Assessment of Regurgitant Jet Direction in Severe Aortic Regurgitation: Value of CMR Compared to Echocardiography and Cineangiography

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Abstract

Severe aortic valve insufficiency is a common valvular heart disease that is characterized by left ventricular (LV) volume overload. A 40-year-old woman with a history of exertional dyspnea of four years' duration was referred to us for evaluation. The patient's symptoms had worsened to NYHA functional class III in the previous months. Catheterization showed severe aortic insufficiency (AI) and normal coronary arteries, but there was aneurysmal outpouching formation in the base of the LV, into which the regurgitation jet did not enter directly. The patient underwent cardiac magnetic resonance imaging (CMR), which clearly showed that the AI jet entered the LV aneurysm. CMR is now an established tool to assess aortic regurgitation and to rule out concurrent pathologies. Determination of the anatomical configuration of the aortic valve is another great merit of preoperative evaluation with CMR compared to echocardiography alone. ***(Iranian Heart Journal 2012; 13 (2):59-61).***

Introduction

Severe aortic valve insufficiency is a common valvular heart disease that is characterized by left ventricular (LV) volume overload. A lasting effect of volume overload is LV remodeling, accompanied by hypertrophy and then dilation. This dilation is usually symmetrical and happens in the process of eccentric hypertrophy and remodeling with no direct effect on localized regurgitation jet effect on the ventricular wall. Literature review did not show previous reports of MRI investigation on this type of LV outpouching. Aortic valve evaluation with cardiac MRI is still under evaluation. In this case, anatomical details obtained only after performing cardiac MRI confirm its advantages over echocardiography alone.

Case Report

A 40-year-old woman with a history of exertional dyspnea of four years' duration was referred to our center for evaluation. Her symptoms had worsened to NYHA functional class III over the previous months. On physical examination, she had normal general appearance. Her blood pressure was 125/60 mm Hg with a pulse rate of 75 beats per minute.

On cardiac examination, the precordium was normal and there was diastolic murmur in the aortic region.

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The ECG showed normal sinus rhythm and left-axis deviation. The patient underwent transesophageal echocardiography (TEE), which showed a reduced ejection fraction of 45% and severe aortic insufficiency (AI) and LV aneurysmal outpouching with no obvious direct regurgitation inside it (Figure 1). Angiography revealed severe AI and normal coronary arteries with the above-mentioned LV basal aneurysm; however, the AI jet was apparently still not directed toward this aneurysm (Figure 2). Reviewing the TEE videos was not in favor of the AI jet direction as the cause of this focal aneurysm. The patient underwent cardiac magnetic resonance imaging (CMR), which clearly showed that the AI jet entered the LV aneurysm (Figures 3-6). She had successful aortic valve replacement and had no complaint on follow-up.

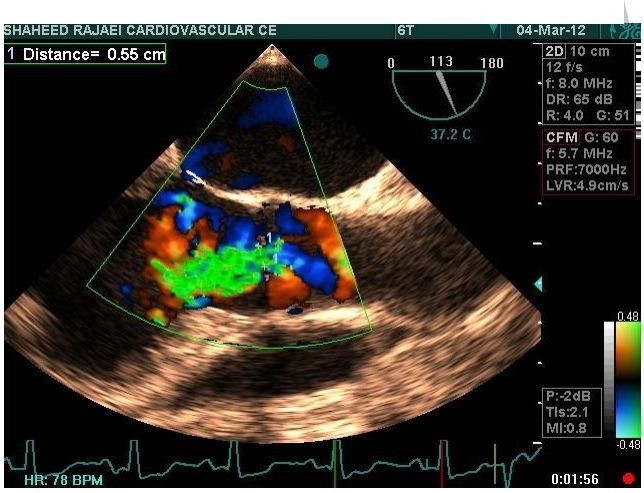

Figure 1: Transesophageal echocardiography shows severe AI.

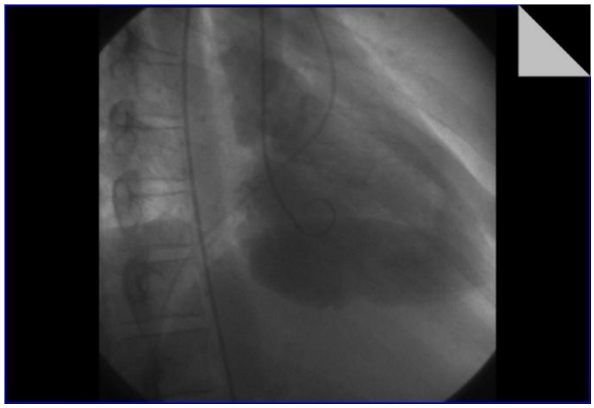

Figure 2: Left ventricular injection shows the pouch, into which the AI jet does not seem to enter.

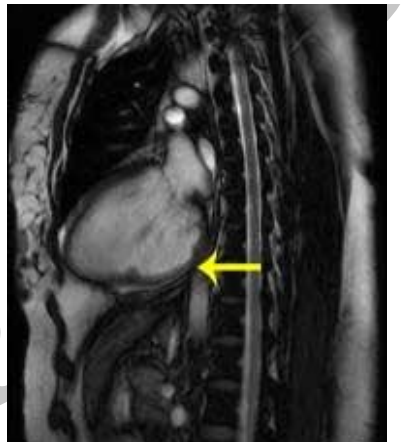

Figure 3: Cardiac MR shows LV pouch in diastole.

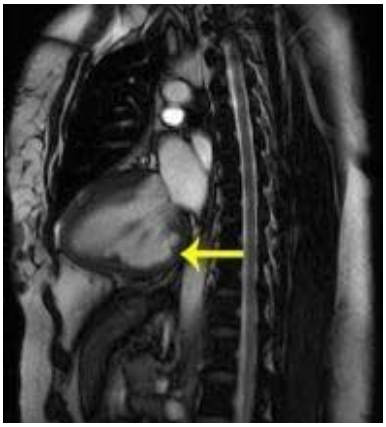

Figure 4: Cardiac MR shows LV pouch in systole.

Figures 5 &6: Cardiac MR shows that the AI jet is directed toward the LV pouch.

Discussion

At present, the combination of clinical findings and echocardiography and sometimes catheterization is used to evaluate the severity of AI, and the LV functional status determines which patients require surgery. Moreover, there is growing evidence supporting the utilization of CMR for the quantification of valve regurgitation and evaluation of ventricular function (1). CMR is now an established tool to assess aortic regurgitation and to rule out concurrent pathologies. Determination of the anatomical configuration of the aortic valve is another great merit of preoperative evaluation with CMR compared to echocardiography alone (2). Our case had LV inferobasal outpouching, and the direction of the regurgitation flow just inside it was its etiology.

Conclusion

In conclusion, the case presented herein highlights the importance of recognizing the pathophysiological aspects of AI and the exact anatomical change as well as determining the exact flow direction with the aid of cardiac MRI, which seems to enjoy acceptable levels of accuracy by comparison with echocardiography and catheterization.

References

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