INSTITUT CARDIOVASCULAIRE PARIS SUD

TAVI in bicuspid valve
Case & Focus review

Bernard Chevalier

ICPS Massy

France

Générale de santé

TAVI

Male 77 y.o

Risk factors / comorbidities

Hypertension, Dyslipidemia,

Diabetes (non-insulin dependent)

Clinical presentation

Patient suffered from dyspnea (NYHA III)

Height: 170 cm, Weight: 63 kg (BSA: 1.73)

ECG findings

Atrial fibrilation

TAVI

Male 77 y.o

Laboratory investigations

Hb = 11.5 g/dl

Creatinine = 65 µmol/L

Creatinine clearance =85ml/min

Risk evluation

Logistic EuroSCORE = 15.96%

EuroSCORE II = 6.51%

TAVI

Male 77 y.o

Echocardiographic data

Aortic valve area 0.8 cm^2

Mean pressure gradient 30mmHg

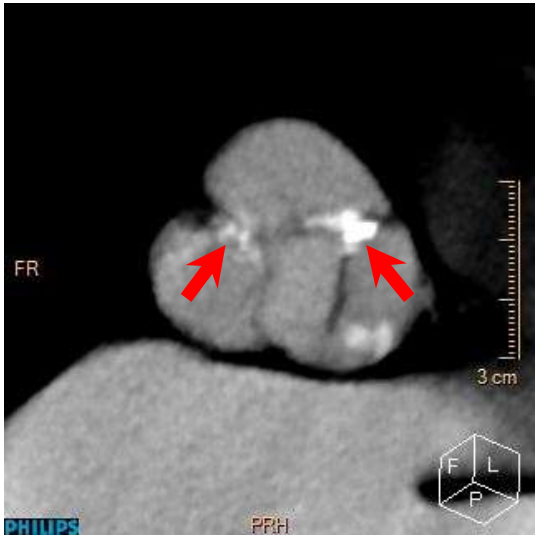
Severe aortic regurgitation

Moderate mitral regurgitation

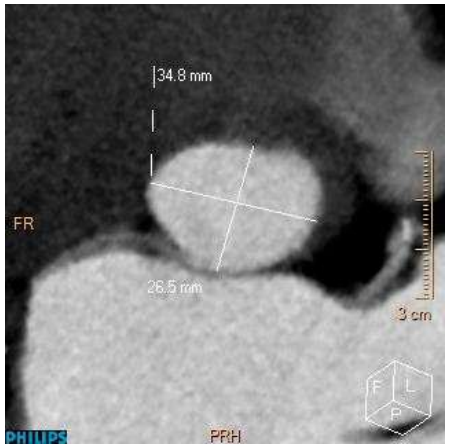
Ejection fraction 25%

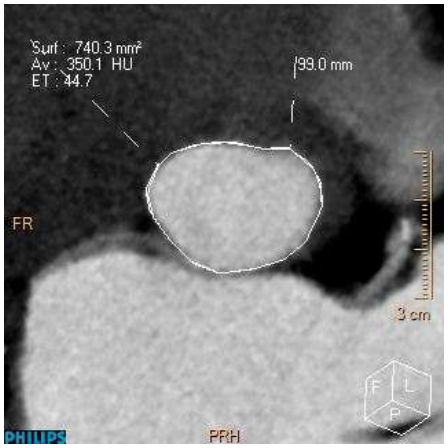
Pulmonary artery pressure 60mmHg

CT data



Bicuspid type2 (L-R &R-N raphe)





Short diameter of annulus 26.5mm
Long diameter of annulus 34.8mm
Mean diameter of annulus 30.7mm
(surface of annulus 740mm^2)
Volume of calcification 584mm^2


aille de la vue : 1215 x 1215
F : 127 LF : 255
Cor
oom : 237% Angle : 0
n : 1/43
on compressé
02/10/2014
lle de la vue : 1215 x 1215
: 127 LF : 255
Card
Coro TG
om : 237% Angle : 0
: 1/24
n compressé
02/10/2014 15:27:

