The aorto-ventricular junction in aortic repair

Emmanuel Lansac,
Isabelle Di Centa

Cardiac Surgery
Institut Mutualiste Montsouris,
Paris, France
Goals for aortic valve repair

- treat dilated aortic annulus and STJ Ø
- preserve root dynamics (neosinuses of Valsalva)
- preserve expansibility (interleaflet triangles)
- restore coaptation and effective height

Need for standardization
2014 ESC Guidelines on the diagnosis and treatment of aortic diseases

**Recommendations for surgical techniques in aortic disease**

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
<th>Ref.</th>
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<tbody>
<tr>
<td>Aortic valve repair, using the re-implantation technique or remodelling with aortic annuloplasty, is recommended in young patients with aortic root dilation and tricuspid aortic valves.</td>
<td>I</td>
<td>C</td>
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<tr>
<td>In patients with connective tissue disorders requiring aortic surgery, the replacement of aortic sinuses is indicated.</td>
<td>I</td>
<td>C</td>
<td>139, 131, 134, 141</td>
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<tr>
<td>Selective antegrade cerebral perfusion should be considered in aortic arch surgery, to reduce the risk of stroke.</td>
<td>IIa</td>
<td>B</td>
<td>139, 131, 134, 141</td>
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<td>The axillary artery should be considered as first choice for cannulation for surgery of the</td>
<td>IIa</td>
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The surgical correction of aortic insufficiency by circumclusion


First subvalvular aortic annuloplasty
Beating Heart Right thoracotomy
11 patients, rheumatic disease (8/11)
Subcommissural plication stitches
(Cabrol stitches 1966)

Plicating U stitches at the base of the interleaflet triangles = partial subvalvular annuloplasty

Plicating U stitches at the commissures = partial supravalvular annuloplasty

Plication of the interleaflet triangles impairing valve dynamics especially for bicuspid valves significant gradient minimal reduction in aortic annular base diameter

Useful to protect a commissural repair or as a bailout technique
Aortic annuloplasty and valve sparing root replacement?

Risk factor for failure of the Remodeling:
Annulus dilation >25-28 mm

Remodeling of the aortic root
Reimplantation of the aortic valve

Reimplantation performs a subvalvular annuloplasty
Remodeling alone is a contraindication if annulus>25 mm
Aortic root dynamics after valve sparing

Cusp motion and expansibility of the aortic root are best preserved

1) after Remodeling than after Reimplantation
2) with graft with neo- sinuses of Valsalva than without

Remodeling provides the most physiological root reconstruction
Physiological and standardized approach to Valve Sparing Root Replacement

Remodeling 1983 Yacoub

Reimplantation 1992 David

Remodeling + subvalvular annuloplasty
Reasons for valve sparing failures

Cusp prolapse

Remodeling / Reimplantation → Reduction of the STJ → Symmetrical prolapse

↓ eH: -3 to -4 mm

No eH resuspension (Eye balling repair)

Risk factor for AI recurrence Reoperation

Schäfers et al., JTCVS 2006

Lansac JTCVS 2010

1. Dissection of the subvalvular plane
Standardization based on aortic annulus Ø

<table>
<thead>
<tr>
<th>Valsalva graft® Ø (mm)</th>
<th>25-27</th>
<th>28-30</th>
<th>31-35</th>
<th>36-40</th>
<th>&gt; 40</th>
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<td>26</td>
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<td>30</td>
<td>32</td>
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<table>
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<th>Extra aortic ring® Ø (mm)</th>
<th>25-27</th>
<th>28-30</th>
<th>31-35</th>
<th>36-40</th>
<th>&gt; 40</th>
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Subvalvular ring = down size from one size
3. 6 subvalvular « U » stitches
4. Alignment of cusp free edges prior Remodeling
5. Suture of the Remodeling
6. Cusp resuspension after the Remodeling (effective height 9 mm)
7. Subvalvular ring implantation
Pre and Post Remodeling with flexible Extra Aortic Ring Annuloplasty

Pre-op

Post-op
Root aneurysms: Bicuspid valves
(Sinus Valsalva $\Omega \geq 45$ mm)

- 6 subvalvular « U » stitches
- Alignment of cusp free edges
- Effective height measurement
- Subvalvular aortic annuloplasty

Commissures at 180°
Isolated aortic insufficiency
(all diameters ≤ 40 mm)

- 6 subvalvular « U » stitches
- Placement of the open subvalvular ring below the coronaries
- Cusp resuspension (effective height ≥9 mm)
- Aligment of cusp free edges
- Final aspect
Pliable bicuspid and tricuspid valves

Aortic root aneurysm

Valsalva ≥45 mm

Supra-coronary aneurysm

Valsalva < 40 mm

Isolated AI

all Ø < 40 mm

Standardized approach according to phenotypes

Remodeling

+ subvalvular annuloplasty

Supra-coronary graft

+ subvalvular annuloplasty
(annulus > 25 mm)

Supra-valvular annuloplasty

Subvalvular annuloplasty
(annulus > 25 mm)

Live on tape Video on caviaar.com

Aortic valve repair: a step by step approach
Paris March 23-24th 2017
caviaar.com
Freedom from reoperation at 7 years was similar among each phenotype with no difference between bicuspid and tricuspid valve

No Valve related reoperation for bicuspid valve
Remodeling + ring

Since 2009 systematic cusp effective height assessment tended to improve freedom from reoperation up to 98.9% freedom from AI ≥ 3 up to 100%

Expansibility is preserved at the aortic annular base and SoV levels up to 19 months

Independently of age and bicuspid valve

Freedom from AI ≥ grade 3 at 7 years 93.1%
Freedom from AI ≥ grade 2 at 7 years 76.0%
Isolated AI repair + open aortic ring

Single or double annuloplasty?

Additional ring at STJ level (double sub and supra-valvular annuloplasty) tend to reduce recurrent of AI when compared to single subvalvular annuloplasty

No reoperation for bicuspid or tricuspid valve
Open Prospective International Multicenter Registry

Isolated AI and/or ascending aorta aneurysm Candidates for Aortic valve repair / sparing

Surgical indication

Yes

No

Medical Registry (In process)

Surgical Registry
Aortic valve Repair / sparing and Replacement

Evaluation of the Guidelines

Evaluation of the results

Open to all center, Join us!
AVIATOR@HeartValveSociety.org