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CASE REPORT

Late Tricuspid Regurgitation as a Result of Rheumatic Tricuspid Disease in a Patient With Prosthetic Mitral Valve. Combined Two-Dimensional and Real-Time Three-Dimensional Transthoracic Echocardiographic Assessment

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KEY WORDS: *tricuspid regurgitation; rheumatic heart disease; real-time three-dimensional echocardiography*

ABBREVIATIONS
RT3D = real-time three-dimensional (echocardiography)
ESC = European Society of Cardiology

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ABSTRACT

We herein present the case of a 65-year-old lady with late tricuspid regurgitation 15 years after successful mitral valve replacement due to severe mitral stenosis of rheumatic origin. She presented to our department complaining of fatigue which worsened over the preceding 6 months. Transthoracic echocardiographic examination including both two-dimensional and real-time three-dimensional modalities revealed severe tricuspid regurgitation and the patient was scheduled for tricuspid annuloplasty. A propos with this case, a brief review of the literature is provided highlighting the key points of this topic.

INTRODUCTION

Tricuspid valve regurgitation constitutes a major problem since its severity represents a major determinant of morbidity and mortality. Its pathogenesis includes functional and organic causes, with the latter being the minority. Of special interest are the cases where late tricuspid regurgitation occurs after successful mitral valve surgery as there are conflicting data and no strong evidence in the literature supporting a clear view on this specific subject. Moreover the herein described case report refers to a patient whose tricuspid valve had been affected by rheumatic fever in the past along with the mitral valve, a fact that further complicates the course of the disease.

CASE REPORT

A 65-year-old Caucasian female presented to our tertiary cardiology department

complaining of fatigue for over a year which worsened over the last 6 months. Additionally she experienced discomfort in the right upper abdominal quadrant unrelated to food intake. Her past medical history was remarkable for rheumatic heart disease in the distant past which caused mitral valve stenosis, leading to surgical replacement of the specific valve about 15 years earlier. She was on diuretics and a beta-blocker for hypertention and heart rate control due to atrial fibrillation.

On physical examination the patient was afebrile, with a blood pressure of 100/65 mmHg and a heart rate of 78 beats per minute. Clinical inspection revealed distended jugular veins and bilateral leg edema. Chest auscultation was remarkable for a grade III/VI holosystolic murmur best heard at the left sternal border which was accentuated during deep inspiration; a metallic first heart sound of mitral valve closure was also audible. Superficial abdominal palpation caused mild discomfort at the right upper abdominal quadrant.

The electrocardiogram showed atrial fibrillation. The biochemical profile was normal. Echocardiographic assessment revealed dilated right cardiac chambers, while the left heart chambers appeared within normal range and a metallic prosthetic mitral valve was depicted (Fig. 1A). The tricuspid valve was thickened and shortened on the right ventricular inflow tract view, while there seemed to be a mal-coaptation between the septal and anterior cusps (Fig. 1B). These findings were consistent with rheumatic tricuspid valve disease. Tricuspid annulus was measured at 44 mm from the apical four chamber view (Fig. 2). Color Doppler examination showed a large regurgitant jet of the tricuspid valve which was indicative of severe disease (Fig. 3), whereas the prosthetic valve at the mitral position appeared to function properly without stenosis or abnormal regurgitation (mean gradient 6 mmHg). Mean pulmonary artery pressure was estimated at about 40-45 mmHg. Applying tissue Doppler imaging, the right ventricle demonstrated well-preserved systolic function (peak myocardial velocity during the ejection phase, S = 13 cm/s). In addition, real-time three-dimensional (RT3D) transthoracic echocardiography was undertaken which further clarified the pathology of the tricuspid valve. Specifically the anterior and posterior cusps appeared to be fused (Fig. 4). Due to the severity of the disease and the intensity of symptoms the patient was scheduled to undergo annuloplasty with the implantation of a prosthetic ring.

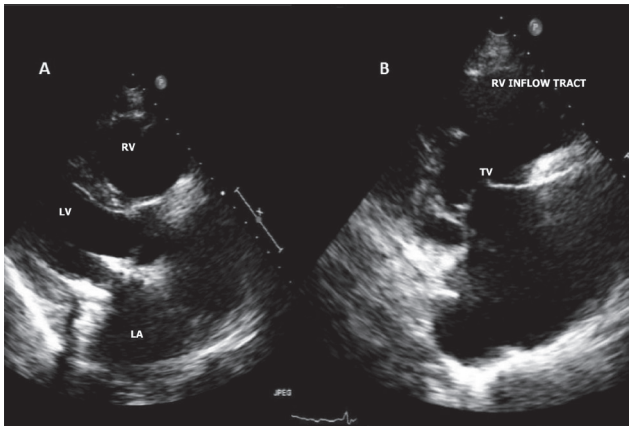

FIGURE 1. A parasternal long-axis two-dimensional echocardiographic view illustrates the prosthetic mitral valve between the left atrium (LA) and the left ventricle (LV) (**panel A).** In an echocardiographic view from the right ventricular (RV) inflow tract (end-systolic frame), one can discern the thickened anterior and septal cusps of the tricuspid valve (TV) with mal-coaptation (**panel B**); these findings are consistent with rheumatic tricuspid valve disease.