77 old Pat ic shock

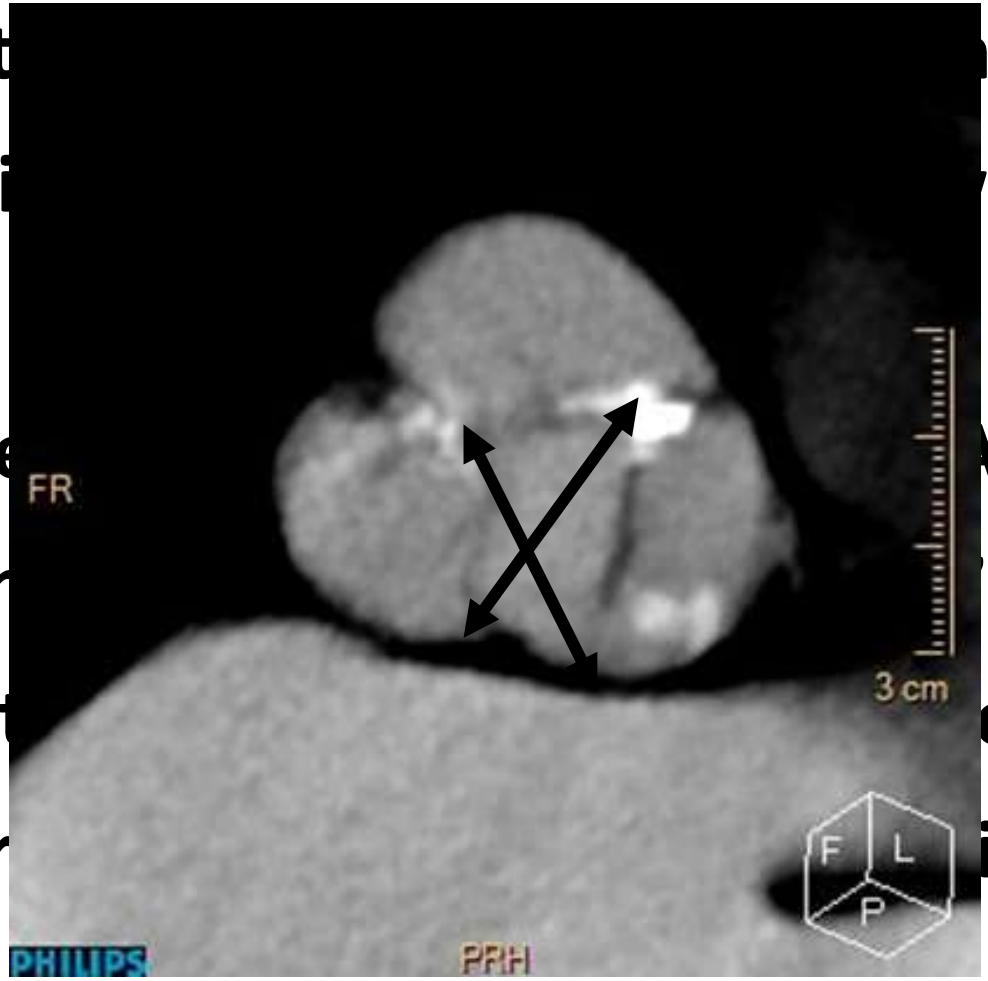
Calci Ef

Patie AVI

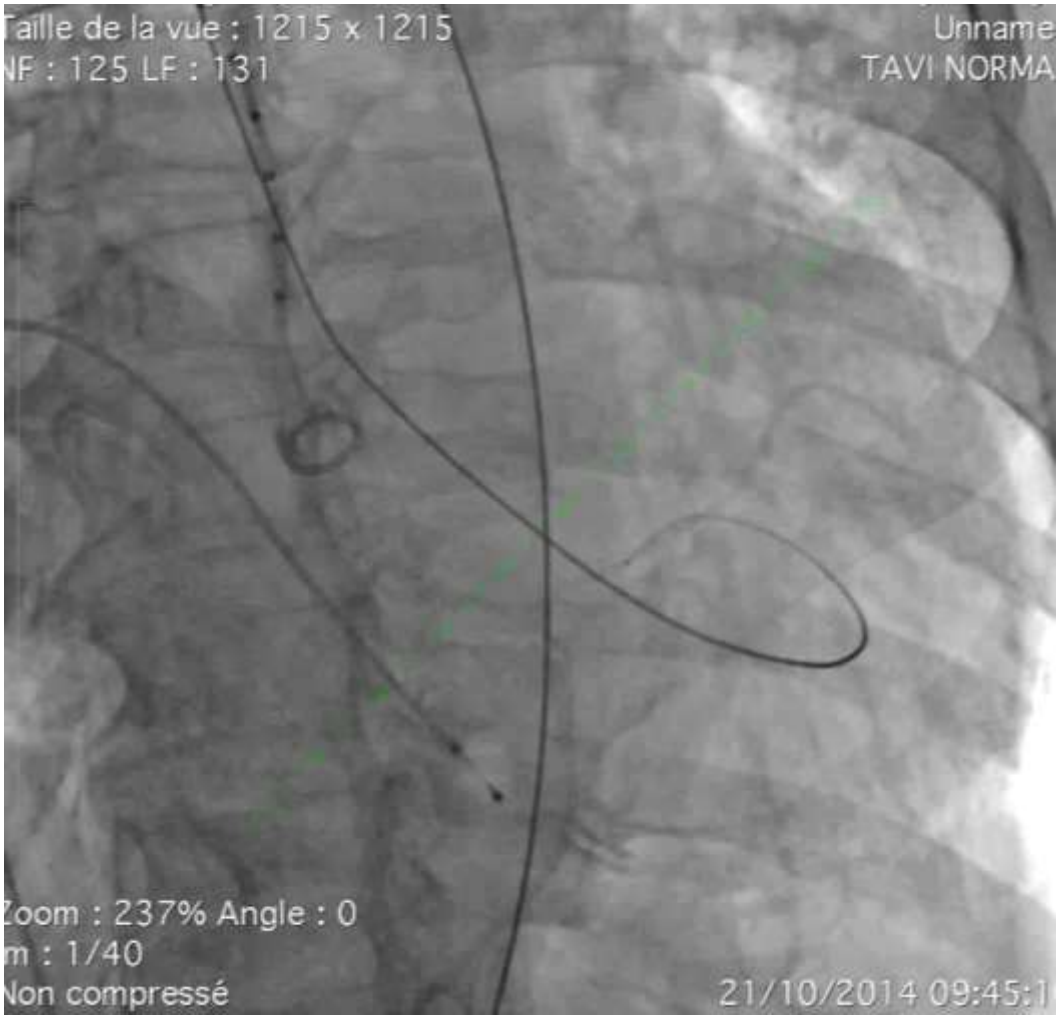
TAVI ir mm)

After Heart o use the

inter ing



Aortography before implantation



