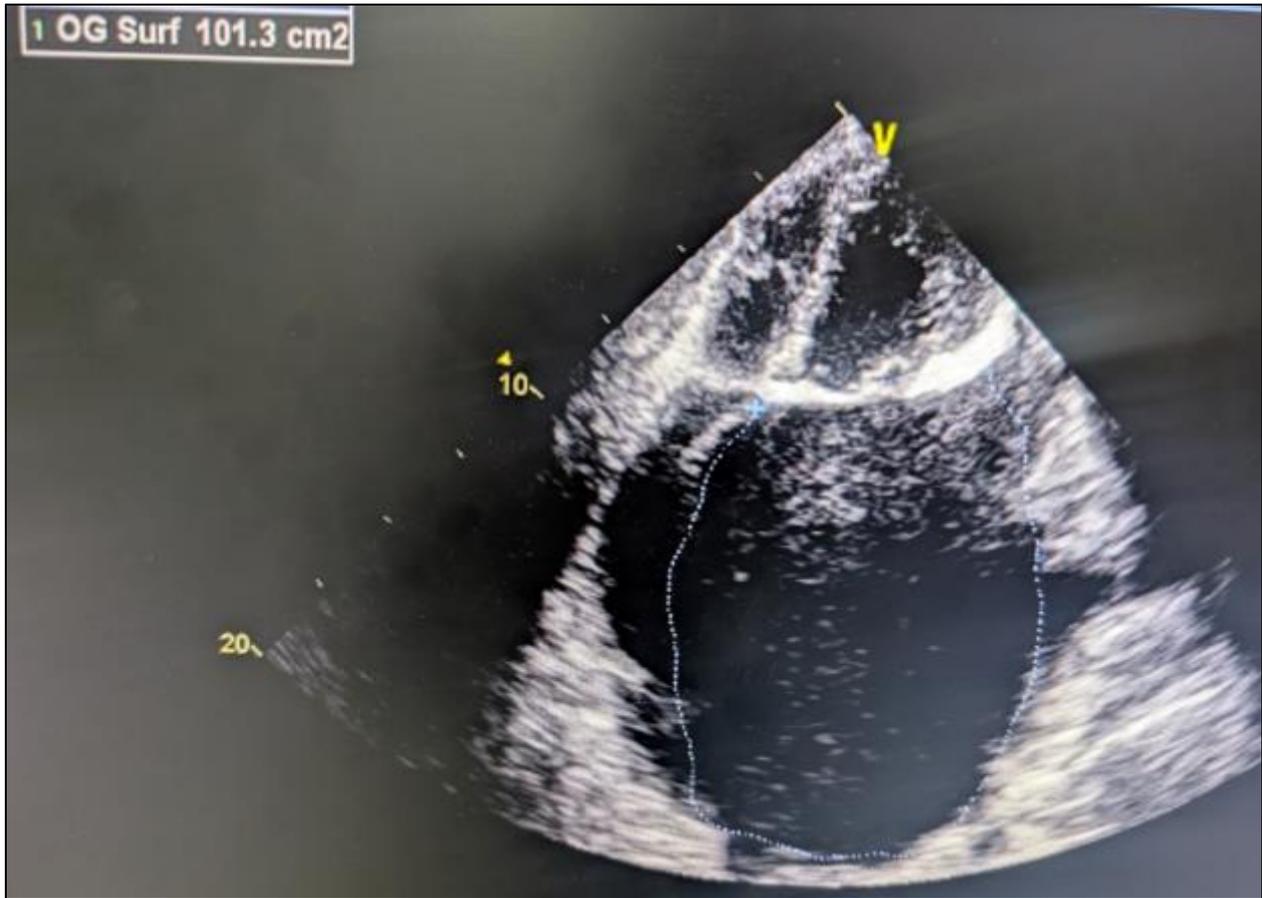


Figure 2 Echocardiographic assessment showing a left atrial area of 101 cm², reflecting severe left atrial enlargement

A transesophageal echocardiographic examination was subsequently performed, confirming the severe nature of the rheumatic mitral stenosis with typical commissural fusion, a shortened and remodeled subvalvular apparatus, moderate mitral regurgitation, and the presence of a thrombus in the left atrial appendage.

- **Diagnosis:** all these findings were highly suggestive of advanced rheumatic valvular disease with significant hemodynamic repercussions.
- **Therapeutic interventions:** Given the severe nature of the mitral stenosis, massive left atrial enlargement with hemodynamic repercussions, pulmonary hypertension, and the presence of a left atrial appendage thrombus in an elderly patient, the case was discussed by the Heart Team. The consensus was to proceed with surgical mitral valve replacement using a mechanical prosthesis, combined with closure of the left atrial appendage and reduction of the left atrium.
- **Follow-up and outcome of interventions:** The patient underwent surgery without complications. Her postoperative course was uneventful, and she demonstrated complete resolution of dyspnea along with marked functional improvement at follow-up. Restoration of optimal hemodynamics resulted in significant clinical recovery.
- **Patient Perspective:** I had been experiencing progressive shortness of breath and fatigue, which eventually led me to seek medical care. I was anxious when I learned about the severity of my heart condition and the need for surgery, but the team explained everything clearly. Following surgical mitral valve replacement, I have noticed significant improvement in my breathing and energy. I am grateful for the care I received and now feel more confident returning to daily activities.

