

Modified Bentall's Procedure for Aortic Root Aneurysm : A Case Report

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Abstract

Background: The modified Bentall(M Bentall) procedure is considered as the gold standard for patients requiring aortic root replacement, where the native aortic valve is required to be replaced.

Case Presentation: We hereby present a case report of a patient who was diagnosed having moderate to severe Aortic Regurgitation (AR) with aortic root aneurysm. He was treated successfully by us with the M.Bentall procedure.

Conclusion: As the aortic disease detection and surgical expertise improved in our country, a M.Bentall procedure is a suitable and safe treatment option for Aortic root aneurysm.

Key words : Bentall's procedure; Aortic root aneurysm; Aortic valve.

Introduction

The aortic root aneurysm (Dilatation of native aorta >1.5 times than normal) is practically important due to rupture or dissection of the aneurysm, Aortic Valvular (AV) incompetence caused by anatomical distortion of the aortic root, or due to compression to the surrounding structures.¹

Bentall procedure was first described in 1968 by Hugh Bentall and Antony De Bono.² The original procedure was associated with a high incidence of coronary button complications, so to solve the problem several modifications have been done and most popular one is button Bentall procedure by Kouchoukos et al.³⁻⁵ The M Bentall Operation, a gold standard of treating a pathological aorta, consist of reinserting the coronary ostia after a mechanical or biological prosthetic valve is placed into the aorta and the entire aortic root is

replaced which aims to prevent adverse aortic events and restoration of AV competence.⁶ Here we present a case of successful M. Bentall procedure, for the treatment of severe Aortic Regurgitation (AR) with aortic root aneurysm performed by our team at Square Hospitals Limited.

Case Presentation

Mr. X, a 46 years old, normotensive, non-diabetic gentleman got admitted to our hospital with the diagnosis of severe AR with Aortic Root and ascending Aortic aneurysm on October 2020.

He had complaints of central, compressive chest pain on exertion for last 2 months prior to admission. Pain was associated with severe sweating and palpitation, and occasional shortness of breath. For his above mentioned complaints he visited local cardiologist and advised to do echocardiography that revealed severe AR with Aortic root and ascending Aortic aneurysm.

He had no history of Bronchial Asthma, COPD, CKD, CVA or any previous surgery.

On physical examination patient had no gross abnormality except an early diastolic marmarat 3rd interspace which radiates toward left sternal border. His BP was 110/40 mm of Hg and pulse was 66b/min.

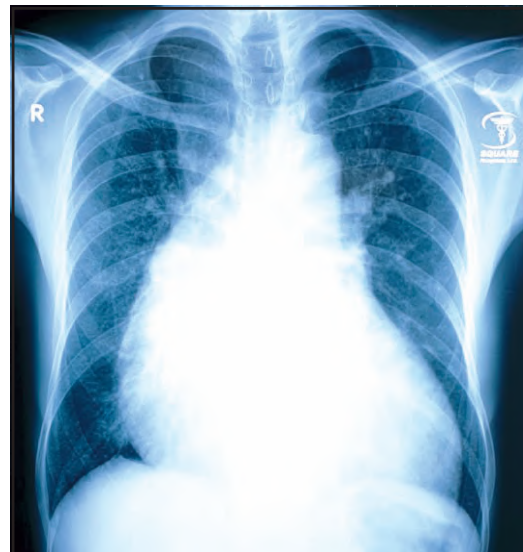


Fig 1 X-ray chest PA view showing cardiomegaly

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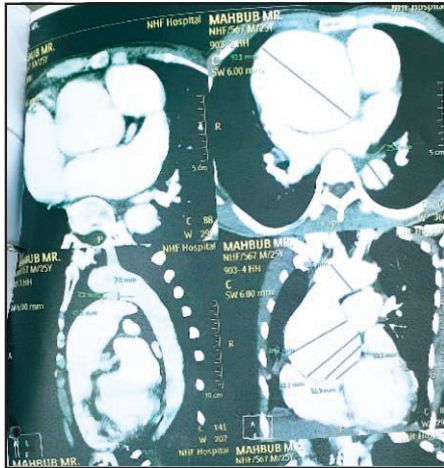


