Suicide Left Ventricule as a Cause of Hemodynamic Collapse Post-TAVR

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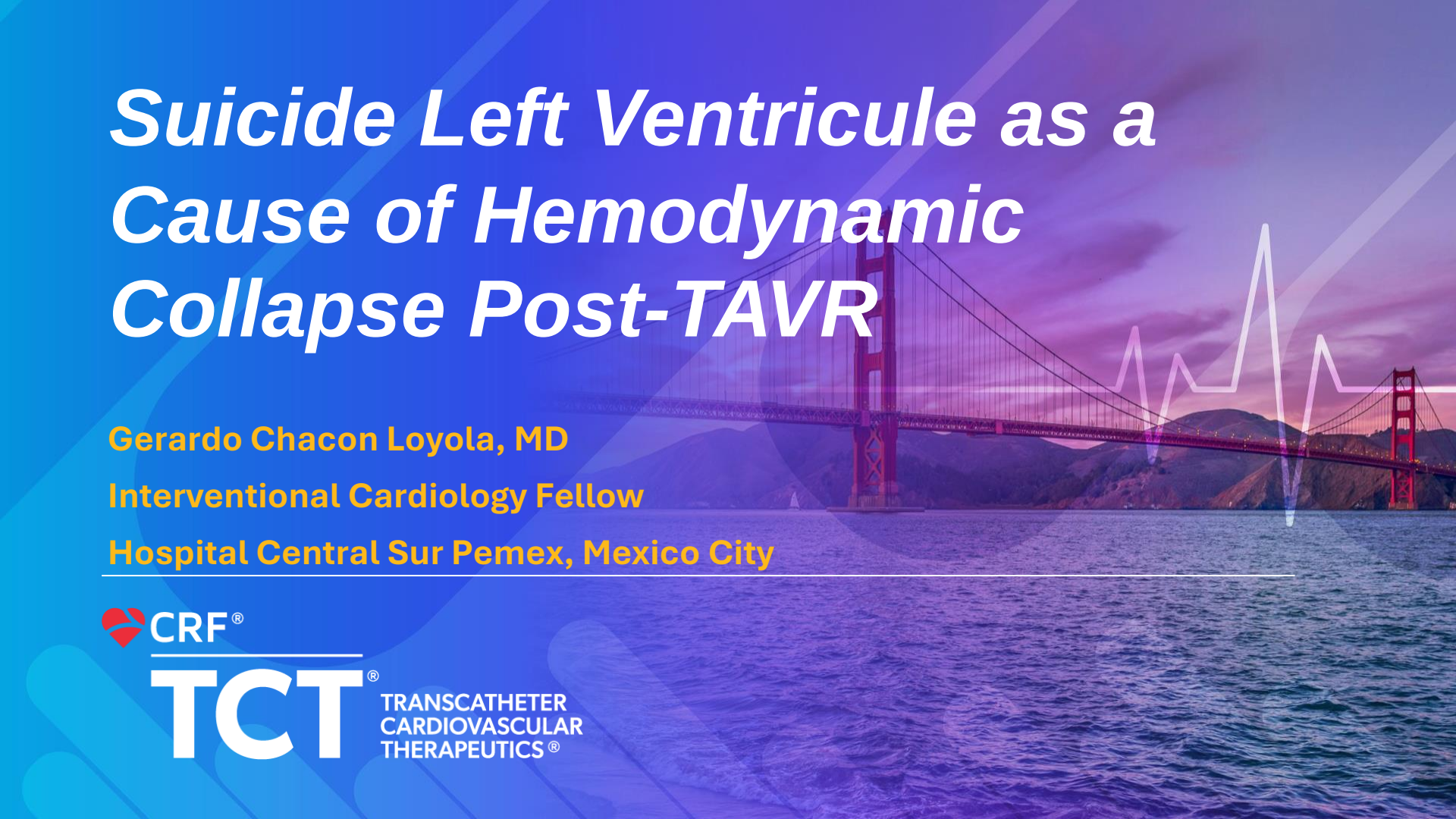

