Remodeling root repair and external aortic annuloplasty ring

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Disclosure information

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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

Remodeling alone is a contraindication if annulus>25 mm

Reimplantation performs an aortic annuloplasty
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 + Aortic annuloplasty 2003
Reasons for valve sparing failures

**Cusp prolapse**

Remodeling / Reimplantation

Reduction of the STJ

Symmetrical prolapse

\[ eH : -3 \text{ to } -4 \text{ mm} \]

No eH assessment (Eye balling repair)

Risk factor for AI recurrence

Reoperation

Cusp eH assessment

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
Moving from Valve Sparing to a standardized approach of Aortic valve REPAIR

- Physiological root Remodeling
- Resuspension of cusp effective height
- Expansible aortic annuloplasty
1. Dissection of the subvalvular plane
Standardization based on aortic annulus Ø

<table>
<thead>
<tr>
<th>Valsalva graft® Ø (mm)</th>
<th>26</th>
<th>28</th>
<th>30</th>
<th>32</th>
<th>34</th>
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<tbody>
<tr>
<td>Extra aortic ring® Ø (mm)</td>
<td>25</td>
<td>27</td>
<td>29</td>
<td>31</td>
<td>33</td>
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</tbody>
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Annuloplasty ring = down size from one size

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

NC
LC
RC
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
Root aneurysms: Bicuspid valves
(Sinus Valsalva Ø ≥ 45 mm)

- 6 subvalvular « U » stitches
- Alignement of cusp free edges
- Commissures at 180°
- Effective height measurement
- Subvalvular aortic annuloplasty
Montsouris serie 177 patients (2003_2015)
30 days mortality : 2.9%
Mean Follow up 47.1±39.4 months (0-145.5)

2007 : calibrated expansible Extra-Aortic™ ring annuloplasty
2008 : cusp effective Height caliper assessment (Fehling)

Since 2007, 7-year freedom from reoperation raised from 81.3% to 99.1%
Since 2008, rate of valve repair raised from 29% to 90% with cusp Eh assessment

\( p = 0.017 \)
7-year freedom AI ≥ III raised from 83.4% to 100%

Extra Aortic Ring, EH+
Dacron Ring, eye balling repair

p = 0.026

7 years Freedom from AI ≥ II remained unchanged
From 78.5 % to 79.5% (p=0.41)
Bicuspid valve n = 59 (39%)

No difference between bicuspid and tricuspid valve

No Valve related reoperation for bicuspid valve

p = 0.151
Risk factor of post operative AI grade $\geq II$: Preoperative AI (HR 2.59)

Proctector factor of reoperation, AI grade III and MAVRE
Calibrated Extra Aortic ring annuloplasty (HR 0.13)
eH caliper assessment (HR 0.11)

Expansibility is preserved at the aortic annulus and sinus of Valsalva levels up to 19 months (1-64)

Multicentric CAVIAAR Trial
130 Remodeling+ring versus 131 Mechanical CVG

At 30 days, REPAIR group showed a trend towards reduce Major Adverse Valve Related Events compared to CVG group (3.8% versus 9.2%, p<0.08)

Wuliya et al EJTCS 2014
Lansac et al JTCVS 2014
Remodeling + annuloplasty: advantages over Reimplantation?

**Reimplantation**
- 1) Annuloplasty
- 2) Root
- 3) Leaflets

**Remodeling + Ring**
- 1) Leaflet length
- 2) Root
- 3) Leaflets eH
- 4) Annuloplasty

**Highly Selected cases**
- 6% of high risk patients
- 20% of low risk patients

Caceres EJTCS 2014

15% rate of VSRR Stable
Stamou JTCVS 2015

**How high do I place the commissures?**
- How do I place them circumferentially?

Commissures at the same level
And symmetrical circumferentially

**80% of bentall for dystrophic AR**
Gaudino JTCVS 2015

**Standardize Valve repair**
With a physiological root reconstruction
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
+ aortic annuloplasty

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

Cusp repair

First EACTS Aortic valve repair master class
Paris March 22-24th 2017
(live surgery)