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James C. Lee, MD, Gennaro Giustino, MD, Dee Dee Wang, MD, William W. O'Neill, MD, Brian P.
O'Neill, MD**

DISCLOSURE

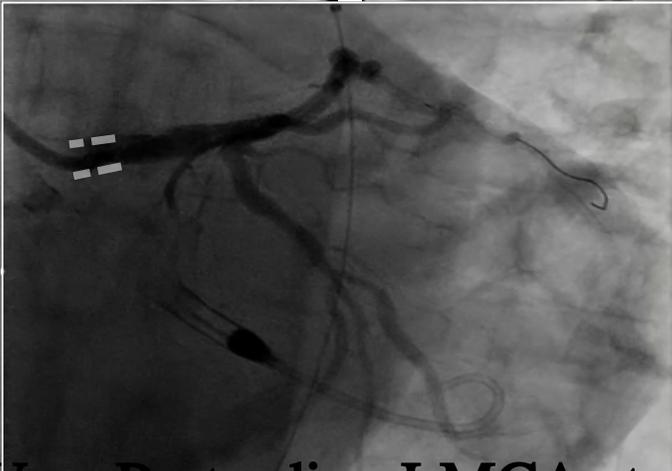
Jonathan X Fang, MBBS – No relevant disclosure

Brian O’Neill, MD - Consultant to and receives research support from Edwards Lifesciences

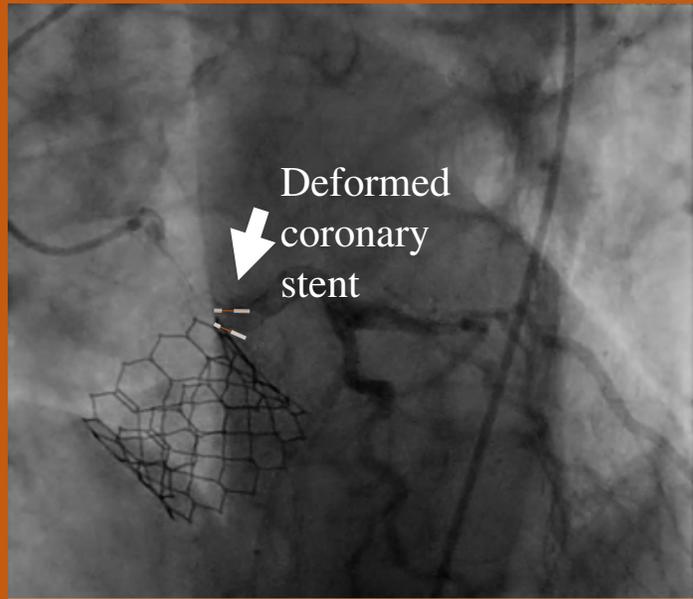
BACKGROUND

LAO 3 CAUD 4

LAO 27 CAUD 14

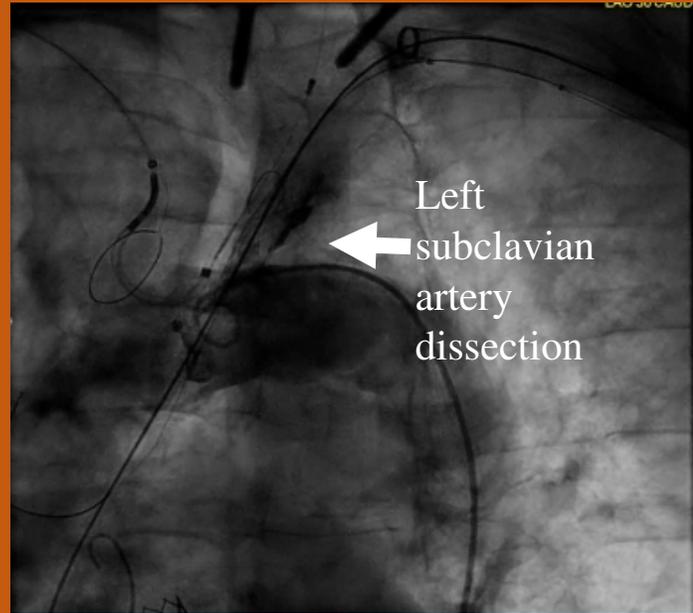


THV vs Protruding LMCA stent



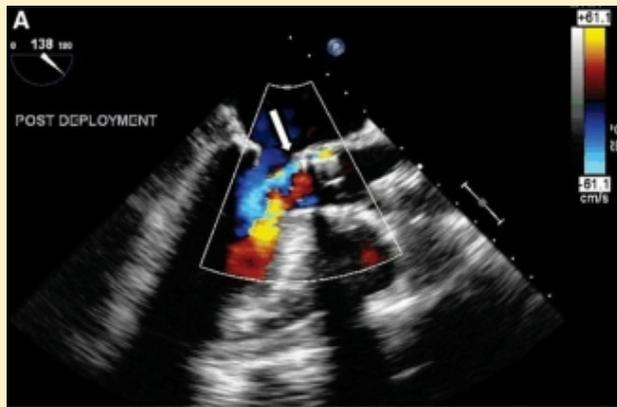
Deformed
coronary
stent

Stent deformat / fracture
Challenging coronary access



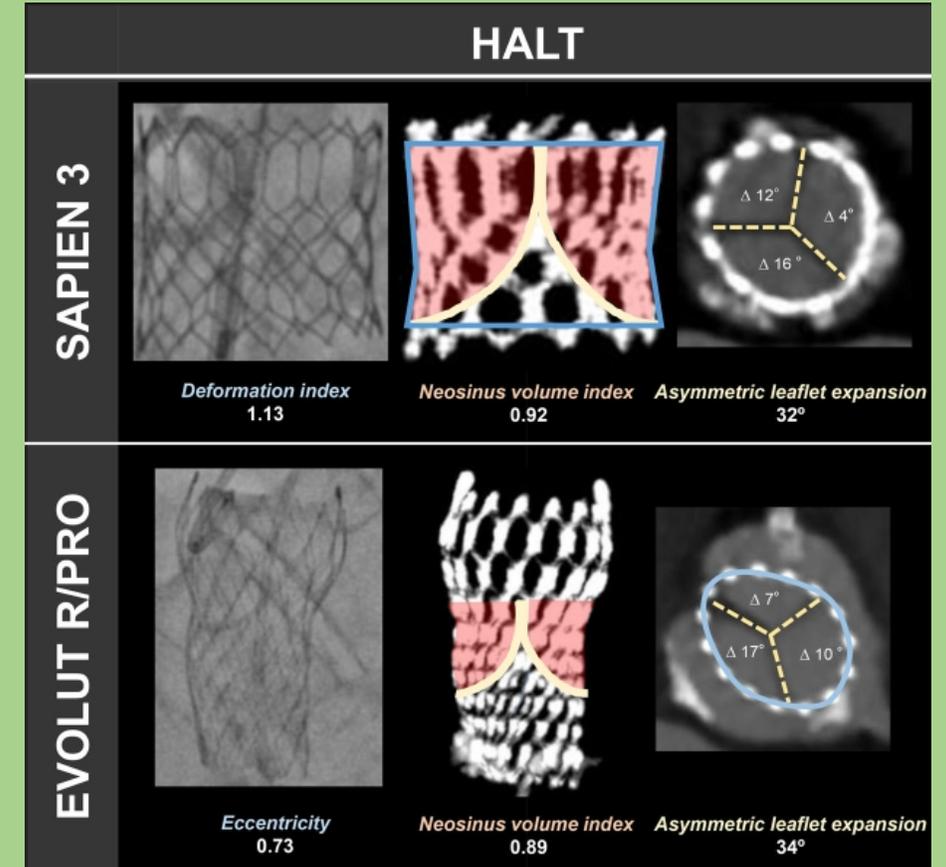
Left
subclavian
artery
dissection

Vascular trauma from ruptured
balloon



Paravalvular leak

Lerakis S, Hayek SS, Douglas PS. Paravalvular Aortic Leak After Transcatheter Aortic Valve Replacement. *Circulation*. 2013;127(3):397-407.

