



Bioprosthetic Valve Thrombosis (TAVR & SAVR)

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Presenter Disclosure Information

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“Bioprosthetic Valve Thrombosis (TAVR & SAVR)”

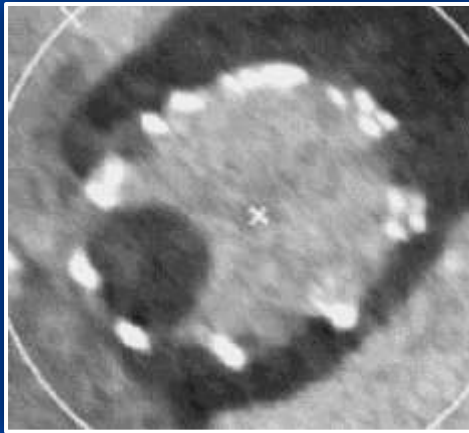
The following relationships exist related to this presentation:

None

Background

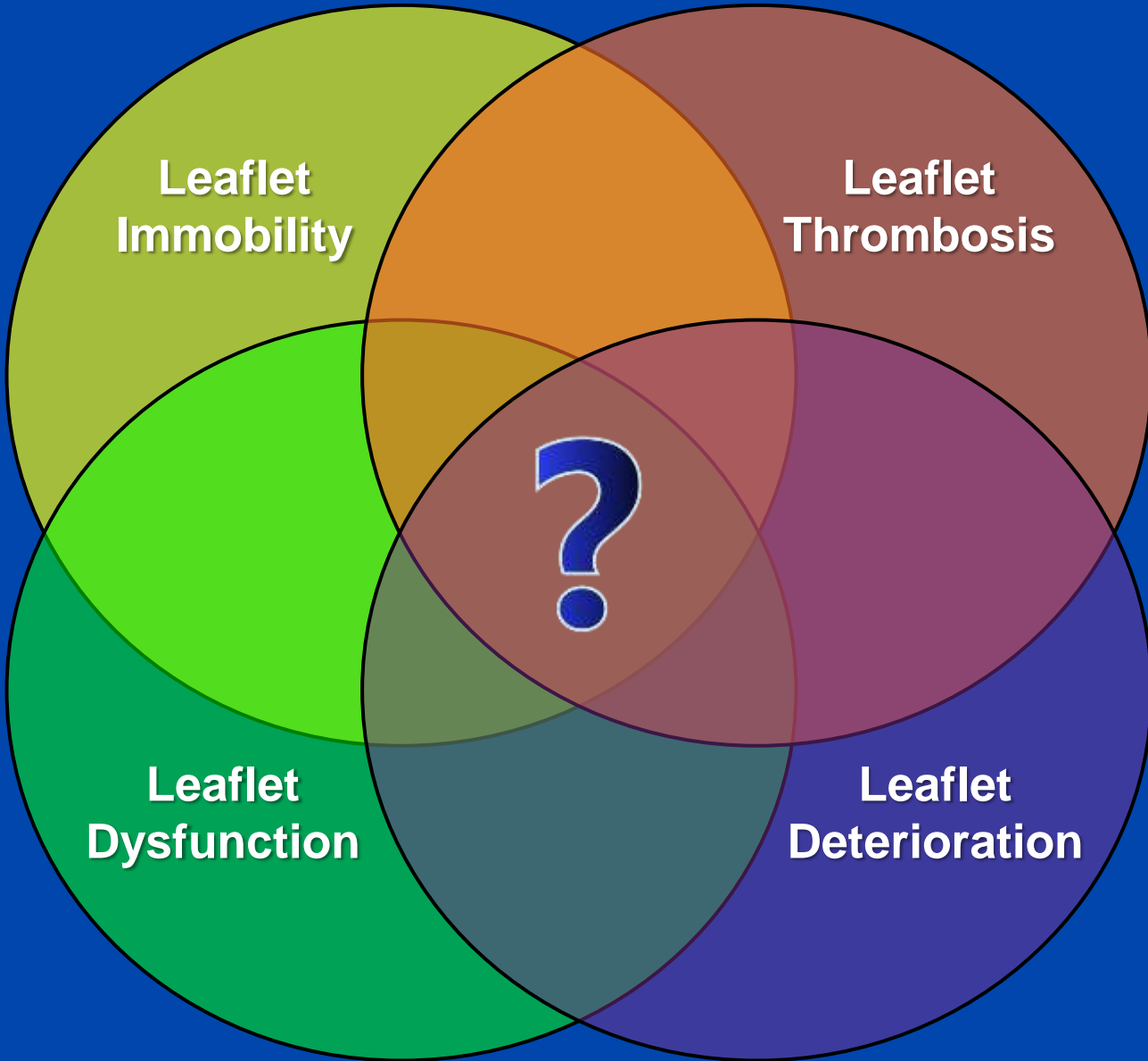
- **Most everyone gets old if they have the chance**
- **Populations are living longer**
- **The prevalence of aortic stenosis increases with age**
- **Aortic stenosis can be treated mechanically**

