



Incidence, Diagnosis and Outcome of Coronary Artery Compression During Percutaneous Pulmonary Valve Implantation

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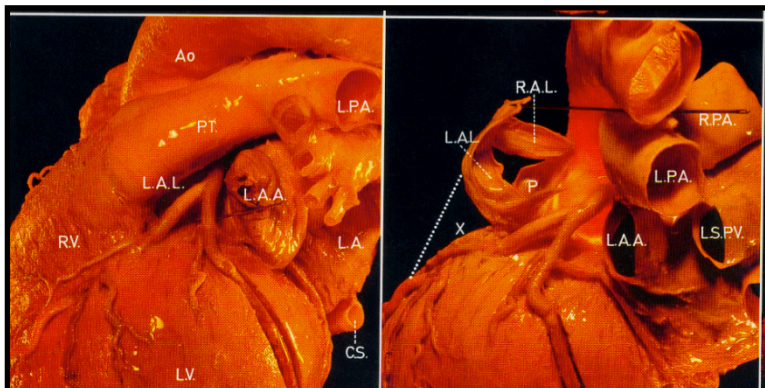


**MY CONFLICTS
OF INTEREST ARE:
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present meeting**

Background and Method



- Coronary compression (CC) initially reported postoperatively after pulmonary valve implantation¹
- May occur during percutaneous pulmonary valve implantation (PPVI)²⁻⁴
- Incidence is variable (1-4.4%)⁴⁻⁶
- Potentially life threatening when undiagnosed before right-ventricular outflow tract (RVOT) stenting⁴
- We sought to evaluate its incidence, diagnosis and outcome
- All consecutive patients with intention to perform PPVI from May 2008 to January 2012 in 2 institutions were studied.



Analysis

- 1 Daskalopoulos . JTCSV 1983
- 2 Sridharan S. Circulation. 2006
- 3 Mauri L. Cardiol Young 2013
- 4 Eicken A. Eur Heart J 2011
- 5 McElhinney DB. Circulation 2010
- 6 McElhinney DB. Circ Cardiovasc Interv. 2011

Results: incidence and patients characteristics

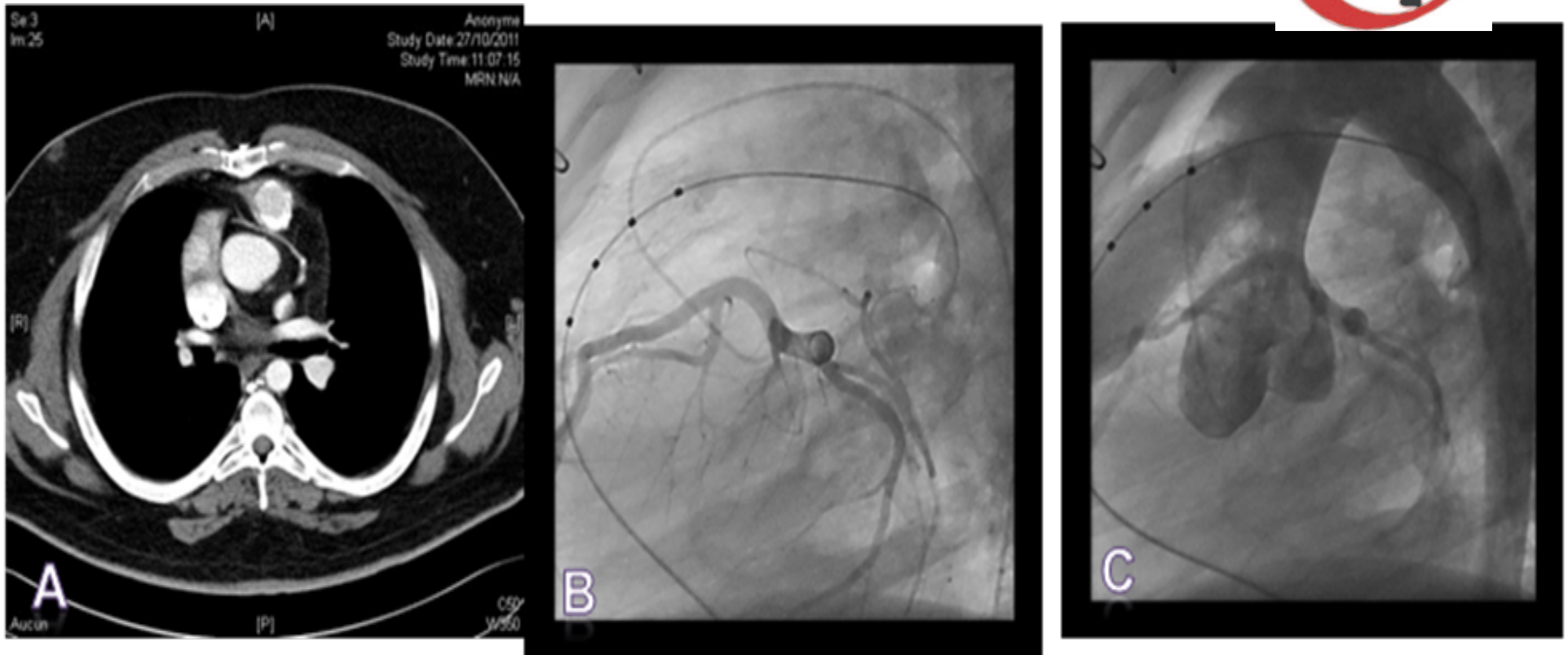
- PPVI in 83 cases; CC in 6/100 patients(6%) - Median age: 24(13 to 49) years
- Conduit stenosis: primary lesion in all cases