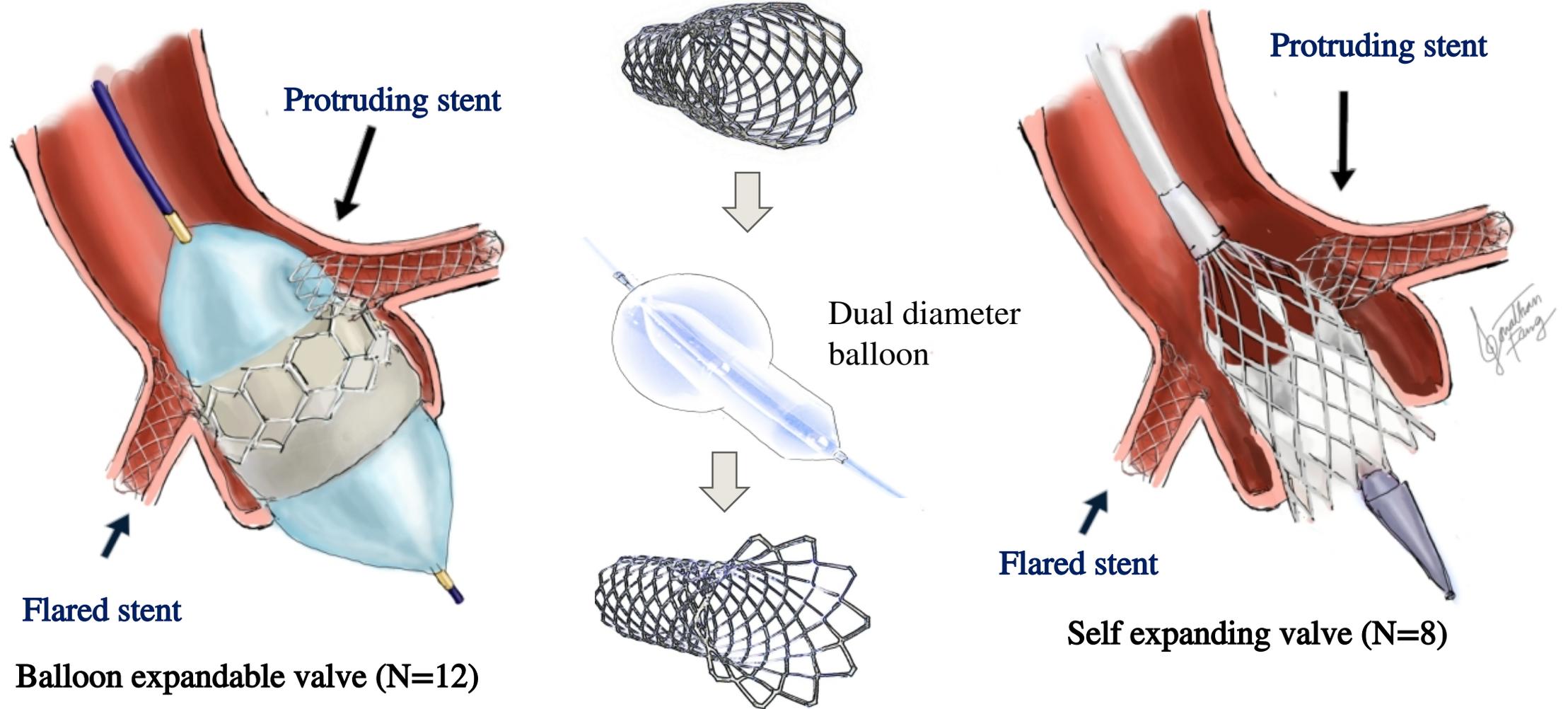


Hypoattenuating leaflet thickening

Fukui M, Bapat VN, Garcia S, Dworak MW, Hashimoto G, Sato H, et al. Deformation of Transcatheter Aortic Valve Prostheses: Implications for Hypoattenuating Leaflet Thickening and Clinical Outcomes. *Circulation*. 2022;146(6):480-93.

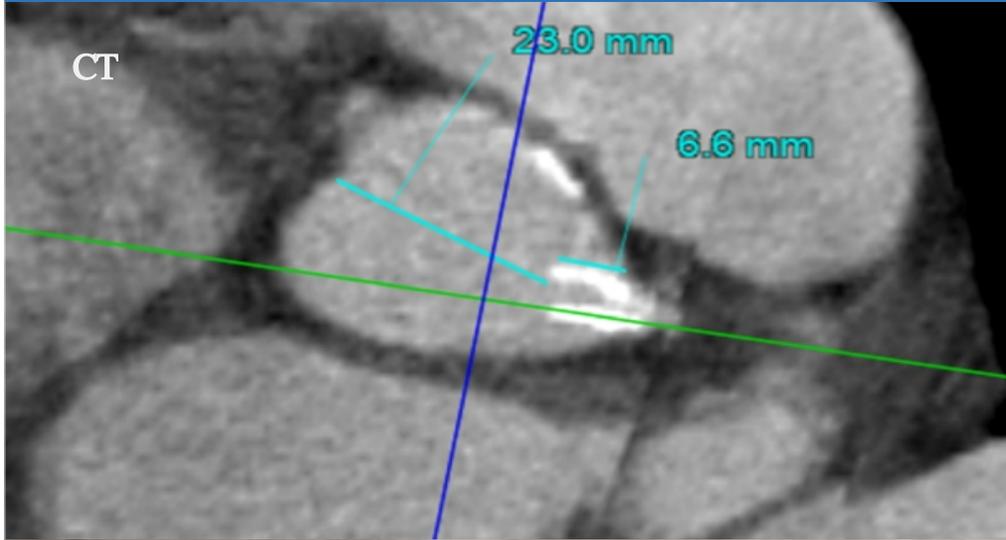
METHODS

20 consecutive patients, 22 total protruding stents requiring flaring pre-



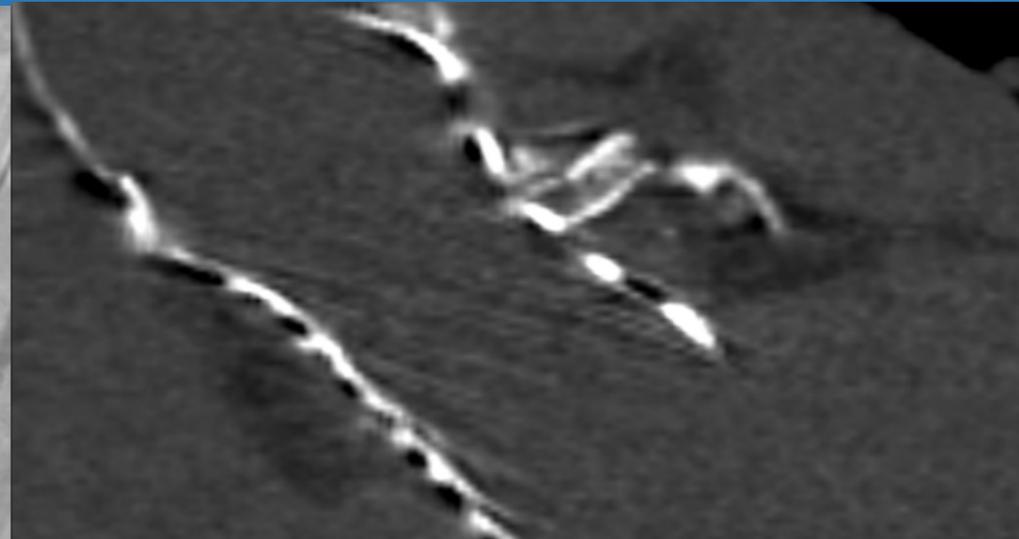
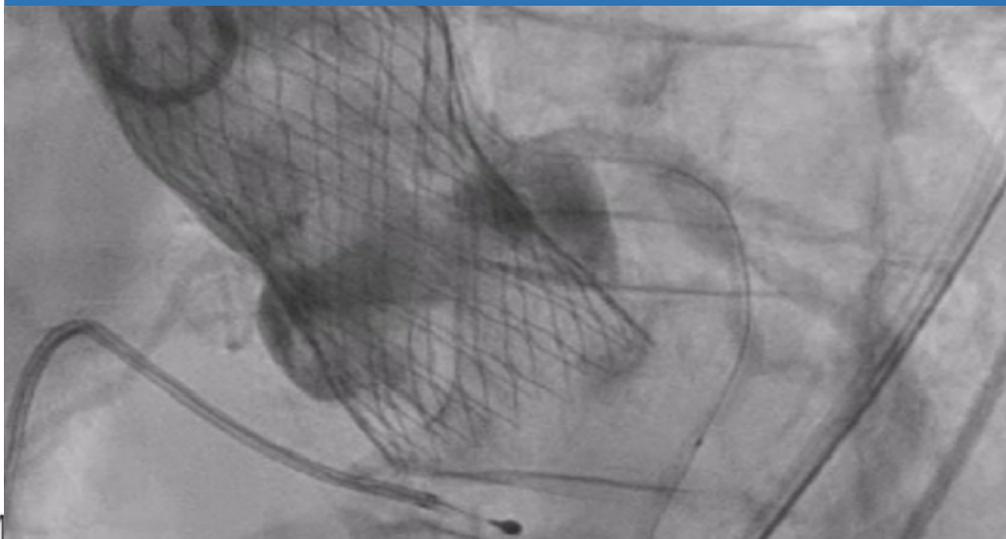
Stent protrusion and distance to opposite wall on

