Impact of Aortic Valve Calcium Score on Early Transcatheter Aortic Valve Replacement Outcomes

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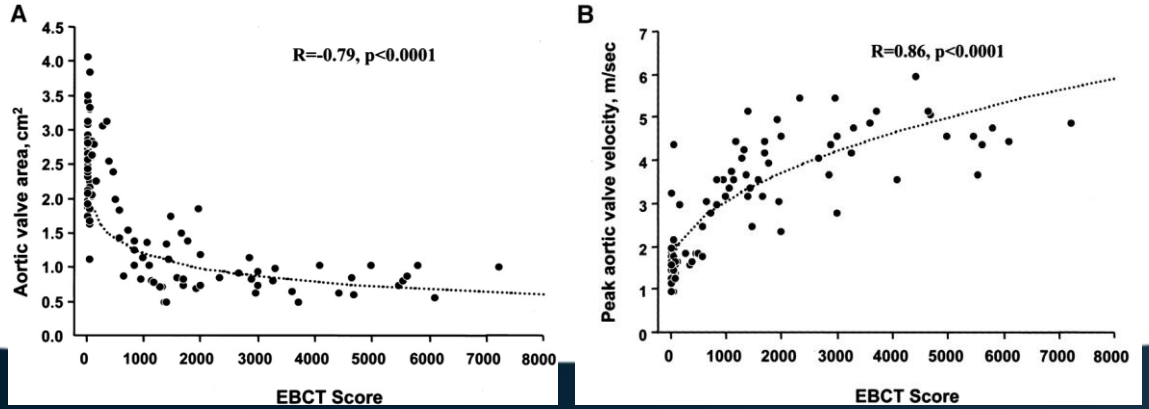
Disclosure of Relevant Financial Relationships

I, Joshua Crane, DO NOT have any financial relationships to disclose.

Background

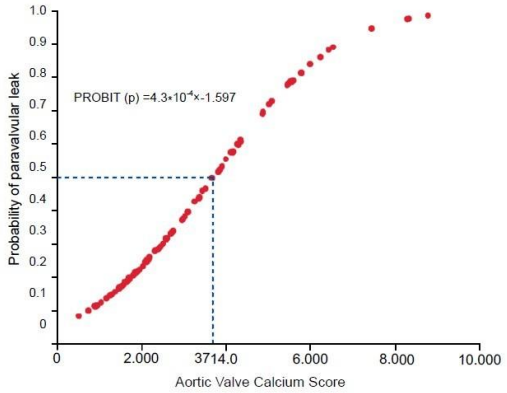
- Aortic Valve Calcium Score
  - Determined by the Agatston method
  - Using Cardiac CT (EBCT), can evaluate the calcium burden
  - Calcium score correlate to the hemodynamic markers of aortic stenosis



Messika-Zeitoun et al., *Circulation*, 2004

Background

- Aortic valve calcification score has been proposed as a predictor of adverse events following TAVR
- Increased paravalvular leak

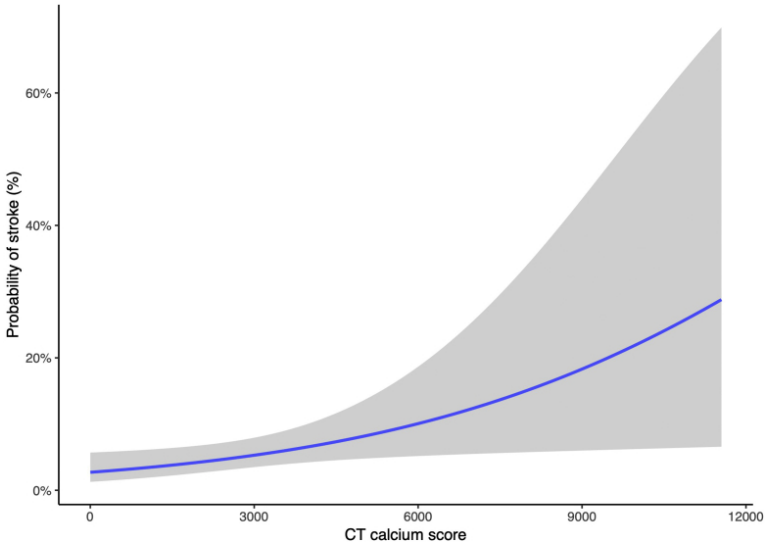


AVCS Cut-off Score (n = 120)	Probability of a paravalvular leak
732.6	0.10
2145.3	0.25
3714.0	0.50
5282.6	0.75
6695.3	0.90

