

Incidental finding of a giant aortic root aneurysm and its repair

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Abstract

The prevalence of aortic aneurysms is 3-4% in individuals more than 65 years. Age and haemodynamic factors play an important role in the development of aortic aneurysms. Most patients with aortic aneurysms are asymptomatic at the time of discovery. Thoracic aneurysms are usually found incidentally after chest radiographs or other imaging studies. The most common complications of thoracic aortic aneurysms are acute rupture or dissection. Some patients present with tender or painful nonruptured aneurysms. Patients are thought to be at increased risk for rupture and should undergo surgical repair on an emergent basis

We document a case of a 66-year-old man who presented with shortness of breath. On evaluation, he was found to have severe aortic regurgitation and large aortic root aneurysm. Patient underwent successful open heart surgery. Aortic root and aortic valve were replaced with valve conduit and coronary arteries were re-implanted. Patient had an uneventful recovery.

Keywords: Aortic Aneurysm, Thoracic; Aortic Aneurysm/radiography, Aortic Aneurysmdiagnosis, Aortic Aneurysmsurgery.

Introduction

Death from aneurysmal rupture is one of the leading causes of death with the prevalence of aortic aneurysms being 3-4% in individuals older than 65 years.¹ The estimated incidence of thoracic aortic aneurysms is 6 cases per 100,000 person-years¹ with the overall prevalence of aortic aneurysms increasing significantly in the last 30 years. This is partly due to an increase in diagnosis based on the widespread use of imaging techniques.²

Most patients with thoracic aneurysms are hypertensive but remain relatively asymptomatic until the aneurysm expands. Their most common presenting symptom is pain that may be acute, implying impending rupture or dissection, or chronic, from compression or distension. The location of pain may indicate the area of aortic involvement, but this is not always the case. Usually, ascending aortic aneurysms tend to cause anterior chest pain, while arch aneurysms more likely cause pain radiating to the neck.

We present a case of a 66 year old man who came in

with shortness of breath at the Aga Khan University Hospital. On evaluation, he was found to have severe aortic regurgitation and a giant aortic root aneurysm.

Case Summary

A 66 year old man presented with progressively increasing shortness of breath on moderate to severe exertion and orthopnoea for 3 years. There were no other systemic symptoms. The patient was a non smoker and did not have any comorbidities. There was no family history of aneurysms. Cardiovascular examination revealed a loud murmur that was best heard in the aortic region, 2nd and 3rd left intercostal space on left side of the chest radiating to right sternal border. Other systemic examination was insignificant.

Initial investigation showed normochromic/normocytic blood picture with Hb=13.9, Hct=40%, WBC=4.9×10⁹/L. Blood urea nitrogen, serum creatinine and electrolyte levels were in normal ranges. Liver function tests and clotting profile was also normal. Initial chest radiograph showed moderate cardiomegaly with findings suggestive of mild chronic obstructive pulmonary disease (COPD). On further evaluation, CT chest showed aneurysmal dilation of aortic root approximately 8cm in length and 7 cm in diameter with cardiomegaly in all chambers (Figure-1).



Figure-1: CT scan of chest showing dilated aortic root (coronal section). Arrow pointing towards aneurysm.

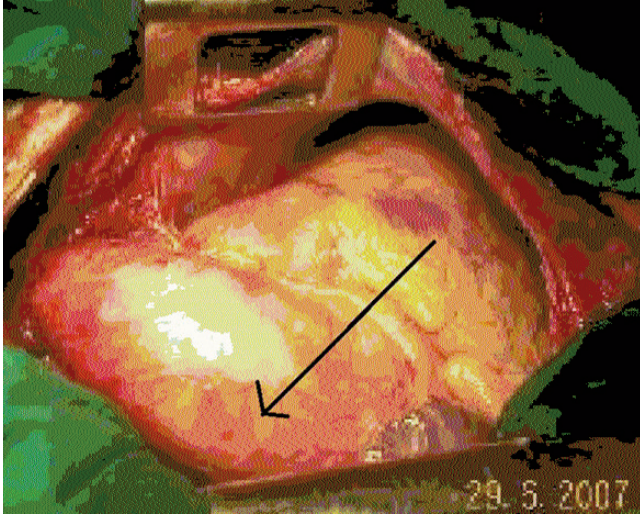


Figure-2: Intraoperative picture of the aneurysm (black arrow).

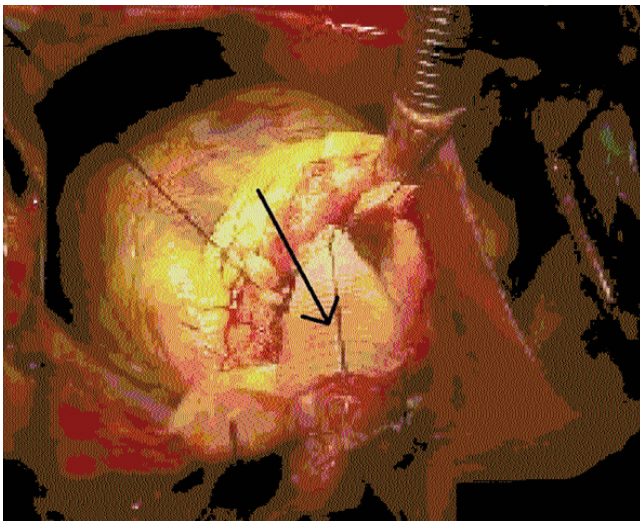


Figure-3: Aortic root is replaced with a 25mm valve conduit (black arrow).