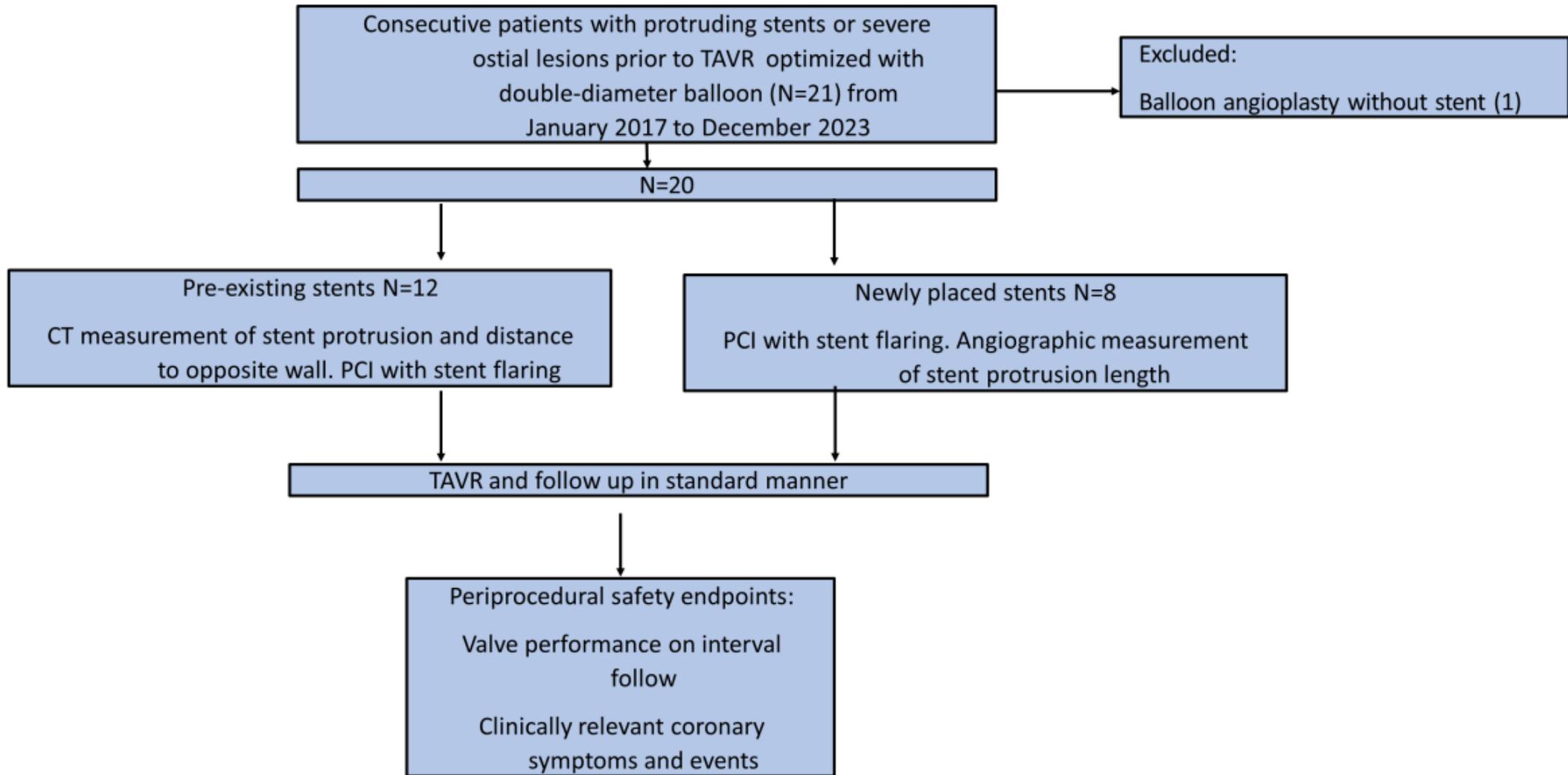
Balloon sizing by IVUS



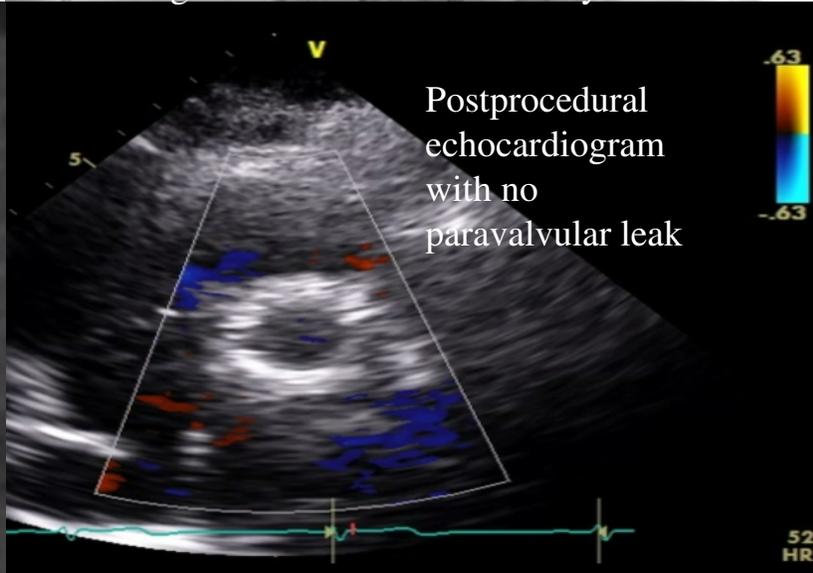
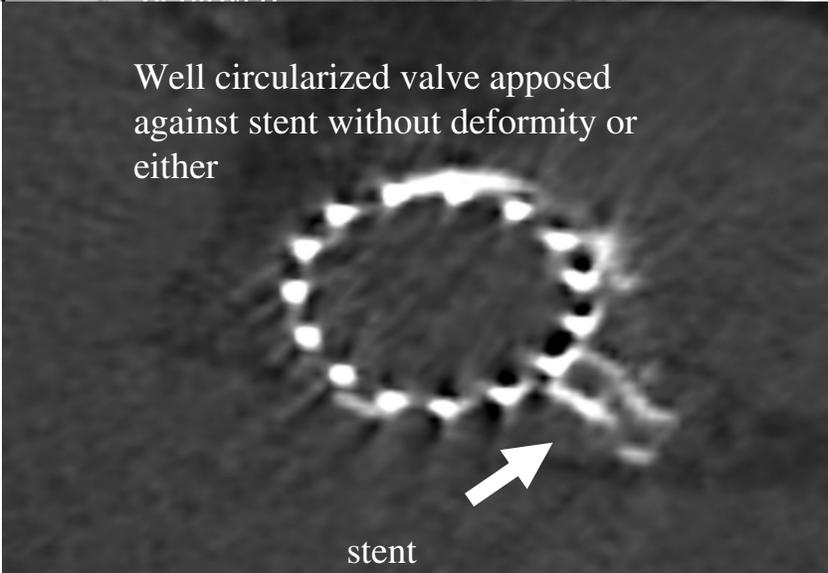
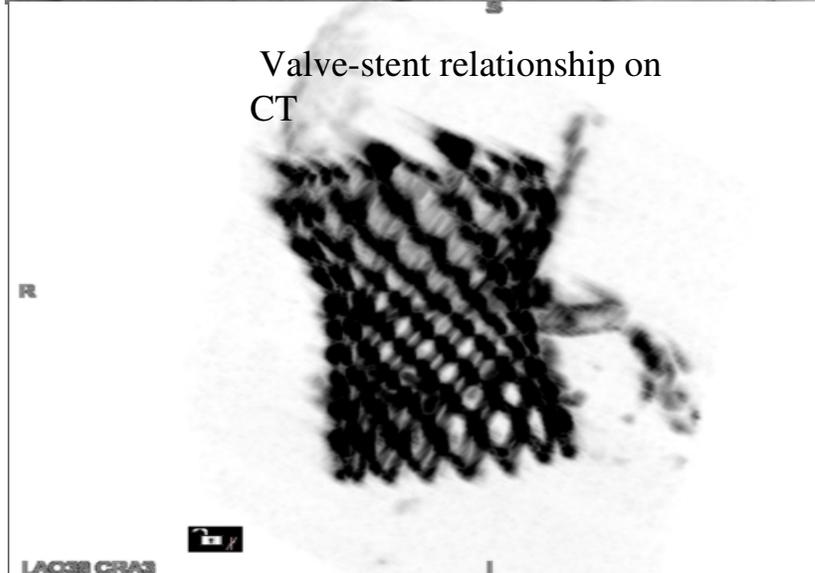
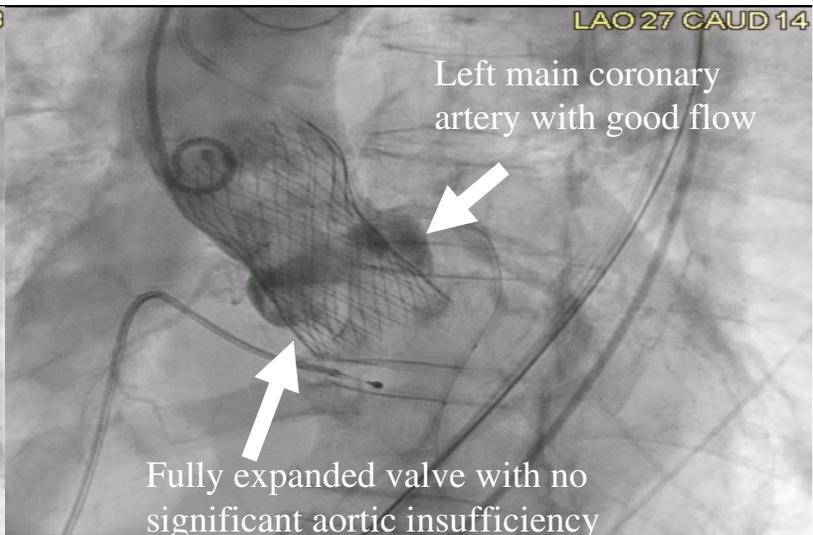
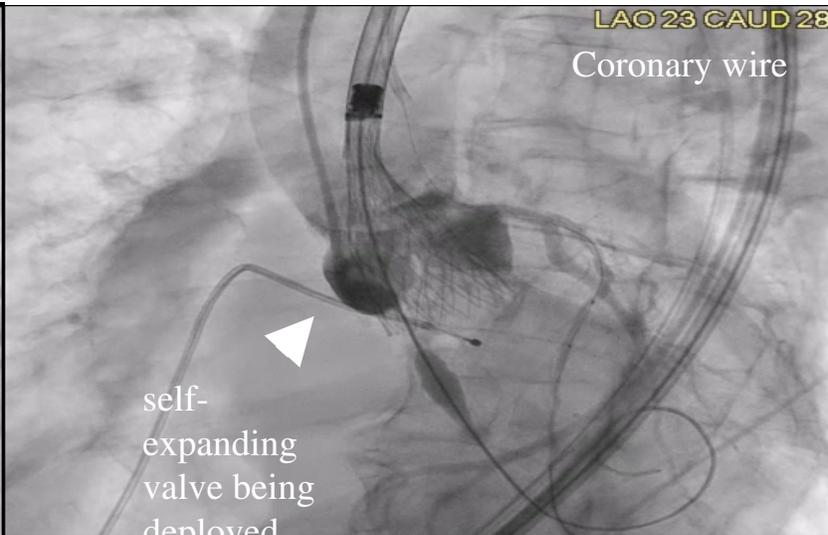