Haensig et al., *Annals of Cardiothoracic Surgery*, 2012

Background

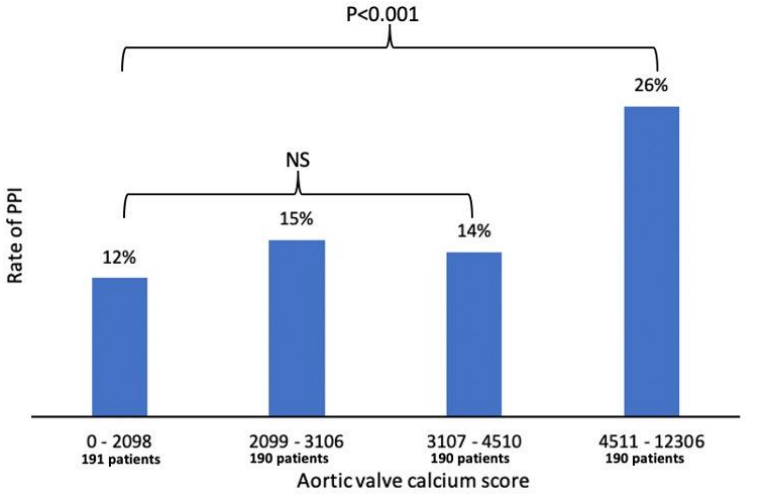
- Aortic valve calcification score has been proposed as a predictor of adverse events following TAVR
- Increased paravalvular leak
- Increased stroke risk



Foley et al., *JSCAI*, 2022

Background

- Aortic valve calcification score has been proposed as a predictor of adverse events following TAVR
- Increased paravalvular leak
- Increased stroke risk
- Increased pacemaker implantation



Barbe et al., *Open Heart*, 2025

Background

- Prior studies show mixed results
- **Primary objective: Evaluate whether aortic valve calcium score is associated with early adverse clinical outcomes following TAVR**

Methods

- Retrospective review
- January 2022- December 2024
- Single center data from STS/ACC TVT Registry

- **Inclusion:** 18+ year old patients undergoing TAVR with prior CT scan documenting Aortic Valve Calcium Score
- **Exclusion:** Patients with prior AVR (Valve-in-valve)

Methods

- Patients were divided into two groups:
  - Calcium Score <1826
  - Calcium Score ≥1826
- Patients were then stratified by gender
  - Males ≥2000 vs <2000
  - Females ≥1300 vs <1300
- **Primary Outcomes: In-hospital mortality and 1-year mortality**
- **Secondary Outcomes: In-hospital stroke, need for PPM, paravalvular leak**

Results

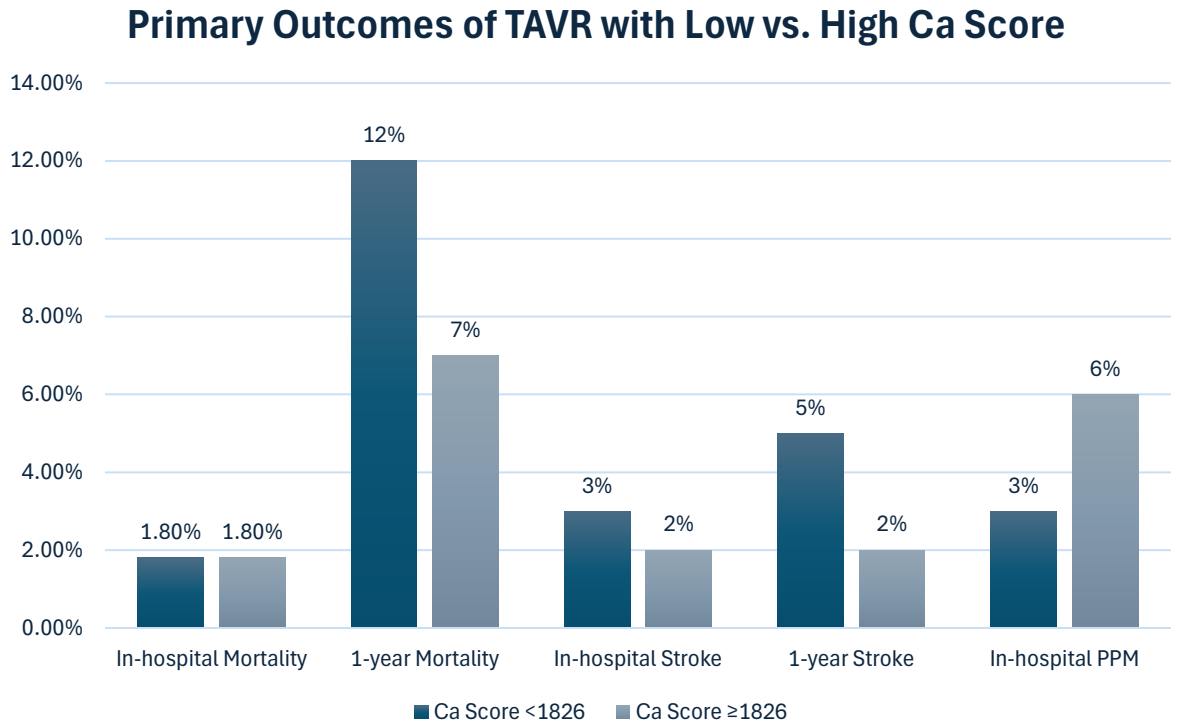
- 332 total patients underwent TAVR between 2022-2024
  - Median calcium score was 1826
    - 166 patients >1826 and 166 <1826