Reduced Leaflet Motion



Makkar et al: NEJM 373:2015, 2015





Leaflet Immobility/Thrombosis Questions

- What is the pathophysiology?
- What is the relationship between valve leaflet abnormalities and echo criteria for VHD?
- What is the true incidence of any abnormalities?
- What is the clinical significance – early & late?
- What is the natural history?
- Is it device specific – TAVR vs TAVR, TAVR vs SAVR?
- How often should we image & with what technology?
- What are optimal treatment strategies?

Leaflet Immobility/Thrombosis

New Lexicon, New Concepts

- **HALT: hypo-attenuating leaflet thickening**
- **HAM: hypo-attenuating affecting motion**
- **Baseline index thickness findings**
- **Double-oblique axial and multiplanar reformatted reconstructions**
- **Low attenuating mass**
- **4DCT imaging**

Transcatheter Aortic Valve Thrombosis

Incidence, Predisposing Factors & Implications

- 460 consecutive patients – TAVR, Sapien XT or 3
 - 405 – MDCT + TEE + TEE 1-3 months post TAVR
- Evaluated MDCT for hypoattenuated leaflet thickening (HALT)

Hansson NC et al: J Am Coll Cardiol 68(19):2059,69, 2016

THV Thrombosis

Detection by Multidetector Computed Tomography – 7%

Predisposing Factors

- Larger transcatheter heart valve (THV) size
- No post-TAVR warfarin

**THV Thrombosis Incidence
7% (28/405 patients)**



Warfarin

**THV Thrombosis
Resolution**



Hansson NC et al: J Am Coll Cardiol 68(19):2059,69, 2016

Results

N=28

- 1) 23 – subclinical event
5 – clinically overt THV thrombosis
- 2) Risk of THV thrombosis in patients not receiving warfarin 10.7% vs 1.8% (RR 6.09)
- 3) 29 mm THV has increased risk (RR 2.89)
- 4) Treatment with warfarin effectively reverted THV thrombosis and normalized function in 85%

Hansson NC et al: J Am Coll Cardiol 68(19):2059,69, 2016



Subclinical Leaflet Thrombosis in Surgical and Transcatheter Bioprosthetic Aortic Valves

Results from RESOLVE and SAVORY registries

Raj R. Makkar, MD
On Behalf of RESOLVE and SAVORY Investigators

Prevalence of Reduced Leaflet Motion Transcatheter vs Surgical Bioprosthetic Aortic Valves: P=0.001