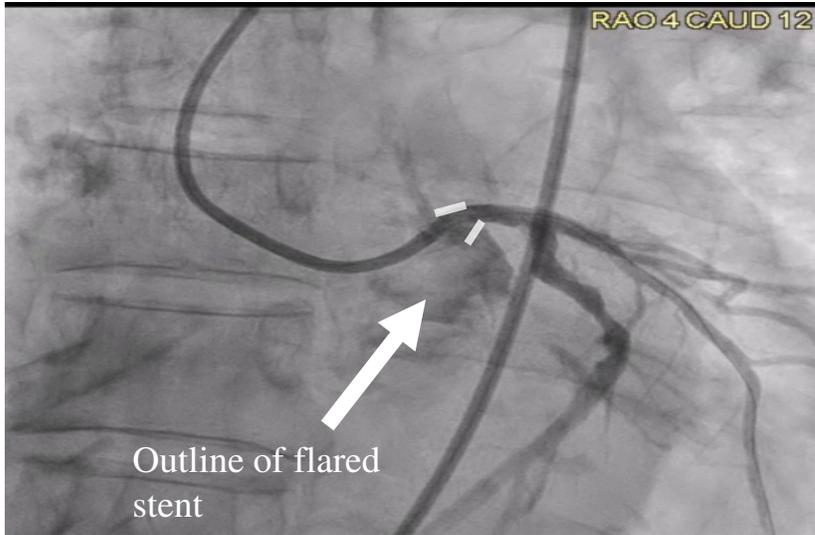
Valve deployment

Assess Valve-stent geometry





RESULT



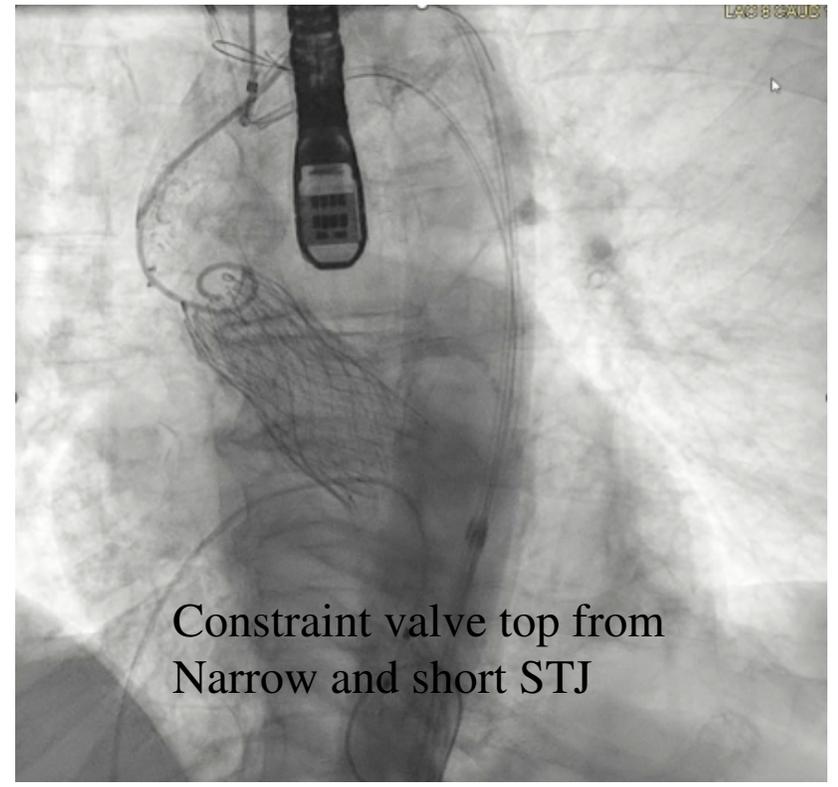
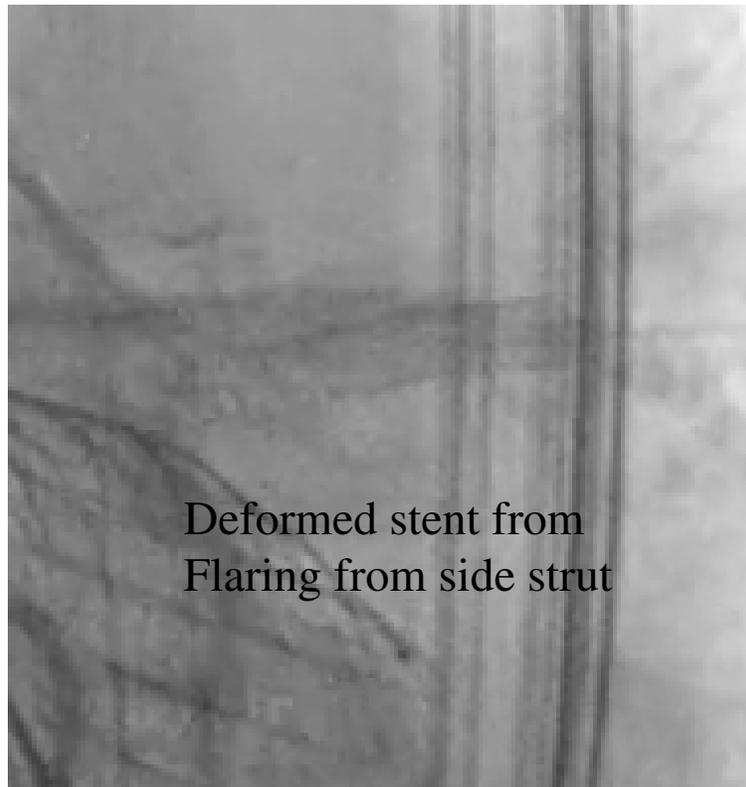
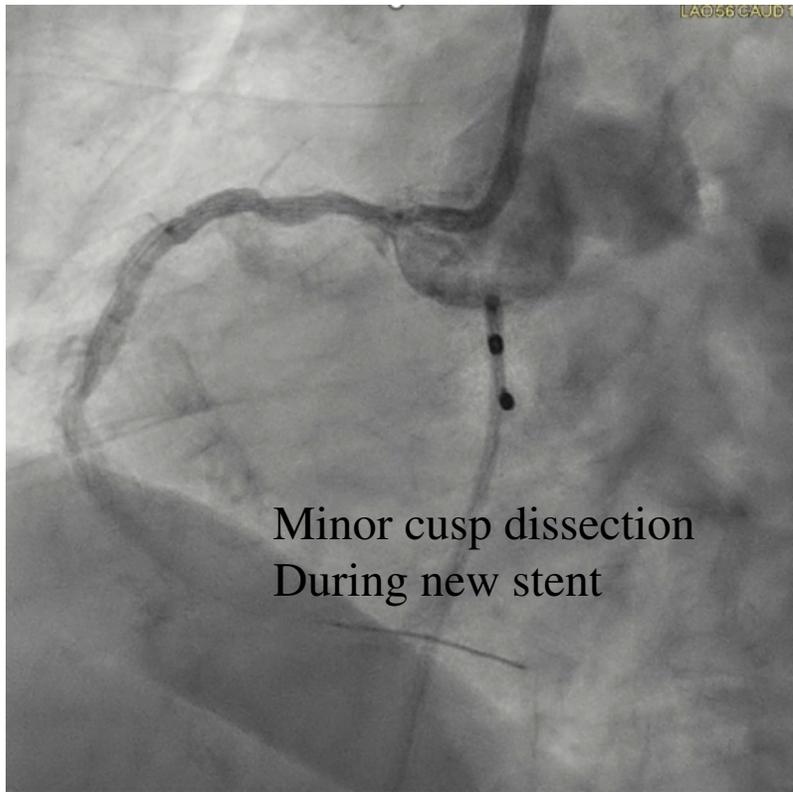
Demographics