Results

- No difference in median age
- Significantly more males in the group ≥1826
- Both groups predominately white patients
- Higher STS risk score in patients in the group that underwent TAVR with Ca score <1826
- No difference in Cr, albumin, Hx of CVD, Bicuspid AV, LVEF%
- Higher mean and peak gradient in the group ≥1826
- Balloon Expandable TAVR used more in higher calcium score patients

	Ca Score <1826	Ca Score ≥1826	p-value
Volume	166	166	
Age	76 (70-82)	77 (73-84)	0.1
Gender (M)	41%	81%	<.01
Race AA	8%	6%	0.66
Race W	90%	94%	0.33
STS Risk Score	4.7 (2.5-7.8)	3.6 (2.3-5.4)	<.01
Creatinine	1.0 (0.8-1.3)	1.1 (0.9-1.3)	0.1
Albumin (g/dL)	3.8 (3.4-4.1)	3.8 (3.4-4.2)	0.24
History of Cardiovascular Disease	27%	30%	0.71
Bicuspid AV	5%	9%	0.28
LVEF (%)	58 (52-64)	58 (49-63)	0.31
Mean Gradient (mmHg)	29 (23-36)	40 (34-48)	<.01
Peak Gradient (mmHg)	51 (42-62)	67 (57-77)	<.01
AV area (cm^2)	0.8 (0.7-0.9)	0.8 (0.6-0.9)	0.04
Self Expanding TAVR	39%	22%	<.01
Balloon Expandable TAVR	61%	78%	

