

Evolution Over Time of Aortic Root Anatomy after Aortic Valve Reimplantation

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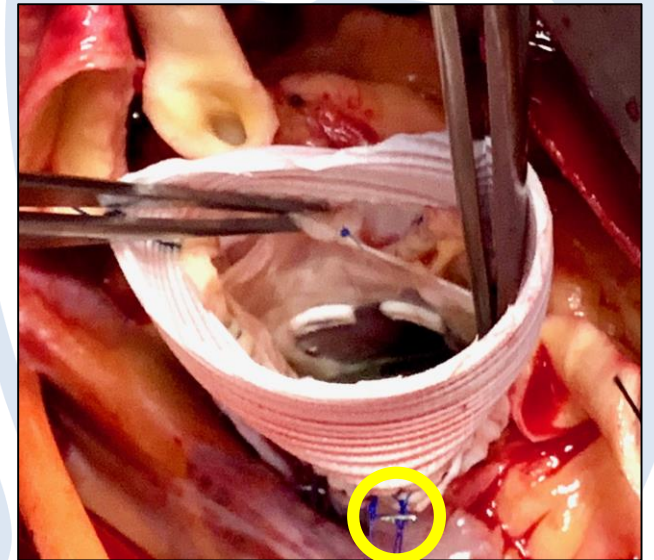
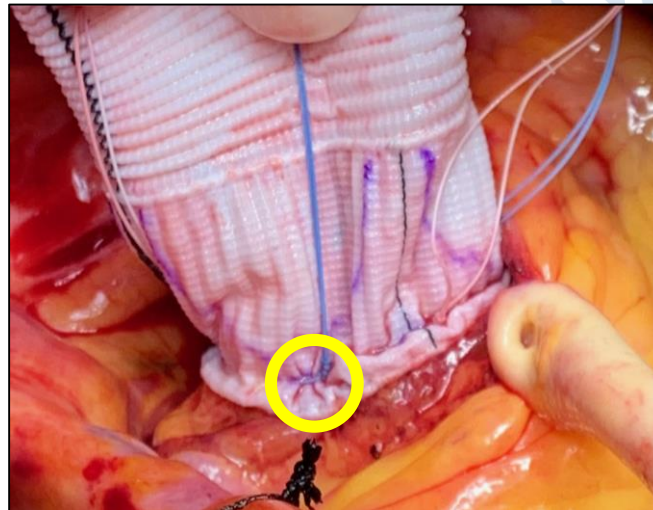
Background

- **Accurate determination of aortic root characteristics in the context of aortic valve reimplantation is paramount to achieving durable valve repair.**
- **In a previous work we analysed the *in vivo* relationships of aortic root components after aortic valve reimplantation procedure.**
- **The aim of this research is to verify if those relationships evolve over time.**

