Performance of Aortic Valve Coefficient (AVC) in Relation with Calcium Score (CS) and Aortic Valve Area (AVA) in Patients Undergoing TAVR

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I, Shreyash Manegaonkar DO NOT have any relevant financial relationships to disclose.

I, Rishi Sukhija work as a consultant for Angiodynamics, Abbott, Medtronic's and Gore.

I, Rupak Banerjee DO NOT have any relevant financial relationships to disclose.

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Within the prior 24 months, I (Rishi Sukhija) have had a financial relationship with a company producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients:

Nature of Financial Relationship	Ineligible Company
Consultant Fees/Honoraria	Angiodynamics, Medtronic, Abbott, Gore

All relevant financial relationships have been mitigated.
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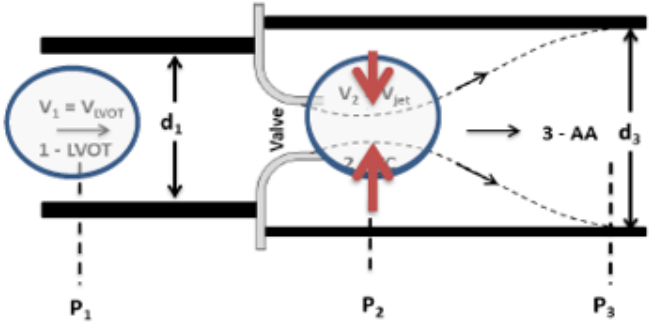
Introduction

- assessment of aortic valve stenosis (AS) is challenging
- ~1.5 million in US have severe AS[1]



LVOT – Left Ventricular Outflow Tract; VC – vena contracta

- diagnosis of AS: *Non-invasive* Doppler echocardiography
  - *aortic vale area (AVA)* = $\frac{\text{Area}_{\text{LVOT}} \times \text{V}_{\text{LVOT}}}{\text{V}_{\text{jet}}}$
  - derived Δp using LVOT and downstream velocities have inherent *inaccuracies*
  - *calcium score* quantifies the extent of valvular calcification
- calcific deposition increases valve stiffness and reduces effective orifice area, thereby elevating transvalvular gradients.

[1]Nkomo VT et al. (2006)

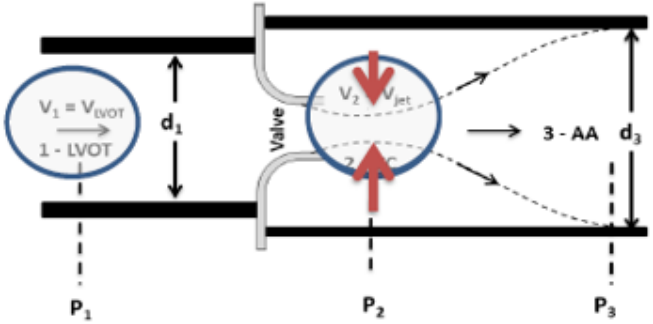
Introduction

- *aortic valve coefficient (AVC)* - ratio of transvalvular *Δp* to *proximal dynamic pressure* (0.5 × blood density × V_{LVOT}^2)

$$AVC_{cath} = \frac{\Delta p_{total,cath}}{0.5 \times \rho \times V_{LVOT}{}^2}$$

← P_1-P_3 directly measured by catheterization

← Velocity from Doppler



LVOT – Left Ventricular Outflow Tract; VC – vena contracta

- AVC is
  - combines *pressure drop (Δp) - flow* measurements
  - provides wide range: *0 ~ 1000*, leads to better delineation of AS severity
  - *non-dimensional* parameter developed from fundamental *fluid dynamic principles*
  - includes both *frictional* (viscous) loss and *inertial* (pressure) loss due to momentum change irrespective of flow status
  - incorporates corrections for *pressure recovery* phenomenon

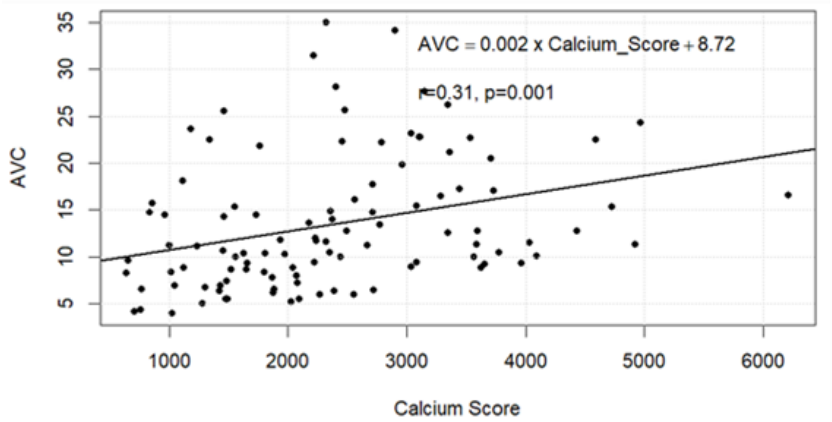
Hypothesis

AVC, a non-dimensional index, will be better for accessing AS severity as it incorporates both *square* of V_{LVOT} and Δp in its formulation

Methods

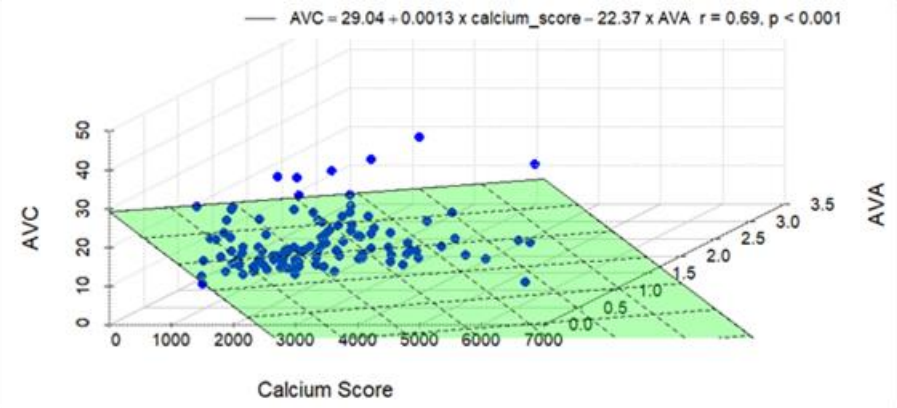
- AVC is derived from mean transvalvular Δp and Doppler V_{LVOT} measurements
- *105* data points were collected *120* patients undergoing TAVR were consented
- 9 datapoints were missing
- after an outlier analysis 6 data points were excluded
- Statistical analysis
  - linear regression analysis
  - p-value <0.05 is considered statistically significant
  - ‘R-markdown’ software was used

Results



- *correlation* between AVC vs calcium score for the entire data set
- *mild linear* correlation (*r = 0.31*, p < 0.001)

Results



- *correlation* between AVC vs AVA vs calcium score
- *moderate linear* correlation (*r = 0.69*, p < 0.001)
- indicating feasibility of AVC as *prospective* index

Conclusion

- AVC, a novel index, has potential to improve diagnosis of AS severity and aid in clinical decision making

- Future direction
  - *randomized trial* with *larger sample* size for cut-off and outcome analysis
  - open for *collaboration* and *funding* opportunities

THANK YOU

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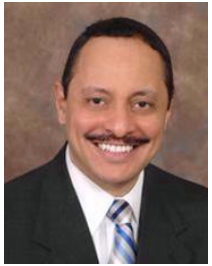

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