The aorto-ventricular junction in aortic repair

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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

\[ \text{= partial subvalvular annuloplasty} \]

Plicating U stitches at the commissures

\[ \text{= partial supravalvular annuloplasty} \]

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
2014 ESC Guidelines on the diagnosis And treatment of aortic diseases

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.
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

Treatment of aortic annulus dilation

Reimplantation performs a subvalvular annuloplasty

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

1) after Remodeling than after Reimplantation

2) with graft with neo- sinuses of Valsalva than without

Remodeling provides the most physiological root reconstruction

Cusp motion and expansibility of the aortic root are best preserved

Leyh RG. Circulation 1999
Physiological and standardized approach to Valve Sparing Root Replacement

Remodeling
1983 Yacoub

Reimplantation
1992 David

Aortic annuloplasty
2003

Remodeling +
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

Lansac JTCVS 2010

Schäfers et al., JTCVS 2006

Soncini. MEP 2009 Bierbach E JTCVS 2010 Jeanmart ATS 2007 De Paulis 2010
Oka ATS 2011 Kunihara JTCVS 2011 Marom JTCVS 2012 Zacek with permission
1. Dissection of the subvalvular plane
Standardization based on aortic annulus Ø

<table>
<thead>
<tr>
<th></th>
<th>Aortic annular base Ø (Hegar dilators, mm)</th>
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<tbody>
<tr>
<td></td>
<td>25-27</td>
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<tr>
<td>Valsalva graft® Ø (mm)</td>
<td>26</td>
</tr>
<tr>
<td>Extra aortic ring® Ø (mm)</td>
<td>25</td>
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Annuloplasty ring = down size from one size

Lansac et al JTCVS 2009
6 subvalvular « U » stitches
Aligment of cusp free edges prior Remodeling
Remodeling Root repair

3 commissures at same level
Symmetrically at 120°
Cusp resuspension after the Remodeling (effective height 9 mm)

Schäfers et al., JTCVS 2006
Subvalvular ring implantation
Pre and Post Remodeling with expansible Extra Aortic Ring Annuloplasty
Root aneurysms: Bicuspid valves
(Sinus Valsalva Ø ≥ 45 mm)

- 6 subvalvular « U » stitches
- Alignment of cusp free edges
- Commissures at 180°
- Effective height measurement
- Subvalvular aortic annuloplasty
Dilated aortic annulus > 25 - 28 mm

Risk factor for failure

Circumferential aortic annuloplasty improves the results

(External ring, proximal suture reimplantation, Annular stitch)

De Kerchove JTCVS 2011
Techniques for aortic annuloplasty
Isolated A1
Internal annuloplasty ring

Tricuspid valve
65 patients with 62 % root aneurysm.

10.8% reoperation rate (7 patients) at 2 years FU

Advantage : place at the nadir

Bicuspid valve
16 patients (43 % with ascending/root aneurysm)

12.5 % reoperation (2 patients) : leaflets tear from annular suture (Mean FU 9 months)

Drawbacks : interference with leaflets Tension on the suture (internal device)
Early results with annular support in reconstruction of the bicuspid aortic valve

Annuloplasty improve rate of no or trivial AR

Advantage: fast

Drawbacks: anatomical landmarks?
Safety and long term stability?
Functional annulus remodelling using a prosthetic ring in tricuspid aortic valve repair: mid-term results

Advantage: STJ and annulus stabilisation

Drawbacks: interference with leaflets, Tension on the suture (internal annuloplasty ring)
Points de plicature sus et sous commissuraux

Insuffisance aortique isolée (sinus de Valsalva < 40 mm)

Double annuloplastie sus et sous valvulaire aortique externe

Advantage : safe with clear anatomical landmarks

Drawbacks : Right coronary sinus nadir (reimplantation limit)
Importance of deep dissection of sub valvular plane
Double annuloplasty
For Isolated aortic valve repair
(all diameters ≤ 40 mm)

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

For Isolated aortic valve repair (all diameters ≤ 40 mm)
Standardization based on aortic annulus Ø

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Aortic ring = down size from one size
92% Freedom from reoperation at 7 years similar among each phenotype with no difference between bicuspid and tricuspid valve.

Since 2007, calibrated annuloplasty and systematic cusp effective height assessment improve freedom from reoperation up to 98.9%.
Isolated AI repair + open aortic ring
Single or double annuloplasty?

97.4% Freedom from reoperation at 7 years

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

Lansac et al EJTCS sept 2016
Pliable bicuspid and tricuspid valves

Aortic root aneurysm
Valsalva $\geq 45$ mm

Supra-coronary aneurysm
Valsalva $< 40$ mm

Isolated AI
all Ø $< 40$ mm

Standardized approach according to phenotypes

Remodeling

+ aortic annuloplasty

Supra-coronary graft
+ aortic annuloplasty
(annulus $> 25$ mm)

STJ annuloplasty

aortic annuloplasty
(annulus $> 25$ mm)

Cusp repair

First EACTS Aortic valve repair master class
Paris March 22-24th 2017
(live surgery)
Open Prospective International Multicenter Registry

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

Surgical indication

- No
- Yes

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