Patients

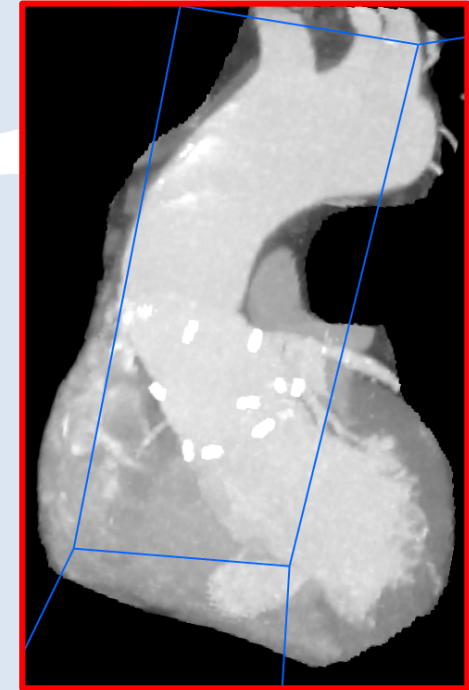
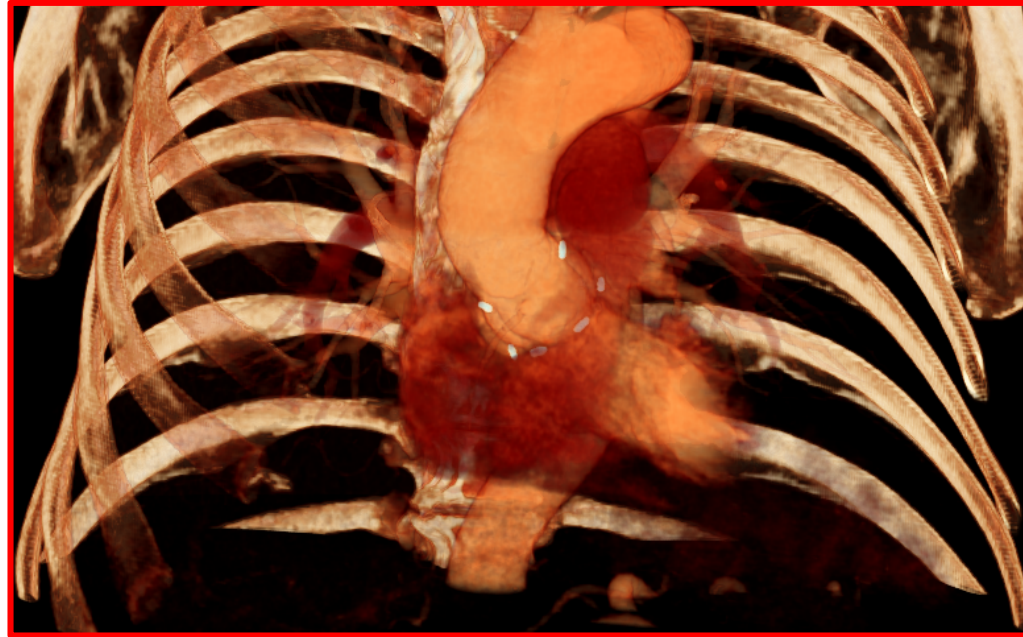
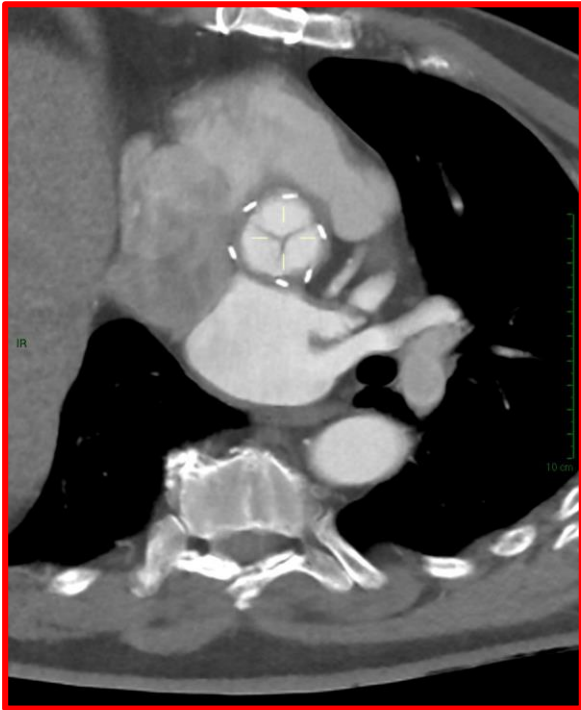
Ten (10) selected patients, with tricuspid aortic valve, underwent reimplantation procedure with Valsalva graft, between March 2019 and April 2020.

Surgical haemoclips were applied at the level of proximal annular knots and at the distal reimplanted commissures on the neo-sinutubular junction, as radiopaque markers.