Pt N°	Age (yo)/ Weight(kg)	CHD	Conduit/ diameter(mm)	Type of CC	Pre CT- scan diagnosis	Balloon Type/ diameter(mm)	Treatment/ Outcome
1	24	PA-VSD	Bioprothesis/19	LAD		Mullins/20	NI/death
2	49	AS	Homograft/24	LAD		Mullins/18	NI/alive and well
3	25	PA-VSD	Homograft/23	RCA*	+	Mullins/20	Surg/alive and well
4	28	PA-VSD	Homograft/23	RCA*	+	Mullins/20	Surg/alive and well
5	13	TGA	Bioprothesis/17	LMC		Atlas/18	Surg/alive and well
6	21	TGA	Pericardial patch/ NA	LMC	+	Mullins/18	Surg/alive and well

*Single coronary artery

Diagnosis: CC in single coronary artery



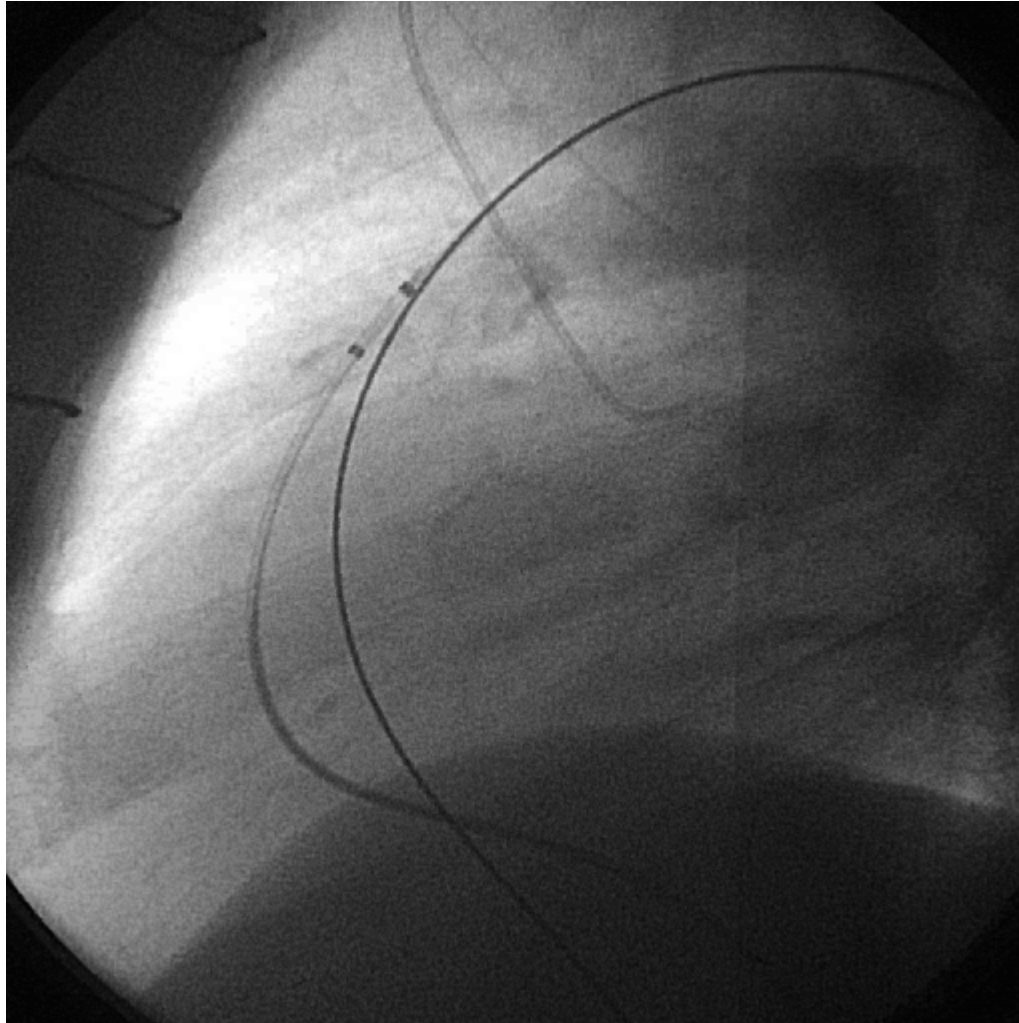
2D axial CT angiogram : the conduit passed over a large right coronary artery that arose from the proximal left anterior descending coronary artery.