Results- Primary and Secondary Outcomes



No statistical difference in all outcomes

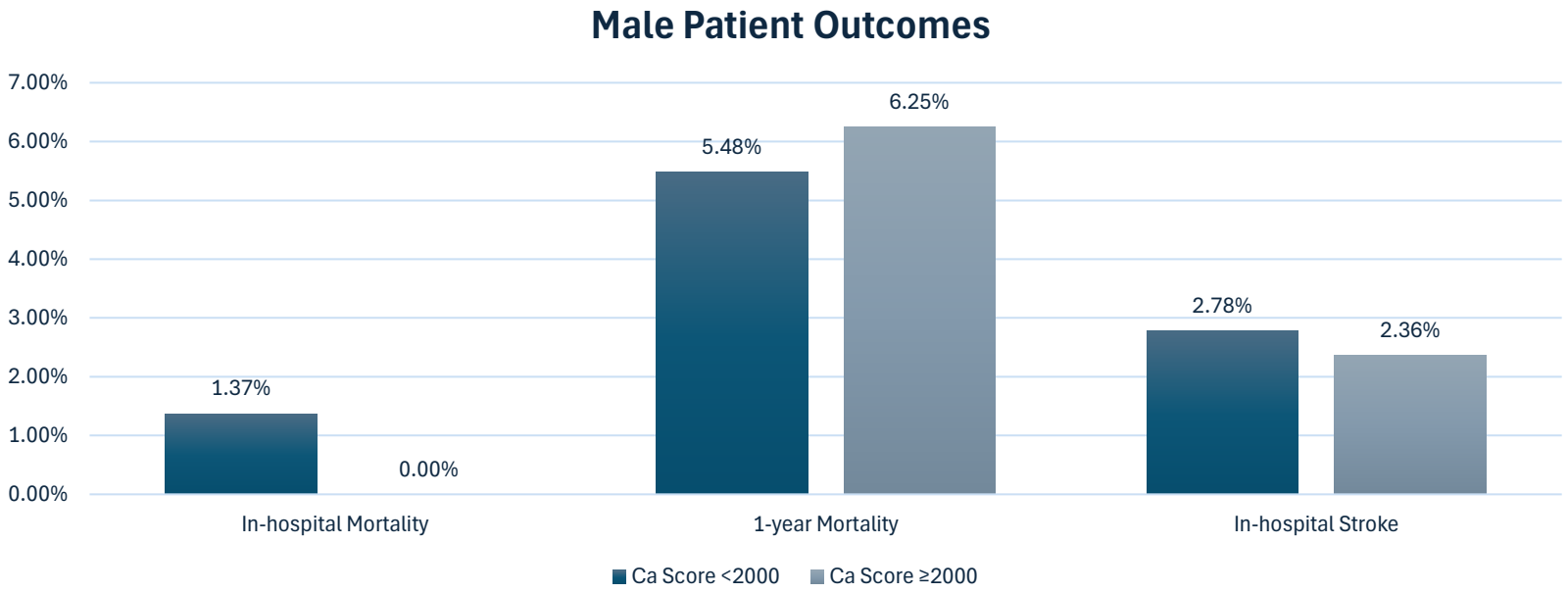
Results

- 302 patients had no PVL
- 30 patients had a PVL
- Mean Calcium score
  - No-PVL: 1780 (1115-2732)
  - PVL: 2042 (1309-3358)
  - There was no statistical difference in calcium score for those with a PVL and those without

Results By Gender

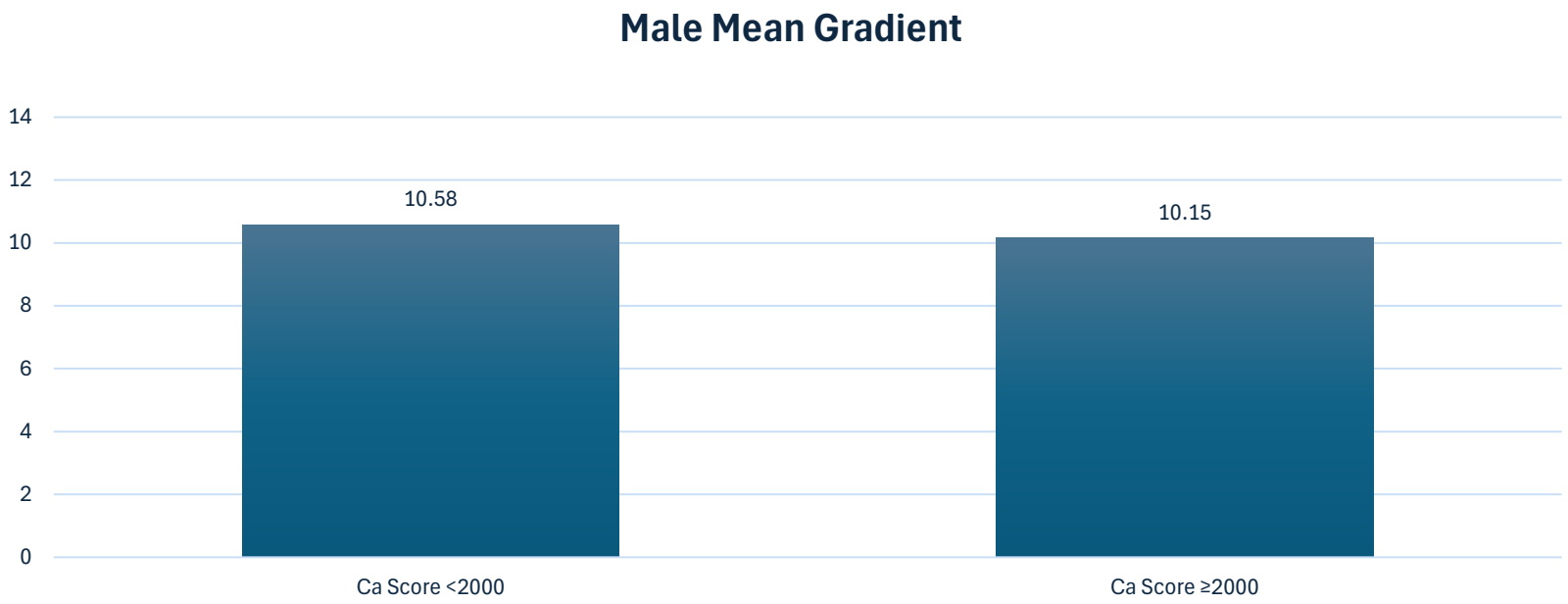
- In patients that underwent TAVR, Males had a significantly lower operative mortality and 1-year mortality compared to females
  - Operative Mortality: Female 3.82 % vs. Male 0.50%, $p<0.05$
  - 1-year Mortality: Female 15.27% vs. Male 5.97%, $p<0.05$
- Males
  - ≥2000 calcium score is cutoff in males for severe AS
  - 128 (64%) had Ca Score ≥2000, 73 (36%) had score <2000
- Females
  - ≥1300 calcium score is cutoff in females for severe AS
  - 61 (47%) had Ca Score ≥1300, 70 (53%) had score <1300