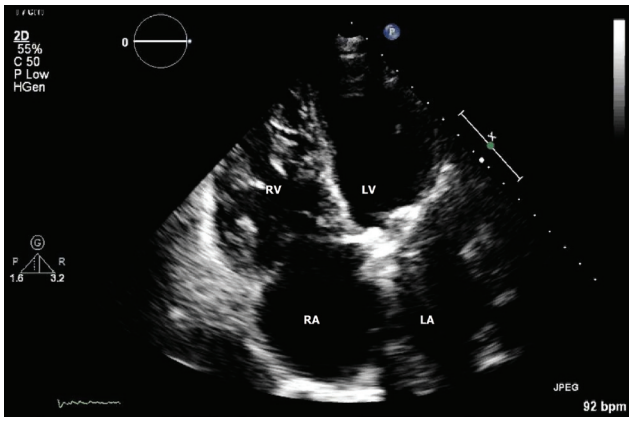

FIGURE 2. Apical four-chamber two-dimensional echocardiographic view depicting slightly dilated right cardiac chambers with preserved systolic function. LA = left atrium; LV = left ventricle; RA = right atrium; RV = right ventricle.

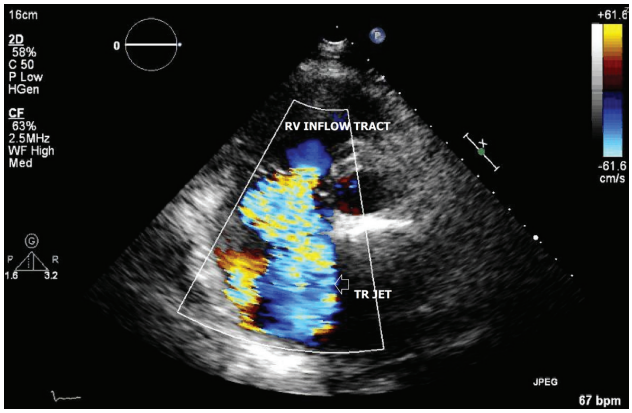

FIGURE 3. Parasternal short-axis color Doppler echocardiographic (two-dimensional) view (end-systolic frame) depicting large regurgitant jet of tricuspid valve. RV = right ventricle; TR = tricuspid regurgitation.

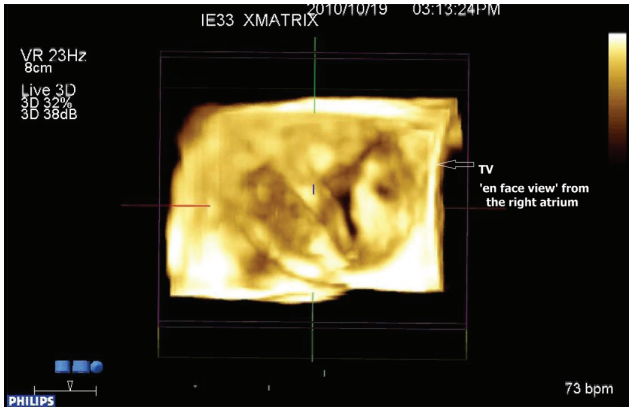

FIGURE 4. Real time three-dimensional (3D) echocardiographic dataset (end-systolic frame) cropped from right ventricular inflow tract illustrating fused posterior and anterior cusps of the tricuspid valve (TV) with concomitant mal-coaptation.

DISCUSSION

This is an interesting case of tricuspid regurgitation, mainly due to the late onset of disease even after successful surgical intervention on the mitral valve. Furthermore, tricuspid valve was also affected by rheumatic heart disease, a fact that creates a diversity of opinion as far as the mechanism of disease is concerned. Moreover, three-dimensional echocardiography has provided useful insights into the pathology of the specific valve.

In the context of late tricuspid valve regurgitation after mitral valve replacement, there seem to be confusing data in the literature. Braunwald et al[1] observed that patients who had their mitral valve replaced, showed improvement of any tricuspid regurgitation, regardless of its severity. That seemed to be the case especially in younger people with diminished pulmonary arterial pressures and resistance post-operatively, with normal left atrium and no atrial fibrillation. Today it is well known that tricuspid valve regurgitation may worsen, despite successful mitral valve surgery. Older age, atrial fibrillation, compromised right and left ventricular systolic function, left atrial dilatation and severe pulmonary hypertension have been recognized as major risk factors.[2,3]

Real time 3D echocardiography on the other hand has emerged as a valuable adjunct in clinical practice, providing distinct information regarding the right cardiac structures.[4] Given the complex crescent shape of the right ventricle and the large area of the tricuspid valve, transition to the three-dimensional imaging modality is deemed mandatory. In the setting of tricuspid valve evaluation, RT3D is a feasible method for echocardiographic assessment, as illustrated by various authors[5] and our previously published clinical experience involving a rare case of carcinoid heart disease.[6]

Last but not least, tricuspid valve repair constitutes a difficult clinical decision as current evidence is not based on large randomized trials. Disease etiology and severity despite optimal management, right ventricular function, and tricuspid annulus diameter comprise key points whether a surgical approach should be undertaken. According to the European Society of Cardiology (ESC) guidelines[7] for valve disease management, our patient is warranted an IC indication for annuloplasty with prosthetic ring, which offers the best results and 10-year survival rates.

CONCLUSION

Late onset tricuspid regurgitation after mitral valve surgery is a clinical problem which is complicated by diverse opinions regarding patient management. Three-dimensional echocardiography has the advantage of multiple cross-sectional views of cardiac structures, which is extremely helpful when evaluating the right cardiac chambers and valves.

CONSENT

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

CA conceived the case report and performed bedside echocardiographic examinations; IF reviewed the literature and wrote the manuscript; GS and EP have been involved in drafting the manuscript; KT contributed critical revision of the manuscript; CS has supervised and commented on the manuscript. All authors read and approved the final version of the manuscript.

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