SUPPLEMENTARY DATA

Table 1 of the supplementary data

Aortic annulus size from the entire studied population according to the recommended CTA measurements for a 23, 26 and 29 mm balloon-expandable valve

	N	Value	Spearman*	P value	Se (%)	Sp (%)	PPV (%)	NPV (%)	LR+	LR-	AI
23 mm											
CTA N-L CC, mm	399	21.4 ± 1.7	0.365	<.01	95.5	40.1	42.3	95.1	1.59	0.11	0.57
N-L CC with AoMC, mm	108	21.3 ± 1.9	0.265	<.01	96.3	28.1	33.7	95.2	1.34	0.13	0.46
N-L CC with AoAC, mm	33	21.4 ± 1.5	0.254	<.01	90.9	35.4	32.6	91.9	1.40	0.25	0.49
26mm											
CTA N-L CC, mm	525	23.4 ± 2.0	0.224	<.01	95.0	20.9	45.9	85.6	1.2	0.23	0.51
N-L CC with AoMC, mm	189	23.3 ± 1.8	0.241	<.01	94.7	22.1	53	81.8	1.21	0.24	0.57
N-L CC with AoAC, mm	69	23.2 [22.2-24.2]	0.300	<.01	50.7	78.3	72.9	58	2.3	0.62	0.63
29 mm											
CTA N-L CC, mm	275	25.9 ± 2.1	0.294	<.01	94.5	38.6	29.9	96.2	1.53	0.14	0.50
N-L CC with AoMC, mm	90	25.5 [24.3-27.0]	0.327	<.01	52.2	81.8	46.1	85.2	2.86	0.58	0.75
N-L CC with AoAC, mm	26	25.3 ± 1.7	0.289	<.01	96.2	36.9	27.8	97.4	1.52	0.10	0.48

Data is presented as mean ± SD, median with [IQR] and percentage (%).

*Spearman correlation was done after dichotomizing the respective values for each size using the value given by the mean ± standard deviation or median with interquartile range compared with computed tomography as the gold standard method, based on the mean diameter and the area of the aortic annulus size for a 23 mm valve (mean diameter between 18 mm and 22 mm, area between 338 mm^2 and 430 mm^2), 26 mm valve (mean diameter between 21 mm and 25 mm, area between 430 mm^2 and 546 mm^2), and 29 mm valve (mean diameter between 24 mm and 28 mm, area between 540 mm^2 and 683 mm^2). AI, accuracy index; AoAC, aortography with automatic calibration; AoMC, aortography with manual calibration; CTA, computed tomography angiography; IQR, interquartile range; LR+, positive likelihood ratio; LR-, negative likelihood ratio; mm, millimeters; N, number of patients; N-L CC, non to left coronary cusp; NPV, negative predictive value; PPV, positive predictive value; SD, standard deviation; Se, sensitivity; Sp, specificity.

Table 2 of the supplementary data.

Best cut-off value from each measurement method and its correlation with the gold standard method[a]

	Value mm	AUC	CI (95%)	P value	Spearman[b]	*P* value
23 mm						
N-L CC with CTA	20.75-22.95	0.561 0.817	0.517–0.605 0.790–0.843	< .01 < .01	0.280	< .01
N-L CC with Ao MC	≤ 21.95	0.828	0.783–0.873	< .01	0.528	< .01
N-L CC with Ao AC	≤ 22.55	0.824	0.745–0.903	< .01	0.420	< .01
26 mm						
N-L CC with CTA	22.0 25.9	0.644 0.571	0.613–0.676 0.533–0.608	< .01 < .01	0.288	< .01
N-L CC with Ao MC	22.0 25.1	0.668 0.632	0.607–0.730 0.567–0.696	< .01 < .01	0.338	< .01
N-L CC with Ao AC	21.6 24.6	0.752 0.706	0.651–0.853 0.597–0.814	< .01 < .01	0.451	< .01
29 mm						
N-L CC with CTA	≥ 24.3	0.884	0.864–0.905	< .01	0.537	< .01
N-L CC with AoMC	≥ 24.3	0.864	0.824–0.904	< .01	0.513	< .01
N-L CC with AoAC	≥ 24.3	0.861	0.782–0.941	< .01	0.579	< .01

AoAC, aortography with automatic calibration; AoMC, aortography with manual calibration; AUC, area under the curve; CI, confidence interval; CTA, computed tomography angiography; mm, millimeters; N-L CC, non to left coronary cusp.

[a]Gold standard method using combined CTA parameters for a 23 mm (mean diameter between 18 mm and 22 mm, area between 338 mm^2 and 430 mm^2), 26 mm (mean diameter between 21 mm and 25 mm, area between 430 mm^2 and 546 mm^2), and 29 mm (mean diameter between 24 mm and 28 mm, area between 540 mm^2 and 683 mm^2) valve.
[b]Spearman correlation was done compared with the gold standard method, after dichotomizing the value based on the mean diameter and the area of the aortic annulus size for a 23 mm, 26 mm, and 29 mm valve.

