A 12.8 cm Diameter: Giant Aortic Aneurysm (GAA) Successfully Treated by Bentall’s Procedure- Case Report

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Abstract

Background: Aortic root aneurysm involves dilatation of sinuses of Valsalva, sinotubular junction and proximal ascending aorta. It is a rare complication after aortic valve replacement surgery. Giant aneurysm is defined as aneurysm of size > 10 cm. Surgical treatment involves Bentall’s procedure.

Case Detail: A 40 year old gentleman with severe aortic regurgitation and moderate aortic stenosis underwent aortic valve replacement with a mechanical prosthetic valve of size 25 mm, 13 years ago. At the time of previous surgery the ascending aorta was mildly dilated, measured 3.5 cm in size. Patient came with complaints of breathlessness on exertion from past two months, NYHA class III. Echocardiography and CECT revealed giant ascending aortic aneurysm about 12.8 cm in diameter with intimal flap suggestive of dissection. Prosthetic valve function and other cardiac structures were assessed as normal. Elective surgery was planned. CPB was established. Ascending aortic aneurysm was excised along with prosthetic mechanical valve. Bentall’s procedure was done using 27 mm Dacron composite graft. Patient required permanent pacemaker for complete heart block in post operative period. Thereafter patient was discharged in stable condition.

Conclusion: Aortic aneurysm should be tackled surgically in order to decrease the morbidity and mortality. Regular follow up of such patients should be done.

Keywords: Giant aortic aneurysm, Bentall’s procedure

Background

An aneurysm is the second most frequent disease of the aorta after atherosclerosis [1]. The dilatation of sinuses of Valsalva involving together sinotubular junction, and the proximal ascending aorta is referred to as Aortic root aneurysm [2]. Being one of the rare complications after aortic valve replacement surgery; the aneurysm of size >5 cm needs surgical intervention like Bentall’s procedure [3].

The exceeding 10 cm diameter of an aneurysm in the aorta is an uncommon clinical entity associated with the risk of...
rupture [4]. The rupture risk is directly proportional to the aneurysm size. The yearly rupture incidence for aneurysms reported in the literature database is 14% for GAA greater than 6 cm diameter [5]. Among various enlisted etiologies atherosclerosis is the most common cause of aortic aneurysm. Other causes are giant cell arteritis, Marfan's syndrome, syphilis, hereditary hemorrhagic telangiectasia, tuberculosis, and medial agenesis [6,7].

We herein present a rare 12.8 cm GAA case, which was successfully treated by Bentall's procedure.

Case Report

A 40-year-old male presented with complaints of breathlessness on exertion from two months, echocardiography, x-ray (Figure 1) and contrast-enhanced computed tomography (CECT) (Figure 2) revealed features of 12.8 cm of diameter-giant ascending aortic aneurysm (GAA) with minimal intimal flap suggestive of dissection. The functioning of prosthetic valve and other cardiac structures were also assessed. The clinical and radiological findings concluded to the diagnosis of severe aortic regurgitation and moderate aortic stenosis.

The medical history was elicited for an aortic valve replacement with a 25mm mechanical prosthetic valve, 13 years ago. In the first operation, mild dilatation in the ascending aorta measuring 3.5cm in size was observed- as per old clinical records of the patient.

Elective surgery was planned as an interventional treatment regimen. Cardiopulmonary bypass (CPB) was established initially via the right axillary artery and right femoral vein, later on after dissection of the aneurysmal sac, was converted into central cannulation via ascending aorta and right atrium which aided in maintaining the circulation of blood and the oxygen content of the patient’s body. Bentall’s procedure was done using a 27 mm Dacron composite graft (Figure 3). Unfortunately, a gross photograph of the aneurysmal sac could not be taken due to hemodynamic compromise during the surgery. The patient required a permanent pacemaker for complete heart block in the post-operative period. Thereafter patient was discharged in stable condition.

Figure 1: X-ray PA view showing dilated part of ascending aorta, and sternal wires of previous surgery
Figure 2: CECT chest showing reconstructed image of dilated ascending aorta approximately 12.8 cm along with aortic mechanical prosthetic valve.

Figure 3: Post Bentall’s Procedure showing Dacron composite graft with central cannulation from ascending aorta and right atrium.

Discussion

Giant aneurysms can have various presentations and is a rare clinical entity. The complications lead to the poor prognosis associated with rupture &/or dissection [8]. Leaking aneurysms, on other hand also present the typical feature of acute dissection along pericardial tamponade [9,10]. The rupture risk is directly proportional to the size and is comparable to the rate of growth of the aneurysm [11]. To the best of our knowledge only some cases of unruptured giant aortic aneurysm are reported in the database. Life expectancy without surgical intervention for cases of giant aneurysms is very low [12]. The surgical intervention recommended in current guidelines is indicative of an aneurysm with a diameter exceeding 5.0 cm [13]. It is not uncommon that these patients die from either the rupture of an aneurysm or decompensating organs and systems [14]. The 10-year risk of mortality is high as 15 times the risk of aorta-related death in patients with abdominal aortic aneurysm (AAA) in comparison to any other cardiovascular
cause (e.g. myocardial infarction or stroke) [15].

The recommended guidelines as per the American Heart Association suggests interventional treatment regimen even if there would not have been any dissection of adjacent organs to prevent complications associated with GAA [16,17]. In the present case sparing operation was not possible because of associated dissection to sinuses of Valsalva involving together sinotubular junction, and proximal ascending aorta. Bentall procedure was performed for the present case using 27 mm Dacron composite graft. The Dacron composite graft remains conduit with excellent hemostatic and hemodynamic properties & in older individuals, aortic root surgery is preferred. A biological aortic valve as a composite biological valved conduit is gaining acceptance in such aggressive cases [18,19].

The Bentall procedure has operative mortality no worse than that for aortic valve replacement as per the literature database with a superior long-term survival rate [20]. Bentall technique involves direct reimplantation of the coronary arteries. Whereas the modified Bentall technique advocated by certain authors requires the formation of ostial "buttons" attached to the graft [21]. The significant improvements with modified techniques are still not able to justify intra-operative blood loss and postoperative complications [22].

**Conclusion**

Aortic aneurysms need an interventional treatment regimen to decrease the associated morbidity and mortality. Regular follow-up of such patients is necessary to trace ascending aortic reoperation if the choice is Bentall procedure.

**References**