		Total N=20	New Stents N=8	Pre-existing stents N=12	p-value
Male sex		7 (35%)	2 (25%)	5 (42%)	0.44
Age		81.25 (76.02-85.30)	80.82 (78.07-84.28)	81.66 (70.32-86.32)	0.76
Prior pacemaker		4 (20%)	1 (13%)	3 (25%)	0.49
Prior malignancy		5 (25%)	1 (13%)	4 (33%)	0.29
Creatinine(mg/dL)		.98 (.79-1.21)	.925 (.76-1.185)	.985 (.79-1.21)	0.88
eGFR		71 (54-78)	66.5 (43-89)	75 (58-76)	0.72
Hemoglobin(g/L)		11.45 (10.7-12.65)	11.5 (10.3-13)	11.3 (10.7-12.2)	0.73
STS score		4.5 (3.45-7.05)	3.45 (2.87-5.6)	4.715 (4.195-8.675)	0.19
Surgical risk	Low	1 (5%)	1 (13%)	0 (0%)	0.49
	Intermediate	9 (45%)	4 (50%)	5 (42%)	
	High	5 (25%)	2 (25%)	3 (25%)	
	Prohibitive	5 (25%)	1 (13%)	4 (33%)	
KCCQ score		58.3 (44.79-77)	73.44 (54.15-77.82)	50 (26.69-73.96)	0.19
Frailty index	0	7 (39%)	3 (38%)	4 (40%)	0.40
	1	8 (44%)	4 (50%)	4 (40%)	
	2	2 (11%)	0 (0%)	2 (20%)	
	3	1 (6%)	1 (13%)	0 (0%)	
LVEF(%)		61.5 (42.5-65.5)	58.5 (46-65)	62 (38-67.5)	0.94
Concomitant severe MS/MR		5 (25%)	1 (13%)	4 (33%)	0.29
Days from PCI to stent flaring		0 (0-640.5)	0 (0-0)	393 (10.5-1137)	0.002
Days from stent flaring to TAVR		24.5 (.5-60.5)	43 (22.5-66.5)	12.5 (0-45.5)	0.12

Procedural characteristics

		Total N=20	New Stents N=8	Pre-existing stents N=12	p-value
Pre-TAVR					
Bicuspid valve		2 (10%)	0 (0%)	2 (17%)	0.22
Intra-procedure					
Coronary vessel intervened	LMCA	6 (30%)	3 (38%)	3 (25%)	0.76
	RCA	12 (60%)	4 (50%)	8 (67%)	
	Both	2 (10%)	1 (13%)	1 (8%)	
Flare from side strut		2 (10%)	0 (0%)	2 (17%)	0.22
Stent diameter		4.25 (3.75-4.5)	4.75 (4-5)	4 (3.75-4.5)	0.057
Ostial flash balloon size		4.75 (4-5)	5 (4-5)	4.25 (4-5)	0.33
Intravascular imaging		14 (70%)	7 (88%)	7 (58%)	0.16
Drug eluting stent		17 (85%)	7 (88%)	10 (83%)	0.80
Max stent protrusion length		4.25 (3.55-5.9)	4.45 (4.05-5.65)	3.75 (2.45-6.7)	0.42
Stent edge to opposing wall		24.15 (22.55-26.95)		24.15 (22.55-26.95)	
Vascular access	Transfemoral	15 (75%)	6 (75%)	9 (75%)	0.66
	Transcaval	4 (20%)	2 (25%)	2 (17%)	
	Transaxillary	1 (5%)	0 (0%)	1 (8%)	
Valve type	Sapien	12 (60%)	4 (50%)	8 (67%)	0.42
	Evolut	7 (35%)	3 (38%)	4 (33%)	
	Lotus	1 (5%)	1 (13%)	0 (0%)	
Sapien oversize (%)		8.285 (7.26-10.34)	9.685 (7.43-11.055)	7.89 (7.26-10.04)	0.31
Prior balloon Valvuloplasty		11 (55%)	5 (63%)	6 (50%)	0.58
Postdilation		4 (20%)	0 (0%)	4 (33%)	0.068
BASILICA		1 (5%)	0 (0%)	1 (8%)	0.40
Coronary protection		3 (15%)	0 (0%)	3 (25%)	0.13
Postdilation		4 (20%)	0 (0%)	4 (33%)	0.068
Stent location to top of valve frame	Below	9 (45%)	5 (63%)	4 (33%)	0.44
	On edge	4 (20%)	1 (13%)	3 (25%)	
	Above	7 (35%)	2 (25%)	5 (42%)	
Stent deformity of final		1 (5%)	0 (0%)	1 (8%)	0.40

