

High-Risk TAVR for Calcified Bicuspid Valve in Cardiogenic Shock

Complicated by Contained Root/Annular Injury

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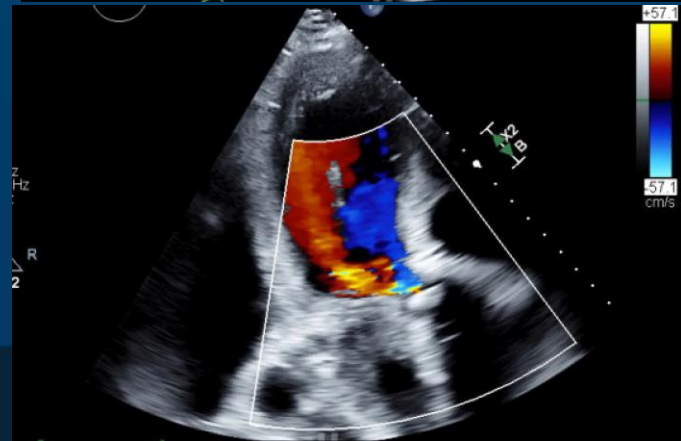
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Disclosure of Relevant Financial Relationships

I, Pradeep Nadeswaran, DO NOT have any financial relationships to disclose.

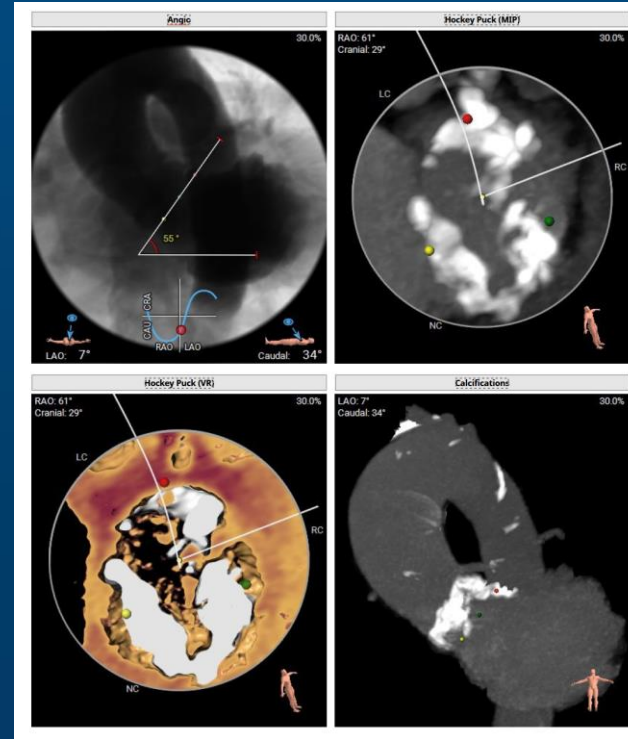
Clinical Snapshot

- 69-year-old male with a prior medical history of DM, HTN, HFpEF (NYHA IV), O₂-dependent combined pre/post-capillary PH
- Echo: LVEF 37%; severe AS (MG 38 mmHg; AVA 0.7 cm²) + severe AR
- Shock physiology: PA 99/46 mmHg; CI 1.4 L/min/m²; elevated bi-ventricular filling pressures
- Multidisciplinary valve team: prohibitive surgical risk → high-risk TAVR



CT Planning — Bicuspid Risk Map

- Sievers type 1 (R/L fusion) with gross annular/root calcification; calcified raphe
- Annulus/LVOT: elliptical; heavy annular & sub-annular (LVOT) calcium
- Root/Coronary: sinus/STJ dimensions & heights acceptable; root angulation considered
- Access: iliofemoral evaluation acceptable



Strategy & Device Rationale

- Goal: Rapid afterload relief with predictable hemodynamics & low PVL
- Chosen platform: 29-mm balloon-expandable SAPIEN 3 Ultra RESILIA
- Pre-dilation: 20 mm balloon to accommodate delivery

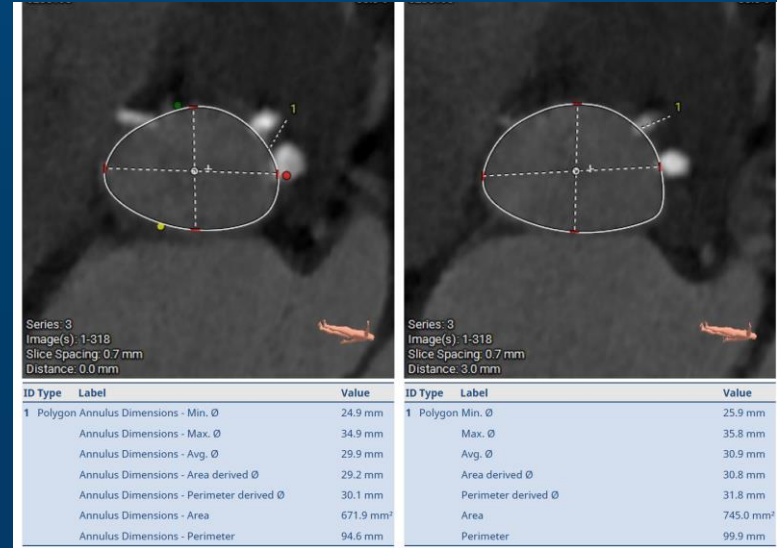
Aortic Valve

Annulus Area	671.9 mm ²
Area Derived Diameter	29.2 mm
Annulus Perimeter	94.6 mm
Perimeter Derived Diameter	30.1 mm
Annulus Min Diameter	24.9 mm
Annulus Max Diameter	34.9 mm