B Angiographic lateral view of the LMCA showing also large RCA arising from LAD

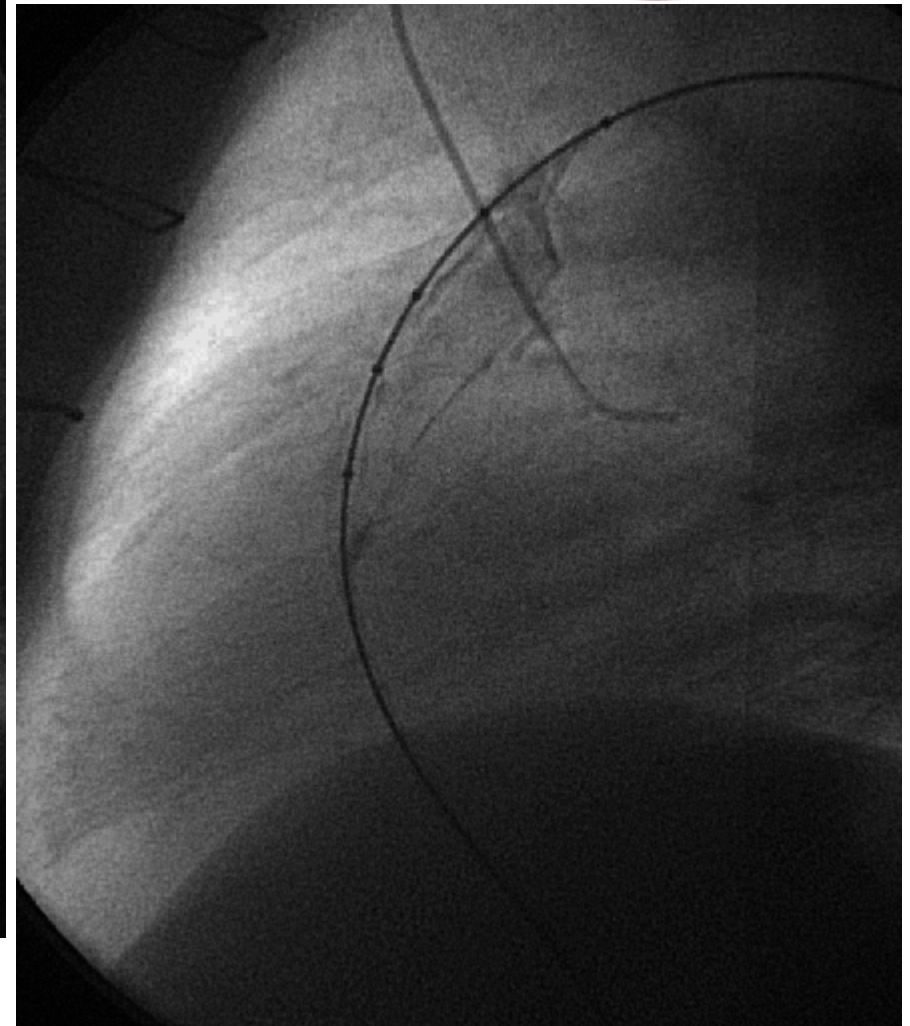
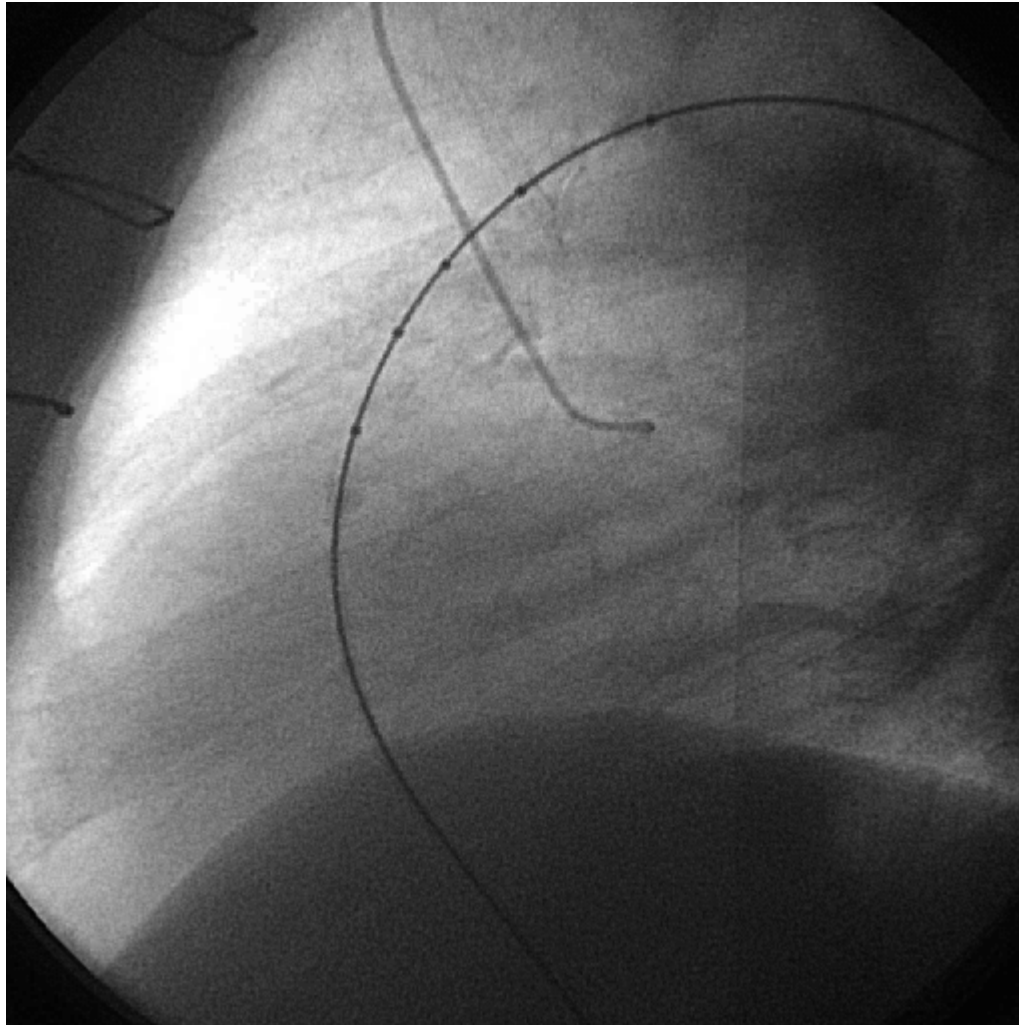
C Compression of the RCA by the inflated balloon in the RVOT