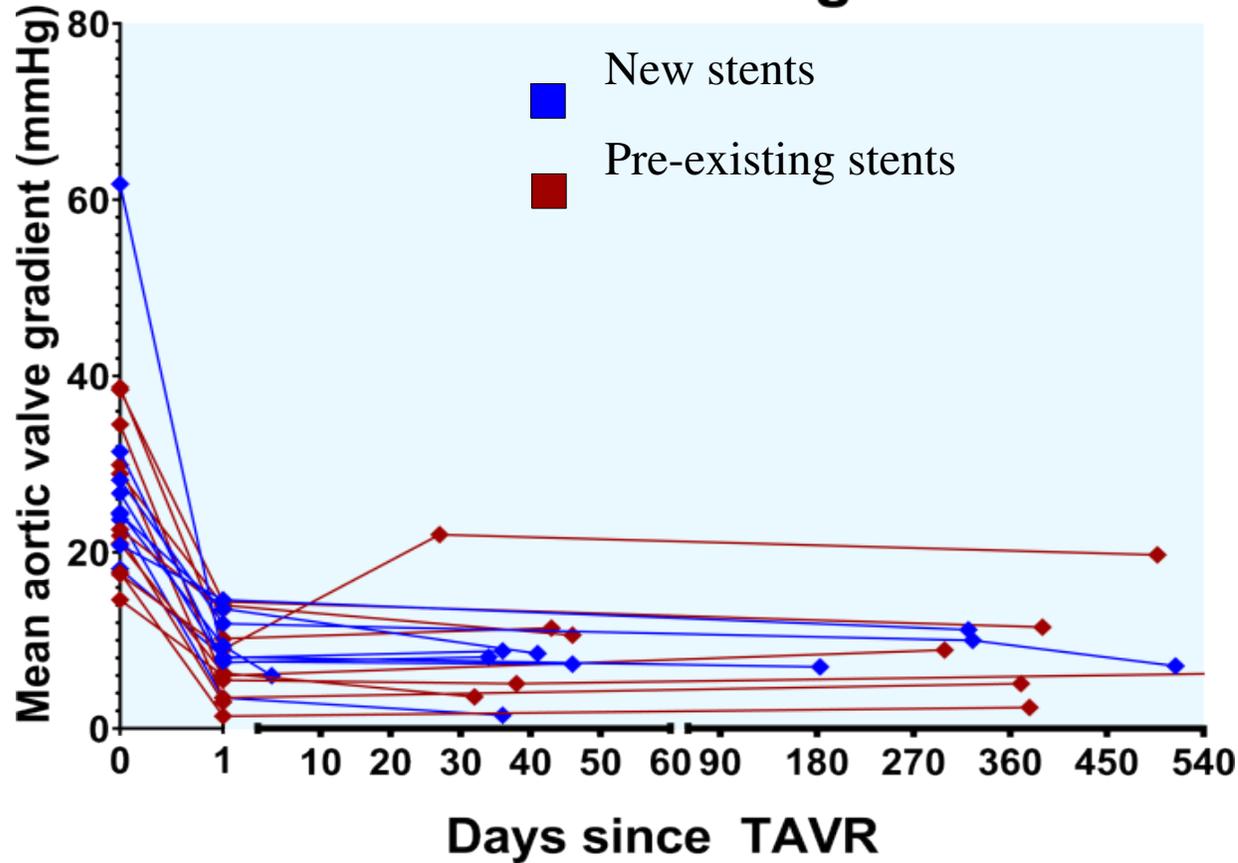
LMCA 30% RCA 60% Both 10%. Bicuspid 10%. Stent protrusion 4.25mm.
 Balloon- expandable valve 40% Self- expanding valve 60%. Oversize 8.5 % Coronary protection 15 %
 Postdilation 20% Access: 75% transfemoral 25% transcaval 5% transaxillary



Events

During Stent flaring procedure	During TAVR procedure
Right common femoral artery dissection, treated with cover stent (1)	Right common femoral artery pseudoaneurysm, treated with cover stent (1)
RCA cusp dissection during contrast injection. Resolved on follow-up angiogram prior to TAVR (1)	Complete heart block one day post-TAVR with CPR done and PPM implantation. Subsequent poor neurological status and passed away 3 days post TAVR after opted for conservative management (1)
	Interventricular and subarachnoid hemorrhage post procedure treated with external ventricular drain (EVD) (1)

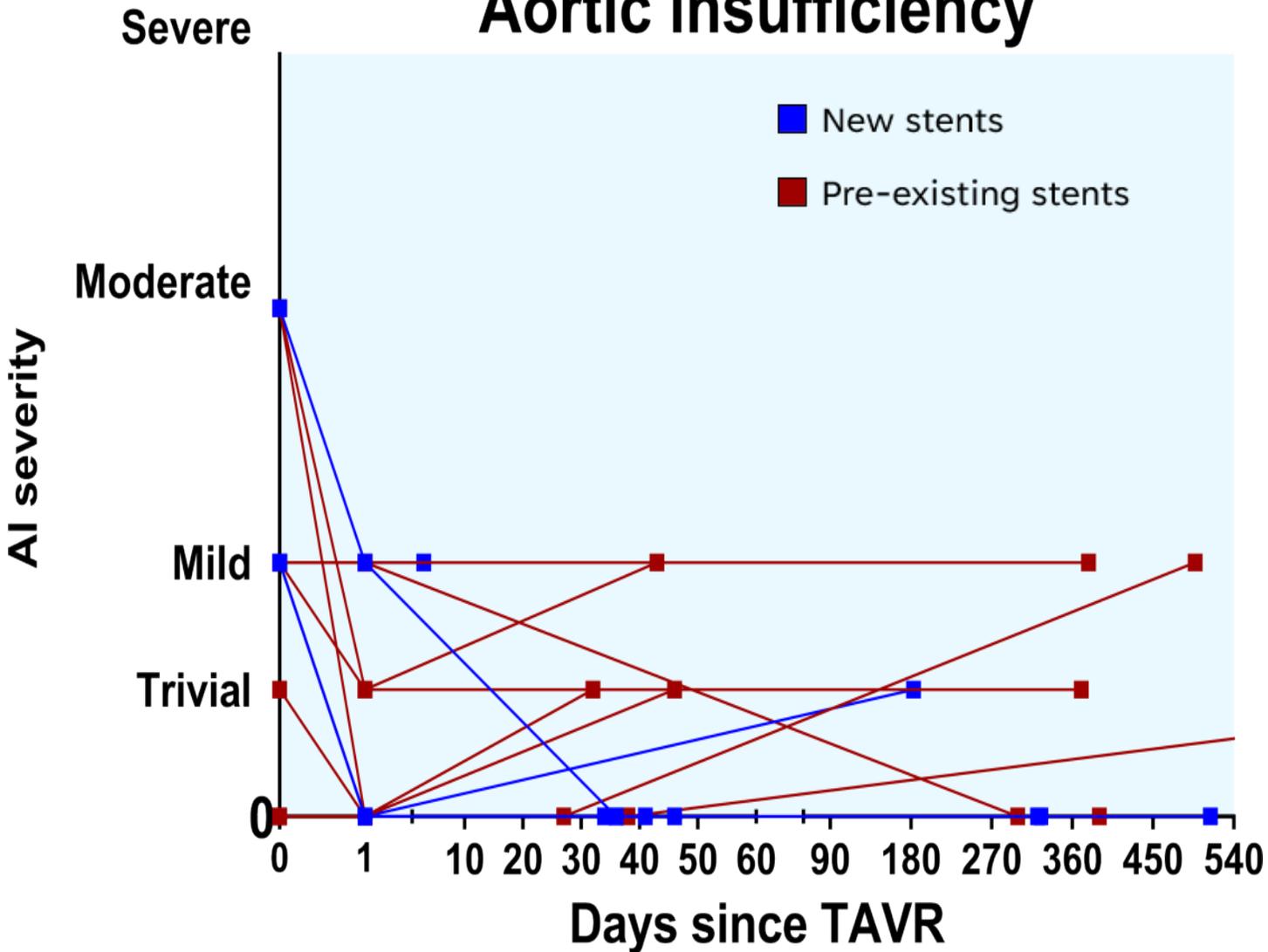
Mean aortic valve gradient



	Total N=20	New Stents N=8	Pre- existing stents N=12	p-value
Post-procedure				
Peak gradient	17.15 (11.6-25.05)	17.85 (16.5-25.35)	15.05 (10.35-21.7)	0.33
Mean gradient	7.85 (4.5-12.7)	8.5 (5.5-12.75)	7.2 (4.5-11.85)	0.67
On follow-up				
Peak gradient	18.15 (11-21.75)	18.15 (15.95-21.5)	17.35 (8.8-21.5)	0.94
Mean gradient	8.3 (5.1-10.9)	8.3 (6.65-9.4)	7.95 (4.35-11.85)	0.76
TAVR to clinical follow-up days	414 (71-592)	280.5 (66-573)	414 (71-740.5)	0.67

1 patient had moderate hemodynamic valve degeneration(VARC-3). Mean gradient 20mmHg

Aortic insufficiency



	Total N=20	New Stents N=8	Pre-existing stents N=12	p-value	
AI on final aortogram	none	6 (75%)	5 (42%)	0.34	
	Trivial	1 (13%)	3 (25%)		
	mild	1 (13%)	4 (33%)		
Post-procedure Paravalvular leak	None	7 (88%)	9 (75%)	0.66	
	Trivial	0 (0%)	1 (8%)		
	Mild	1 (13%)	2 (17%)		
On follow-up Paravalvular leak	None	8 (100%)	7 (58%)	0.11	
	Trivial	0 (0%)	3 (25%)		
	Mild	0 (0%)	2 (17%)		
Paravalvular leak present	5 (25%)	0 (0%)	5 (42%)	0.035	
PVL location (o'clock)--coronary	1--LM	1 (20%)		1 (20%)	
	3--RCA	1 (20%)		1 (20%)	
	7--RCA	1 (20%)		1 (20%)	
	9--Both	1 (20%)		1 (20%)	
	11--RCA	1 (20%)		1 (20%)	
TAVR to follow-up TTE days	46.00 (35.00-	38.50 (35.00-	241.00 (37.50-	0.37	