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Disclosure of Relevant Financial Relationships

In the last 24 months:

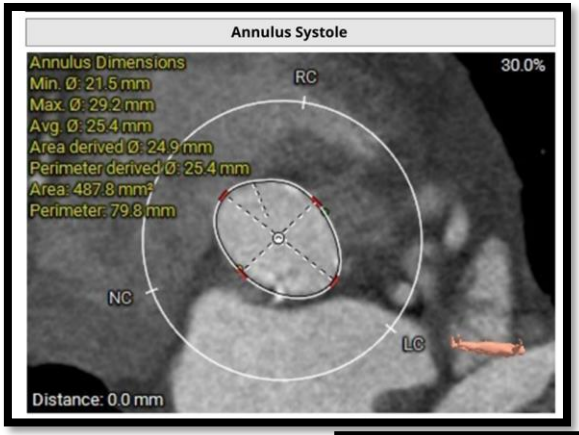
I, Gerardo Chacon Loyola DO NOT have any financial relationships to disclose.

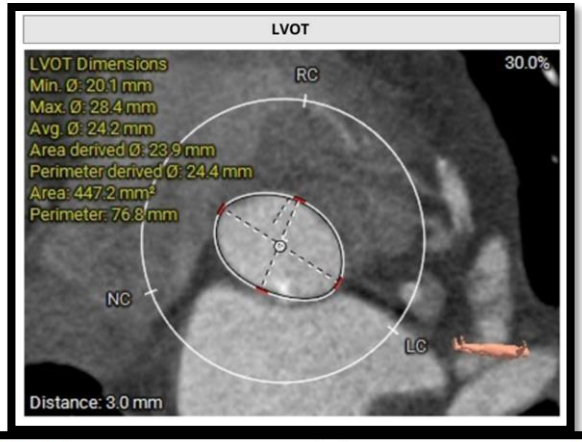
Clinical Case

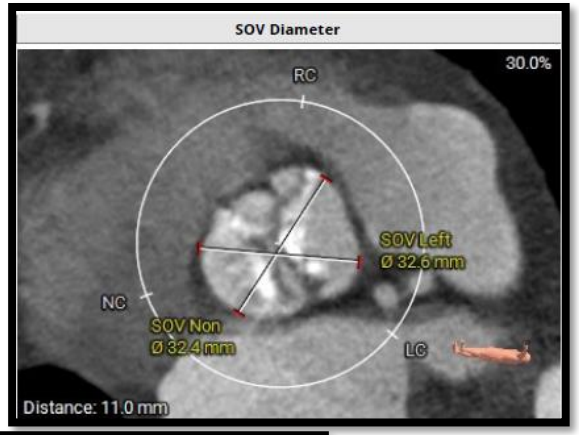
71-year-old female – severe symptomatic AS ACC Stage D1 – DOE/exertional fatigue x 3 months, NYHA III

