The Living Aortic Valve: repair or else??

Reconstruction of the Aortic Valve and Root: A practical approach

Homburg, September 18 – 20, 2019

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Anatomy (Dynamic) of the aortic root

The aortic valve – a unique structure

Leaflets are 10x thinner than the aortic wall

Supports 80mmHg
Non subvalvular apparatus

Non obstructive, non turbulent flow

2.5 billions beats in 70 years old
## Recommendations for surgical techniques in aortic disease

<table>
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<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
<th>Ref.</th>
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<tr>
<td>Cerebrospinal fluid drainage is recommended in surgery of the thoraco-abdominal aorta, to reduce the risk of paraplegia.</td>
<td>I</td>
<td>B</td>
<td>126–127</td>
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<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>
<td></td>
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Pulmonary valve

Vojacek J, Zacek P, Dominik J: Aortic regurgitation, Springer 2018
Ross procedure
The Ross procedure

D. Ross: Replacement of Aortic and Mitral Valves with a Pulmonary Autograft. The Lancet 1967;2:956-8
The Ross procedure
Perioperative TEE

Procedure of choice in children and in young or middle aged adults
The Ross operation: a Trojan horse?†

Loes M.A. Klieverik1*, Johanna J.M. Takkenberg1, Jos A. Bekkers1, Jolien W. Roos-Hesselink2, Maarten Witsenburg3, and Ad J.J.C. Bogers1

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Complex procedure – higher risk of in hospital mortality

Transition of one valve disease into two valve disorders (aortic and pulmonary)

The risk of pulmonary autograft and/or pulmonary homograft failure (reoperation)
Complex procedure
– higher risk of in hospital mortality

Transition of one valve disease into two valve disorders (aortic and pulmonary)

The risk of pulmonary autograft and/or pulmonary homograft failure (reoperation)
Valve related complications after the Ross procedure

Very low incidence!

Combined end point (TEC, bleeding, PVE):
0.1% – 0.3%/patient/year

The risk during 10 years of FU: 1% - 3%

The long-term survival after the Ross procedure

German-Dutch Ross Registry

Probability of Survival

Years of FU

ROSS Survival
Age-and-Gender-matched
The long-term survival after the Ross procedure

The long-term survival after the Ross procedure

Improved Survival After the Ross Procedure Compared With Mechanical Aortic Valve Replacement

P. Skillington, JACC 2018

Univariable Cox regression: HR = 0.13 (0.07-0.25), p < 0.001
Multivariable Cox regression: HR = 0.34 (0.17-0.67), p = 0.002

Survival (%)

Time (Years)

Number at risk

<table>
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<tr>
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<th>Ross</th>
<th>Mechanical AVR</th>
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<tr>
<td>10 years</td>
<td>98% (97-100%)</td>
<td>88% (86-90%)</td>
</tr>
<tr>
<td>20 years</td>
<td>95% (92-99%)</td>
<td>68% (63-73%)</td>
</tr>
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</table>

Log rank p < 0.001

10 years: Ross 98% (97-100%), Mechanical AVR 88% (86-90%)
20 years: Ross 95% (92-99%), Mechanical AVR 68% (63-73%)
Long-Term Outcomes of the Ross Procedure Versus Mechanical Aortic Valve Replacement
Propensity-Matched Cohort Study

T. DAVID, Circulation, August 2016
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T. DAVID, Circulation, August 2016

258 Ross X 1444mech AVR; operated by TD; 208 pairs; Ø FU: 14±6 years
Long-Term Outcomes of the Ross Procedure Versus Mechanical Aortic Valve Replacement
Propensity-Matched Cohort Study

T. DAVID, Circulation, August 2016

258 Ross X 1444mech AVR; operated by TD; 208 pairs; Ø FU: 14±6 years

In the Ross group

BETTER SURVIVAL
LOWER INCIDENCE OF VALVE RELATED COMPLICATIONS
SAME RISK OF REOPERATION
Ross Procedure vs Mechanical Aortic Valve Replacement in Adults

A Systematic Review and Meta-analysis

Amine Mazine, MD, MSc; Rodolfo V. Rocha, MD; Ismail El-Hamamsy, MD, PhD; Maral Ouzounian, MD, PhD; Bobby Yanagawa, MD, PhD; Deepak L. Bhatt, MD, MPH; Subodh Verma, MD, PhD; Jan O. Friedrich, MD, DPhil

**Key Points**

**Question** What is the optimal aortic valve substitute in young and middle-aged adults undergoing aortic valve replacement?

**Findings** This meta-analysis included 3516 adults who underwent the Ross procedure and found a 46% lower incidence of all-cause mortality compared with patients undergoing mechanical aortic valve replacement, indicating a significant difference.

**Meaning** In carefully selected young and middle-aged adults, the Ross procedure is associated with lower all-cause mortality compared with mechanical aortic valve replacement.
Quality of life after aortic valve repair is similar to Ross patients and superior to mechanical valve replacement: a cross-sectional study

Pavel Zacek, T. Holubec, M. Vobornik, J. Dominik, J. Takkenberg, J. Harrer and J. Vojacek
Pooled TEC and bleeding rates were very low compared to general population
The excellent long-term survival after the Ross procedure
The Ross procedure: How to reduce the risk of the autograft failure?
Modified Ross operation with reinforcement of the pulmonary autograft: Six-year results

How to reinforce the root

How to reinforce the root

How to reinforce the root

How to reinforce the root

Surgical technique

Stabilization of aortic annulus and STJ

Ascending aorta replacement in 55%
Coronéro extra-aortic annuloplasty ring could stabilize even the pulmonary autograft annulus in a Ross operation

Jan Vojacek*, Jaroslav Spatenka, Tomas Holubec and Pavel Zacek

* Charles University, Prague, Faculty of Medicine and University Hospital, Hradec Kralove, Czech Republic

Abstract

The Ross procedure is an alternative technique to mechanical prosthesis with improved long-term survival and quality of life. However, late pulmonary autograft valve insufficiency due to a significant dilation of the aortic annulus. Here, we present a technical modification of the Ross procedure in which the gross dilation of the aortic annulus was corrected with a Coronéro annuloplasty ring. Before discharge, we performed a multidetector computed tomography (MDCT) demonstrating that the ring sits in the optimal position at the level of the aortic valve, significantly reducing the risk of valve dehiscence.
No WARFARIN!
The Ross procedure - indications

STOP No WARFARIN!

Alternative to aortic valve repair
10 months after the Ross procedure
Thank you for your attention ☺️