Table 3 of the supplementary data.

Diagnostic values to determine the aortic annulus size using different diagnostic test for all balloon-expandable valve sizes.

	N	Value mm	Se (%)	Sp (%)	PPV (%)	NPV (%)	LR+	LR-	AI	YI
23 mm										
N-L CC with CTA	1256	20.75 22.95	52.4	75.9	50.0	77.6	2.17	0.62	0.68	0.28
N-L CC with Ao MC	393	≤ 21.95	67.6	86.0	64.6	87.5	4.82	0.37	0.80	0.53
N-L CC with Ao AC	129	≤ 22.55	72.7	74.0	49	88.8	2.79	0.36	0.73	0.46
26 mm										
N-L CC with CTA	1256	22.0 - 25.9	66.9	62.4	55.7	72.7	1.77	0.53	0.64	0.29
N-L CC with Ao MC	393	22.0 - 25.1	66.7	67.2	65.3	68.5	2.03	0.49	0.67	0.34
N-L CC with Ao AC	129	21.6 - 24.3	66.7	78.3	78.0	67.1	3.07	0.42	0.72	0.45
29 mm										
N-L CC with CTA	1256	≥ 24.3	79.6	81.1	53.9	93.5	4.21	0.25	0.80	0.60
N-L CC with Ao MC	393	≥ 24.3	76.7	80.5	53.9	92.1	3.93	0.28	0.79	0.57
N-L CC with Ao AC	129	≥ 24.3	80.8	84.5	56.8	94.6	5.21	0.22	0.83	0.65

*CTA values as gold-standard measurements, according to the size chart recommended based on mean diameter and area size for a 23 mm (mean diameter between 18 mm and 22 mm, area between 338 mm^2 and 430 mm^2), 26 mm (mean diameter between 21 mm and 25 mm, area between 430 mm^2 and 546 mm^2) and 29 mm (mean diameter between 24 mm and 28 mm, area between 540 mm^2 and 683 mm^2) valve. The values were obtained comparing the valve used (23 mm, 26 mm and 29 mm).

AI, accuracy index; AoAC, aortography with automatic calibration; AoMC, aortography with manual calibration; CTA, computed tomography angiography; LR+, positive likelihood ratio; LR-, negative likelihood ratio; mm, millimeters; N-L CC, non to left coronary cusp; NPV, negative predictive value; PPV, positive predictive value; Se, sensitivity; Sp, specificity; YI, Youden index.

Table 4 of the supplementary data

Intra and interobserver correlation and agreement between two different independent operators. The values measured were from aortogram from two different measurements in time.

	Pearson	*P*		ICC	95%CI	*P*
	Intra-observer					
A1 > A2	0.868	<.01		0.931	0.869-0.963	<.01
B1 > B2	0.863	<.01		0.908	0.778-0.957	<.01
	Inter-observer					
A1 > B1	0.819	<.01		0.902	0.814-0.948	<.01
A1 > B2	0.765	<.01		0.848	0.700-0.921	<.01
B1 > A2	0.875	<.01		0.933	0.874-0.965	<.01
A2 > B2	0.823	<.01		0.879	0.735-0.940	<.01

1, first measurement; 2, second measurement; A, operator 1; B, operator 2; ICC, intraclass correlation coefficient (using absolute agreement);
95%CI, 95% confidence interval.

Table 5 of the supplementary data

Diagnostic test in the validation cohort for each balloon-expandable valve size using the obtained angiographic values.

Valve size	Se	Sp	PPV	NPV	LR+	LR-	AI
23 mm	0.50	0.73	0.25	0.89	1.85	0.68	0.70
26 mm	0.44	0.73	0.73	0.44	1.63	0.76	0.55
29 mm	0.57	0.88	0.50	0.91	4.75	0.48	0.82

AI, accuracy index; NPV, negative predictive value; LR+, positive likelihood ratio; LR-, negative likelihood ratio; PPV, positive predictive value; Se, sensitivity; Sp, specificity.