The patient was electively admitted for further workup. On admission, echocardiography was done that showed severe aortic regurgitation and moderate mitral regurgitation with pulmonary artery systolic pressure of 42mmHg. Mild bi-atrial and left ventricle enlargement was also noted. There was global hypokinesia and mild pulmonary hypertension with ejection fraction of 25-30%. Coronary angiography and aortogram showed non obstructive coronary artery disease, severe aortic regurgitation (+4) and dilated aortic root. He was started on Losartan 25mg twice a day (BID) and Furosemide 20mg once a day (QD).

Thereafter, the patient was taken to the operating

room for the repair of the aneurysm. Intra-operatively, a large aneurysm was found, involving the ascending aorta at the root and sinus of Valsalva which was about 11cm (Figure-2), that was successfully replaced with 25mm valve conduit (Figure-3). Aortic valve was regurgitant and was completely excised. The right and left coronary artery buttons were reimplanted.

Patient underwent successful surgery and was shifted to ICU with minimum inotropic support. Retrosternal drains were placed. The chest was left open and then closed the following day in routine fashion. Post operative ejection fraction was 25%.

Following this, the patient remained uneventful in the post-op period except for few episodes of intermittent atrial fibrillations for which he was managed accordingly. The pacing wires were subsequently removed and the patient was discharged on 8th post-op day on digoxin, furosemide, captopril, aspirin and warfarin.

Discussion

An aneurysm is a localized or diffuse dilation of an artery with a diameter at least 50% greater than the normal size of the artery. Thoracic aortic aneurysms are subdivided into 3 groups depending on the location: ascending aortic, aortic arch, and descending thoracic aneurysms or thoracoabdominal aneurysms.¹

Genetics play a role in the formation of aortic aneurysms with first-degree relatives of patients with aortic aneurysms having a 15% chance of developing an aneurysm. Risk factors include smoking, hypertension, atherosclerosis, bicuspid or unicuspid aortic valves, and genetic disorders. Aortic aneurysms are more common in men and those with chronic obstructive pulmonary disease.

Aneurysms may complicate into life-threatening rupture with haemorrhage, dissection causing ischaemia or occlusion with resultant complications. Population-based studies suggest an incidence of thoracic aortic rupture of 3.5 per 100,000 persons with an aged population playing a significant role.³

Early symptoms can include aortic regurgitation, heart failure, cerebrovascular events, or upper extremity claudication from great vessel involvement. Their most common presenting symptom is pain as the aneurysm expands. Ascending aortic aneurysms tend to cause anterior chest pain, while arch aneurysms more likely cause pain radiating to the neck. In our case the patient was a 66 year old male who presented with the symptoms of shortness of breath on exertion.

Thoracic aortic aneurysms are usually found incidentally after chest radiographs or other imaging studies. Echocardiography and CT scan are the main investigations in

the evaluation of the diameter of the ascending aorta and its follow up.

Asymptomatic patients require close monitoring of the thoracic and abdominal aorta by echocardiography, ultrasound, or computed tomographic angiography.⁴ Indications for treatment are based on size or growth rate and symptoms. Because the risk of rupture is proportional to the diameter of the aneurysm, aneurysmal size is the criterion for elective surgical repair.⁴

Elefteriades published the natural history of thoracic aortic aneurysms and recommends elective repair of ascending aneurysms at 5.5 cm and descending aneurysms at 6.5 cm for patients without any familial disorders such as Marfan syndrome.⁵ Beyond 50mm, an aneurysm has a higher risk for complications. Supraaortic aneurysms can be treated by a simple supraaortic tube graft unlike aortic root aneurysms in which replacement or repair of the aortic valve is often necessary.⁶ Patients who undergo surgery for symptomatic aortic insufficiency or stenosis with an associated enlarged (questionably aneurysmal) aorta should have concomitant aortic replacement if the aorta exceeds 4-5 cm in diameter.¹

Thus, several technical options have been devised to perform replacement of the ascending aorta (i.e. aortic valve, root, and tubular ascending aorta) including the use of a xenograft.² A bioprosthetic approach would combine the benefits of avoiding lifelong anticoagulation with those of general applicability and low risk of technical failure.

Composite freestyle with Dacron graft extension appears to be a safe option for bioprosthetic replacement of the aortic root and tubular ascending aorta. Since its first description by Bentall and De Bono in 1968,⁷ the technique for composite aortic valve and root replacement using a mechanical valved conduit has evolved to become the "gold standard" for the treatment of combined aortic valve and root disease. A similar procedure was performed in our case.⁸

Aneurysm surgery usually has no strict contraindications. The relative restrictions are individualized, based on the patient's ability to undergo extensive surgery (ie, the risk-to-benefit ratio). Patients at higher risk for morbidity and mortality include elderly persons and individuals with

end-stage renal disease, respiratory insufficiency, cirrhosis, or other comorbid conditions.

Conclusion

In conclusion, aortic root aneurysm may manifest as progressive shortness of breath apart from pain. The diagnosis in most of these cases can be made through radiological imaging techniques where CT scan and echocardiography are considered the main investigations for complete evaluation of an aneurysm. After diagnosis, asymptomatic patients should be monitored closely especially if the diameter of the aneurysm is greater than 50mm. Surgical intervention should be considered in such cases because of the higher rate of complications. Replacement of aortic valve, aortic root and part of the ascending aorta with a mechanical valve conduit is considered "gold standard" for the combined aortic valve and root disease.

Consent:

Informed consent was obtained from the patient to disseminate any information/data related to the hospital course, management and treatment. However, he was assured that his name will not appear in any scientific writing.

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