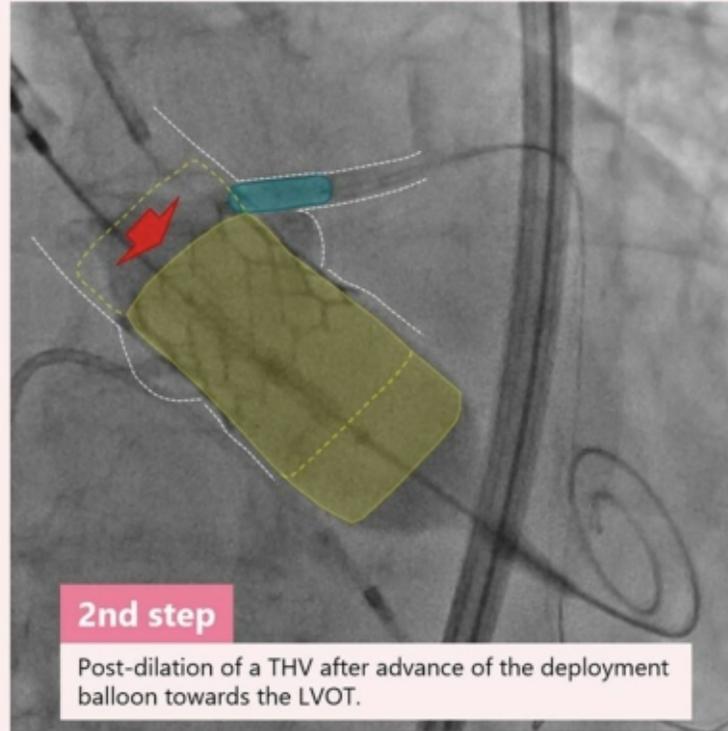
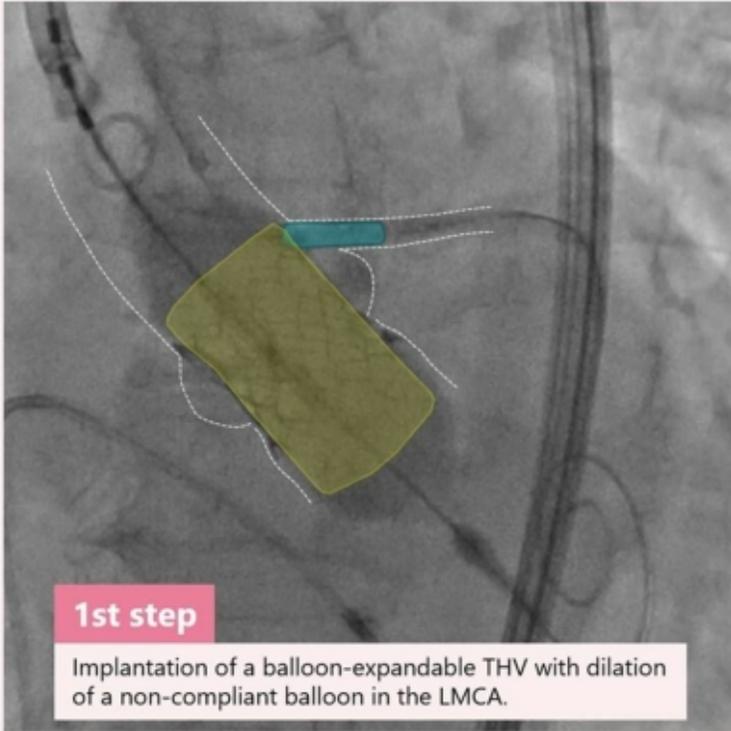
Subclinical PVL in patients with new stents

Median follow up period : 414 (71-592 days) from TAVR

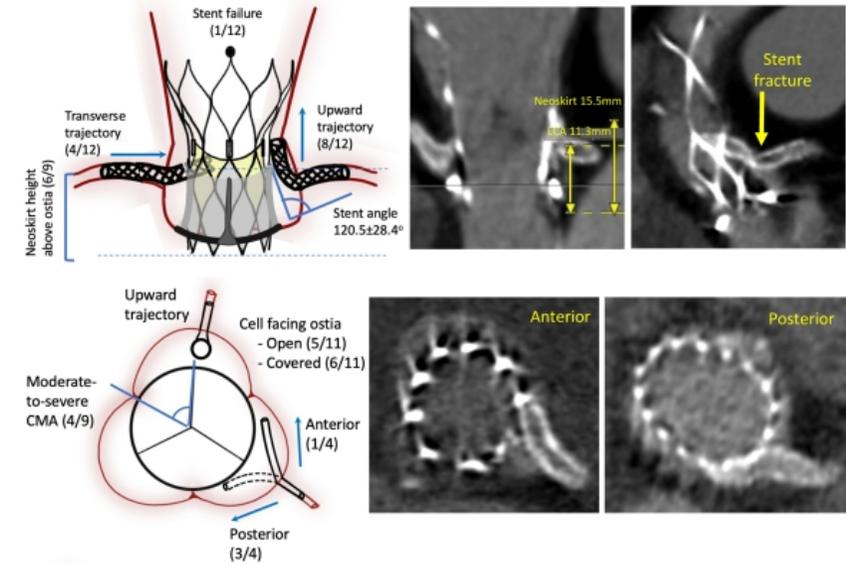
	days
Moderate HVD, patient asymptomatic (1)	30
Dyspnea on exertion with Negative stress Echo (1) -	225
Atypical chest pain. Coronary arteriogram showed pre-existing mid RCA 50% disease, physiologically insignificant with negative iFR =0.97 (1)	384
Non-cardiac Mortality:-due to newly diagnosed metastatic Adenocarcinoma (1), Covid-19 pneumonia (1), Peritonitis (1)	527, 1740, 540

DISCUSSION

TAVR for a patient with protruding stent in the LMCA using the two-step inflation technique and the kissing-balloon technique