Table 6 of the supplementary data. Baseline characteristics validation cohort

	Validation cohort (n = 40)
Age, years	81 [77.5-82.5]
Men	25 (62.5)
BMI, kg/m²	25.9 [24.3-29.3]
BSA, m²	1.96 ± 0.26
NYHA functional class III-IV	21 (52.5)
CCS III-IV	11 (27.5)
Arterial hypertension	36 (90)
Diabetes mellitus	13 (32.5)
Dyslipidemia	31 (77.5)
COPD	5 (12.5)
Smoking history	10 (25)
PAD	4 (10)
Previous PCI	11 (27.5)
CAD	23 (57.5)
1 vessel	6 (15)
2 vessels	7 (17.5)
3 vessels	10 (25)
Pacemaker	4 (10)
Previous MI	4 (10)
Previous CABG	6 (15)
Previous Stroke/TIA	6 (15)
Atrial fibrilation	16 (40)
Creatinine, mg/dL	1.09 [0.89-1.38]
eGRF	61.8 ± 17.4
Dialysis	0 (0)
Aortic insufficiency 2+	4 (10)
AVA, mm²	0.84 [0.67-1.14]
LVEF, %	58 [49-60]
Ao mean Gradient, mmHg	45 [36-59]
Ao maximal Gradient, mmHg	75 ± 27
sPAP, mmHg	42 ± 12
EuroScore I, %	10.87 [6.90-17.61]
EuroScore II, %	2.89 [1.90-5.96]
CTA measurements	
Minimal diameter, mm	21.5 ± 2.2
Maximal diameter, mm	27.9 ± 2.3
Mean diameter, mm	24.2 [23.6-25.8]
Area, mm²	459 [421-505]
Perimeter, mm	78 ± 6.7
Visual valve calcification severity	
Mild	4 (10)
Moderate	16 (40)
Severe	20 (50)
Visual annulus calcification severity	
None	3 (7.5)
Mild	24 (60)
Moderate	12 (30)
Severe	1 (2.5)
Visual LVOT calcification severity	
None	19 (47.5)
Mild	16 (40)
Moderate	5 (12.5)
Severe	0 (0)

Data is presented as mean ± SD, median with [IQR] and number (%).

Ao, aortic; AVA, aortic valve area; BMI, Body mass index; BSA, Body surface area; CABG, coronary artery bypass graft; CAD, coronary artery disease; CCS, Canadian Cardiovascular Society angina grading scale; COPD, chronic obstructive pulmonary disease; CTA, computed tomography angiography; eGFR, estimated glomerular filtration rate; LVEF, left ventricular ejection fraction; LVOT, left ventricular outflow tract; MI, myocardial infraction; mg/dL milligrams per deciliter; mL/min, milliliters per minute; mm², square millimeters; mmHg, millimeter mercury; NYHA, New York Heart Association functional classification; PAD, peripheral artery disease; PCI, percutaneous coronary intervention; sPAP, systolic pulmonary artery TIA, transient ischemic attack.

Table 7 of the supplementary data.

Procedural characteristics validation cohort

	Validation cohort (n = 40)
Elective	36 (90)
Need of intubation	1 (2.5)
Emergency	1 (2.5)
Use of ECMO	0 (0)
Use of cerebral protection device	1 (2.5)
Size of the valve implanted	
23 mm	4 (10)
26 mm	16 (40)
29 mm	5 (12.5)
S	1 (2.5)
M	9 (22.5)
L	5 (12.5)
THV implanted	
Sapien 3	5 (12.5)
Sapien 3 Ultra	20 (50)
Acurate neo2	15 (37.5)
Pre-dilatation	31 (77.5)
Post-dilatation	15 (37.5)
Contrast media, mL	170 [131-210]
Fluoroscopic time, min	13.5 [9.5-17.1]
Fluoroscopic dose, cGys/cm²	2001 [1106-4919]
Procedure time, min	55 [45- 62]
Device success	38 (95)
Procedural success	38 (95)
Intended performance	39 (97.5)
Correct position	40 (100)
Multiple valves	0 (0)
Access site complication	2 (5)
THV embolisation	0 (0)
Tamponade	1 (2.5)
Annulus rupture	0 (0)
Coronary impairment	0 (0)
Procedural CPR	1 (2.5)
Conversion to surgery	1 (2.5)
Procedural death	1 (2.5)
Angiographic AI ≥moderate	0 (0)
Mean gradient pos-procedure, mmHg	10 ± 4
Days in ICU	1 [1-1]

Data is presented as mean ± SD, median with [IQR] and number (%). AI, aortic insufficiency; CPR, cardiac pulmonary reanimation; ECMO, extra corporeal membrane oxygenator; ICU, intensive care unit; mm, millimeters; mL, milliliters; min, minutes; cGys/cm^2, centiGrays per square centimeters; THV, transcatheter heart valve.

Table 8 of the supplementary data. In-hospital complications validation cohort

	Validation cohort (n = 40)
Lifethreatening bleeding	3 (7.5)
Major bleeding	3 (7.5)
Minor bleeding	5 (12.5)
Vascular major	6 (15)
Vascular minor	5 (12.5)
TIA	0 (0)
Stroke major	0 (0)
Stroke minor	0 (0)
Myocardial infarction	0 (0)
New pacemaker implantation	2 (5)
In-hospital death	1 (2.5)

Data is presented as number (%).
TIA, transient ischemic attack.