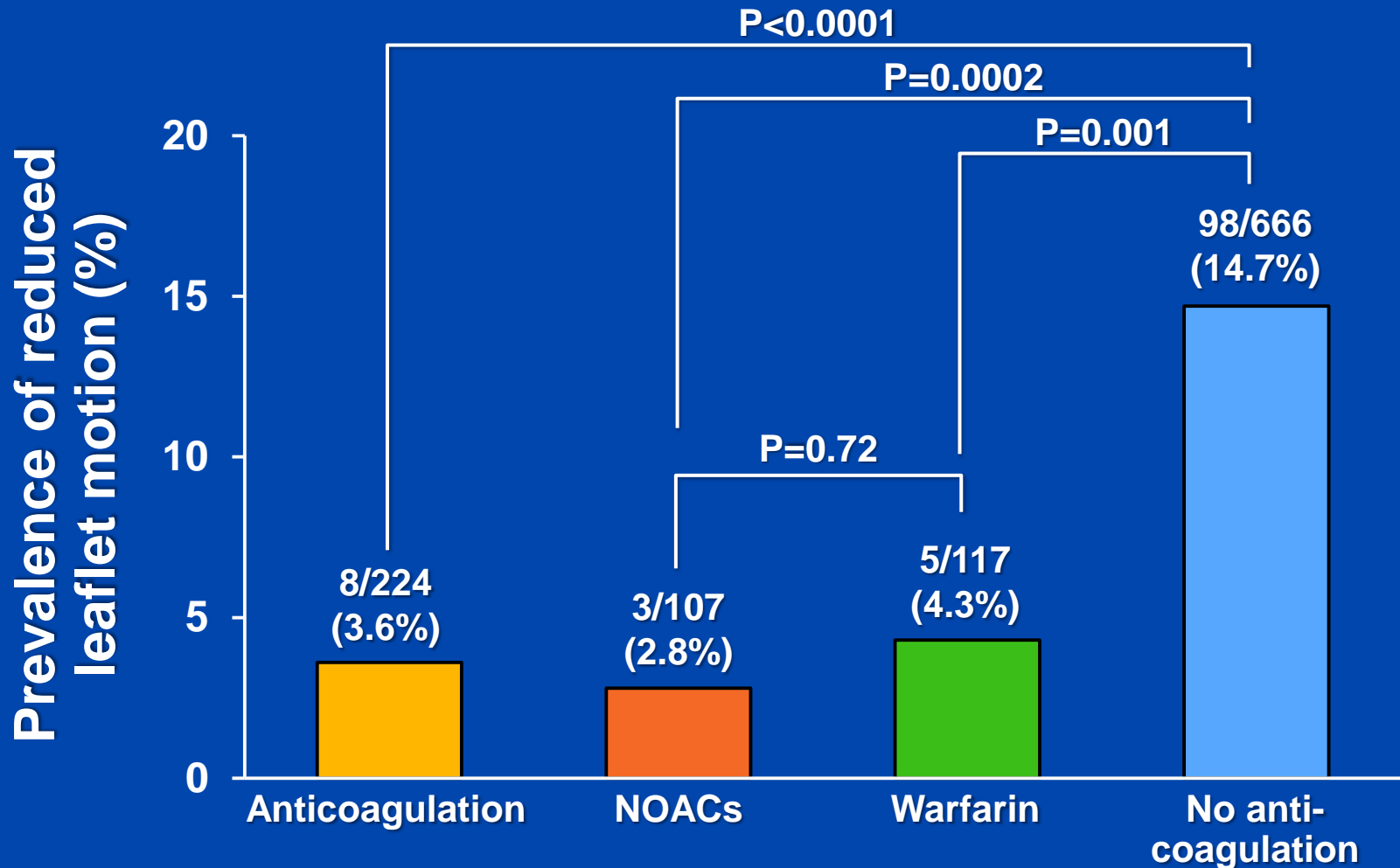
Reduced leaflet motion was present in 106 (11.9%) patients

Transcatheter valves