Methods

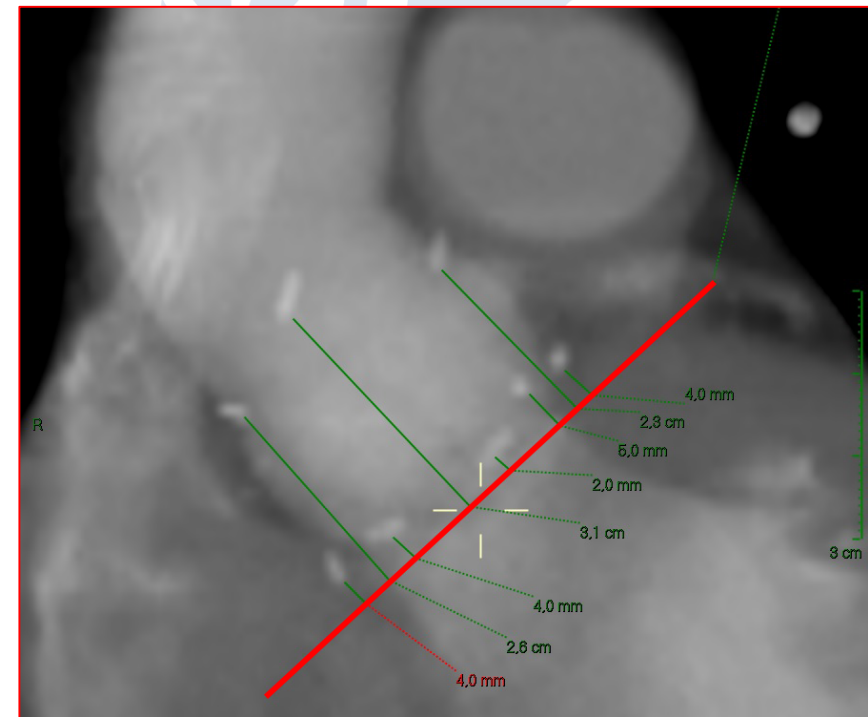
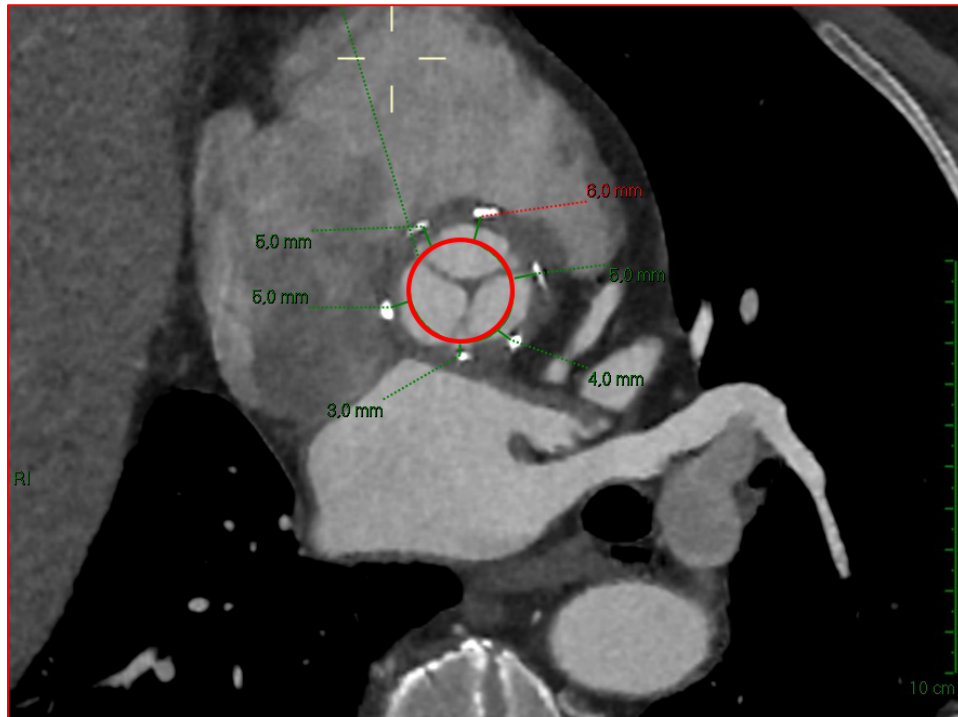
All patients received an ECG-gated cardiac CT scan both on the immediate post-operative and at follow-up.