Diagnosis

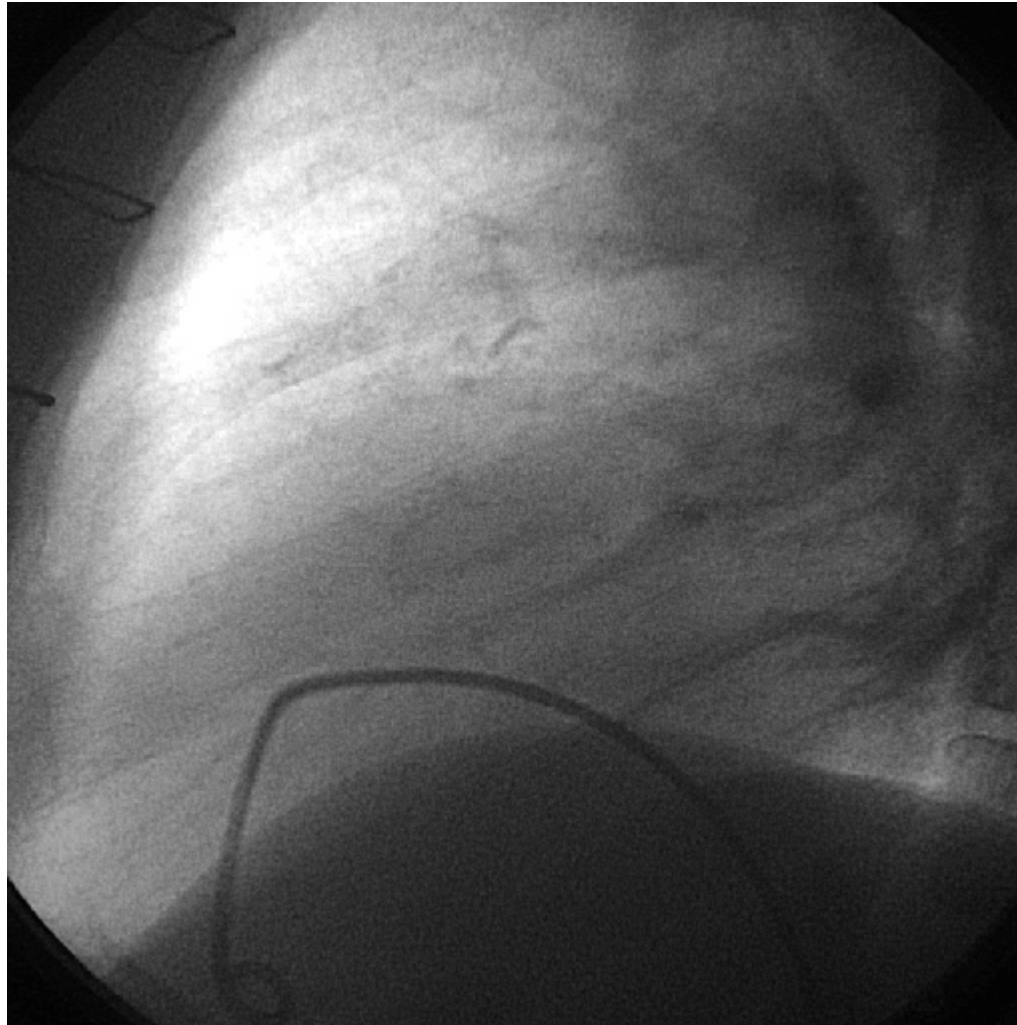
49 yo, coarctation syndrome s/p repair s/p Ross (24 mm homograft)