Fig 2 CT Scan showing hugely dilated ascending Aorta and aortic root

Patients biochemical tests revealed no gross abnormality and his serum bilirubin was 1.1 mg/dl and S. Creatinine was 1.2mg/dl. His chest X-ray PA view showed cardiomegaly and ECG showed complete LBBB, with sinus rhythm and HR was 66 beats per minute. Pre-operative transthoracic color Doppler echocardiography (TTE) showing ascending aortic aneurysm with Aortic root dilatation causing severe AR (Root 24mm, sinus 56 mm, STJ 45 mm, ascending Aorta 42 mm, arch of Aorta 24 mm, DTA 22 mm). Dilated LV with mild global LV hypokinesia and mild LV systolic dysfunction (LVEF-45%). Trivial TR (PASP-35 mm of Hg). Good RV function. His coronary angiogram showed normal coronary arteries and his Euro SCORE II for in hospital mortality was 2.34%.

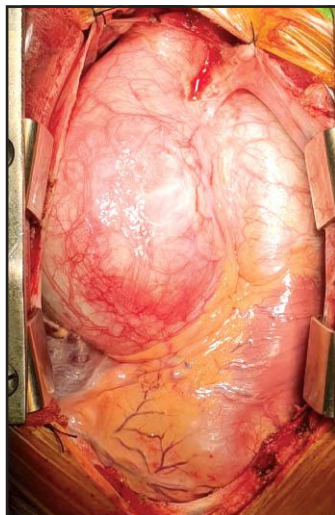


Fig 3 Per-operative picture showing grossly dilated aortic root and ascending aorta

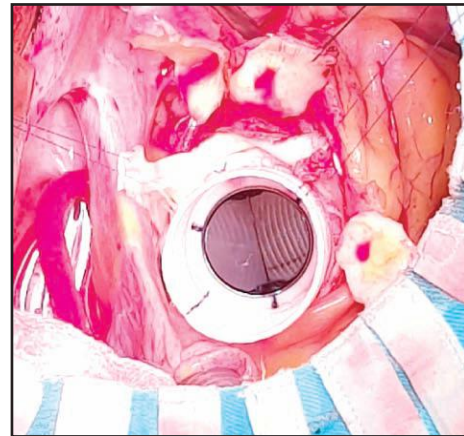


Fig 4 Mechanical aortic valve seen through transected aorta with both coronary buttons

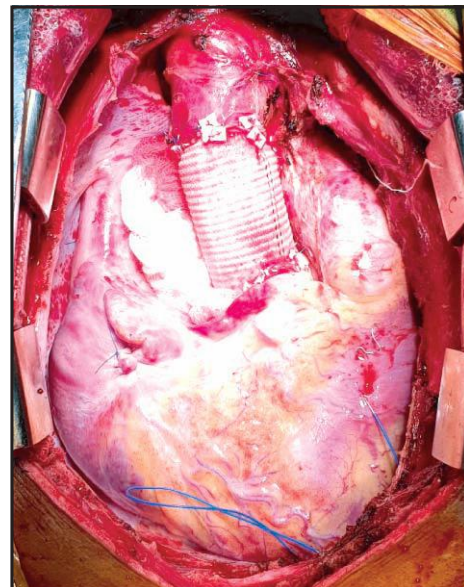


Fig 5 Reconstructed aorta just before chest closure

Surgery

After optimization of patient condition, patient was brought to OR for surgical correction two days after admission. Central venous line (Right, jugular) left radial and femoral arterial lines, along with NIRS (Near Infrared Spectroscopy) were established. Under all aseptic precaution, under GA after proper positioning patient was operated through median sternotomy. TEE (Trans-Esophageal Echocardiogram) showed hugely dilated aortic root with severe aortic regurgitation. After opening the pericardium aortic root and ascending aorta was found severely dilated. CPB was established through aortic (Just proximal to innominate artery) and two stage single venous

cannula once we achieved desired ACT. Subsequently aortic cross clamp was applied, cold-blood cardioplegia was delivered, heart was arrested at diastole, and patient was cooled to 28°C. Ascending aorta was then transected, the aneurysmal portion of aorta was excised and valve inspected. Aortic valve cusps (3) were found distorted, thickened, non-coapted and not repairable. Subsequently aortic root and ascending aorta was replaced with 25 mm valved conduit, sutured with interrupted polyester and running polypropylene sutures. The coronary arteries were re-implanted through button incisions in the vascular prosthesis. Distal graft to aortic anastomosis with continuous polypropylene suture completed the repair.