29 mm SAPIEN 3 implantation

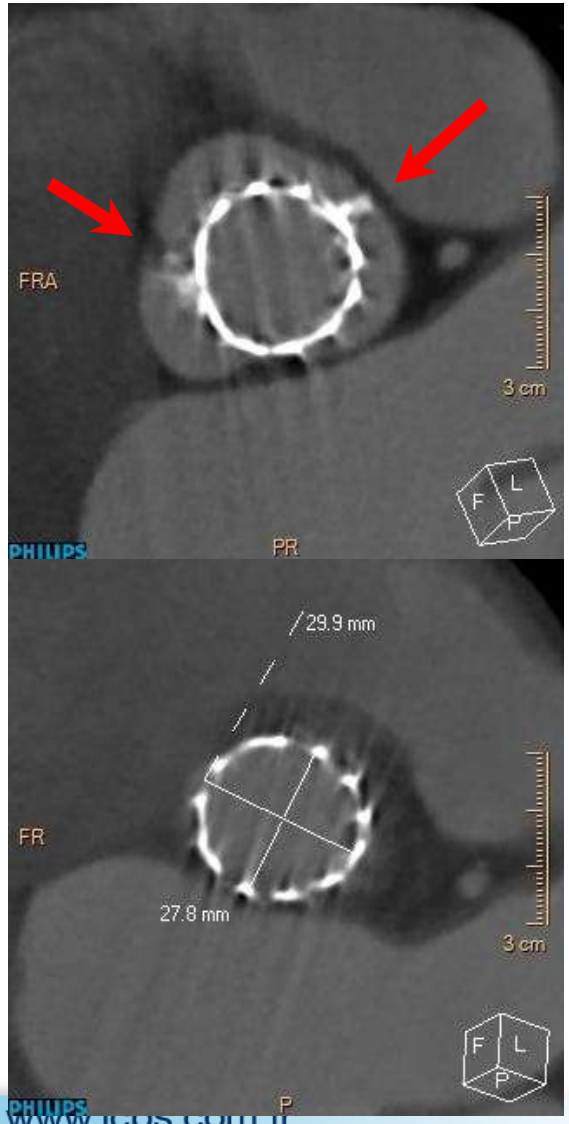
Post-dilatation

TTE revealed moderate aortic regurgitation.
The middle part of the prosthesis was not fully expanded.