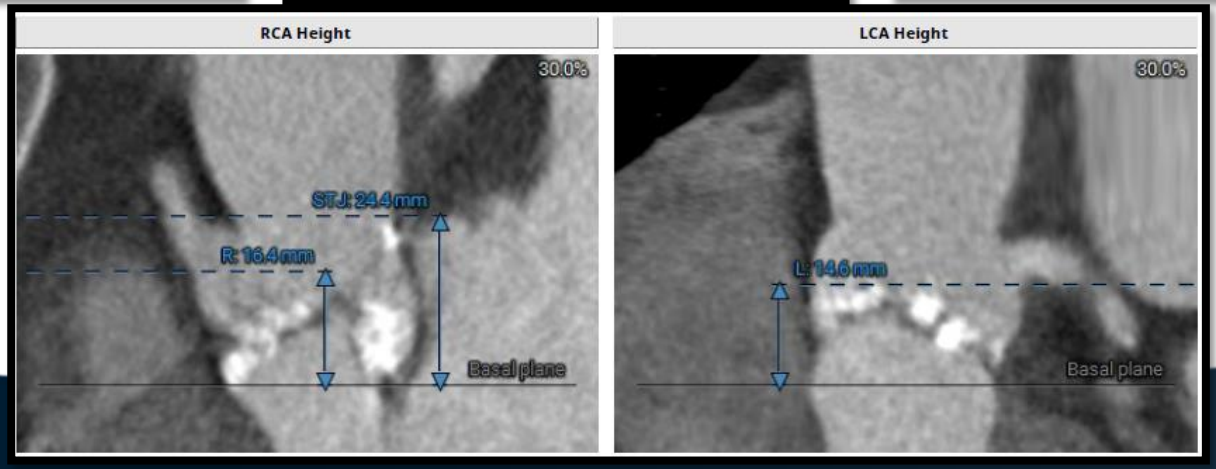
- PMH: HTN, DMT2, treatment with metoprolol 100mg BID, insulin 30UI
- BMI: 31 BSA 1.89
- Laboratories: hct 33 platelets 230, creat 1.1 PBNP 1450
- EKG: left ventricle hypertrophy, pr segment 160ms, no bundle branch block
- TTE: IVS 17 mm (diastole), LVEDD 30 mm, LVESD 21 mm, LVEF 65%, AV: severe calcification, Vmax 5.2m/s, mean gradient 60mmHg, AVA 0.7 cm^2
- LHC: no coronary lesions, peak-to-peak gradient: 100mmHg
- STS risk score: 2.5 %
- Heart Team: ballon-expandable TAVR candidate

