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CASE REPORT

Mitral Valve Replacement with Regent Aortic Valve in Severe Mitral Stenosis

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Introduction

Mitral valve replacement (MVR) in the context of calcification of the mitral valve annulus (<25 millimeters diameter) is challenging, with an increased risk of postoperative complications.[1] Mitral annular calcification is more common in elderly patients due to secondary aging and tissue degeneration. It can also be found in younger patients with connective tissue disorders and inflammatory conditions including the Marfan's syndrome, rheumatoid arthritis, and rheumatic fever.[2] Calcification of the mitral annulus has been associated with arrhythmias, heart block, stenosis, valve insufficiency, bacterial endocarditis, and arterial embolization. Although the condition is not common, calcified mitral annulus may been found in patients requiring surgery for mitral valve dysfunction. However, replacement of a calcified valve is challenging especially because of the difficulty in placing the sutures through the calcified annulus, increasing the risk of leakage, poor positioning and dehiscence.[3,4] For this reason, some studies have suggested the implantation of an aortic mechanical valve (St. Jude Medical prosthesis) in mitral position due to its smaller surface area.[5] Advantages of the St. Jude Medical valve prosthesis over other mechanical prostheses include a reduced sewing cuff size and a reduced frame diameter to allow a greater orifice area for a given annular size. There is limited number of studies on this kind of replacement surgeries, and here we report a case of successful placement of a St. Jude Medical aortic valve prosthesis in a calcified mitral annulus without postoperative complication.

Keywords

Rheumatic Heart Diseases/complications; Hypertrophy, Left Ventricular; Mitral Valve/surgery; Stenosil mitral valve/surgery; Calcinosis/complications; Heart Valve Prosthesis.

Case

A 49-year-old patient with a history of rheumatic heart disease, diabetes mellitus and dyslipidemia presented with chest pain and exertional dyspnea (New York Heart Association functional class II. The body mass index (BMI) was 30 kg/m^2. A transthoracic echocardiography showed an ejection fraction (EF) of 60% with severe mitral stenosis (mitral valve area 0.5 cm^2, mean gradient 16 mmHg) (Figure 1). There was mild mitral regurgitation, mild valvular aortic stenosis, mild aortic regurgitation, mild concentric left ventricular hypertrophy with arterial hypertension (sPAP=88 mmHg). Moreover, pre-operative coronary angiography showed stenosis of 70-90% of the distal left circumflex artery and first obtuse marginal artery (OM1). Combined MVR and CABG was planned. The patient underwent a MVR with placement of the mechanical St. Jude Medical Regent bileaflet prosthetic valve. After cardiac arrest, CABG was performed on the OM1. The patient had severe calcified and fibrotic mitral valve, not suitable for replacement with a regular mitral mechanical valve. With excision of the diseased valve, the mitral annulus was found to be too small for a 25-mm mechanical prosthesis, and thus, a 19-mm St. Jude Medical Regent prosthesis was chosen. Supra-annular pledgeted sutures were placed circumferentially and the Regent aortic valve was then implanted in the mitral position. After a four-month follow-up, the patient was free of symptoms and the echocardiography showed an EF of 55%, good leaflet motion with acceptable gradient of 4 mmHg, no paravalvular leakage, and sPAP of 55 mmHg (Figure 2). The study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki as reflected in a priori approval by the ethics committee of the Tehran Heart Center.

Discussion

The number of patients presenting with severely stenotic valve is limited and so are the techniques for

