## **Case Report**

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# Aneurysmal fate of the residual aortic root, after ascending aorta surgery: a case report

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## **ABSTRACT**

Ascending aortic partial graft interposition is a widely used surgical technique in ascending aorta surgery. Long term results of this operation is well if native aortic valve is in good condition. Patients who have bicuspid aortic valve undergoing ascending aortic partial graft interposition experience aortic valve stenosis or regurgitation in long term. Due to hemodynamical changes which leads to an increase in pressure in native aortic wall recurrent residual aortic aneurysms can be observed. Those patients require reoperation which leads to an extensive procedure such as Bentall procedure. In this report, we present a case who has developed aortic root aneurysm after having surgery for acute aortic dissection and aortic coarctation.

Keywords: Aortic aneurysm, Aortic dissection, Bicuspid aortic valve, Computed tomography angiography, Aortic root

## INTRODUCTION

Ascending aortic partial graft interposition is a widely used surgical technique which is especially performed in patients whose aortic root and aortic valve is normal. In this method native aortic valve and native coronary artery roots are spared. However in long term results, especially in patients who have bicuspid aortic valve; aortic valve stenosis or regurgitation is reported. Also progressive residual native aortic root dilatation and aneurysm can be observed which leads to the need for reoperation. <sup>2</sup>

Patients with bicuspid aortic valve quite often have another abnormalities of cardiovascular system. These abnormalities can be ascending aorta dilatation, ascending aorta aneurysm, aortic dissection or aortic coarctation.<sup>3,4</sup> Main reason of dilatation and aneurysm formation is the accelerated smooth muscle apoptosis in patients who have bicuspid aortic valve.<sup>5</sup> Patients who

had partial prosthetic replacement of the ascending aorta, aortic root consists of sinuses of valsalva, sinotubular junction and residual ascending aorta. In those patients, wall tension increases in the residual aorta and this increase in pressure causes dilatation or aneurysms in the native aorta.<sup>6</sup>

## **CASE REPORT**

We present a 20 year old patient who has developed aortic root aneurysm after having surgery for acute type II aortic dissection and aortic coarctation 14 months ago, in one month interval respectively.

Patient presented with 2-month history of progressive dyspnea. Patient was New York Heart Association class II at admission. On physical examination, blood pressure was 160/60 mmHg, and heart rate was 85 bpm. Other physical examination findings were normal.

Transthoracic and transesophageal echocardiography was performed. Findings on echocardiography were bicuspid aortic valve with a maximum 35 mmHg and mean 30 mmHg gradient without regurgitation, aortic root was 59 mm in diameter and a residual aortic coarctation was observed in descending aorta with 22 mmHg gradient. Left ventricular diameters and ejection fraction (%65) were normal. Ascending aortic aneurysm and normal root aortic were reported on transthoracic echocardiography which was performed before previous surgery. Bicuspid aortic valve without stenosis or regurgitation was also reported at previous transthoracic echocardiography. Multi Slice Computed Tomography (MSCT), low dose dual source 128 slices, performed. On tomography: sinuses of Valsalva was 60 mm in diameter. graft was positioned between sinuses of valsalva and innominate artery and the diameter of graft was 42 mm (Figure 1). Tomography also confirmed the residual coarctation in descending aorta as %20 by diameter. Cardiac catheterization was not performed as it was thought it would not give further information useful in the management of the patient.

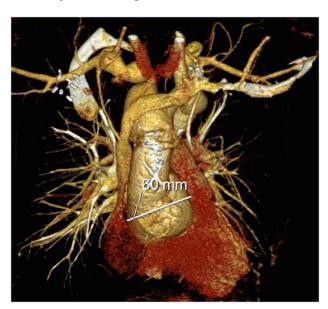


Figure 1: Aortic root: 60 mm.

