Calcium Cataclysm: TAVR Outcomes in Patients with Extreme Calcium Scores in Bicuspid Aortic Valves

Xena Moore, MD

On behalf of: *Stephen Patin, MD, Ken Chan, APRN, Muhammad J Khan, MD, Iad Alhallak, MD, Sanjana Rao, MD, Sukhdeep Basra, MD, Richard Smalling, MD, Anthony Estrera, MD, Biswajit Kar, MD, Abhijeet Dhoble, M.D.*

CRF®

TCT® TRANSCATHETER CARDIOVASCULAR THERAPEUTICS®

UTHealth Houston Heart & Vascular | MEMORIAL HERMANN Texas Medical Center

Disclosure of Relevant Financial Relationships

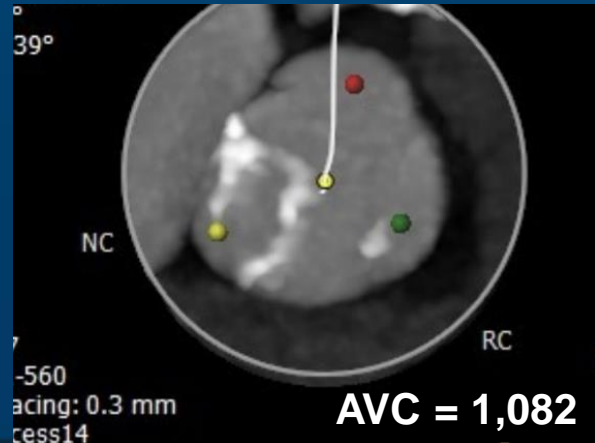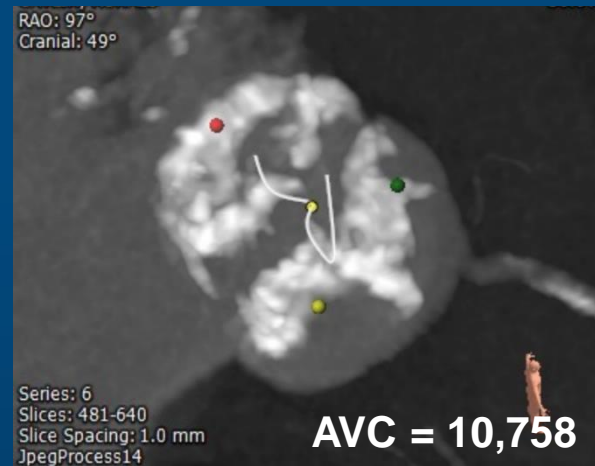I, Xena Moore, DO NOT have any financial relationships to disclose.

Background

- Aortic valve calcium (AVC) burden predicts outcomes in aortic stenosis (AS).

- TAVR outcomes in extreme calcification of the **bicuspid aortic valve anatomy remains understudied**.

- "Extreme" AVC (>6,000 AU) represents the top 10% of patients with highest calcium load.

Objective

To determine whether **extreme AVC (>6,000 AU)** in bicuspid aortic valve patients undergoing TAVR is associated with *higher mortality or procedural complications*.

Methods

- Retrospective single-center study (2012–2024)
- N = 276 BAV TAVR patients
- ECS (Extreme Calcium Score): AVC >6,000 AU (n = 26)
- Non-ECS: AVC <6,000 AU (n = 250)
- **Outcomes:**
  - MACE at 1 year (death, stroke, major procedural complications)
  - 1-year mortality
  - Stroke at 1 year
  - Long-term mortality (5 years)

