20 Years of PEARS (Personalised External Aortic Root Support Experience): what we have learnt so far

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Background:

A little bit of history...

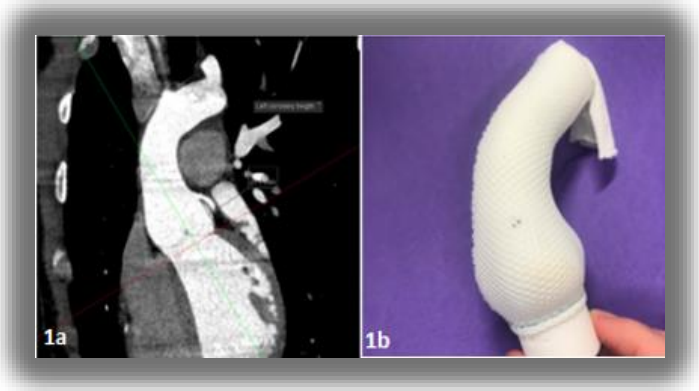
The first PEARS operation was performed in 2004 on a patient with Marfan's syndrome after a 4 year feasibility project in the (United Kingdom)

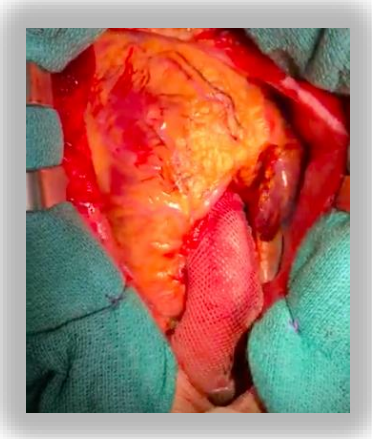
This patient was Tal Golesworthy, a Research & Development engineer with Marfan Syndrome, who invented and developed the ExoVasc PEARS graft.

Background: What is PEARS?

A custom-made PolyEthylene Teraphthalate (PET) mesh created with the exact measurements of the aortic root obtained by a CT scan

This mesh is implanted around the patient's native aorta to prevent dilatation and rupture.





Background

This has gone a long way and currently PEARS has been performed all over the world, in all sorts of clinical scenarios.

Countries where PEARS grafts have been implanted (as per February 2024):

- England
- Scotland
- Northern Ireland
- Netherlands
- Czech Republic
- Ireland
- New Zealand
- Malaysia
- Slovakia
- Italy
- Brazil
- Australia
- Greece
- Belgium
- Austria

Methods:

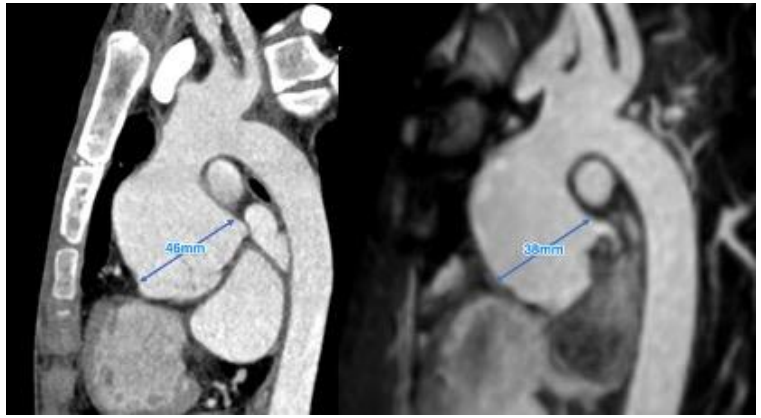
We present the results of all the PEARS operations that have been done in these 20 years-time, including the demographic data and the immediate postoperative outcomes.