Results-Male



No statistical difference in all outcomes

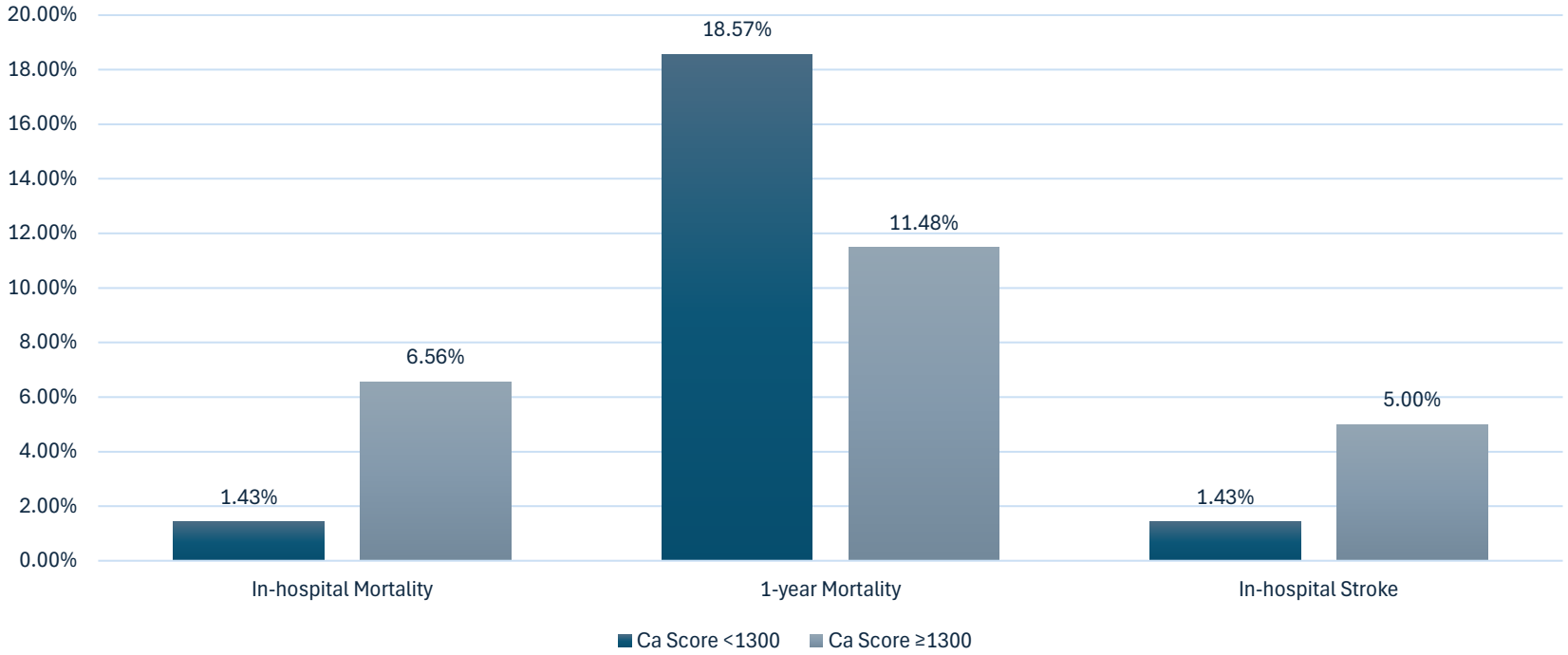
Results- Males



No statistical difference in gradient

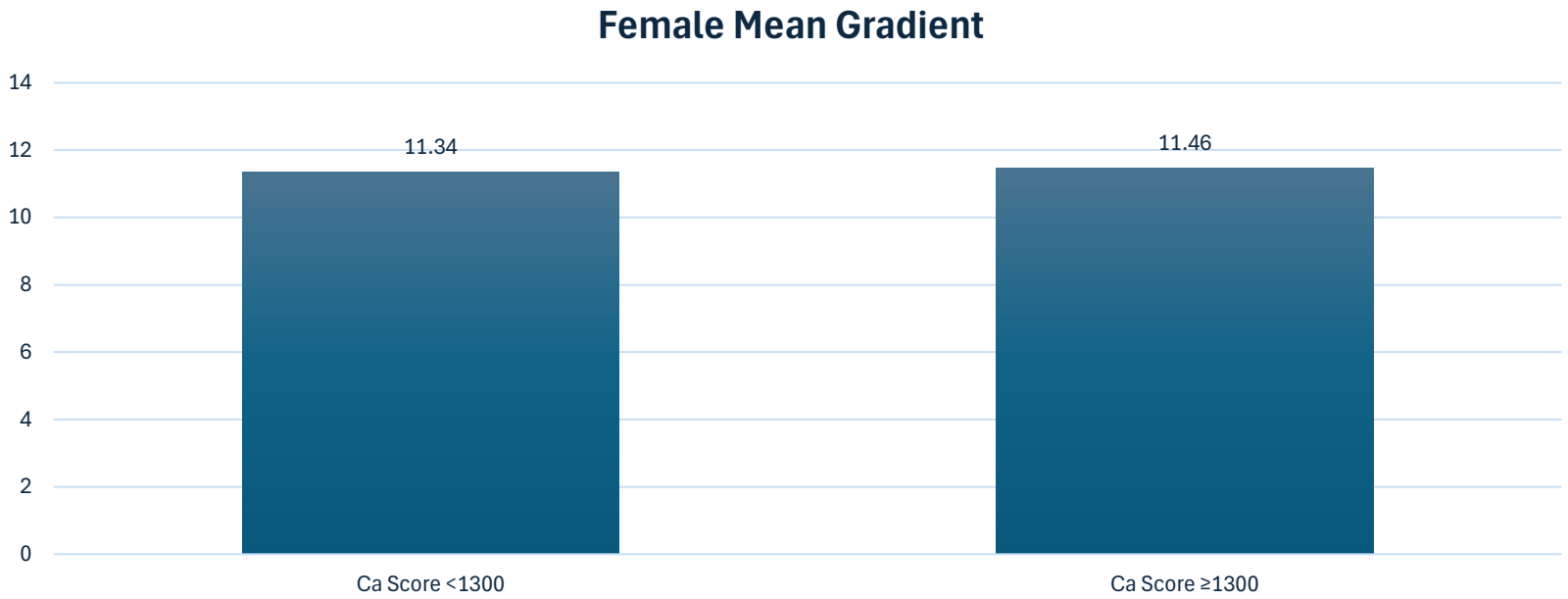
Results-Female

Female Patient Outcomes



No statistical difference in all outcomes

Results- Female



No statistical difference in gradient

Conclusions

- Higher aortic valve calcium score prior to TAVR was not associated with significant differences in:
  - In-hospital and 1-year mortality
  - In-hospital and 1-year stroke
  - Need for PPM
- There was no difference in calcium score in patients with or without a PVL

Conclusions

- Females had higher in-hospital and 1-year mortality than males, regardless of calcium score
- When accounting for gender differences in calcium scores, there was no significant difference in mortality or stroke in patients with higher calcium scores
- **Calcium score alone may have limited utility in predicting early-post TAVR complications and mortality**
- **Future studies should evaluate if the calcium score affects long-term outcomes**