CC of the proximal-mid tract of the left anterior
descending coronary artery

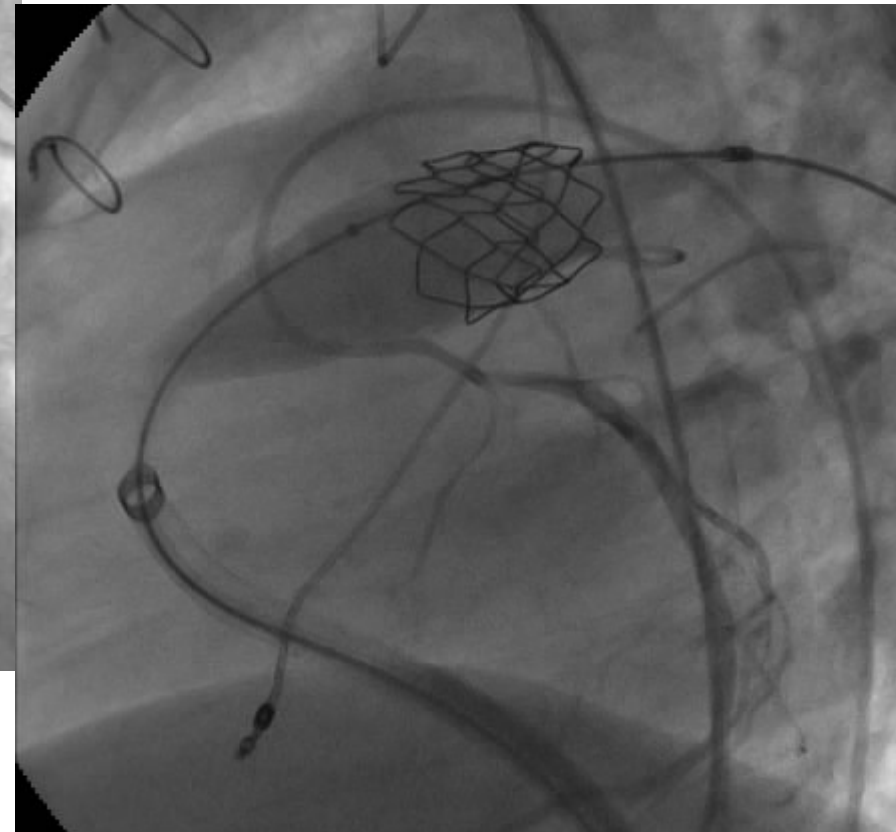
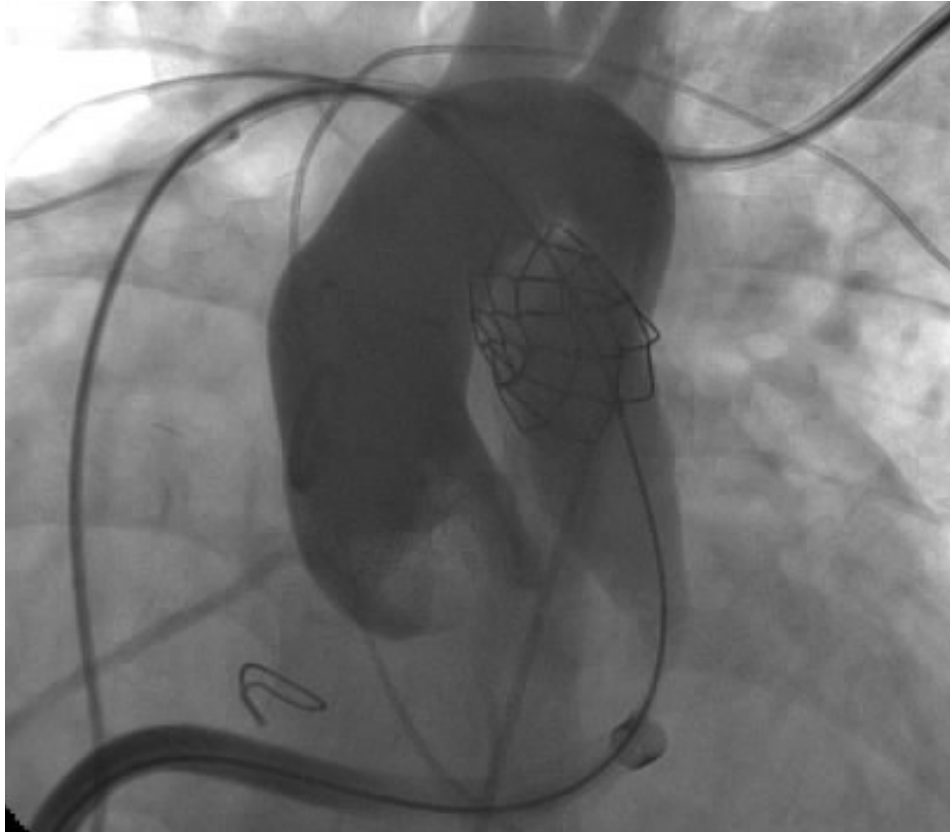


Good result after balloon dilation...



Risk for CC after a Ross procedure:
-LMCA implanted in high or anterior location
-Conduit lies low across the outflow region..

