

Personalised External Aortic Root Support (PEARS): Our Preliminary Single Surgeon Results on 100 Patients

Background

Personalised External Aortic Root Support (PEARS) has been used since 2004 as a technique to stabilise aortic root dilatation in Marfan's root disease. Starting in 2012 we have developed this procedure to include other aortopathies, and as a free root Ross autograft support. The graft consists of a bespoke polyester mesh, created from the CT scan measurements of the patient's own aorta to prevent aortic dilatation by providing an exact anatomical external aortic support.

Methods

We present our single surgeon institutional experience on the first 100 patients undergoing PEARS procedure, recording the underlying diagnosis, the family history of acute aortic syndrome, the degree of pre and post-operative aortic regurgitation, the pre and post-operative aortic root dimensions, and the type of operation performed.

Results

Our institution started PEARS in 2012. Patients aged from 9 to 73 years. In our 100 patients we now have 5 distinct groups: 1) Dilatational aortopathy as Marfan's disease, Loeys-Dietz syndrome etc (52%) 2) Dilatational bicuspid valve aortopathy with functional aortic valve (10%) 3) Aortopathy associated with congenital heart disease: Post arterial switch, cono-truncal repairs (7%) 4) Free root Ross autograft support, so called Ross PEARS procedure (29%) 5) Free root autograft dilatational recovery with reduction PEARS application (2%).

In groups 1-3 the mean aortic root dimensions (max measurement) preoperatively was 4.67cm, ranging from 3.7 to 6.2 cm. Most aortopathy cases were performed off cardiopulmonary bypass with 4 resorting to CPB to facilitate graft insertion. The immediate postoperative aortic measurements showed a mean reduction of 0.82 cm (ranging 0 to 2.3 cm). Six patients had a significant reduction of their preoperative aortic regurgitation by deliberate application of a reduced size PEARS.

There was one early death due to right heart failure after concomitant Ebstein's repair and one late death from Covid-19. There has been no progressive aorta dilatation. There have been 3 late aortic valve replacements, 2 early Ross PEARS support and 1 cono-truncal dilatational aortopathy. There were no coronary artery injuries.

Conclusions

PEARS can be used in a wide range of dilatation aortopathies or as a support for the pulmonary autograft in Ross operations. We have proven it to be safe operation which can be performed off cardiopulmonary bypass in most cases of simple aortopathies. Application of a reduced size PEARS has the additional benefit of correcting mild or moderate central trileaflet aortic regurgitation. Our pioneering development of groups 4 and 5 are predicted to have a major impact on widening the patients suitable for Ross surgery and in treating the failing free root Ross dilatation

Additional Resources

- https://files.aievolution.com/prd/aat2101/abstracts/abs_3085/PEARS100PP.pptx