RAO: 97°
Cranial: 49°

Series: 6
Slices: 481-640
Slice Spacing: 1.0 mm
JpegProcess14

AVC = 10,758

39°

NC

RC

-560
acing: 0.3 mm
cess14

AVC = 1,082

Baseline Data

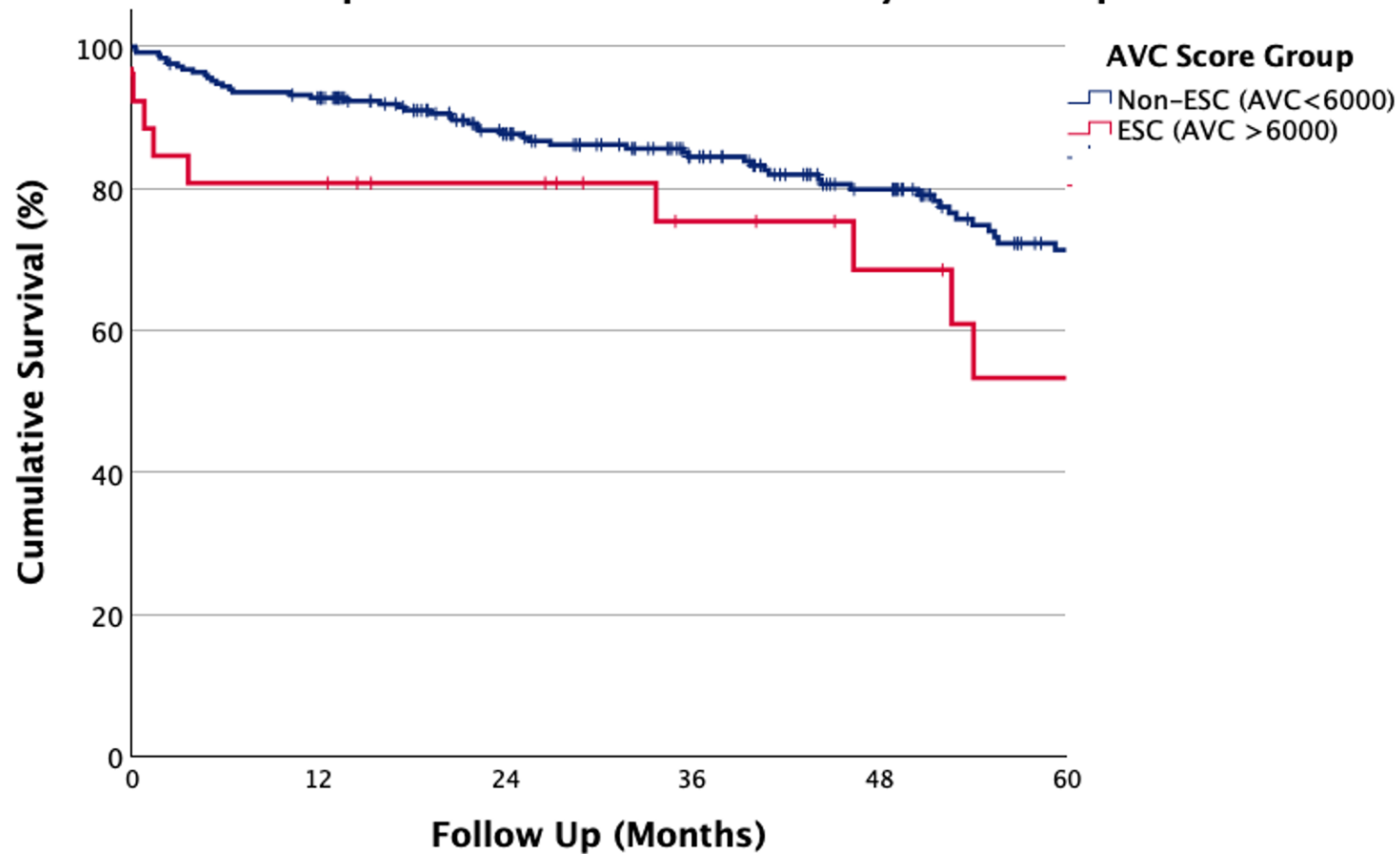| Demographic	Low-Intermediate AVC (n = 250)	High AVC (n = 26)	p-value
Age (years)	72.2 ± 9.1	73.3 ± 10.7	0.591
Female (%)	47.2	15.4	0.002
BMI	28.4 [23.9 – 33.1]	28.2 [24.2 – 34.3]	0.54
eGFR	70.0 [52 – 84]	66.5 [54 – 82]	0.53
NYHA (III – IV)	195 (78%)	20 (76.9%)	0.3
STS	3.3 [2.3 – 4.6]	3.5 [2.5 – 5.6]	0.24
Diabetes (%)	78 (31.2)	4 (15.4)	0.093
Hypertension (%)	212 (85.8%)	19 (73.1%)	0.264
CAD	119 (47.6%)	11 (42.3%)	0.607
Prior Pacemaker	18 (7.2%)	1 (3.8%)	0.446
LV EF (Pre-Procedure, %)	55 [45 – 62]	47 [38 – 55]	<0.001
Aortic Peak Velocity (Pre-Procedure)	4.20 [3.9 – 4.9]	4.95 [4.7 – 5.5]	<0.001
Aortic Mean Gradient (Pre-Procedure)	44 [34 – 58]	61 [47 – 70]	<0.001
Aortic Valve Area	0.70 [0.60 – 0.86]	0.60 [0.48 – 0.72]	0.002
Annulus Area	479.1 ± 105.8	563.7 ± 106.4	<0.001

Outcomes

TAVR and Extreme Calcium Score Outcomes

AVC	n	Follow Up (Months) (Median [IQR])	Mortality (All-time)	Mortality (1 year)	Stroke (1-year)	MACE (1-year)
>6000	26	42.4 [14.0 – 68.4]	12 (46.2%)	5 (19.2%)	2 (7.7%)	6 (23.1%)
<6000	250	37.5 [21.8 – 67.7]	68 (27.2%)	18 (7.2%)	8 (3.2%)	28 (11.2%)
p (Chi-square)		0.504	**0.042**	**0.035**	0.25	0.078

Key Results

- **1-year mortality:** ECS 19% vs Non-ECS 7% ($p = 0.035$)
- **5-year mortality:** ECS 46% vs Non-ECS 27% ($p = 0.042$)
- **Aortic root rupture:** 3 events (11.5%), *all in ECS group*
- No differences in other MACE components

Kaplan–Meier Curve Survival by AVC Group

Conclusion

- In BAV patients undergoing TAVR:
  - **AVC >6,000 AU** identifies a **high-risk phenotype**
  - Associated with **higher 1 and 5-year mortality**
  - **Increased risk of root rupture** **(11.5%)**
- **CT-based AVC quantification** may identify high-risk BAV patients pre-TAVR
  - May inform:
    - Valve choice and implantation depth
    - Caution with aggressive post-dilatation

Acknowledgements

- Deep gratitude to the **UTHealth Heart & Vascular Team**

- Special thanks to **Dr. Abhijeet Dhoble and Ken Chan** for their mentorship and support

- For correspondence: **xena.v.moore@uth.tmc.edu**