TAVR CT's

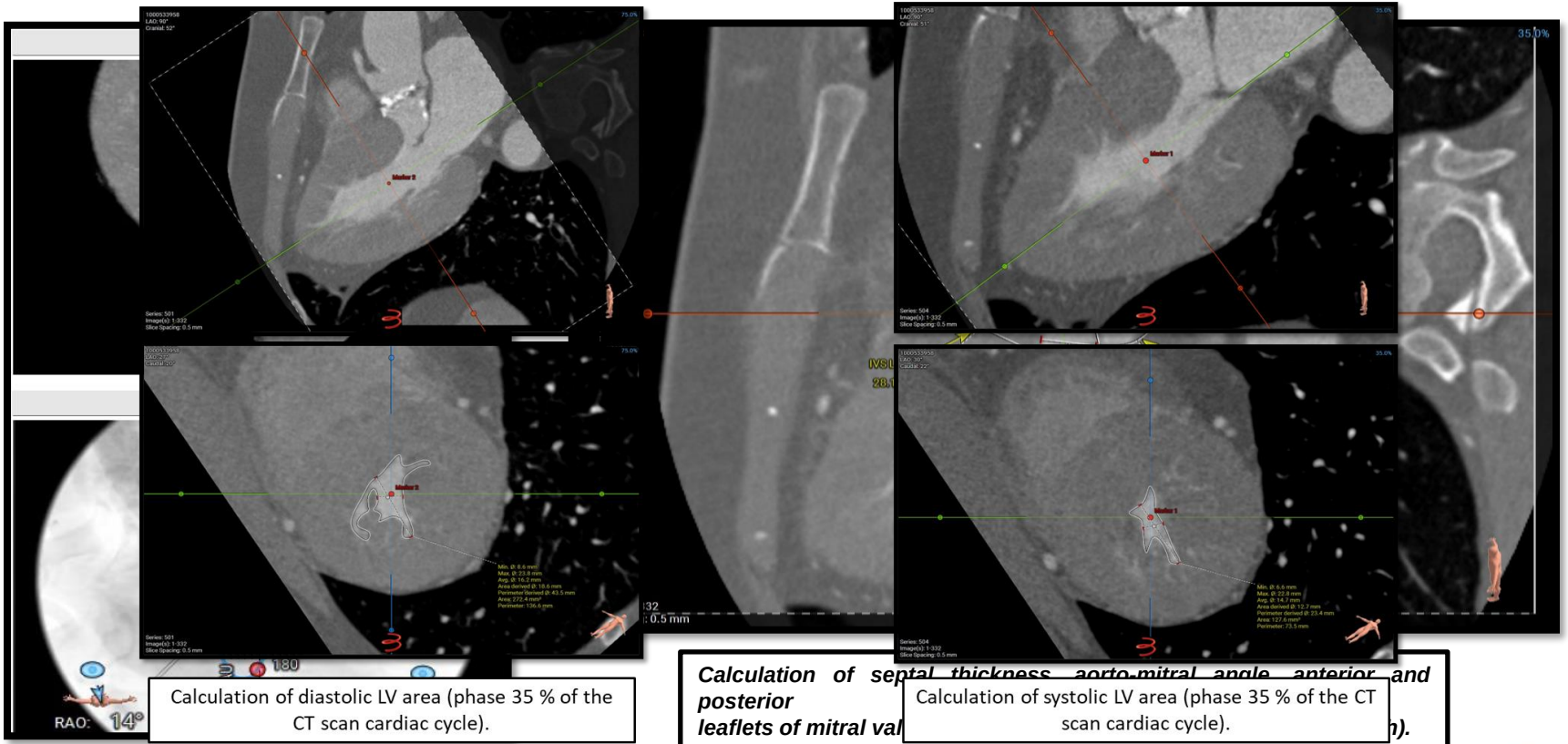

Annulus Systole
Annulus Dimensions
Min. Ø: 21.5 mm
Max. Ø: 29.2 mm
Avg. Ø: 25.4 mm
Area derived Ø: 24.9 mm
Perimeter derived Ø: 25.4 mm
Area: 487.8 mm²
Perimeter: 79.8 mm
30.0%
RC
NC
LC
Distance: 0.0 mm


LVOT
LVOT Dimensions
Min. Ø: 20.1 mm
Max. Ø: 28.4 mm
Avg. Ø: 24.2 mm
Area derived Ø: 23.9 mm
Perimeter derived Ø: 24.4 mm
Area: 447.2 mm²
Perimeter: 76.8 mm
30.0%
RC
NC
LC
Distance: 3.0 mm


SOV Diameter
30.0%
RC
SOV Left
Ø 32.6 mm
NC
SOV Non
Ø 32.4 mm
LC
Distance: 11.0 mm


RCA Height
30.0%
STJ: 24.4 mm
R: 16.4 mm
Basal plane
LCA Height
30.0%
L: 14.6 mm
Basal plane

TAVR CT's



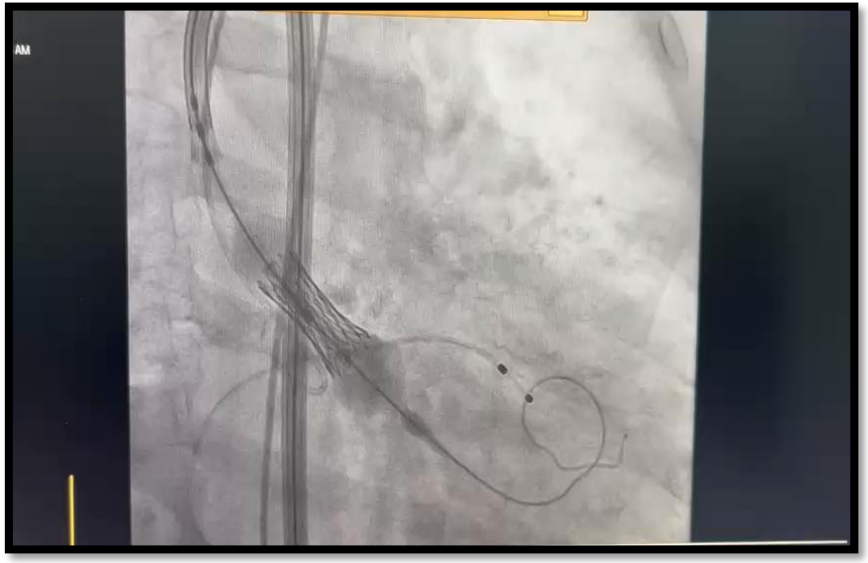
Calculation of diastolic LV area (phase 35 % of the CT scan cardiac cycle).

