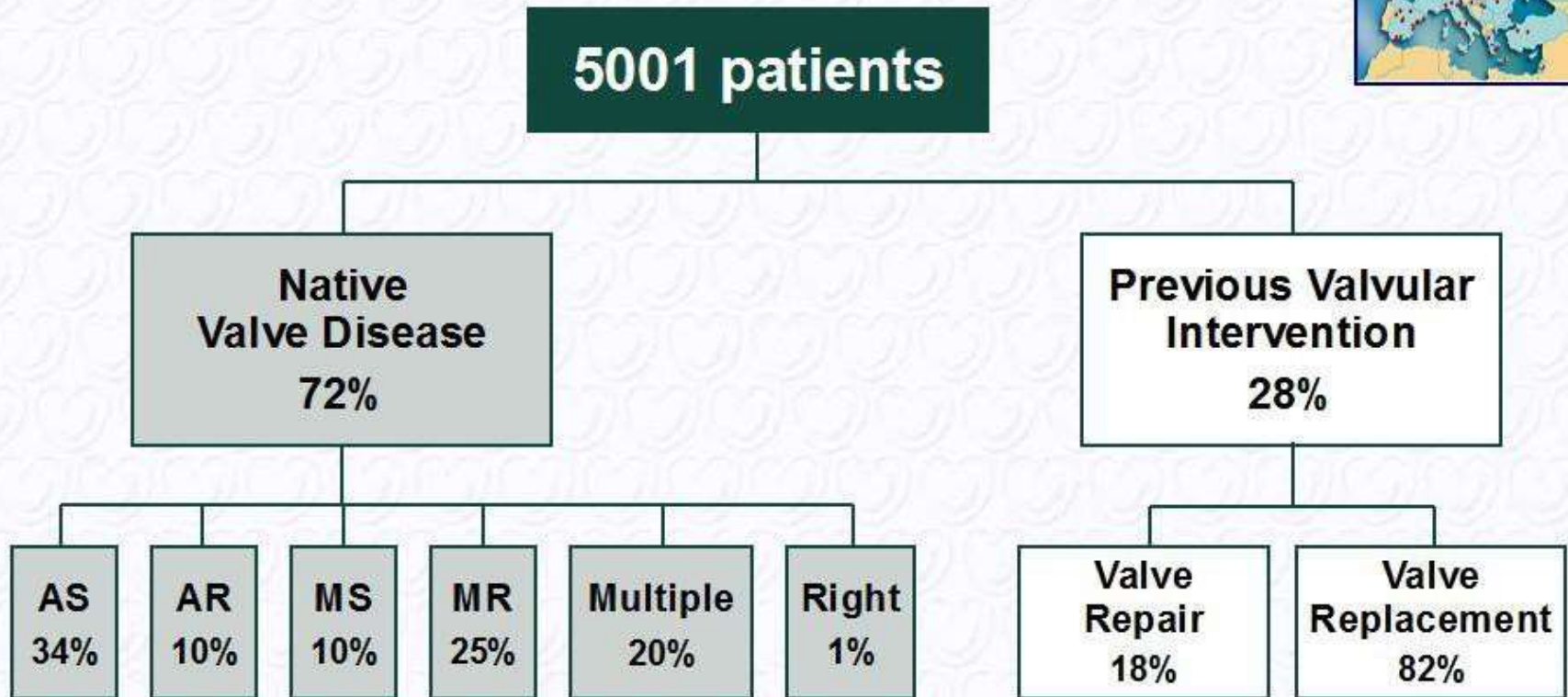


# *TAVR for Pure AR: International Registry Data and Technical Pearls*

Anna Sonia Petronio, MD, FESC

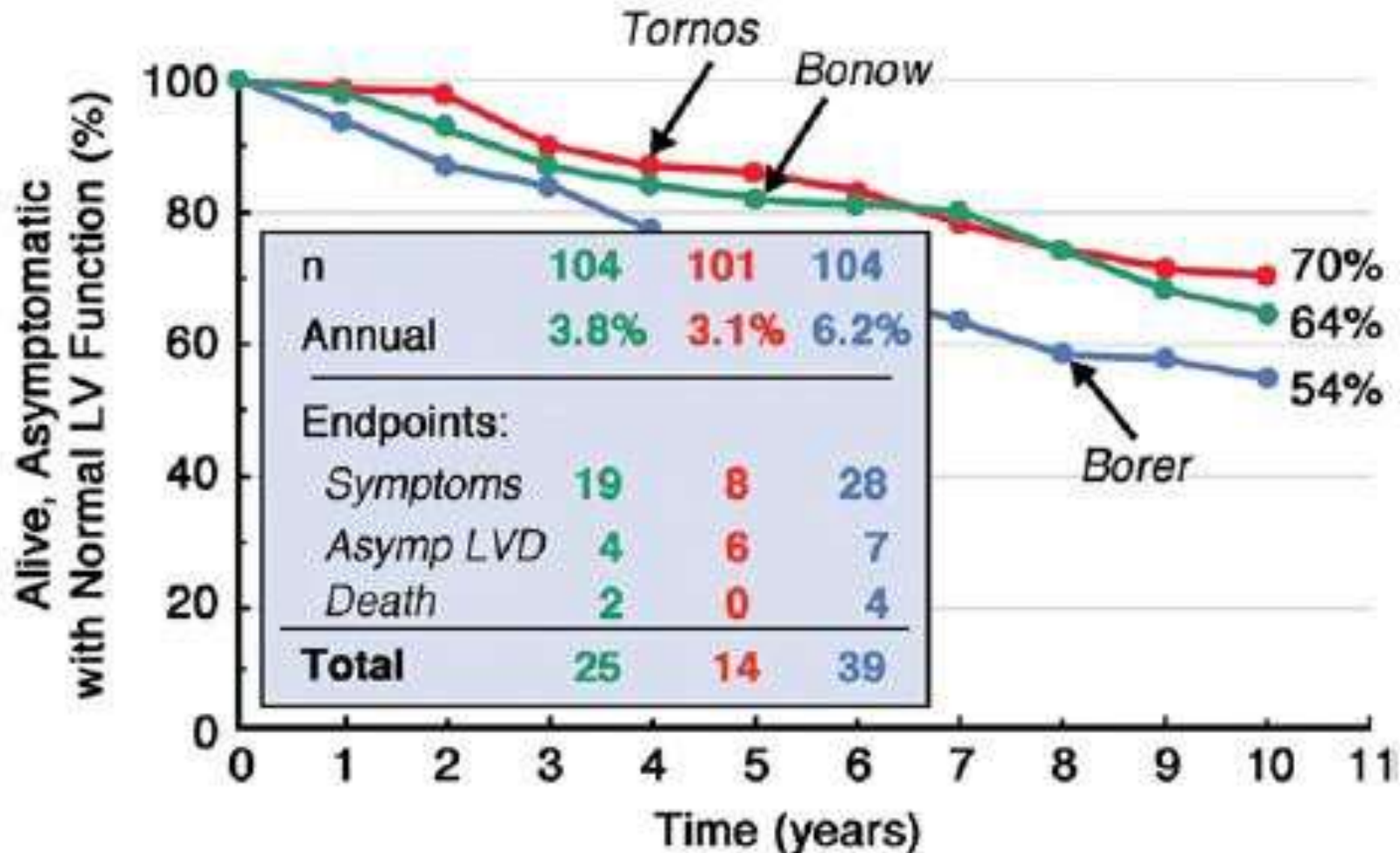
Head of Cardiac Catheterization Lab  
Cardiothoracic and Vascular Department  
University of Pisa, Italy  
[as.petronio@gmail.com](mailto:as.petronio@gmail.com)