➡Post-dilatation by adding 2ml contrast into the delivery balloon.

No paravalvular aortic regurgitation

Post procedure CT data



Both L-R and R-N raphes filled the gaps → no PVL despite undersizing

Short diameter of annulus 27.8mm

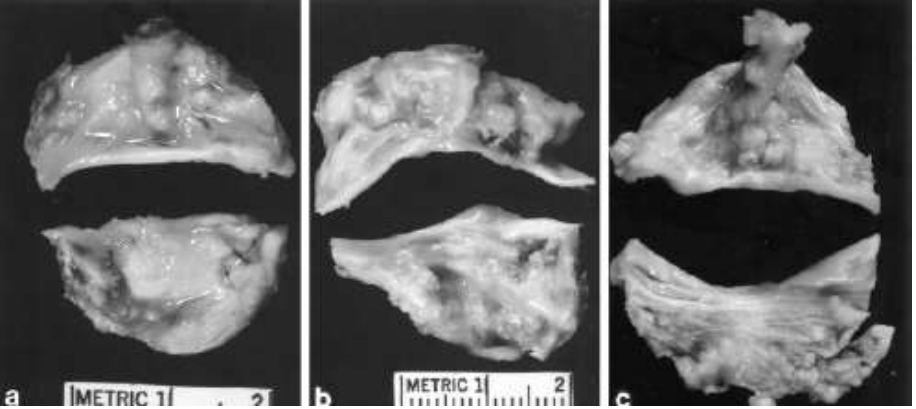
Long diameter of annulus 29.9mm

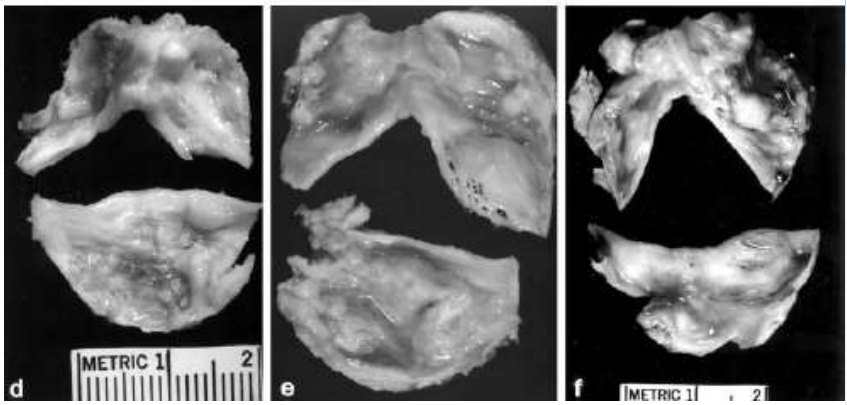
Messages

①Bicuspid valve : the anatomy of the valve which may give a good sealing at the level of the inter-commissural space.

②Outer skirt : the new design of SAPIEN 3.

➡No paravalvular aortic regurgitation was detected after TAVI.





1 to 2% incidence, 2 to 4 times more frequent in men

(Tzemos et al. JAMA 2008; 300:1317-25.)

Could be an heritable condition – mutation of gene NOTCH1 *(Garg et al. Nature 2005; 437: 270-4)*

Frequency by Decades of Unicuspid, Bicuspid, and Tricuspid Aortic Valves in Adults Having Isolated Aortic Valve Replacement for Aortic Stenosis, With or Without Associated Aortic Regurgitation

William C. Roberts, MD; Jong M. Ko, BA

Background—Aortic valve stenosis (with
in the Western world has been cons
atherosclerotic disease.