13.4% (101 out of 752)

Surgical valves
3.6% (5 out of 138)

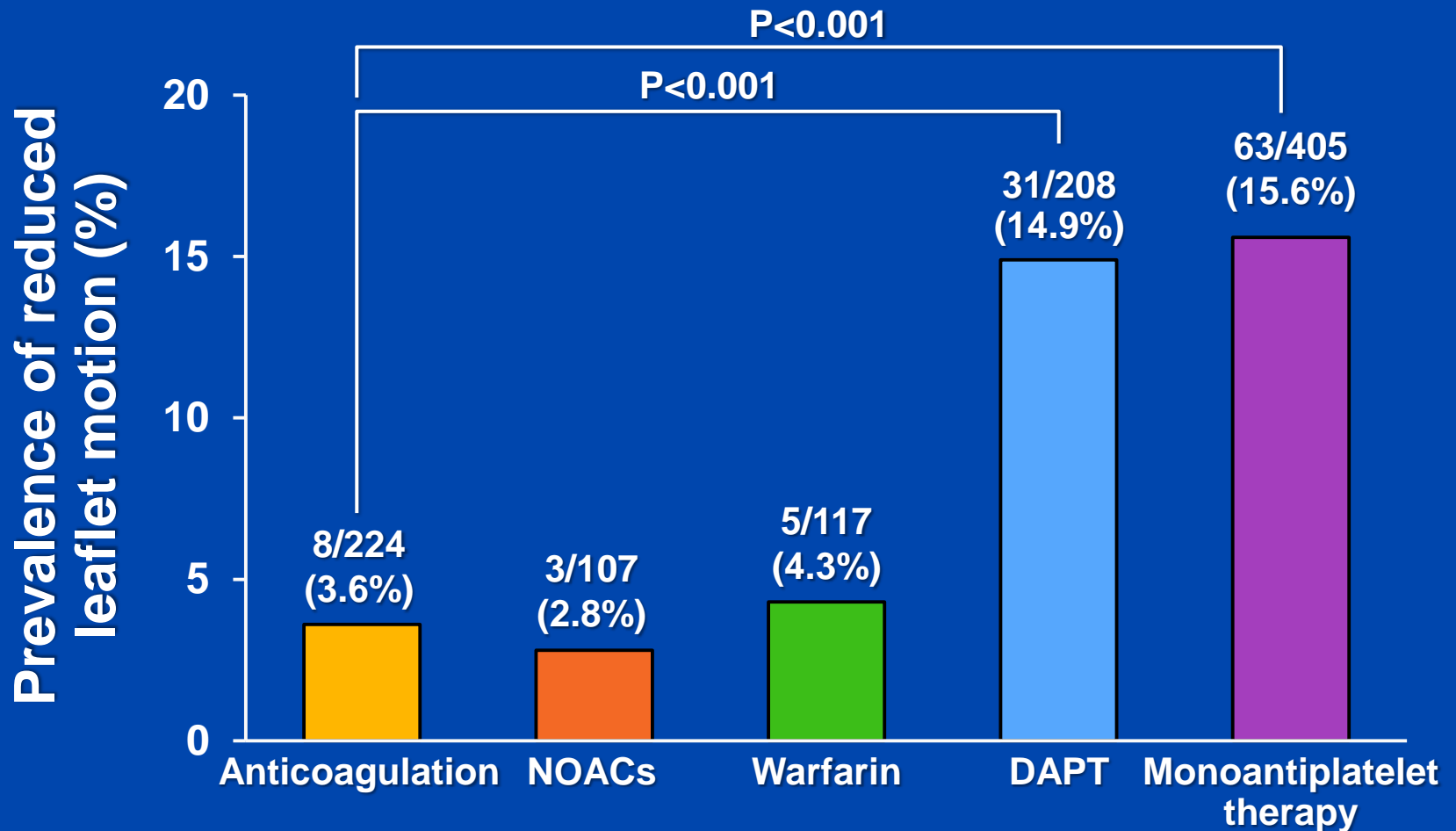
Anticoagulation and Reduced Leaflet Motion