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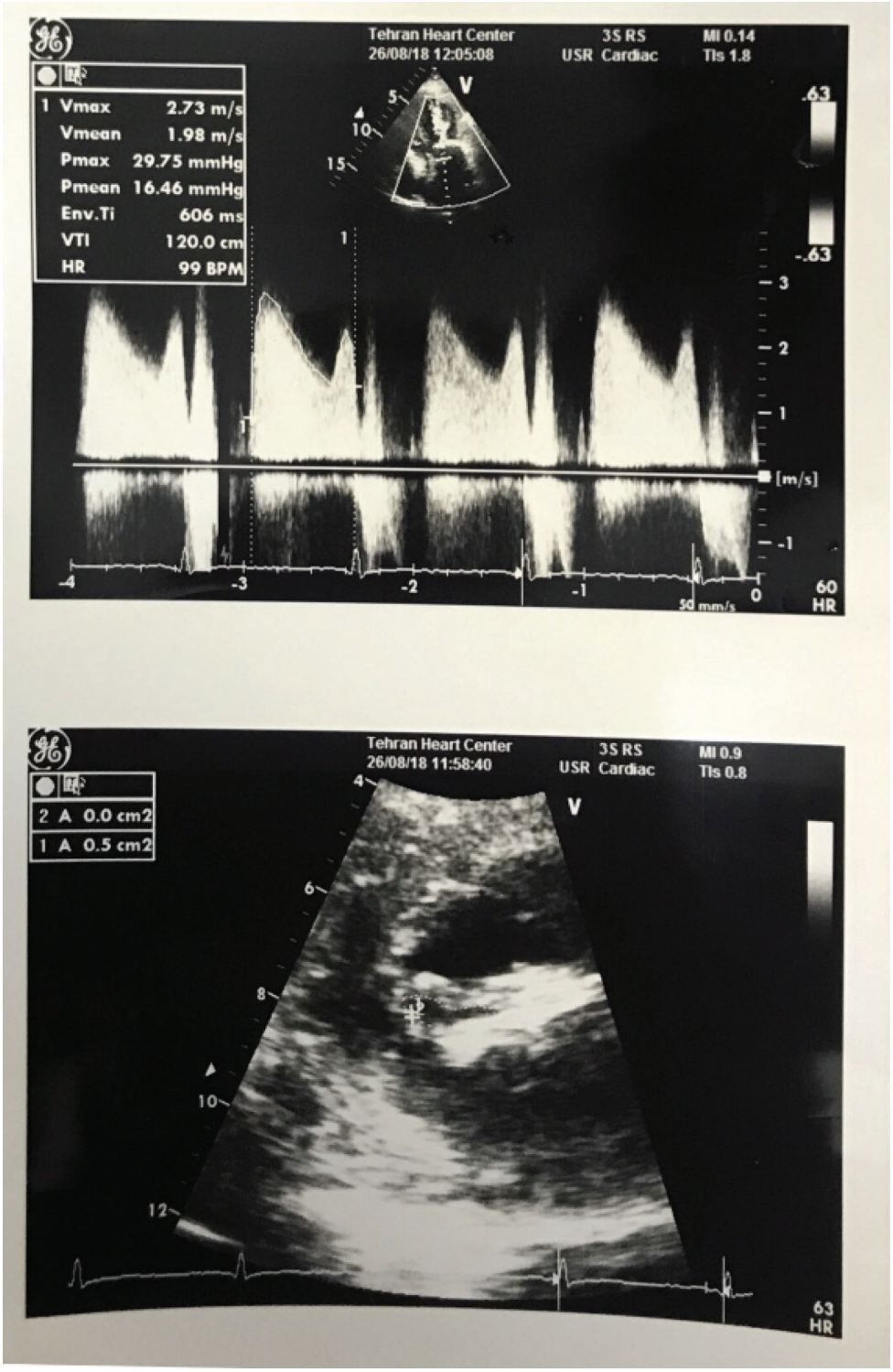

Figure 1 – Upper figure: Echocardiography before mitral valve replacement. Ejection fraction of 60% with severe mitral stenosis (mitral valve area 0.5 cm², mean gradient 16 mmHg). Lower figure: Two-dimensional echocardiography showing mitral valve replacement with a St. Jude Medical Regent aortic prosthesis. Cross-section at the mitral valve, showing a calcified valve with a 0.5 cm² valve area by planimetry.