Methods and Results—We examined op
(mean±SD, 70±12), and none had associated mitral valve replacement or evidence of mitral stenosis: A total of 504 (54%) had congenitally malformed valves (unicuspid in 46 [unicommissural in 42; acommissural in 4] and bicuspid in 458); 417 (45%) had tricuspid valves (either absent or minimal commissural fusion); and 11 (1%) had valves of undetermined type. It is likely that the latter 11 valves also had been congenitally malformed. Of the 584 men, 343 (59%) had either a unicuspid or a bicuspid valve; of the 348 women, 161 (46%) had either a unicuspid or a bicuspid aortic valve.

Conclusions—The data from this large study of adults having isolated aortic valve replacement for aortic stenosis (with or without associated aortic regurgitation) and without associated mitral stenosis or mitral valve replacement strongly suggest that an underlying congenitally malformed valve, at least in men, is more common than a tricuspid aortic valve. (*Circulation*. 2005;111:920-925.)

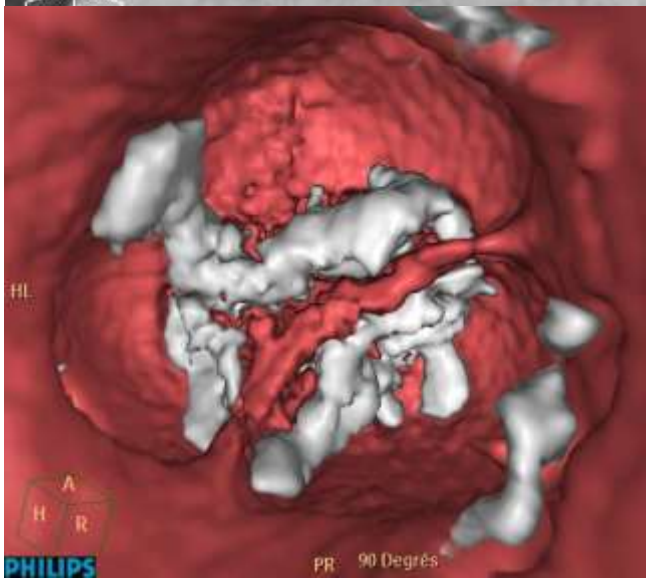
Bicuspid valve 62% <70 y & 38% > 80 y

TABLE 1. Aortic Valve Structure in 584 Men and 348 Women Aged 26 to 91 Years With Operatively Excised Stenotic Aortic Valves Unassociated With Mitral Valve Disease and Excised From 1993 to 2004

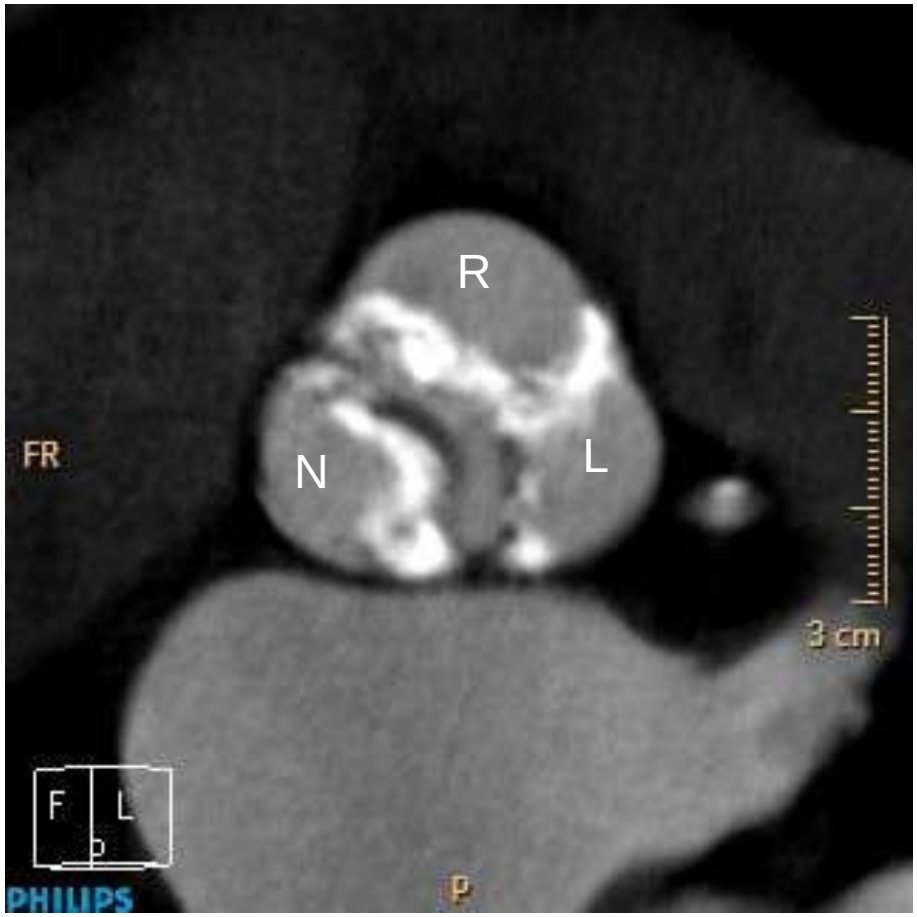
Aortic Valve Structure	Cases, n (%)	Ages (y) of Patients by Decades at Time of Aortic Valve Replacement							
		21–30	31–40	41–50	51–60	61–70	71–80	81–90	91–100
Men									
Unicuspid	34 (6)	3	4	11	8	4	4	0	0
					4	111	94	24	1
					4	50	119	51	0
					0	3	2	2	0
					(13)	168 (29)	219 (38)	77 (13)	1 (<1)
Women									
Unicuspid	12 (3)	1	2	3	1	4	1	0	0
Bicuspid	149 (43)	1	5	10	20	44	55	14	0
Tricuspid	183 (53)	0	0	2	11	43	79	47	1
Uncertain	4 (1)	0	0	1	0	0	3	0	0
Subtotals, n (%)	348 (100)	2 (<1)	7 (2)	16 (5)	32 (9)	91 (26)	138 (46)	61 (18)	1 (<1)

