jaa Just accepted article

EuroIntervention

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DOI: 10.4244/EIJ-D-19-00778

Citation: Li X, Wei X, Tang H, Chen M. Paradoxical low-flow, low-gradient severe aortic stenosis with only mild aortic valve calcification. *EuroIntervention* 2019; Jaa-679 2019, doi: 10.4244/EIJ-D-19-00778

Manuscript submission date: 23 August 2019

Revisions received: 08 October 2019

Accepted date: 08 November 2019

Online publication date: 12 November 2019

Paradoxical low-flow, low-gradient severe aortic stenosis with only mild aortic valve calcification

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Short running title: New reason for paradoxical LFLG-AS

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The authors have no conflicts of interest to declare.

Classifications: Aortic stenosis; TAVI; Transthoracic echocardiogram

A 71-year-old male was admitted to our hospital for chest distress and dyspnea. Transthoracic echocardiography (TTE) revealed concomitant aortic and mitral stenosis with significant thickening of both valves, suggesting rheumatic heart disease. The left ventricle was small and severely hypertrophied (Panel 1A). Hemodynamic measurements (ejection fraction [EF] 69%, stroke volume index 24.17 ml/m^2, mean pressure gradient 26 mmHg, peak jet velocity 3.2 m/s, effective valve orifice area 0.7cm^2) (Panel 1B) suggested low-flow, low-gradient aortic stenosis (LFLG-AS) with preserved EF. There was also mild aortic regurgitation and mild mitral stenosis (MS) (Panel 1C and 1D). The patient's symptoms were mismatched with his AS severity as assessed by the mean gradient, but otherwise unexplainable. Despite of the low calcium burden (calcium volume: 82.4 mm^3) detected on contrast computed tomography with the threshold set at 850HU (Panel 1E and 1F), severe AS was considered very likely based on clinical background and imaging data available. Thus a low-dose dobutamine stress echocardiography (DSE) was performed [1] (Panel 1G and 1H), which confirmed severe AS (Panel 1I). The patient ultimately underwent transcatheter aortic valve replacement and experienced profound symptom improvement.

Typically, AS is characterized by calcific degeneration, therefore calcium scoring is of critical importance in the assessment of AS severity in the entity of LFLG-AS with preserved EF according to current guidelines[2]. However, rheumatic AS featuring diffuse fibrosis and commissural fusion is not rare in developing countries. In this paper, we demonstrated an example of 'paradoxically' severe LFLG-AS in the presence of only mild valve calcium. The case suggested that the absence of severe valve calcium could not exclude severe AS in the entity of LFLG-AS with preserved EF, where DSE could be helpful. Patients with this entity could suffer from severe AS and require timely interventions.

Reference

1 Clavel M A , Ennezat P V , Maréchaux S, Dumesnil J G, Capoulade R, Hachicha Z, Mathieu P, Bellouin A, Bergeron S, Meimoun P, Arsenault M, Tourneau T L, Pasquet A, Couture C, Pibarot P. Stress echocardiography to assess stenosis severity and predict outcome in patients with paradoxical low-flow, low-gradient aortic stenosis and preserved LVEF.[J]. JACC-Cardiovasc imag, 2013, 6(2):175-183.

2 Baumgartner H, Hung J, Bermejo J, Chambers J B, Edvardsen T, Goldstein S, Lancellotti P, LeFevre M, Miller F, Otto C M. Recommendations on the Echocardiographic Assessment of Aortic Valve Stenosis: A Focused Update from the European Association of Cardiovascular Imaging and the American Society of Echocardiography[J]. J Am Soc Echocardiog, 2017, 30(4):372-392.

Figure 1. Echocardiography Before and After DSE and Fluoroscopic Images

(A)Transthoracic echocardiography suggesting a hypertrophied, small ventricle. (B) Continuous wave Doppler echocardiogram showing moderate aortic stenosis (mean pressure gradient 26 mmHg, peak jet velocity 3.2 m/s). (C and D) Echocardiogram showing mild mitral stenosis. (E and F) Computed tomography showing a low calcium burden (calcium volume: 82.4 mm^3) with significantly thickened leaflets (G and H). (I) Peak jet velocity and mean pressure gradient increased to 4.5m/s and 43mmHg respectively after DSE.