Sinus of Valsalva Diameter	36.9 mm
Sinotubular Junction Diameter	31.7 mm
LCA Height	15.0 mm
RCA Height	16.0 mm
Sinotubular Junction Height	23.0 mm

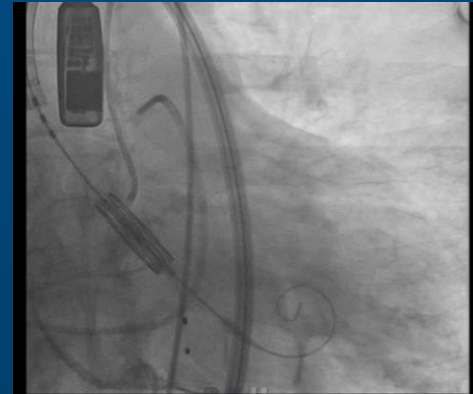
THV Oversize/Undersize (%) Calculation

Annulus Area	671.9 mm ²			
THV Size	20 mm	23 mm	26 mm	29 mm
% THV Over (+)/Under(-)				
Annulus Area by 3D CT				-3.4%



In-Lab Course & Complication Recognition

- Post-deploy: No central AR; trace PVL; immediate hemodynamic improvement
- ≈10 min later: Hypotension + rising CVP
- Differential: Coronary obstruction; severe AR/malposition; LV failure; annular/root injury
- TEE: Rapidly enlarging circumferential effusion → follow tamponade pathway

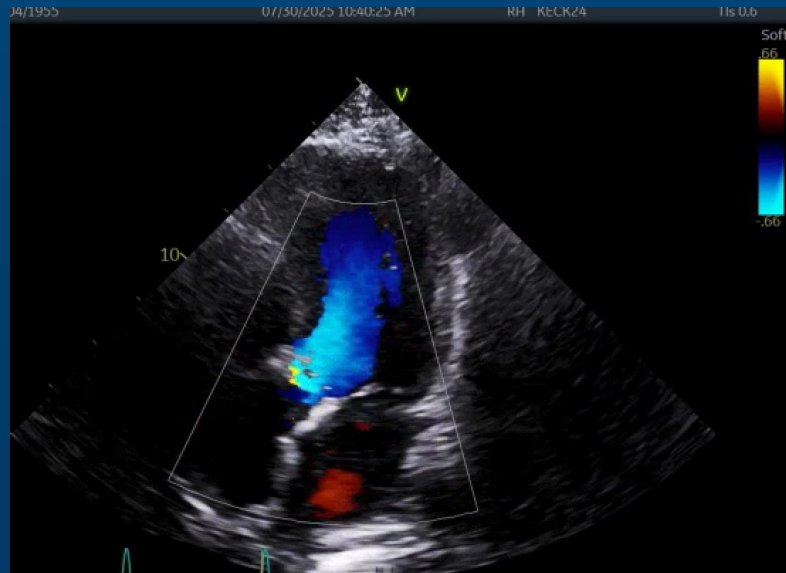


Rescue

- Subxiphoid pericardiocentesis → 1L fresh arterial blood, auto-transfused to patient
- Reversed heparin with protamine after device removal
- Result: Bleeding stopped and hemodynamics stabilized
- Dx: Likely contained annular/root perforation from calcified bicuspid anatomy
- Post-procedure: Pericardial drain, continued mechanical ventilation, sedation/paralysis in the ICU

Outcome

- Discharge TTE: well-seated valve; MG 10 mmHg; no significant regurgitation; LVEF 72%



Valve	% Oversizing [2]	Coronary Analysis [3,4]	Stent Apposition	Stretch Analysis [5]	Waist Diameter (mm)
BE 29 -2cc	N/A	LCA DLC/d = 0.7 RCA DLC/d = 1.2	Largest gap = 2.6 mm	Max Stretch 1.6	23.8mm/24.5mm
BE 29	-11.6% undersized	LCA DLC/d = 0.6 RCA DLC/d = 1.2	Largest gap = 2.4 mm	Max Stretch 1.8	25.2mm/25.9mm

Balloon-Expandable Stretch Analysis

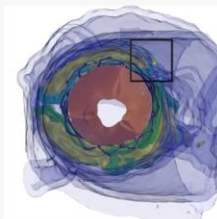
■ Left-Right Coronary Cusp
■ Non-Coronary Cusp

DASI
Simulations

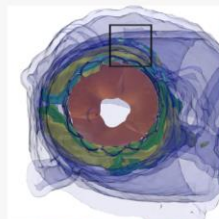
Stretch

1.6

1.0



BE 29 -2cc



BE 29 Nominal

	BE 29 -2cc	BE 29 Nominal
Peak Stretch	1.6	1.8

Caution/Warning: The stretch analysis exclusively relies on calcium-induced stretching.

Take-Home Points

- Calcified BAV (raphe/LVOT calcium): the oversizing penalty = rupture
 - Size conservatively; gentle pre-dilation; avoid routine post-dilation
- CT imaging predominates and TEE complements intra-procedurally
- Arrive rescue-ready
 - Pericardial kit, protamine drawn, occlusion balloon/covered stent, surgical + ECLS plans
- Patient-specific simulation: Useful adjunct in extreme strain/expansion scenarios

One-line takeaway: In calcified bicuspid (raphe/LVOT calcium), conservative sizing + rescue readiness are paramount; simulation can flag extreme strain risk pre-case.