

# Aortic valve homograft for revision surgery - transesophageal echocardiography considerations

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## ABSTRACT

Aortic root surgical anatomy and knowledge of the various homograft implantation techniques is of paramount importance to the attending anesthesiologist for echocardiographic correlation, estimation and accurately predicting aortic annular dimensions for the valve replacement in a case of diseased homograft.

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The Editor,

The use of homografts for the replacement of a diseased aortic valve is an attractive option for the surgeons. It is cheap and has an excellent hemodynamic performance, with no requirement of anticoagulation and devoid of mechanical complications. A fully active valve banking facility is an important prerequisite for a successful homografts implantation program.<sup>[1]</sup> Although *prima facie* it is free of any common postoperative morbidities of mechanical and bioprosthetic valve commercially available today, these patients still have a potential to get re-admitted for degenerative changes in the homografts if not affected with rheumatic processes. Other reasons for the failure of homograft aortic valve replacement (HAVR) are young age, larger native aortic root, and geometric distortion due to aortotomy closure leading to postoperative homograft regurgitation.<sup>[2]</sup>

The present case was a 39-year-old male with a history of mitral valve commissurotomy, HAVR 15 years ago. At present, he complained of breathlessness for 15 days and palpitation for 7 days. He was conscious, oriented, heart rate was 117/min, and blood pressure was 148/52 mmHg with a low volume pulse. On auscultation, the chest was clear; heart sounds were normal, crescendo type systolic murmur in the aortic valve (AV) area, and

a rumbling mid-diastolic murmur over the apical region. The previous discharge notes revealed that he had a 22 mm size AV homograft *in situ* which was calcified and stenotic (peak gradient 64 mmHg), severe mitral stenosis (mean gradient >9 mmHg), left atrium was enlarged (52 mm), and mild left ventricle dysfunction (ejection fraction ~50%). He was optimized with tablet digoxin 0.25 mg once daily, tablet torsemide and frusemide once a day, tablet enalapril 25 mg twice daily. He was planned for elective double valve replacement under cardiopulmonary bypass.

On the day of surgery, all noninvasive monitors were attached, invasive arterial line was inserted under local anesthesia, and the patient was induced with injection etomidate, fentanyl, and rocuronium. After endotracheal

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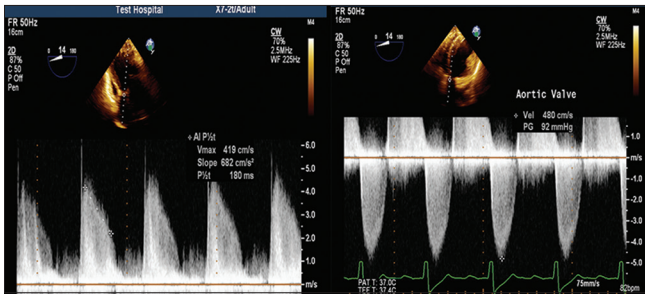
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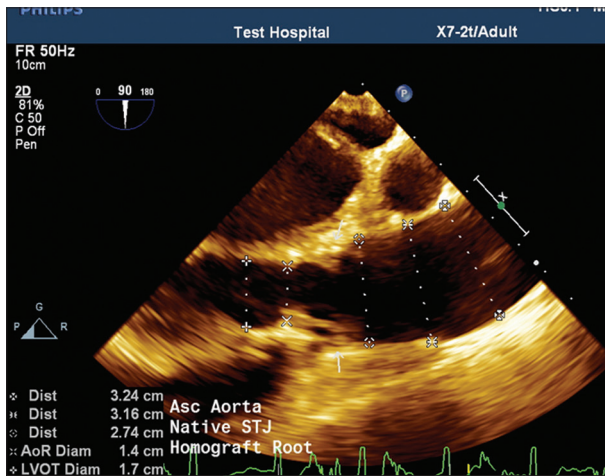
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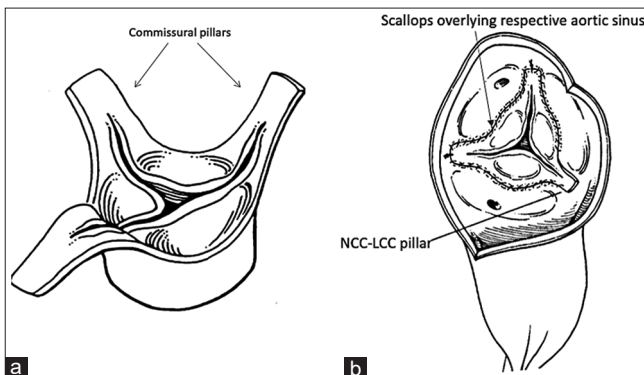




**Figure 1:** Deep transgastric aortic valve long axis Doppler interrogation of regurgitant velocity and deceleration slope in the left and Doppler measurement of peak gradient across the homograft in the right



**Figure 2:** Midesophageal aortic valve long axis profiling the root and the ascending aorta with homograft *in situ*



**Figure 3:** (a) The excised and scalloped aortic valve graft, (b) The implanted homograft – commissure to commissure

intubation, a central venous catheter (arrow 7.5 Fr) and a transesophageal echocardiographic probe (Philips S7-2t) were inserted. Before incision, a thorough transesophageal echocardiography (TEE) examination was performed with the primary aim of evaluating the aortic root and ascending aorta. We confirmed the diagnosis of severe aortic stenosis and aortic regurgitation by Doppler echocardiography<sup>[3]</sup> [Figure 1].

A closer look into our long axis imaging of aortic root revealed that there was an abrupt increase in the diameter of the root beyond the native sinotubular junction. Moreover, there was a 1.5 cm long piece of tissue in the noncoronary sinus probably depicting the left and noncoronary commissural pillar usually created as a part of subcoronary HAVR implantation [Figure 2].

Surgical knowledge of the homograft implantation technique used is crucial in deciphering two-dimensional echo-anatomy correlation of the aortic root and estimating the “correct” annulus size before the replacement of degenerated homograft.<sup>[4]</sup> This helps to predict the need for any root enlargement procedure if the resulting annulus following HAVR is too small. The two techniques commonly employed while performing HAVR are (1) root replacement and (2) root preservation technique. The latter is achieved by (i) scalloped subcoronary implantation [Figure 3a and b] and (ii) valved root replacement (cylindrical implantation).<sup>[5]</sup> Considering the left ventricular outflow tract diameter to be 17 mm and homograft annulus of 14 mm [Figure 2], we suggested the surgeon to try sitting a 19 mm mechanical valve. Moreover, previous TEE records suggested an aortic annulus of 20 mm. A 19 mm valve “sizer” freely passed after clearing all the damaged tissues. Thus, in our patient, an intuitive imaging of the neo-AV apparatus following HAVR along with decisive sizing of the native annulus was only possible because of a surgical knowledge and experience about aortic root preservation technique.

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**Conflicts of interest**

There are no conflicts of interest.

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