Radiopaque haemoclips (markers) were identified as showed in the 3D images

Methods

On multiplanar reconstruction, virtual basal ring (VBR) was identified and marked (red circle and red line) and distance between radiopaque marker and virtual basal ring was measured on the VBR plane (left), as “thickness” and on the perpendicular plane (right), as “height”.



We then compared **immediate post-operative** vs. **follow-up** findings.

Results I

Patients Characteristics

N° Of Patients	10
Male Sex	10 (100%)
Age, years	
Mean	60.3 ± 7.9
Range	46 - 72
BSA, m ²	2.08 ± 0.17
Graft Size, mm	32 ± 0
Mean Follow-up, months	50 ± 4

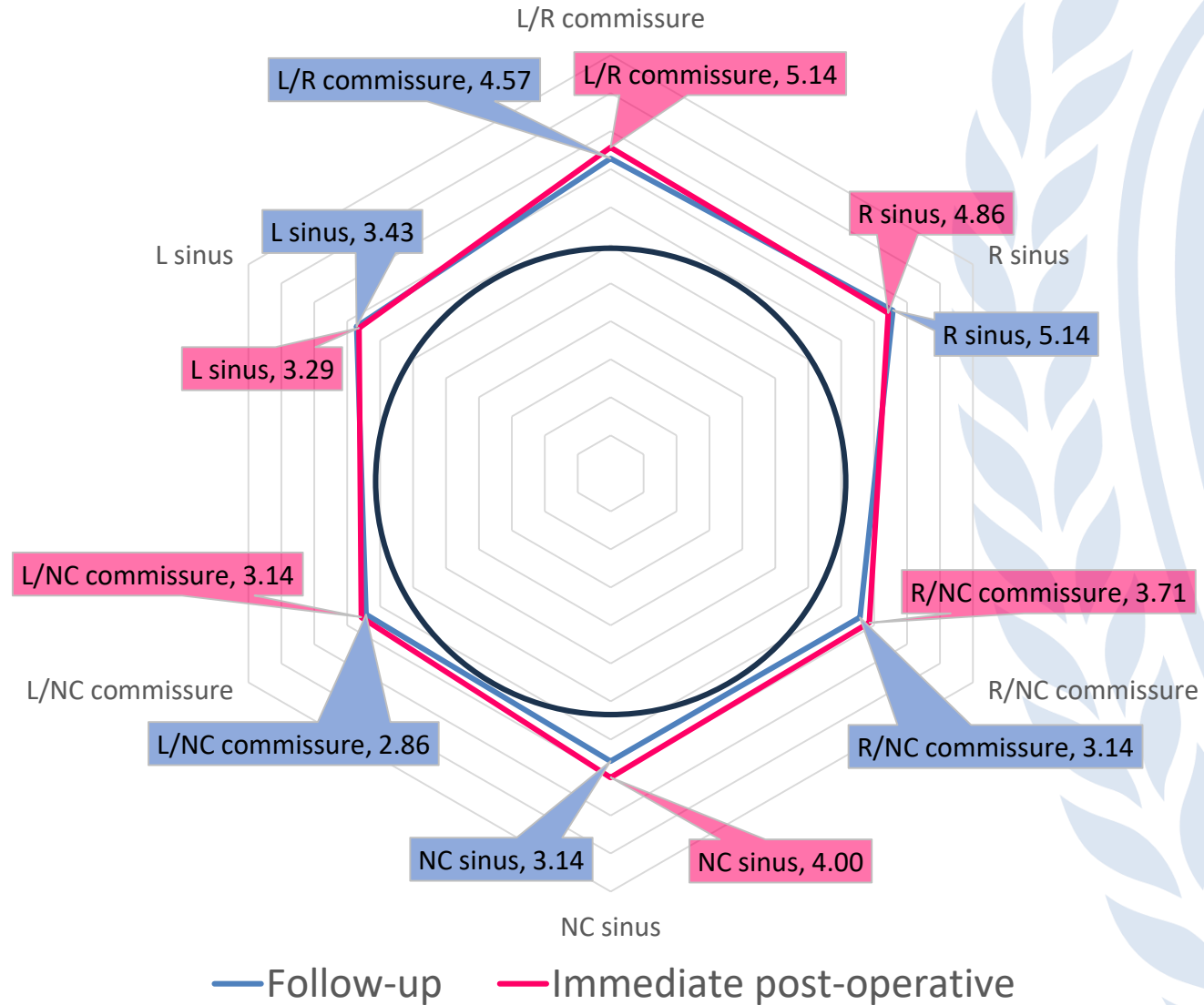
No death, reoperation or recurrent aortic regurgitation (> 2+) occurred at follow-up.