Diagnosis of CC: Inaccuracy of selective coronary angiogram

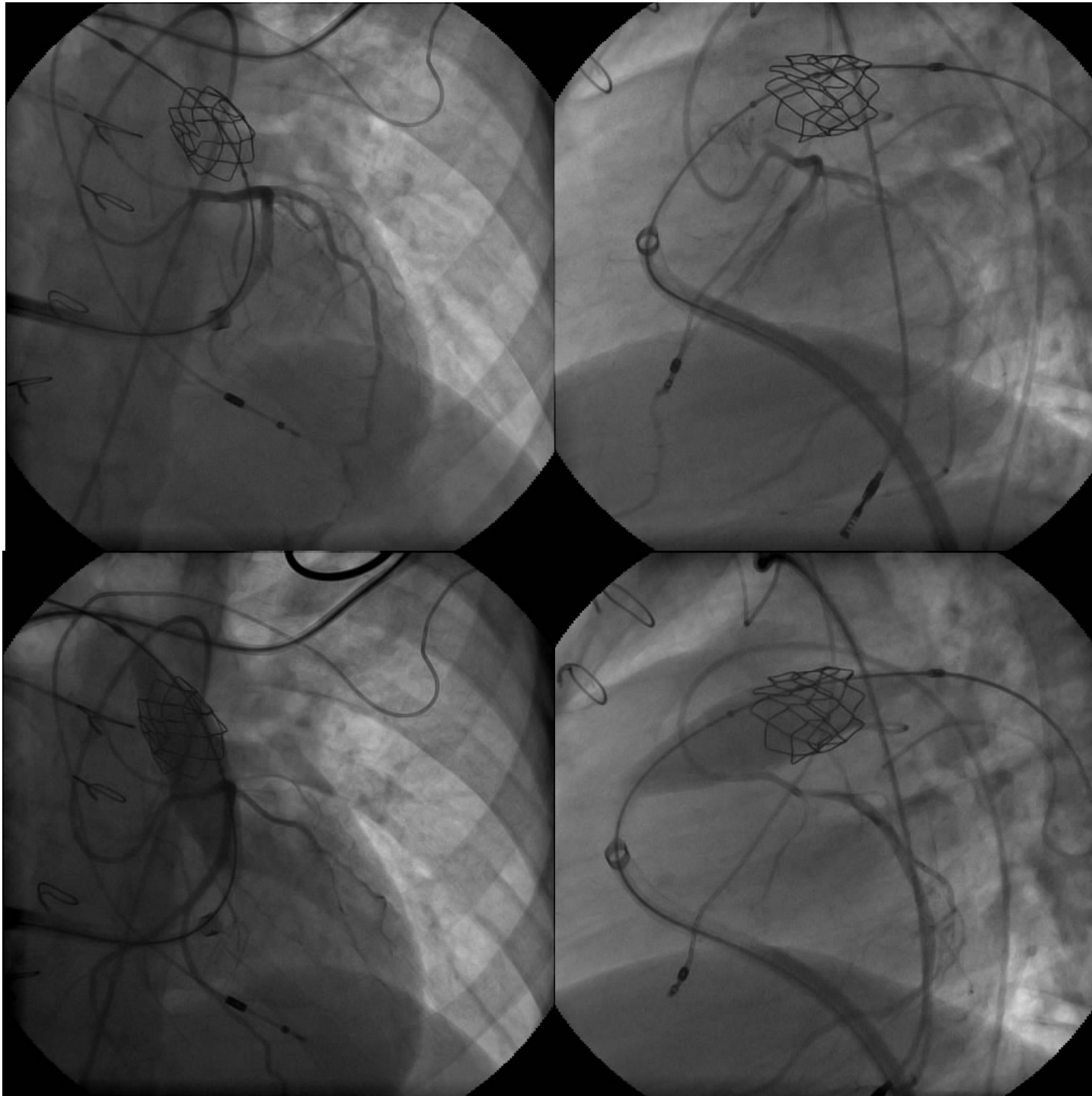


13 yo, TGA

Aortogram during balloon dilation: no flow in LMCA

Selective LMCA angiogram during balloon dilation : LMCA is opacified

CC is missed with selective coronary angiogram when LMCA is intubated



In our practise we moved from selective coronary angiogram to non selective aortogram in 2 views

3 CC were diagnosed by aortogram

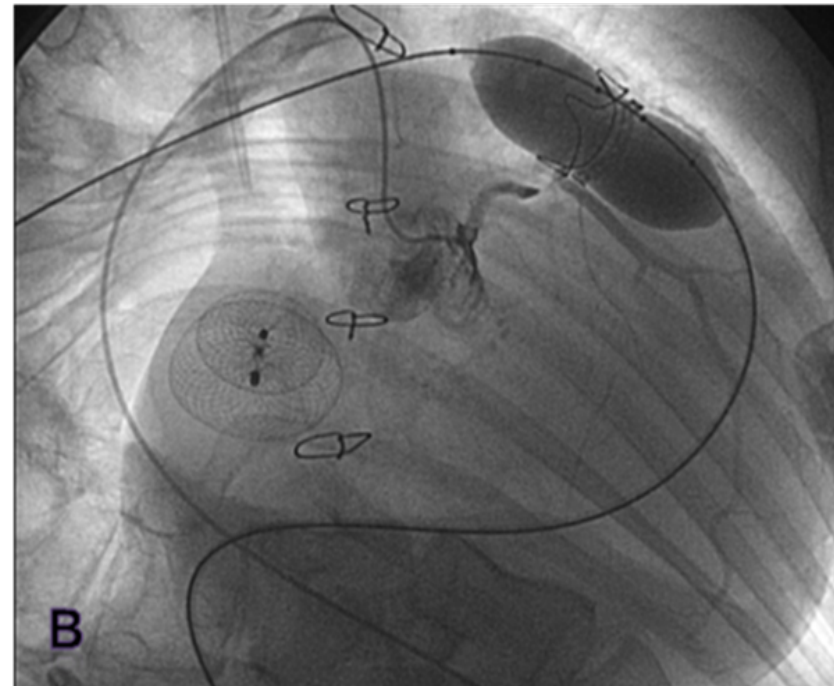
Diagnosis: Case with non expandable conduit and CC

22 yo, PA-VSD

19mm bioprosthesis

LMCA compression

Can we do PPVI in the non
expandable part of the
bioprosthesis??

