A successful double valve repair on an interesting background: Case report

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Abstract
Aortic regurgitation in a bicuspid aortic valve is a complex entity that involves not only the semilunar valve but also the structure of the aortic root which is functionally and pathologically in a very close relationship to it. Considering repairing a bicuspid valve mandates a mindful involvement of all related structures concurrently. Here, we report an interesting case of both bicuspid aortic valve and mitral valve regurgitation in a patient with a history of infective endocarditis, that was successfully managed by double valve repair.

KEYWORDS
valve repair/replacement

1 | CASE REPORT

A 33-year-old Bangladeshi male was referred to our hospital with a diagnosis of progressive mitral regurgitation. Main complaint was dyspnea on exertion. Laboratory findings were normal.

His first presentation was 4 years ago when he was admitted with fever, atypical chest pain, and vomiting. Physical examination at that time revealed a blowing systolic murmur at the apex radiating to the left axilla. Transthoracic (TTE) and transesophageal echocardiography (TEE) confirmed a bicuspid aortic valve with moderate AR, a moderate MR, and a 15 mm vegetation attached to the mitral valve leaflets. Blood cultures were positive for Streptococcus sanguinis, and the patient was managed conservatively with antibiotics, he was started on Vancomycin and Ceftriaxone empirically once diagnosis of infective endocarditis was suspected then he was kept on Ceftriaxone as per his culture sensitivity results, he received a total of 6 weeks of Ceftriaxone IV injections till his infection was cleared and echo confirmed resolution of his vegetation.

Outpatient echocardiographic follow-up subsequently showed the same degree of moderate mitral and aortic regurgitation but a marked increase in the left ventricular diameters along with preserved function. He lost follow-up for 2 years during the COVID pandemic. He presented again with worsening shortness of breath and palpitation. Echocardiography showed severe mitral regurgitation with two eccentric jets, and the aortic valve as well (Figures 1 and 2).

Patient consented for double valve surgery. Computed tomography (CT) aorta was done as preoperative routine for bicuspid aortic valve, and it was normal.

Through conventional median sternotomy, followed by routine direct aortic cannulation along bicaval cannulation and cold cardioplegic arrest.

Mitral valve was accessed via trans-septal incision, a sizable perforation at A3 section of the anterior mitral valve leaflet was evident; we opt to repair the perforation using a synthetic pericardial patch about 0.9 cm followed by implantation of a 30 mm 4D annuloplasty ring.

Abbreviations: BAV, bicuspid aortic valve; LV, left ventricle; MR, mitral regurgitation; MVP, mitral valve plasty; MVRep, Mitral valve repair; TEE, transesophageal echocardiography; TTE, transthoracic echocardiography.
Aortic valve was truly bicuspid; sievers type 1 L-R. Aortic root wasn't dilated with a redundant fused aortic leaflet aggravating the regurgitation, and coronary ostia were normal.

The effective height (EH) of the non-fused cusp was measured with a ruler and was about 14 mm; aortic valve repair was performed with plication of the central and the free edges of the prolapsed cusp then plicating the fused sinus posteriorly to the level of the STJ to regain commissural orientation (Figures 3 and 4).

Bypass time was 150 min with cross-clamp time of about 100 min.

Intraoperatively, there were no signs of any vegetation or active infection, so he received a routine prophylactic perioperative antibiotics regimen for valve surgery followed by our institute; ceftriaxone and vancomycin for 24 h.

Patient recovery was unremarkable, he remained in sinus rhythm, we preferred to keep him on aspirin rather than warfarin as his compliance with warfarin was doubtful.

After 1 year, he is doing very well with no complaints. Follow-up echocardiography showed competent repair in both valves (Figure 5).

**FIGURE 1** Showing sizable perforation at the anterior mitral leaflet (arrow).

**FIGURE 2** Severe aortic regurgitation with bicuspid configuration.

**FIGURE 3** Plicating the fused sinus posteriorly to the level of the STJ to regain commissural orientation.

**FIGURE 4** The result of the aortic valve repair.

**FIGURE 5** Postoperative echocardiogram showing competent repair.

2 | **DISCUSSION**

Given the fact that bicuspid aortic valve (BAV) anomaly is the most common congenital cardiovascular malformation seen in the adult, which can be a stenosed or regurgitant due to the abnormal and
unique configuration of this valve anomaly. The reported mean age of developing stenosis is 60.1 On the other-hand regurgitation associated with bicuspid valve is usually seen in a younger age group; mean age of 30.1,2 Aortic dilatation is a superimposed pathology which is seen in about 50%–60% of the bicuspid valves.3 Reconstruction of the regurgitant BAV was proposed as early as 1992.4 Many studies have shown the safety of BAV repair, and its durability with accepted low mortality rates, less reoperation, and good long-term survival.5,6 Cusps prolapse due to technical errors in a less optimal repair is one of the common causes of reoperation in these patients; however, the natural progression of the disease—causing an increase in the valve gradient postrepair have been found as a culprit that accounts for a substantial proportion of failure postrepair as well.7

Repair techniques include cusp free margin plication, sub commissural annuloplasty, and free margin reinforcement.

Looking at the current state of the art in aortic valve repair described by Schäfers and El Khoury, a tailored approach to address the unique anatomic features of the bicuspid aortic valve which are Commisural orientation, the non-fused cusp geometric and effective heights and annular dilatation; should be the rule. With a more comprehensive, standardized approach and unified nomenclature; repair techniques are becoming more objective and reproducible.7

On the other side, the mitral valve repair techniques were solidified long time ago since its introduction by Carpentier, also it has been proven to be successful and durable in cases of IE whether its acute or healed. One study reviewed 34 patients who underwent MVRep for IE, have demonstrated that MVRep is feasible in endocarditis with good clinical and echocardiographic results and significant reductions in left atrial and left ventricular dimensions. Two-year survival was excellent 100% and 76% in patients undergoing surgery for healed and acute endocarditis.8

In another more recent and a larger cohort of a nationwide population-based propensity score-matching study, MV repair for patients with IE was found to have better perioperative and late outcomes compared with MV replacement.7

Referring to our patient; intraoperatively aortic valve anatomy looked suitable for valve repair, so we performed plication of both the central and the free edge of the fused right and left aortic cusps. Aortic dimensions were within normal range which was not indicated for any further intervention.

Interestingly, the patient had concomitant mitral regurgitation due to perforation of the A3 segment of the anterior mitral valve. Most likely because of the previous infective endocarditis he sustained earlier. The mitral valve was repaired using a synthetic pericardial patch, followed by the implantation of a 30 mm Sorin Memo 4D annuloplasty ring.

Postrepair anticoagulation regimen remain a debatable subject and are based on unpowered observational studies. Based on expert opinion, the occurrence of atrial fibrillation or the use of annuloplasty ring in case of mitral valve justifies short-term of antithrombotic medications. Moreover, Observational studies suggest that VKAs are not superior to low-dose aspirin regarding thromboembolic prevention after mitral valve repair, but potentially increase the risk of bleeding. After aortic valve repair, low-dose aspirin can be considered as per current recommendations.10

3 | CONCLUSION

BAV repair has become a seemingly better alternative to AVR with favorable hemodynamics and survival, considering the younger age of presentation of such pathology. The reported incidence of repair-related complications is low with meticulous technique. Careful patient selection and adequate repair give a good durability result. Evidence of bicuspid aortic valve preservation especially when regurgitation dominates the pathology started to be the rule with replacement of such valve becoming an exception.

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