Aortic Root Dimensions

	Post-op	Follow-up	Difference	P
VBR features				
Major Diameter (MD), mm	25.3 ± 1.1	27.6 ± 0.9	1.4 ± 1.3	NS (0.024)
Minor Diameter (md), mm	22.9 ± 0.9	23.6 ± 0.5	0.7 ± 0.7	NS (0.09)
Perimeter (P), mm	77.9 ± 2.5	80.7 ± 2.3	2.8 ± 2.6	NS (0.05)
Area (A), mm ²	478.6 ± 38.9	504.3 ± 22.2	25.7 ± 28.8	NS (0.15)
Ellipticity index, (MD/md)	1.10 ± 0.04	1.13 ± 0.04	0.03 ± 0.04	NS (0.23)
Valsalva Sinuses Diameters				
Off-center right, mm	39.3 ± 0.7	39.0 ± 0.6	-0.29 ± 0.7	NS (0.44)
Off-center left, mm	38.1 ± 0.9	37.8 ± 0.9	-0.29 ± 0.7	NS (0.56)
Bisecting, mm	34.7 ± 0.7	35.4 ± 0.5	0.71 ± 0.7	NS (0.06)

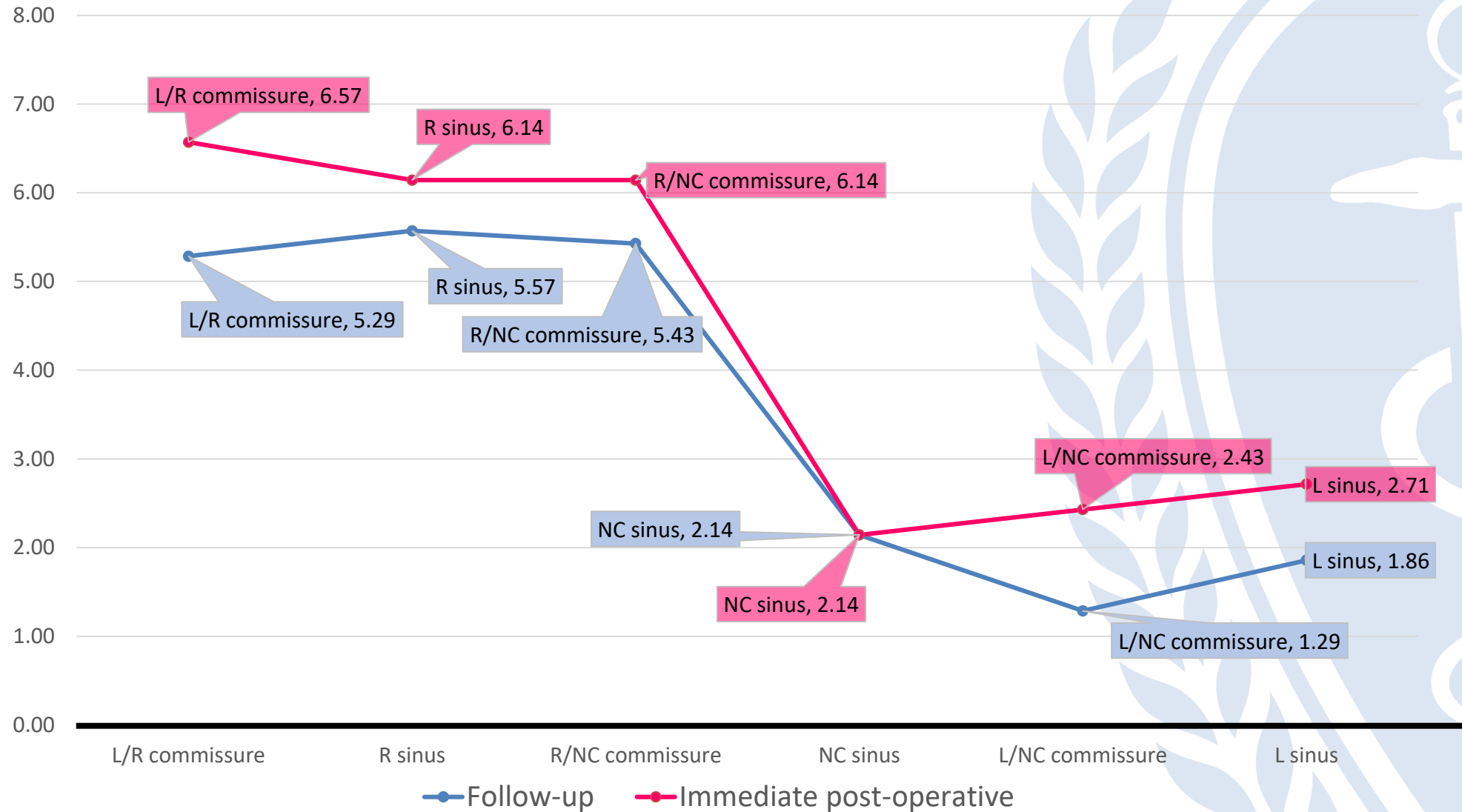
Results II

Mean landmark distance from VBR, on VBR plane (thickness), in *mm*.



Results III

Mean landmark height from VBR plane, in *mm*.