2. Discussion

In recent decades, the global incidence of rheumatic heart disease (RHD) has declined substantially in high-income countries; however, it continues to pose a major health burden in low- and middle-income regions, where limited access to early diagnosis and prophylaxis leads to chronic valvular damage [1,2]. Severe MS presenting in advanced age is rare and may result from delayed diagnosis or slow disease progression.

Rheumatic MS usually manifests in young to middle-aged adults. In endemic regions, children and adolescents may exhibit mitral involvement, with mean age at diagnosis around 10 years [3,4].

Recent studies indicate a trend toward older age at presentation. A Korean multicenter registry of 2,337 patients with moderate-to-severe rheumatic MS reported mean age at diagnosis increasing from 54.3 to 63.0 years over two decades, with higher prevalence of atrial fibrillation and hypertension [5].

In elderly patients from developed countries, degenerative and calcific mitral valve disease, including mitral annular calcification, has become a more common etiology [6].

In endemic regions or patients with prior rheumatic fever, rheumatic etiology predominates, as in our patient, whose mitral valve morphology demonstrated leaflet thickening and commissural fusion without extensive calcification.

In this population, the onset of symptoms in rheumatic mitral stenosis (MS) may be significantly delayed due to powerful compensatory adaptations, most notably progressive left atrial (LA) enlargement, which allows long-standing elevation of transmitral gradients to be tolerated with minimal clinical manifestations.

This marked LA remodeling increases compliance and buffers pressure transmission to the pulmonary circulation, thereby masking early symptoms such as exertional dyspnea and fatigue for years [7,8].

However, this compensatory phase is eventually exhausted, leading to the abrupt emergence of atrial fibrillation, pulmonary hypertension, and overt heart failure symptoms, as frequently observed in advanced rheumatic MS like our patient [9,10].

Recognition of these adaptive mechanisms is essential for timely diagnosis, risk stratification, and implementation of guideline-directed management.

According to the ESC 2025 Guidelines for the management of valvular heart disease, echocardiography remains the cornerstone of diagnostic assessment in mitral stenosis (MS), providing essential information on valve area, transmitral gradients, pulmonary pressures, and valve morphology to guide therapy.

Percutaneous mitral commissurotomy (PMC) is recommended as first-line treatment only in patients with favorable anatomical characteristics, minimal or no mitral regurgitation, and absence of left atrial thrombus.

In contrast, surgical intervention is indicated in symptomatic patients with unfavorable valve morphology, in those requiring concomitant cardiac surgery, or when PMC is contraindicated.

The guidelines further recommend tricuspid annuloplasty during left-sided valve surgery in the presence of functional tricuspid regurgitation or annular dilation, and emphasize that patients with MS and atrial fibrillation should receive vitamin K antagonist anticoagulation, as NOACs are not advised in moderate-to-severe rheumatic MS.

Overall, the ESC underscores the importance of a Heart Team–based, individualized approach, particularly in elderly or comorbid patients.

These recommendations support the management chosen for our patient, whose advanced rheumatic pathology, significant transmitral gradient, atrial fibrillation, and secondary pulmonary hypertension warranted surgical mitral valve replacement combined with closure of the left atrial appendage and reduction of the left atrium. [11,12].

This case underscores the importance of maintaining a high index of suspicion for severe MS in older adults, particularly in endemic regions. Timely and appropriate management is crucial to prevent hemodynamic deterioration and thromboembolic complications, underscoring the value of comprehensive evaluation and a multidisciplinary approach.

Subtle symptoms such as exertional dyspnea, fatigue, irregular rhythm, or lower-limb edema should prompt echocardiographic assessment.

Multidisciplinary Heart Team evaluation is crucial for guiding management.

Despite the decline in RHD prevalence in some regions, data on elderly patients with late-presenting rheumatic MS are limited. Case reports like this highlight the role of LA remodeling in masking symptoms, and the effectiveness of timely surgical intervention even in advanced age [5,12].

3. Conclusion

This case underscores that rheumatic mitral stenosis remains a relevant public health concern in endemic regions, even among elderly patients. Late presentation with subtle and nonspecific symptoms may be facilitated by progressive cardiac remodeling, leading to delayed diagnosis and advanced disease. Heightened clinical awareness, early access to echocardiography, and systematic multidisciplinary Heart Team evaluation are essential to improve outcomes and prevent severe complications. Despite advanced age, timely surgical intervention can be safe and effective and should not be withheld solely on the basis of age. Strengthening strategies for early detection and long-term follow-up of rheumatic heart disease remains crucial in low- and middle-income countries.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of informed consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Confidentiality

All identifying information has been removed to ensure patient anonymity.

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