Patient was weaned to normal sinus rhythm with minimum inotrope. TEE confirmed normal functioning of prosthetic aortic valve. Decannulation was done after protiminization. Total CPB time for this patient was 157 min, and total X clamp time was 106 min. Haemostasis was achieved and chest wound was closed with chest drain tubes and pacing wires. He was shifted to ICU with minimum inotropes and was extubated 8 hours after ICU admission.

Patients post-operative course in the ICU was eventless. Post-operative echocardiography showed well seated and normally functioning prosthetic Aortic valve. Replaced aortic diameter 25 mm. Paradoxical IVS with global hypokinesia of hypertrophied LV and mild LV systolic dysfunction (LVEF-45%). Trivial TR (PASP-30 mm of Hg). Good RV function. Patient was discharged on 8th POD with an INR of 2.3 at 5mg warfarin.



Fig 6 Post-operative X-ray chest at 3rd post-operative day

Discussion

Mutation of the Fibrillin-1 gene (FBN1) usually leads to defective extracellular microfibrils resulting in instability of the connective tissue.⁷ The aortic root dilates due to increased aortic stiffness and pulse wave velocity, enhanced by fibrillin fragmentation as a result of underlying FBN1 mutation.⁷ In patients with Marfan Syndrome (MFS) the FBN1 mutation is inherited autosomal dominant with extensive phenotypical variability. The skin, skeletal system, eyes, dura and the pulmonary along with the cardiovascular system are affected. Although MFS is a systemic disorder, the extent of cardiovascular manifestations is the primary determinant of reduced life expectancy.⁸ In our patient we couldn't do any genetic testing as patient refused to do it.

In case of aortic root aneurysm, surgery should be considered when the diameter ≥ 55 mm (Class IIa) for any patient, in case of Marfan Syndrome surgery is indicated when ≥ 50 mm (Class I) and should be even considered earlier 45 mm in the presence of family history of aortic dissection, diameter growth >3 mm/year, severe aortic/mitral regurgitation or desire for pregnancy (Class IIa). In patients with bicuspid aortic valve with other risk factors (Including hypertension, aortic regurgitation) when diameter 50 mm (Class IIa). Implantation of a mechanical valve prosthesis is associated with a durable solution (Lower rate of reoperation) although it requires life-long anticoagulation and associated with increased bleeding risk.^{6,9} The biological M Bentall operation, was one such answer to the problem of anticoagulation but after biological valve insertion it has the risk of reoperation.^{10,6,9}

Studies showed patients with Marfan's disease are on average younger and more often presented with acute aortic dissection. Considering the mean age and comorbidities of the M Bentall patients' population, mortality rate (8.9%) is acceptable but the incidence of major bleeding and thromboembolic complications are substantial.¹¹ Bleeding and thromboembolic complications are strongly associated with the use of oral anticoagulation and mechanical valve implantation. One may consider Valve Sparing Aortic Root Replacement (VSRR) as an option for young patients with aneurysmal disease involving the aortic root while the Aortic

Valve (AV) itself is functionally intact and can be repaired. In our case as the valve was irreparable, a mechanical valved conduit was chosen for him.

Ethical issues

Before commence the study necessary permission was obtained from the authority. The authors have taken appropriate consent from the patient, that his images and other clinical information to be reported in the journal. He understands that his name and initial will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Limitation

This is a case report, a multi-patient case series would have given the readers a better understandings of the outcome.

Conclusions

Over the years' surgeon expertise and patient awareness has improved, which lead to amplified detection of aortic root disease and as a result rates of aortic root surgery have increased. In our country these days, with proper planning, team support, OT setup, rigorous perfusion backup and right ICU setup M Bentall surgery can be safely done.

Recommendation

In our experience prophylactic replacement of the dilated aortic root can be safely done without major difficulties.

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Contribution of authors

SDG-Conception, drafting & final approval.
MH-Design, critical revision & final approval.
BCM-Drafting, citing referemces & final approval.
MAI-Concepting, drafting & final approval.
PKC-Critical revision, citing references & final approval.

Disclosure

All the authors declared no competing interests.

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