Values in parentheses are percentages.

- Bicuspidy is regarded as a relative contraindication to TAVI due to the risk of uneven expansion of the bioprosthesis.
- Not indicated in the IFU of approved devices
- Exclusion criteria in clinical trials
- Thus, the safety and efficacy of TAVI for this anatomic variation still remains unclear.



CT Classification



Total: 50

Type 1 L-R: 33

- Type 1 L-N: 3
- Type 1 R-N: 5
- Type 2 L-R + L-N: 6
- Type 0 3

* Of 50 cases, 36 were not diagnosed as bicuspid valve by echocardiography

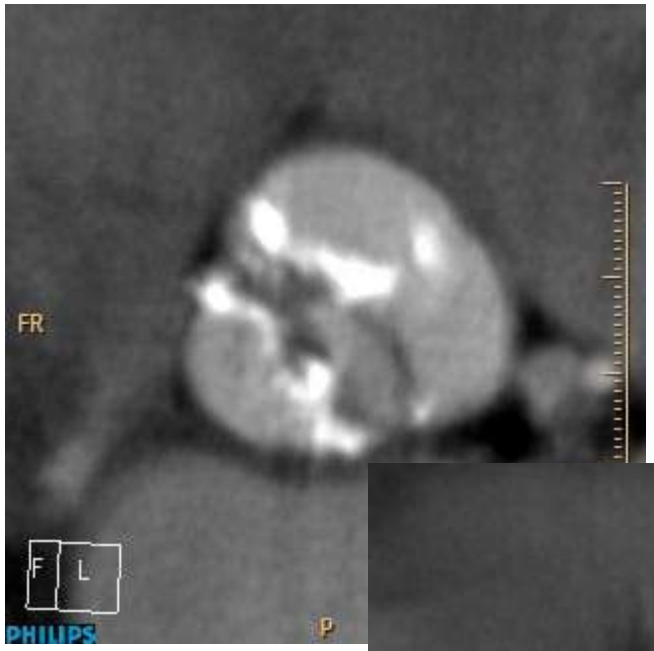
CT Findings

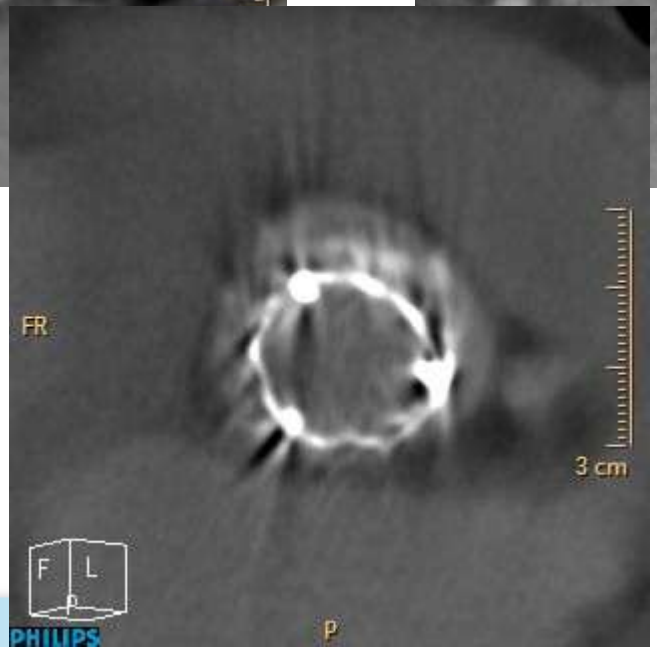
	Bicuspid	Non-bicuspid	p
Patient number	50	562	
Mean annulus size (CT), mm	**25 ± 3.0**	**23.7 ± 2**	**<0.05**
Long-axis annulus size (CT), mm	**27.5 ± 3**	**26.4 ± 2.5**	**<0.05**

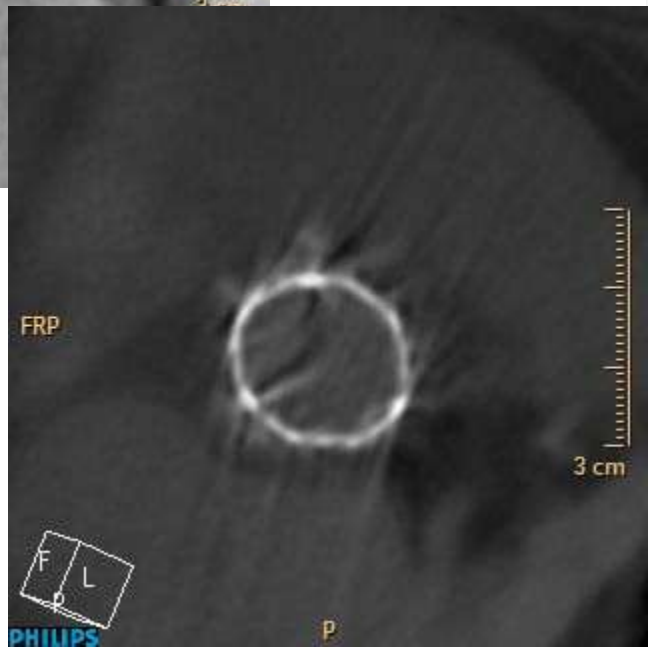
Procedural Characteristics

	Bicuspid	Non-bicuspid	p
Patient number	50	562	
Edwards	24 (48%)	400 (71,7%)	<0.01
CoreValve	25 (50%)	152 (27%)	<0.01
Valve size, mm	28 ± 3.0	26.4 ± 2.1	<0.05

Edwards Valve







CoreValve

Clinical Outcomes

	Bicuspid	Non-bicuspid	p
Patient number	50	562	
Mean pressure gradient, mmHg	**10.0 ± 3.4**	**9.7 ± 4.1**	**NS**
Aortic regurgitation ≥2	**10 (20%)**	**68 (14.9%)**	**0.12**
Annulus rupture	2	8 (1.2%)	NS
Valve migration	0	8 (1.2%)	NS
Coronary flow compromise	1	10 (3,3%)	NS
New pacemaker	6 (12%)	53 (9,4%)	NS

Clinical Outcomes

	Bicuspid	Non-bicuspid	p
Patient number	50	562	
Device success	48 (96%)	528 (94%)	NS
30-day mortality	3 (6%)	46 (8.1%)	NS
30-day combined safety point	8 (16%)	91 (16,1%)	NS

Conclusions

CT was more sensitive than echo to detect bicuspid valve.

Type 1 L-R was the most common type in this cohort.

Larger aortic annulus requiring larger bioprosthesis size

Similar device success was achieved

Although longevity of prostheses in non-circulatory expansion should be explored, indication of TAVI might be extended to this type of anatomy in the future.