At surgery, femoral artery and vein was cannulated and cardiopulmonary bypass was initiated with low flow prior to median sternotomy. Sternotomy was performed with oscillating saw and then patient was cooled to moderate hypothermia during blunt tissue dissection. Superior vena cava was cannulated selectively for better exposure on ascending aorta. The ascending aorta was grossly dilated (approximately 6 cm in diameter) and presented the typical morphology of enlarged sinuses of Valsalva. Aortic cross clamp was placed in moderate hypothermia, intermittent isothermic blood cardioplegia was used for myocardial protection. Aortic root aneurysm incised vertically. The aortic valve was bicuspid (Figure 2). The coronary artery ostiums were displaced distally along the aortic wall. We excised the aortic valve and aneurysmal

site and performed a classic Bentall procedure; simultaneous replacement of the aortic valve and ascending aorta, using a composite mechanical-valved conduit (St. Jude Medical Masters Valved Graft). Distal anastomosis performed to proximal end of graft which was placed on previous surgery one year ago. The patient was easily weaned from cardiopulmonary bypass. The operation was well tolerated, the postoperative course was remarkably uneventful, and the patient was discharged on the ninth postoperative day in good condition. One month after discharge patient had a routine control; aortic valve was functional with minimal gradient on echocardiography, physical examination did not reveal any abnormality and patient was symptom free.

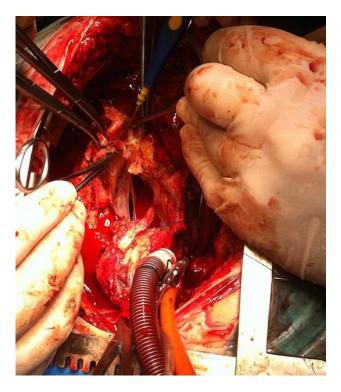


Figure 2: Bileaflet aortic valve.

#### DISCUSSION

Ascending aortic dilatation is seen in one-third of patients who have bicuspid aortic valve and aortic coarctation. Physicians should be aware of that these patients can develop ascending aortic dilatation and aneurysms especially at ages between 20-40 years and so they should be followed up. Replacement of ascending aorta by tube graft is performed when dilatation in ascending aorta leads to aneurysm. This procedure is widely used in in cardiac surgery and outcomes of the procedure are good. However, prosthetic replacement of the ascending aorta increases wall tension in the residual aorta by loss of distensibility at the aortic root. As a result residual aortic root can develop aneurysms. For this reason especially in young patients who have aortic regurgitation and moderate aortic dilatation (>45 mm in diameter)

extensive procedure such as Bentall procedure can be justified.<sup>8</sup>

Aortography or coronary angiography may not give additional information about planning surgery. As in the present case, MSCT is a useful and less invasive imaging modality. MSCT can show the morphology of the affected aortic tissue and coronary ostium in more detail then conventional angiography and can help the physician in the planning for surgical procedure.

Composite valved graft replacement is a widely performed surgical procedure in the presence of aortic valve and ascending aorta pathologies and the results of operation is good in both short and long term follow-up. David procedure is performed in situations as normal aortic valve and coronary artery ostiums with extensive aneurysm of sinuses of valsalva. 10 Our patient had a bicuspit aortic valve with 35 mmHg gradient and displaced coronary artery ostiums so we decided to perform classic Bentall procedure. Long term results of patients undergoing aortic root replacement or repair who have bicuspid aortic valve are better when aortic valve is replaced too. 76.8% of patients with bicuspid aortic valve who were operated for ascending aortic aneurysm without any intervention on aortic valve experience aortic valve stenosis, sinuses of valsalva aneurysm or suture line aneurysms in ten year follow-up period. 12

## **CONCLUSION**

In conclusion, in order to prevent reoperation of those patients Bentall procedure should be performed if there are any abnormalities of aortic valve. Aortic reimplantation or remodeling should be considered as a valve sparing procedure in patients who have normal aortic valve to avoid residual aortic pathology in long term follow up. 12

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