Calculation of systolic LV area (phase 35 % of the CT scan cardiac cycle).

Calculation of septal thickness, aorto-mitral angle, anterior and posterior leaflets of mitral val…h).

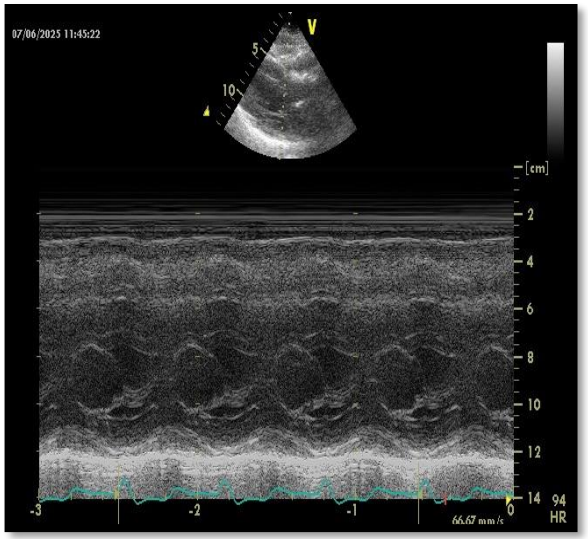
Case Summary

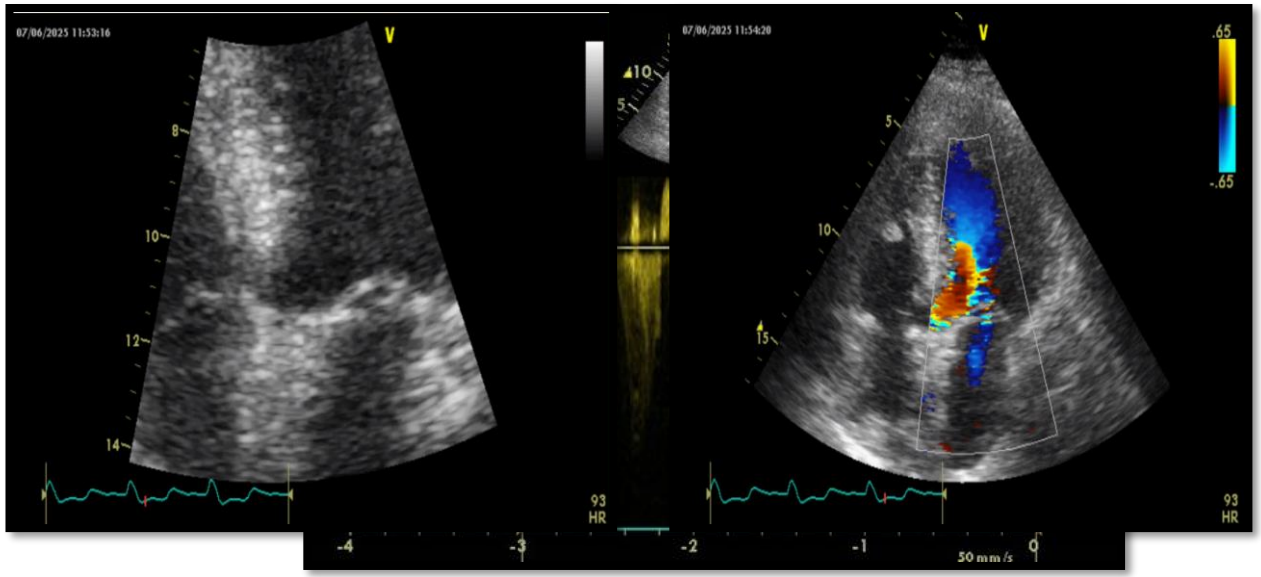
- A 26mm EDWARDS SAPIEN 3 valve was implanted
- Immediately post-procedure, she developed severe hypotension requiring vasopressor support
- The mean LV apex-to-aorta gradient was 23mmHg
- CCU: she developed severe hypotension, escalating vasopressor requirements, sinus tachycardia and oliguria
- TTE revealed an obstructive gradient in the LVOT, and severe mitral regurgitation due to SAM



Case Summary

Post-TAVR TTE





TTE showing SAM and mitral regurgitation	*TE showing LVOTO*

Case Summary

- IV fluids and beta-blockers were initiated.
- Patient developed cardiogenic shock, acute pulmonary edema, and multiorgan failure.
- Refractory to medical treatment and temporary pacemaker stimulation, leading to death.