PREOPERATIVE
- Age
- Sex
- Background disease

INTRAOPERATIVE
- Use of bypass
- Concomitant procedures

POSTOPERATIVE OUTCOMES
- Death
- Aortic related events
- Need for reoperation

<u>Follow-up protocol</u> included:
- Aortic MRI one year after the operation
- An annual echocardiogram



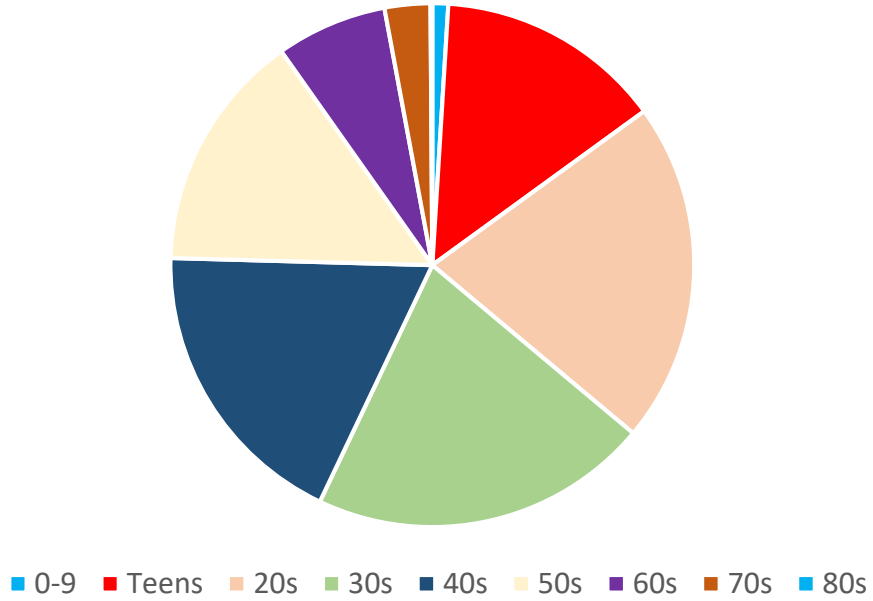
We have divided the PEARS cohort in 5 groups:

1. Patients with dilatation aortopathies (Marfan's syndrome, Loeys-Dietz...)
2. Patients with aorta dilatation related to bicuspid aortic valve disease
3. Patients with corrected congenital heart disease
4. PEARS as autograft support for the Ross procedure (the so-called Ross-PEARS procedure)
5. Recovery treatment for dilating and failing Ross autografts

Results (20th February 2024):

976 patients have been treated using the PEARS surgery in 52 surgical centres all over the world (most of them being done in the United Kingdom)

Median age: 37 years old (age range 3-80 years old)



Pre-teens: 10 patients
Teens (10-19): 135 patients

Results (background diagnosis):

Group 1 (dilatation aortopathies): 601 patients (66.40%)

Marfan's syndrome: 357 patients

Group 2 (bicuspid aortic valve aortopathy): 130 patients (14.36%)

Group 3 (corrected congenital cardiopathies): 11 patients (1.21%)

Group 4 (Ross-PEARS operation): 147 patients (16.24%)

Performed in 7 centres

81 cases were performed in the UK (4 centres)

Group 5 (dilatation recovery post Ross): 16 patients (1.76%)

Results (intraoperative data):

- 79% of procedures with uncomplicated anatomy were performed ***off bypass***

- Concomitant ***mitral valve repair*** was performed in 41 cases (most of them with background of Marfan's syndrome)

- In over 68% of patients with previously reported ***aortic regurgitation***, this was noticeable reduced in the postoperative echocardiogram (especially in those patients with reduced diameter PEARS graft)

Results (postoperative follow-up):

No reoperation for aortic root dilatation has been reported

Aortic PEARS:

- One patient with aortic PEARS died perioperatively due to intra-cranial bleeding after ECMO for coronary injury during surgical dissection

- One patient had to be reoperated to re-adjust the graft due to an occluded circumflex coronary artery

Results (postoperative follow-up):

Ross PEARS

- One patients died after ECMO support due to right coronary artery ostial stenosis

- One patient died during long-term follow-up due to sudden cardiac death (complex reoperation case with coronary calcification)

Conclusions:

⁕ The ExoVasc PEARS graft has been successfully used since first being implanted 20 years ago.

⁕ More surgical centres all over the world have progressively implemented this technique into their routine practice, and clinical scenarios are increasing, with more challenging patients.

⁕ Results so far are very promising; however, larger numbers are needed for a formal clinical trial that could help include this technique and its indications in treatment guidelines.