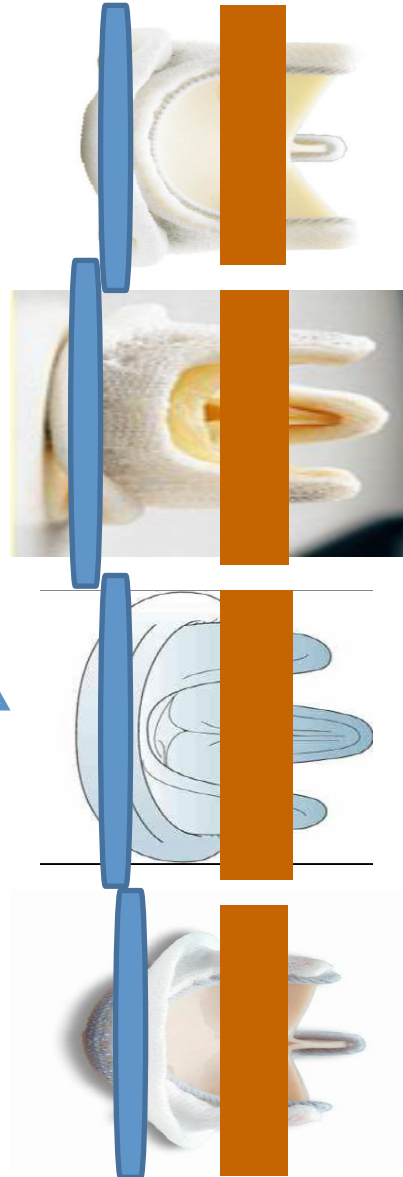


BPV: right rigid site of anchoring



NOT expandable

Potentially expandable



Need to know both valves!!!

Melody valve

- 3 dedicated diameters (18-20-22)
- Length 28 mm



Non expandable BPV

- ID of the ring (annulus)
- ID of the crown (leaflets)
- ID of the real NON expandable part ?

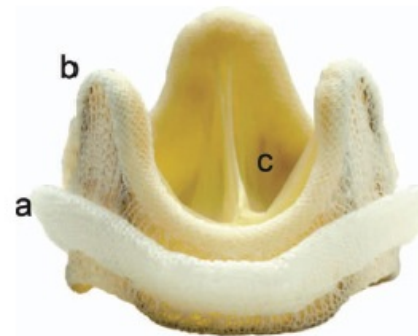
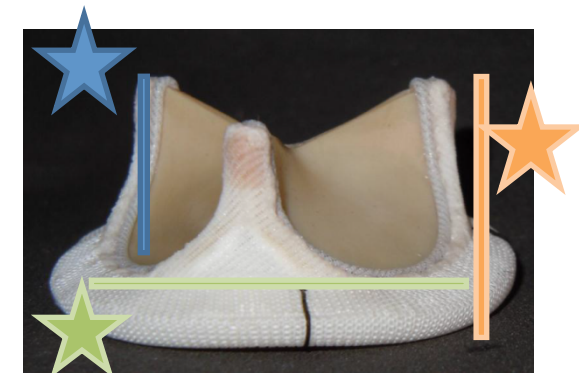
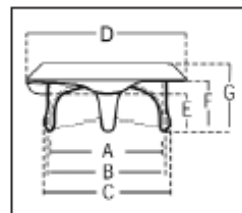


Fig. 1. (a) Circular base with sewing ring; (b) Stent post or strut; (c) Valve leaflets. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]



Final Diameter	Final Length
18	26,2
20	24,2
22	23,6

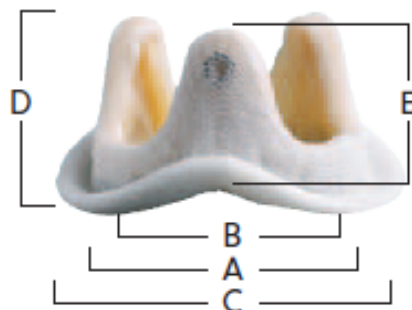


Size	25 mm	27 mm	29 mm	31 mm	33 mm
A. Stent Diameter (Wireform—Inner Diameter ID)	25	27	29	31	31
B. External Stent Post Diameter (Base)*	28.0	29.5	31.5	33.5	33.5
C. External Stent Post Diameter (Tip)	29	31	34	35	35
D. External Sewing Ring Diameter	36	38	40	42	44
E. Ventricular Projection (anterior)	7	7.5	8	8.5	8.5
F. Ventricular Projection (posterior)	10	10.5	11	11.5	11.5
G. Total Profile Height	16	17	18	19	19

* Tissue annulus diameter

The real non expandable part is smaller (probably G – E)

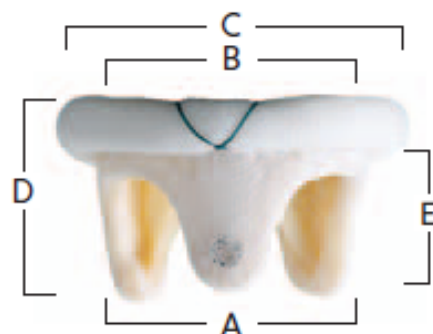
Hancock® II Aortic Valve, Model T505



Valve Size (Stent O.D.†) (A)	Orifice Diameter (Stent I.D.) (B)	Suture Ring Diameter (C)	Valve Height (D)	Aortic Protrusion (E)
(±0.5 mm)	(±0.5 mm)	(±1 mm)	(±0.5 mm)	(±0.5 mm)
21	18.5	27.0	15.0	12.0
23	20.5	30.0	16.0	13.5
25	22.5	33.0	17.5	15.0
27	24.0	36.0	18.5	15.5
29	26.0	39.0	20.0	16.0

(nominal values, in millimeters)
† Equivalent to annulus diameter

Hancock® II Mitral Valve, Model T510



Valve Size (Stent O.D.†) (A)	Orifice Diameter (Stent I.D.) (B)	Suture Ring Diameter (C)	Valve Height (D)	Ventricular Protrusion (E)
(±0.5 mm)	(±0.5 mm)	(±1 mm)	(±0.5 mm)	(±0.5 mm)
25	22.5	33.0	18.0	13.5
27	24.0	35.0	19.0	14.0
29	26.0	38.0	20.5	15.5
31	28.0	41.0	22.0	17.0
33	30.0	43.0	23.0	17.5