Comments

- Acute hemodynamic compromise after TAVR due to dynamic Left Ventricular Outflow Tract Obstruction (LVOTO), also termed ***suicide left ventricle***, is a rare but life-threatening complication.
- Pathophysiology involves a sudden reduction in LV afterload, leading to unopposed hypercontractility, chamber obliteration (LV unloading), and a dynamic intraventricular gradient.
- Certain ***clinical, echocardiographic, and CT*** findings can identify ***predictors of LVOTO***.

Comments

- Acute hemodynamic compromise after TAVR because of dynamic LVOTO manifests mainly as ***significant hypotension progressing to hemodynamic collapse***, an occurs most often ***immediately after deployment.***
- ***Management strategies*** aim to ***augment preload and afterload to support LV filling pressures*** and attenuating hypercontractility.
- ***Interventions*** include IV fluids, β-blockers, phenylephrine, alcohol septal ablation, ventricular pacing, MitraClip, and ECMO.

Predictors of LVOTO after TAVR

Predictors of LVO after TAVR.

	Univariate analysis			Multivariate analysis		
	OR	C·I	P val	OR	C.I.	P val
Clinical variables						
Sex	2.296	1.26–4.17	*0.006*	–		
Age	1.04	0.99–1.09	*0.078*	–		
Weight	0.977	0.96–0.99	*0.027*	–		
Height	0.966	0.93–1.00	*0.056*	–		
BSA	0.195	0.050–0.76	*0.019*	–		
Previous MI	0.289	0.10–0.83	*0.021*	–		
Previous PTCA	0.407	0.18–0.89	*0.026*	–		
Pulmonary hypertension	0.155	0.021–1.16	*0.069*	–		
Renal failure	0.406	0.21–0.80	*0.009*	–		
PM after TAVI	0.347	0.10–1.16	0.087	–		
Echocardiographic variables						
EDD	0.899	0.85–0.95	*<0.001*	–		
EDV	0.979	0.97–0.99	*<0.001*	–		
EF	1.093	1.05–1.14	*<0.001*	1.075	1.02–1.12	*0.01*
Gmed	1.031	1.01–1.05	*0.007*	–		
CT						
Annulus aortic valve	0.861	0.774–0.957	*0.005*	–		
Area VBR	0.996	0.992–0.999	*0.010*	–		
Perimeter VBR	0.944	0.908–0.981	*0.003*	–		
Aorto-mitral angle	0.950	0.925–0.977	*<0.001*	0.971	0.94–1.0	*0.06*
SLCL	0.870	0.825–0.918	*<0.001*	0.923	0.86–0.99	*0.03*
LV Area (systole)	0.997	0.996–0.998	*<0.001*	0.998	0.98–0.99	*0.001*
LV Area (diastole)	0.999	0.998–0.999	*<0.001*	–		
Minimal LVOT area	0.993	0.990–0.997	*<0.001*	–		

Variables	Cut-off
Ejection Fraction (%)*	≥ 62%
Intraventricular septum to leaflet coaptation length(SLCL)	≤ 22.1mm
LV Area (systole)	≤ 267mm2

Echocardiographic variable

Ferri et al. Int J Cardiol. 422 (2025) 132956

Conclusions

- ***Suicide left ventricle*** following TAVR is a well-documented phenomenon associated with high morbidity and mortality.
- Recognition and understanding of this complication are critical for timely diagnosis and optimal management.
- ***Pre-procedural echocardiography and CT findings*** may provide key insights to anticipate this complication.
- Advanced therapies should be considered early in cases refractory to medical treatment.