

# **Aortic Root Replacement with Composite Prosthetic Valve Conduit (Bentall's procedure) in a Case of Aneurysm of Ascending Aorta Secondary to Marfan's Syndrome**

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## **Abstract**

Aneurysm of the ascending aorta is commonly found in patients with annulo-aortic ectasia, some of whom have Marfan's syndrome. Clinically patients may present with signs and symptoms secondary to aortic valve insufficiency. Occasionally they may present with complications like dissection, rupture, congestive cardiac failure. Treating the aneurysm may many a times require aortic valve replacement also. We hereby present a case of aneurysm of ascending aorta in a patient of Marfan's syndrome with aortic insufficiency who was successfully operated using a composite prosthetic valve conduit with direct implantation of coronary arteries on to the graft (Bentall's procedure).

## **Introduction**

The aorta is considered pathologically dilated, if the diameters of the ascending aorta and the aortic root exceed the norms for a given age and body size. A 50% increase over the normal diameter is considered aneurysmal dilatation. Such dilatation of the ascending aorta frequently leads to significant aortic valvular insufficiency, even in the presence of an otherwise normal valve. The dilated or aneurysmal ascending aorta is at risk for spontaneous rupture or dissection. The magnitude of this risk is closely related to the size of the aorta and the underlying pathology of the aortic wall. The occurrence of rupture or dissection adversely alters natural history and survival even after successful emergency surgical treatment. In recommending elective surgery for the dilated ascending aorta, the patient's age, the

relative size of the aorta, the structure and function of the aortic valve and the pathology of the aortic wall have to be considered. The indications for replacement of the ascending aorta in patients with Marfan's syndrome, acute dissection, intramural haematoma, and endocarditis with annular destruction are supported by solid clinical information. There are a number of current techniques for surgical restoration of the functional and anatomical integrity of the aortic root. The choice of procedure is influenced by careful consideration of multiple factors, such as the patient's age and anticipated survival time; underlying aortic pathology; anatomical considerations related to the aortic valve leaflets, annulus, sinuses, and the sinotubular ridge; the condition of the distal aorta; the likelihood of future distal operation; the risk of anticoagulation; and, of course, the surgeon's experience with the technique. Currently, elective root replacement with an appropriately chosen technique should not carry an operative risk much higher than that

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of routine aortic valve replacement. Composite replacement of the aortic valve and the ascending aorta, as originally described by Bentall, DeBono and Edwards (classic Bentall), or modified by Kouchoukos (button Bentall), remains the most versatile and widely applied method. To learn more about outcome of surgical patients of aortic root replacement in patients with aneurysm of ascending aorta and to add up to others that operation be considered at the earliest in patients with aneurysm of ascending aorta we are presenting this case who underwent aortic root replacement at our institute.

#### Case History

A 38 Yr male presented with complaints of exertional dyspnoea (NYHA Class III), and palpitation since last 2-3 years. Patient gives history of similar complaints in his son who expired 2 years back. Clinical examination revealed marfanoid features, normal sinus rhythm and early diastolic murmur at the aortic area. Laboratory investigations including haematologic and biochemical profiles were within normal limits. X-ray chest postero-anterior view revealed prominence of the aortic root and cardiomegaly. Two-Dimensional Echocardiographic and colour Doppler study revealed abdominal and atrial situs solitus, AV and VA discordance, dilated aortic root and proximal part of ascending aorta with severe aortic insufficiency. Aortic root diameter was 57 mm left ventricular volume overload was present with LVEF of 55%. CT aortogram revealed aneurysm

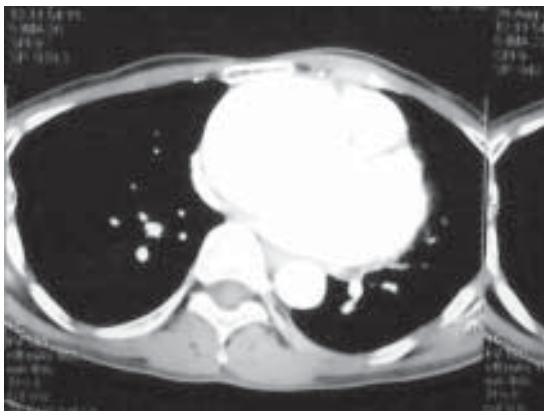


Fig. 1 : CT scan thorax showing dilated aortic root.

of proximal ascending aorta with dilatation of aortic root. Decision for aortic root replacement was taken. A standard technique for cardiopulmonary bypass was used. After cross clamping of aorta, the aneurysm was opened vertically. There was evidence of aortic root dilatation with normal non-coapting cusps and normal coronary ostia. The valve was excised and the aneurysmal sinus aorta was excised leaving behind a button of wall around coronary ostia. Diameter of the annulus was calibrated and appropriate sized prosthetic valve conduit was selected. The sewing ring was sutured to the annulus of the aortic valve using interrupted suture. Two holes were made in the graft at appropriate site for coronary ostia and the coronary buttons were sutured to the holes using continuous suture. The distal end of the graft was cut to the appropriate length and was sutured to the distal aorta. Biogluce was used to seal the anastomotic sites. The post-operative period was uneventful and the patient was discharged on the 7<sup>th</sup> post-op day. Review 2-D Echo revealed normally functioning prosthetic valve in situ.



Fig. 2 : Hugely dilated aortic root.



Fig. 3 : Composite graft in situ.

## Discussion

Aortic root reconstruction remains a challenging surgical procedure. Aortic root replacement is a complex surgical procedure which has undergone major technical modifications with time. The most common technique used for repair of this condition was the Bentall operation. The Bentall-DeBono operation is the technique of choice for aortic root replacement. As more patients do not accept or have contraindications to lifelong anticoagulation, the biological Bentall operation is a good option for these patients, even though complex reoperations would then be required for bioprosthesis degeneration. Currently, elective root replacement with an appropriately chosen technique should not carry an operative risk much higher than that of routine aortic valve replacement. Composite replacement of the aortic valve and the ascending aorta, as originally described by Bentall, DeBono and Edwards (classic Bentall), or modified by Kouchoukos (button Bentall), remains the most versatile and widely applied method. Since 1989, the button modification of the Bentall procedure has been used in 250 patients at Mount Sinai Medical Center, with a hospital mortality of 4% and excellent long-term survival. Elective aortic surgery in Marfan patients can be performed with good results. Close follow up of patients undergoing surgery is important. The long-term functional status of surviving patients is satisfactory. The decrease in early mortality and the satisfying late results demonstrate that aortic root replacement is a low risk surgical procedure and an effective and durable treatment. The availability of

biologic substitutes for the aortic root has allowed the extension of this operation to all patient age group, with results comparable to these obtained with composite grafts. The decrease in early mortality and the satisfying late results demonstrate that aortic root replacement is a low risk surgical procedure and an effective and durable treatment. The availability of biologic substitutes for the aortic root has allowed the extension of this operation to all patient age group, with results comparable to these obtained with composite grafts.

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