Post-TAVR CT: mechanism of coronary obstruction & stent morphology and position

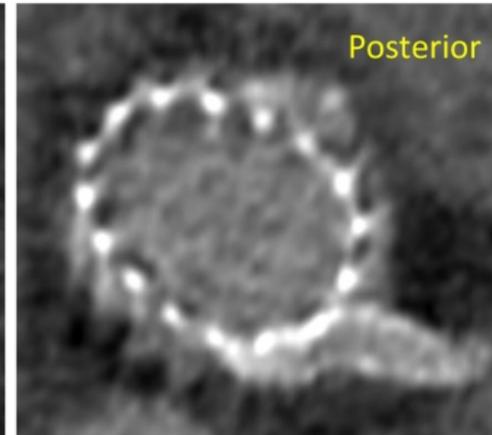
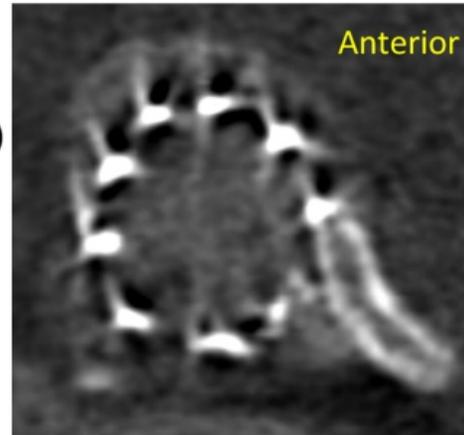
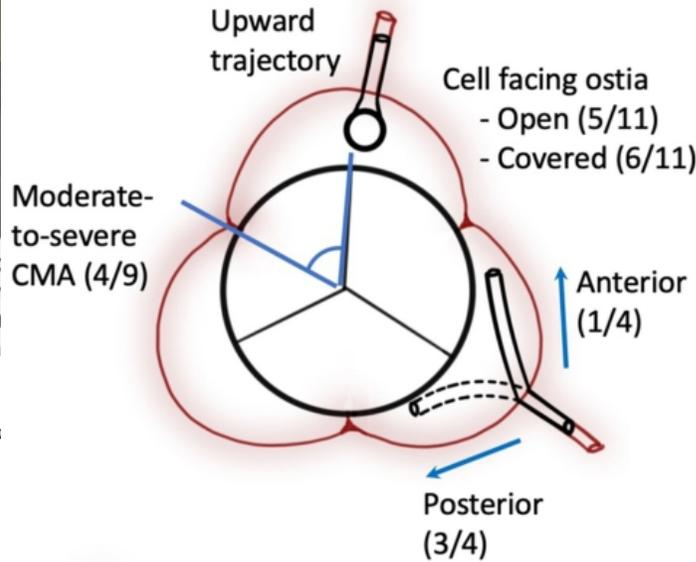
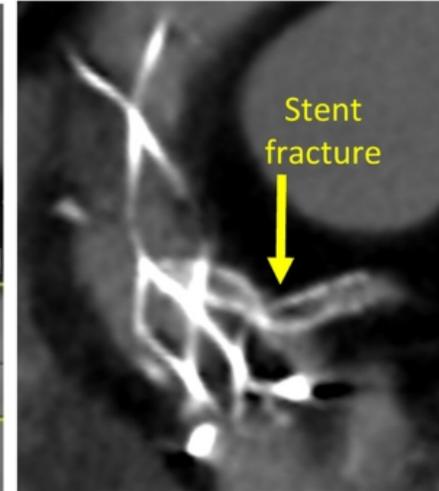
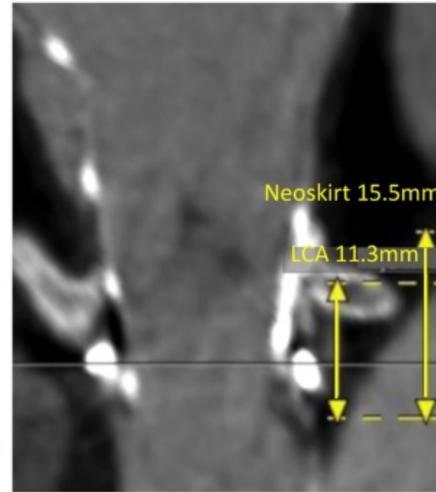
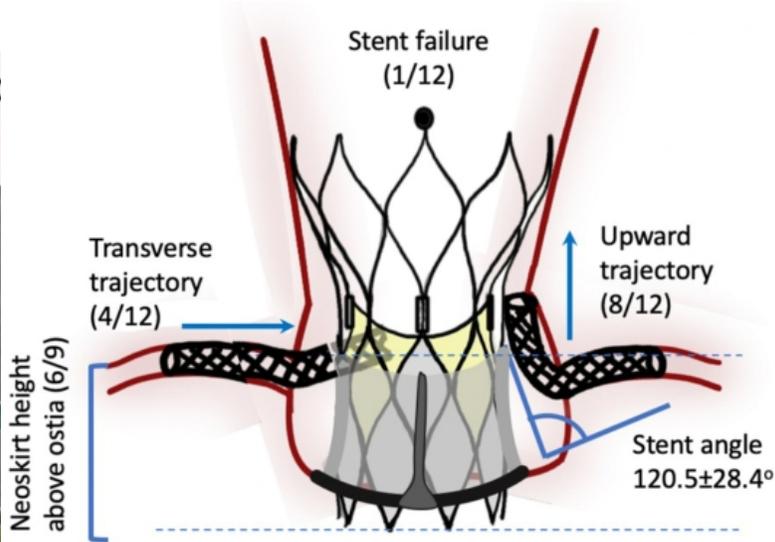
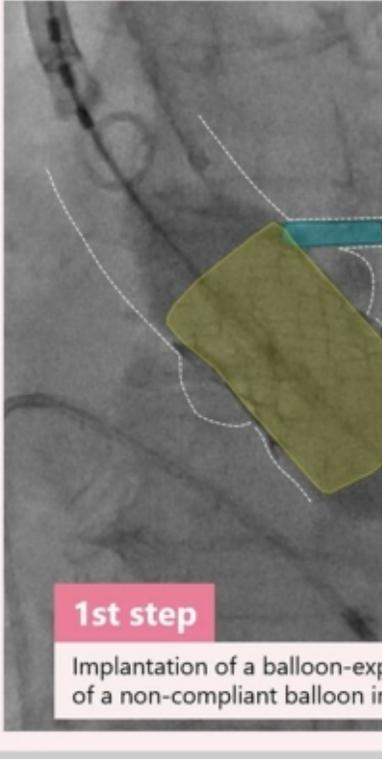


Paredes-Vázquez, J, Tirado-Conte, G, Jiménez-Quevedo, P. et al.
Computed Tomography Analysis of Coronary Chimney Stenting Following
Transcatheter Aortic Valve Replacement. *J Am Coll Cardiol Interv.*

Ohi, Takuma et al. "Transcatheter aortic valve replacement using the two-step inflation technique and the kissing-balloon technique for a patient with a protruding stent in the left main coronary artery: a case report." *European heart journal. Case reports* vol. 7,12 yta575. 30 Nov. 2023

Post-TAVR CT: mechanism of coronary obstruction & stent morphology and position

TAVR for using **the two-step**



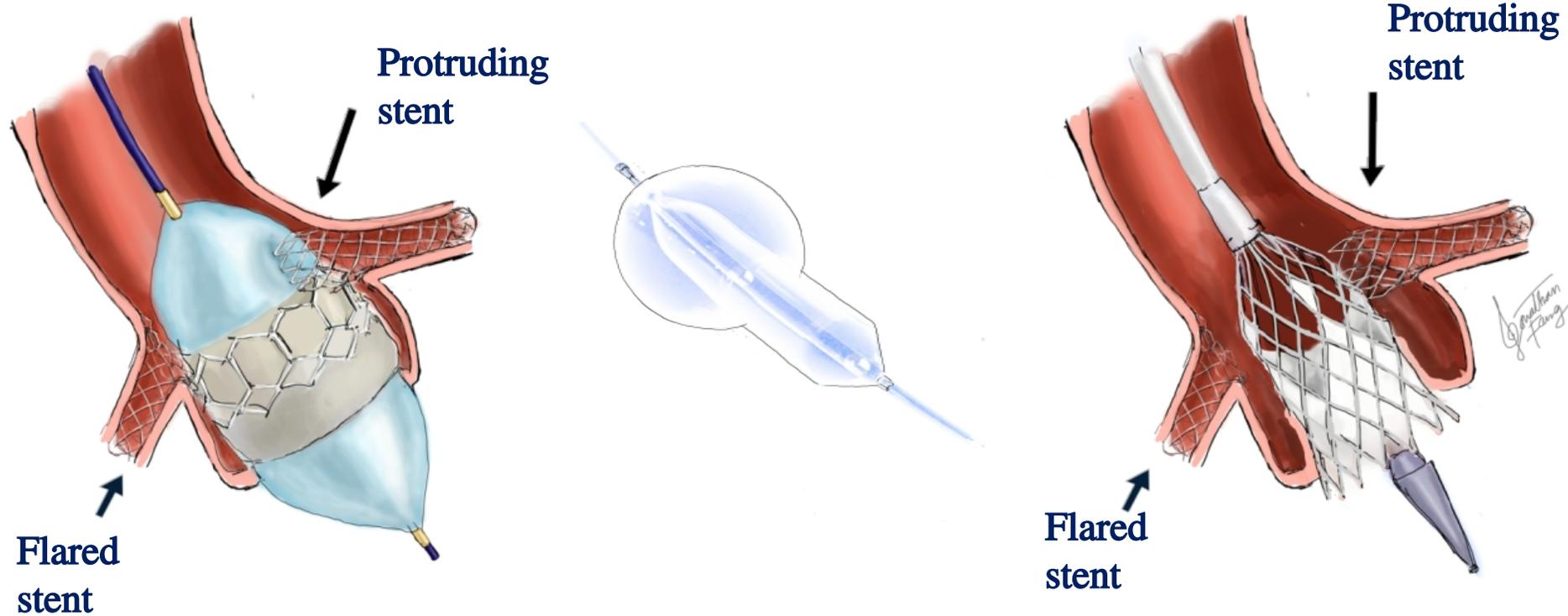
Ohi, Takuma et al. "Transcatheter aortic valve replacement with a protruding stent in the left main coronary artery." *J Am Coll Cardiol* 2014;53:100-106.

Paredes-Vázquez, J, Tirado-Conte, G, Jiménez-Quevedo, P. et al. Computed Tomography Analysis of Coronary Chimney Stenting Following Transcatheter Aortic Valve Replacement. *J Am Coll Cardiol Intv*.

CONCLUSION

Conclusion

- Flaring of protruding ostial coronary stents prior to TAVR is clinically feasible and safe
- Potentially eliminate concern of stent deformity, balloon-rupture, and valve under-expansion



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