Anticoagulation vs No Anticoagulation

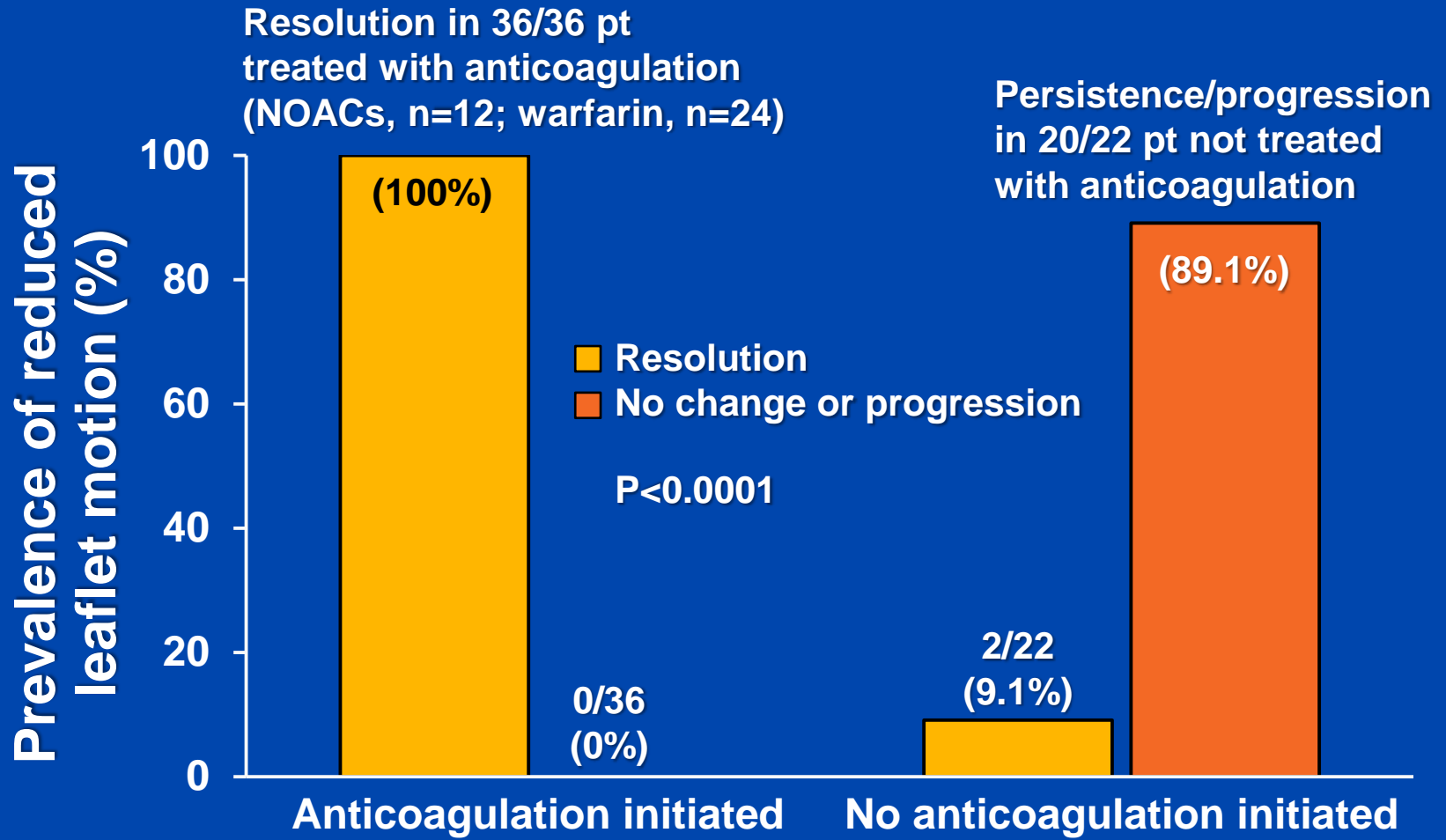


Anticoagulation and Reduced Leaflet Motion

Anticoagulation vs Antiplatelet Therapy



Impact of Initiation of Anticoagulation on Reduced Leaflet Motion



Recurrence of Reduced Leaflet Motion Following Discontinuation of Anticoagulation

Baseline

Reduced Leaflet Motion



s/p Xarelto

10 mg x 3 Months

Normal Leaflet Motion



**6 Months Following
Discontinuation of
Xarelto**

Reduced Leaflet Motion



Reduced leaflet motion recurred in 4 out of 8 patients in whom anticoagulation was discontinued

Mean time from discontinuation of anticoagulation to recurrence of reduced leaflet motion was 164 ±109 days

Impact of Reduced Leaflet Motion on Clinical Outcomes

All Clinical Events Post-TAVR/SAVR Included

No significant difference in strokes; but increased risk of TIAs

All events	Normal leaflet motion n=784			Reduced leaflet motion n=106			HR (95% CI)	P
	No.	%	Rate/100 person-yr	No.	%	Rate/100 person-yr		
Death	34	4.3	2.91	4	3.8	2.66	0.96 (0.34-2.72)	0.94
MI	4	0.5	0.34	1	0.9	0.67	1.91 (0.21-17.08)	0.56
Strokes/TIAs	27	3.4	2.36	11	10.4	7.85	3.27 (1.62-6.59)	0.001
All strokes	22	2.8	1.92	6	5.7	4.12	2.13 (0.86-5.25)	0.10
Ischemic	21	2.7	1.83	6	5.7	4.12	2.23 (0.90-5.53)	0.08
TIAs	7	0.9	0.60	6	5.7	4.18	7.02 (2.35-20.91)	0.0005

Conclusions

- Pt with subclinical leaflet thrombosis had a small but significant increase in transvalvular gradients compared to pt without subclinical leaflet thrombosis
- A greater proportion of pt with subclinical leaflet thrombosis (15% vs 1%) had hemodynamically significant increase in gradients (aortic valve gradients >20 mm Hg **and** increase in aortic valve gradients >10 mm Hg)
- While the death, MI and stroke rates were not significantly different between the 2 groups, subclinical leaflet thrombosis was associated with increased rates of TIAs and strokes/TIAs

Leaflet Immobility/Thrombosis

What do we know?

- It occurs with both TAVR and SAVR
- 4DCT is felt to be the 'gold' standard
- There is a difference between 4DCT findings and echo parameters of valve function
- Clinical events uncommon
- Anticoagulation is typically associated with resolution
- These abnormalities will be endpoints in FDA trials

On Going Studies

- **ATLANTIS (NCT 02664649)**
 - 1,510 TAVR patients
 - Apixaban vs standard of care
 - D, MI, Stroke/SE, bioprosthesis thrombus, bleeding up to 13 months
 - Estimated completion – 2019
- **GALILEO (NCT 02556203)**
 - 1,520 TAVR patients
 - Rivaroxaban + ASA vs ASA + clopidogrel
 - D, thromboembolic event including valve thrombosis, MI, Stroke up to 25 months
 - Estimated completion – 2018



Questions & Discussion