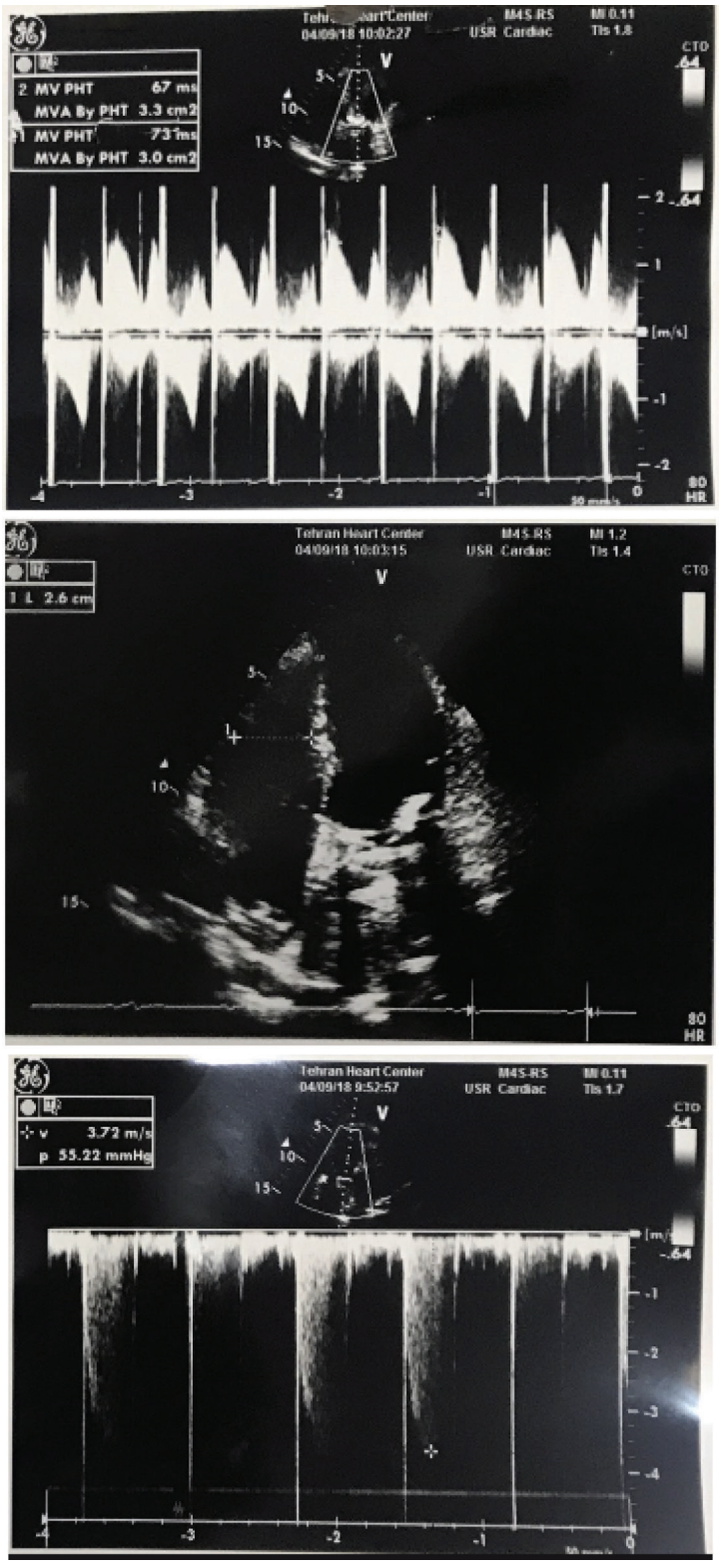

Figure 2 – Echocardiography after mitral valve replacement with a St. Jude Medical Regent aortic prosthesis. Upper figure: mitral flow showing a mitral valve area (PHT) of 3.0 cm², mean gradient of 3.5 mmHg and maximum gradient of 7 mmHg. Middle figure: Two-dimensional echocardiography showing the mechanical prosthesis in the mitral position. Lower figure: tricuspid reflux with a pulmonary artery pressure of 55 mmHg.

repairing this problem including extensive annular debridement and reconstruction. MVR in these patients is technically difficult and is associated with increased risk of mitral annular disruption, ventricular dysfunction, atrioventricular groove rupture, circumflex coronary artery injury, thromboembolic events, left ventricular outflow obstruction and perivalvular leakage.[2,3,5] In the present case, due to the small mitral annular size, a St. Jude Medical Regent 19 was used for MVR. Body surface area was 1.76 cm^2/m^2. On the other hand, effective orifice area (EOA) of the prosthesis was 1.7 cm^2/m^2, so the EOA index would be 0.96 cm^2/m^2. Although a minimum EOA index of 1.2 cm^2/m^2 is recommended to prevent patient prosthetic mismatch,[6] the patient showed a well-seated and normally function valve without mismatch in the follow-up. Barac et al.,[5] reported that, even though the Regent aortic valve is approved by the Food and Drug Administration (FDA) to be placed in the aortic position only, it can also be used in severe stenosis of the mitral valve. In this case, one might expect a low risk of late valve dysfunction, new paravalvular leak or pannus ingrowth. Our results, consistent with the one published by Barac et al.,[5] suggest that this technique can be used as a safe option in small mitral annulus.

Conclusion

Implanting a Regent aortic valve in a small fibrotic or calcified mitral valve annulus is feasible with a minimum risk of technical complications . Certainly, more cases and long-term follow-ups are required to ensure the safety of this procedure.

Author contributions

Conception and design of the research: Tafti SHA, Shirzad M. Acquisition of data: Tafti SHA, Shirzad M. Analysis and interpretation of the data: Yavari N, Landy MG. Writing of the manuscript: Yavari N, Landy MG, Omidi N. Critical revision of the manuscript for intellectual content: Yavari N, Tafti SHA, Landy MG, Shirzad M, Omidi N.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

This study is not associated with any thesis or dissertation work.

Ethics approval and consent to participate

This article does not contain any studies with human participants or animals performed by any of the authors.

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