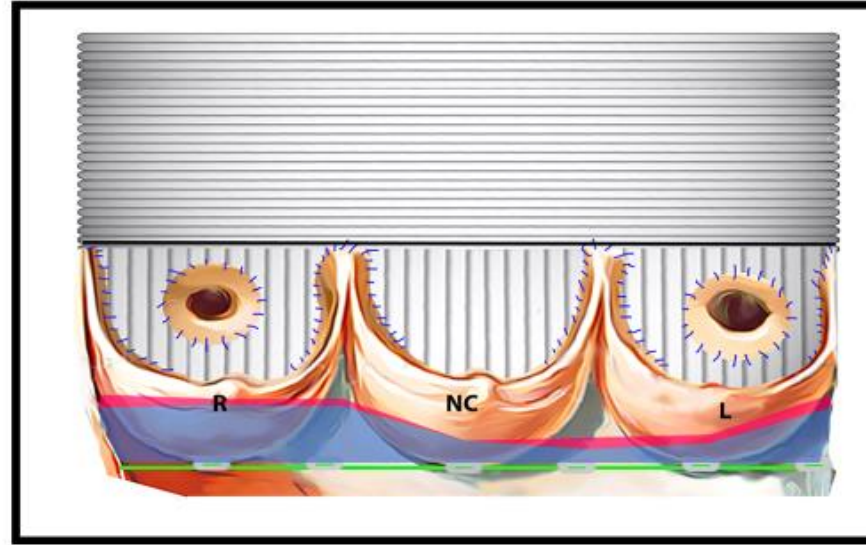
Results IV

Mean landmark height from VBR plane, mm				
	Post-op	Follow-up	Difference	P
R-L commissure	6.6 ± 2.0	5.2 ± 1.1	-1.3 ± 2.2	NS (0.16)
R sinus	6.1 ± 1.9	5.6 ± 1.3	-0.6 ± 2.2	NS (0.53)
R-NC commissure	6.1 ± 1.6	5.3 ± 2.1	-1.6 ± 2.5	NS (0.45)
NC sinus	2.1 ± 1.7	2.1 ± 1.2	0.0 ± 1.1	NS (1)
L-NC commissure	2.4 ± 1.5	1.3 ± 0.9	-1.1 ± 1.1	NS (0.11)
L sinus	2.7 ± 1.4	1.8 ± 1.1	-0.9 ± 1.3	NS (0.22)

Mean landmark distance from VBR, on VBR plane (thickness), mm				
	Post-op	Follow-up	Difference	P
R-L commissure	5.1 ± 1.3	4.6 ± 1.3	-0.6 ± 1.3	NS (0.43)
R sinus	4.9 ± 1.6	5.1 ± 1.3	0.3 ± 1.4	NS (0.72)
R-NC commissure	3.7 ± 0.5	3.1 ± 1.1	-0.6 ± 0.8	NS (0.22)
NC sinus	4.0 ± 0.8	3.1 ± 0.7	-0.9 ± 0.9	NS (0.05)
L-NC commissure	3.1 ± 0.7	2.8 ± 0.7	-0.3 ± 0.5	NS (0.45)
L sinus	3.3 ± 1.1	3.4 ± 0.8	0.1 ± 0.9	NS (0.78)

Conclusions I

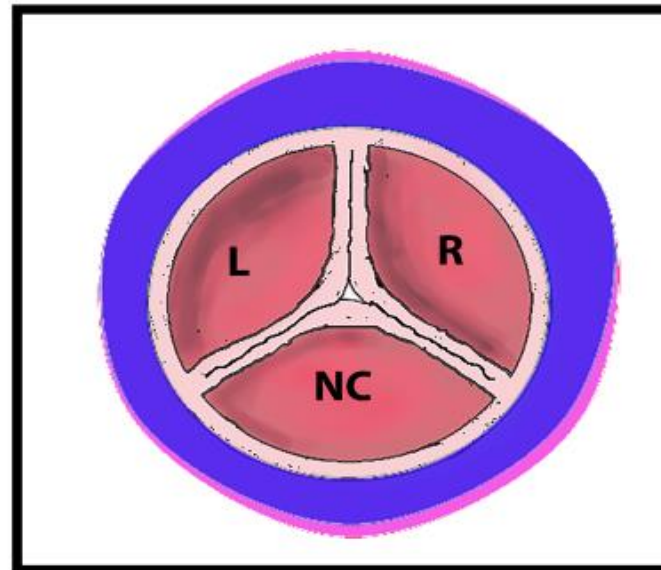
- After a 4 years mean follow up, no significant modification of relationships of aortic root components occurred.
- The proximal edge of the Dacron graft lies on the ventricular-arterial junction at a slightly different thickness and height along the annular circumference, being these measure higher at the level of right sinus and left-right commissure.
- This feature persists at follow-up control.
- Annular stabilization appears unaffected.
- A minimal reduction trend of the tissue thickness all along the annulus was present (despite not significant), which seems to correspond to a minimal increase in annular dimensions (also not significant).



Dacron – Virtual Basal Ring **Height**

■ Immediate post-operative

■ Follow-up



Dacron – Virtual Basal Ring **Thickness**