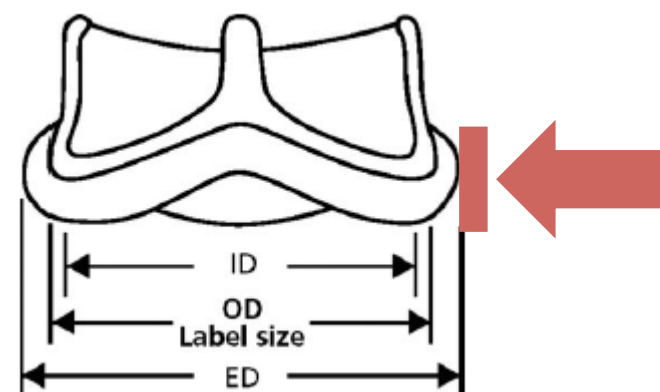
E seems too small to do PPVI when CC while inflating high pressure balloon in RVOT...
CT scan may help...

TABLE II. Dimensions of Various Bioprostheses

Model	Valve size	Stent internal diameter (ID)	Stent outer diameter (OD)	External sewing ring diameter (ED)	Profile height
Perimount	19	18	19	26	14
	21	20	21	29	15
	23	22	23	31	16
	25	24	25	33	17
	27	26	27	35	18
Magna/Magna ease	29	28	29	37	19
	19	18	19	24	13/14
	21	20	21	26	15
	23	22	23	28	16
	25	24	25	30	17
CE Porcine standard/SAV	27	26	27	32	18
	29	28	29	34	19
	19	17	19	24	15
	21	19	21	27	16
	23	21	23	29	16
Mosaic/Mosaic Ultra	25	23	25	31	18
	27	25	27	34	18
	29	27	29	36	19
	31mm	29	31	37	19
	19	17.5	19	24	13.5
Hancock II Modified orifice	19	16	19	23.5	14/16
	21	18.5	21	27	15
	23	20.5	23	30	16
	25	22.5	25	33	17.5
	27	24	27	36	18.5
Epic Supra/Biocor Supra	29	26	29	39	20
	19	19	19	25	14
	19	NA	NA	NA	NA
	21	19	21	25	14
	23	21	23	27	15
Trifecta	25	23	25	29	16
	27	25	27	31	17
	29	27	29	33	19
	19	1.7	19	24	15
	21	1.9	21	26	16
Mitroflow	23	2.1	23	28	17
	25	2.3	25	31	18
	27	2.5	27	33	19
	29	2.7	29	35	20
	19	15.4	18.6	21	11
Soprano	21	17.3	20.7	23	13
	23	19	22.7	26	14
	25	21	25.1	29	15
	27	22.9	27.3	31	16
	29	24.7	29.5	33	16
Aspire	18	17.8	21	26	12
	20	19.8	23	28	14
	22	21.7	25	30	15
	24	23.7	27	32	16
	26	25.6	29	35	19
Aspire	28	27.6	31	38	19
	20	18.2	20	23	16
	21	19.2	21	24	16
	23	21	23	26	17
	25	23	25	28	18
Aspire	27	25	27	30	18



The information on the length of the crown/protrusion of the BPV is often lacking⁷



No true risk factors for CC



Characteristics :	CC + (n= 6)	CC- (n= 94)	p
Value – no. (%); Mean ($\pm$ SD)			
Age at conduit surgery (mean $\pm$ SD)	26.5($\pm$ 12.2) year-old	20.8($\pm$ 9.7) year-old	0.2
conduit or RVOT diameter (mean $\pm$ SD)	21.2($\pm$ 3) mm	19.3 ($\pm$ 3.6) mm	0.21
Balloon diameter	19($\pm$ 1.1) mm	19.2($\pm$ 2.4) mm	0.66
Type of conduit :			
-exp/non exp	34/2	60/4	0.63
-stenotic/mixed or reg	6/0	79/15	0.37
Type of CHD	0 (0)	1(1)	0.88
-Aortic atresia	1(17)	13(14)	
-Aortic stenosis	3(50)	44(47)	
-Fallot/ PA-VSD	0(0)	13(14)	
-Truncus arteriosus	2(33)	18(19)	
-TGA	2(33)	31(33)	
Conduit position	4(67)	63(67)	0.65
-Anatomic			
-Extra-anatomic			
Center N°	2(33)	72(77)	0.04
-1	4(67)	22(23)	
-2			

Conclusions

- CC is efficiently diagnosed by coronary angiogram during balloon dilation in a small proportion of patients undergoing transcatheter interventions on RVOT.
- Non selective coronary angiogram (2 views) is more appropriate than selective coronary angiogram
- The LMCA seems more frequently involved.
- Diagnosis by pre procedure CT-scan is not accurate.
- No specific risk factors exist.
- Surgical conduit replacement is indicated when balloon dilation fails to improve the RVOT obstruction.

Tetralogy of Fallot: 1888 - 2013

FALLOT

ALL TOGETHER !

Le premier Congrès Médecins/Patients sur la Tétralogie de Fallot

A photograph of a heart shape drawn in the sand on a beach, with the event information overlaid.

Conception : Atout Organisation Science - Tél. 04 96 15 12 50

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See you in Marseille next month...