Table 9 of the supplementary data. Procedure-related complications in concordant and discordant valve size in aortography with manual and with automatic calibration versus CTA

	Manual calibration (n = 40)				Automatic calibration (n = 40)			
	Validation cohort (n = 40)	Discordant N = 17	Concordant N = 23	*P* *	Validation cohort (n = 40)	Discordant N = 20	Concordant N = 20	*P**
Efficacy Technical success Correct position Intended performance	38 (95) 38 (95) 40 (100) 39 (97.5)	16 (94.1) 16 (94.1) 17 (100) 16 (94.1)	22 (95.7) 22 (95.7) 23 (100) 23 (100)	>.99 >.99 NA .42	38 (95) 38 (95) 40 (100) 39 (97.5)	18 (90) 18 (90) 20 (100) 20 (100)	19 (95) 20 (100) 20 (100) 19 (95)	.48 .48 NA > .99
Safety Multiple valves THV embolisation New pacemaker implantation Post valve implantation AI more than moderate	38 (95) 0 (0) 0 (0) 2 (5) 0 (0)	15 (88.2) 0 (0) 0 (0) 2 (11.8) 0 (0)	23 (100) 0 (0) 0 (0) 0 (0) 0 (0)	.17 NA NA .17 NA	38 (95) 0 (0) 0 (0) 2 (5) 0 (0)	18 (90) 0 (0) 0 (0) 2 (10) 0 (0)	20 (100) 0 (0) 0 (0) 0 (0) 0 (0)	> .99 NA NA .48 NA
Conversion to surgery	1 (2.5)	1 (5.9)	0 (0)	.42	1 (2.5)	1 (5)	0 (0)	> .99
Procedural death	1 (2.5)	1 (5.9)	0 (0)	.42	1 (2.5)	1 (5)	0 (0)	> .99
Lifethreatening bleeding	3 (7.5)	2 (11.8)	1 (4.3)	.56	3 (7.5)	2 (10)	1 (5)	> .99
Major bleeding	3 (7.5)	1 (5.9)	2 (8.7)	> .99	3 (7.5)	1 (5)	2 (10)	> .99
Minor bleeding	5 (12.5)	3 (17.6)	2 (8.7)	.63	5 (12.5)	2 (10)	3 (15)	> .99
Vascular major	6 (15)	3 (17.6)	3 (13)	> .99	6 (15)	3 (15)	3 (15)	> .99
Vascular minor	5 (12.5)	3 (17.6)	2 (8.7)	.63	5 (12.5)	2 (10)	3 (15)	> .99
In-hospital death	1 (2.5)	1 (5.9)	0 (0)	.42	1 (2.5)	1 (5)	0 (0)	> .99

Data is presented as number (%). AI, aortic insufficiency; CTA, computed tomography angiography; NA, not applicable.

*Fisher exact test.

Table 10 of the supplementary data. 30-days follow-up comparing concordant versus discordant measurements

	N-L cusp aortography measurement with manual calibration				N-L cusp aortography measurement with automatic calibration			
	Total n = 40	Discordant n = 17	Concordant n = 23	*P*	Total n = 40	Discordant n = 20	Concordant n = 20	*P*
Mortality	1 (2.5)	1 (5.9)	0 (0)	.42[a]	1 (2.5)	1 (5)	0 (0)	> .99[a]
CHF	0 (0)	0 (0)	0 (0)	NA	0 (0)	0 (0)	0 (0)	NA
Stroke	0 (0)	0 (0)	0 (0)	NA	0 (0)	0 (0)	0 (0)	NA
Valve dysfunction	0 (0)	60 [53-63]	60 [60-60]	< .91[b]	0 (0)	60 [56-60]	60 [60-60]	.90[b]
LVEF, %, (n 21)	60 [57-60]	9 [8-10]	12 [9-15]	.49[b]	60 [57-60]	9 [8-11]	14 [12-17]	.10[b]
Mean Gradient, mmHg, (n 21)	10 [8-14]	0 (0)	0 (0)	NA	10 [8-14]	0 (0)	0 (0)	NA
AI more than moderate (n 22)	0 (0)	1 (5.9)	0 (0)	.42[a]	0 (0)	1 (5)	0 (0)	> .99[a]
NYHA ≥ III	1 (2.5)				1 (2.5)			

Data is presented as median with [IQR] and number (%).
AI, aortic insufficiency; CHF, congestive heart failure; IQR, interquartile range; LVEF, left ventricle ejection fraction; mmHg, millimeters mercury; NA, not applicable; N-L, non to left; NYHA, New York Heart Association functional class.

[a]Fisher exact test.
[b]U-Mann-Whitney test.