

## Case Report



# Aortic Root Enlargement In Case of Double Valve Replacement

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### Abstract

Rheumatic valvular heart disease is quite common in Bangladesh. It affects most commonly mitral and aortic valve. As a result of annular fibrosis, aortic root become smaller in some patients. So, if smaller prosthesis is implanted, there is gross patient prosthesis mismatch (PPM), poor LV regression, increase overload, and ultimately low survival rate. Its' to report our experience in aortic root enlargement in case of double valve replacement where a patient of severe mitral stenosis and aortic regurgitation with small aortic annulus requiring aortic root enlargement (ARE). Weaning from Cardiopulmonary bypass (CPB) was uneventful, perioperative and post operative period was satisfactory. Post-operative echocardiography revealed normally functioning prosthesis. In case of small aortic root, aortic root enlargement (ARE) can be safely done by double valve replacement to overcome the prosthetic patient mismatch (PPM).

**Key words:** Patient prosthetic mismatch, Aortic root enlargement.

**Date of received:** 02.02.2020.

**Date of acceptance:** 15.05.2020.

**KYAMC Journal.2020;11(2): 108-110.**

**DOI:** <https://doi.org/10.3329/kyamcj.v11i2.48426>.

### Introduction

In our country, rheumatic heart disease is quite common. It affects mitral valve mostly and also aortic valve. It causes fibrosis as a whole, as a result of which annulus sometimes reduced in size. So, most of them develop low cardiac output, volume overload and LV dysfunction. The aim of replacing aortic valve is to reduce volume overload, improve symptoms, and increase survival rate. With small aortic root, the patient can't maintain normal activity after aortic valve replacement (AVR) because of increase demand and patient prosthesis mismatch (PPM). So, now a days surgeons are preferring to do aortic root enlargement (ARE) to overcome those difficulties and to obtain optimum haemodynamics.

### Case Report

A female patient of 31 years admitted in KYAMC with the complaints of palpitation, chest pain, exertional dyspnea, repeated respiratory tract infection for 2-3 years. She had rheumatic fever in childhood. On examination, her pulse was 76/min, irregularly irregular, BP: 90/60 mm of Hg, mid diastolic murmur and early diastolic murmur. Chest Xray showed left atrial enlargement, and cardiomegaly. Echocardiography revealed AML and Posterior Mitral Leaflet (PML) thickened, moderate to severe calcification in both leaflets with moderate subvalvular changes. MVA was 1.1cm<sup>2</sup>, MV annulus 42 mm, PPG 34 mm of Hg. (Figure 1) In aortic valve, all cusps were thickened and non-coated. AV ring size was 20 mm, PPG was 23 mm of Hg. Diagnosis was severe mitral stenosis with aortic regurgitation Grade II+ with LA thrombus. Her ejection fraction was 51%. (Figure 2)

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**Figure 1:** Echocardiogram of the patient



**Figure 2:** Echocardiogram of the patient

The patient underwent double valve replacement with aortic root enlargement by PTFE patch. CPB was established by aortic and bi caval cannulation. Later X clamp was applied and heart arrested after giving both antegrade and retrograde cardioplegia. The aorta was opened by giving oblique incision, valve excised. Then RA was opened and RA incision was extended through LA roof. Mitral valve was inspected, excised and replaced with 27 mm SJM valve. Then IAS and LA was closed. RA closure done. Aorta was enlarged up to NCC. PTFE patch augmentation of aorta done. Then annular stitches were taken. In the region of PTFE patch, pledgets remain outside the aorta. Then Aortic valve was replaced with 21 mm SJM. The aorta was closed meticulously by 6/0 prolene. Proper haemostasis ensured and wound was closed in layers.

The post operative period was uneventful and she was discharged on 12<sup>th</sup> post operative day. She came for follow up after one month and her both valves were functioning normally. Regarding MV, PPG was 10 mm of Hg and for aortic valve PPG was 17 mm of Hg.

## Discussion

Rahimtola<sup>1</sup> first described the issue of prosthesis patient mismatch (PPM) if the effective orifice area (EOA) of the valve is very small in relation to his body surface area. Using and indexed EOA (iEOA), the EOA of the prosthesis is divided by the body surface area.<sup>2</sup> If the iEOA is  $85\text{cm}^2/\text{m}^2$ , it is mild if  $65\text{-}85\text{cm}^2/\text{m}^2$  moderate,  $<6.5\text{cm}^2/\text{m}^2$  severe PPM. If PPM persists after surgery, there will be persistently high transvalvular gradient, persistence of symptoms, less regression of left ventricle which may lead to poor outcome after surgery.<sup>3,4,5</sup> To avoid PPM largest possible prosthesis should be implanted in a patient undergoing aortic valve replacement (AVR).<sup>6</sup> To overcome these difficulties, surgeons are now opting for ARE in case of small aortic root. Historically, posterior aortic annular enlargement was first reported by Nick et al<sup>7</sup> in 1970. The proposed patch enlargement by incising in NCC and taking a patch. Later Manouguian<sup>8</sup> stated to give an incision toward the commissure between LCC and NCC and extending the incision through mitral annulus upto anterior mitral leaflet (AML). Later Konno<sup>9</sup> and associates described anterior annular enlargement by longitudinal incision along the commissure of right and left coronary cusp with an extension onto the septum and the outflow tract of right ventricle. Nick's procedure is limited upto annulus of aortic valve without extending upto AML. So, aortic root can't be enlarged more. But on the contrary, in Manouguian procedure incision is extended upto AML and a diamond shaped patch is given to enlarge the aortic root. By this method, not only the mitral leaflet but the left atrial attachment at the base of aorta can be divided. Therefore, in Nick's procedure one can use one larger prosthesis but in Manouguian technique, one can insert a two size larger prosthesis.<sup>10-12</sup>

Similarly Konno et al<sup>9</sup> described a technique to enlarge anterior annulus by giving incision between the commissure between RCC and LCC. With extension into the septum and the outflow tract of right ventricle.<sup>9</sup> Konno procedure is preferred when a prosthesis is required two size greater than the native aortic valve. But it is a complex procedure requiring creation of ventricular septal defect, right ventriculotomy with double patch closure of both. There is also chance of damaging septal arteries, conduction system and creation of intercameral fistulae. In Nick or Manouguian procedure, if the prosthesis is placed in a tilted position, then one large valve can be inserted. Some people choose, Simplified Manouguian aortic annulus enlargement.<sup>11,12</sup> where the incision extended into the fibrous trigone between non coronary cusp and LCC upto mitral annulus but without extending into the left atrium. In case of double valve replacement (DVR), there is chance of narrowing the annulus if mitral valve is inserted first. So, some surgeons are taking annular stitches of mitral valve first, then aortic annular stitches are taken and aortic valve is inserted. Then mitral valve replacement (MVR) done.

## Conclusion

If aortic root enlargement can be done in safe hand there is less chance of prosthetic patient mismatch and less chance of tranvalvular gradient. Surgeons are now preferring aortic root enlargement to avoid post operative complications.

## Acknowledgement

We are grateful to all the doctors, nurses and the other staffs for their encouragement and support. We express special thanks to Dr Robert Hooker who was the team leader of this operation.

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