# Distribution of Valvular Heart Diseases in the Euro Heart Survey

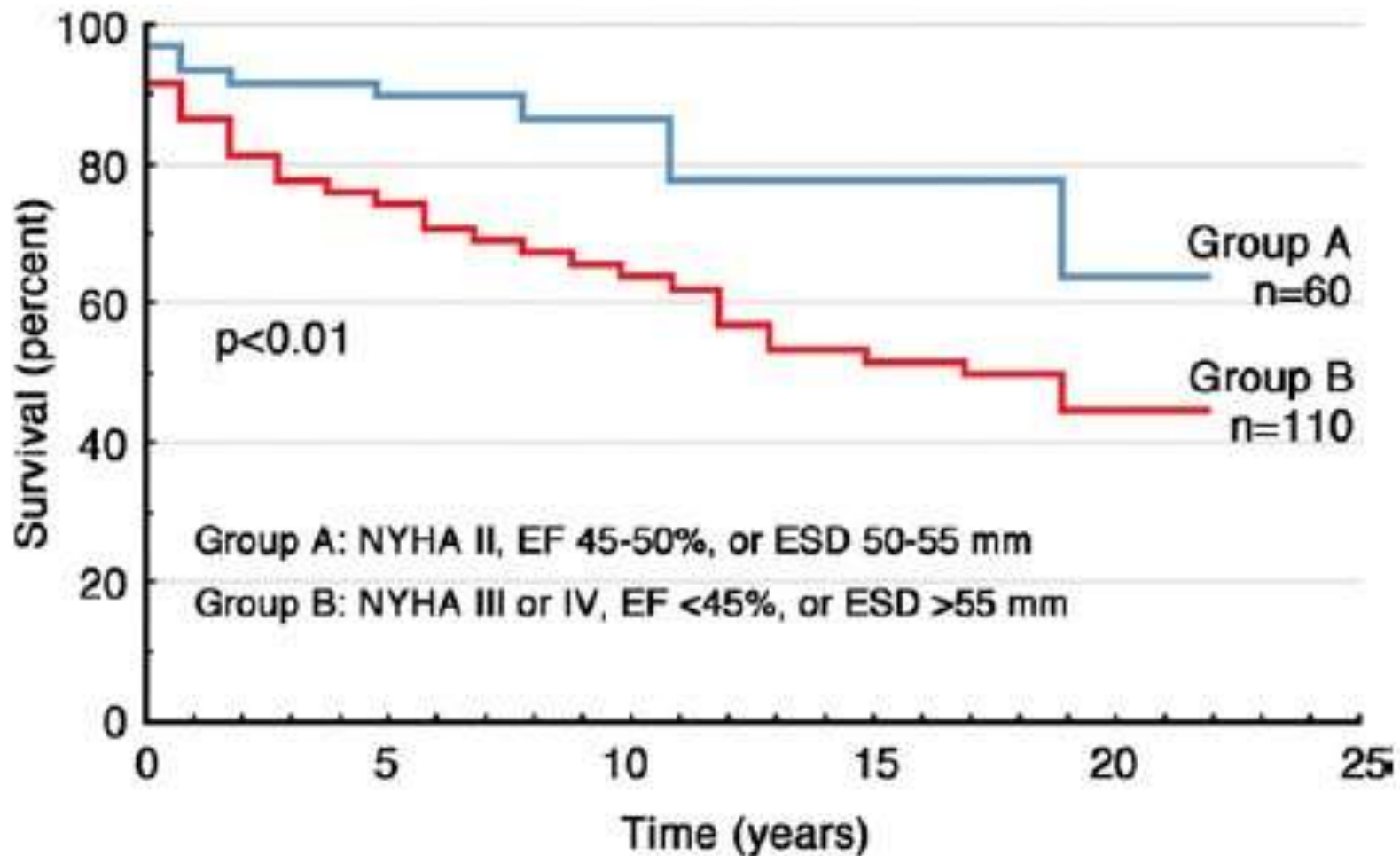


Third valvulopathy

# Aortic regurgitation: Natural History in Asymptomatic Patients



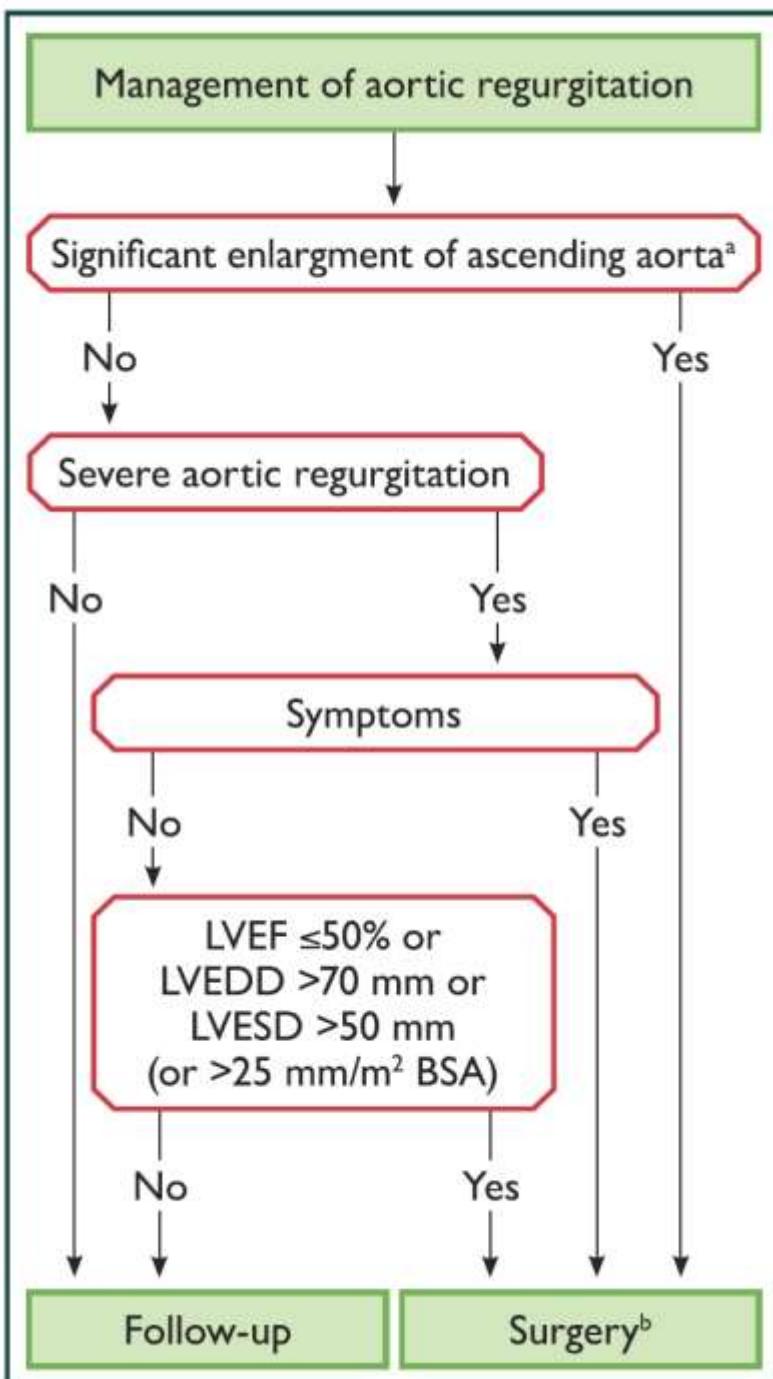
# Survival after AVR for AR



# Aortic regurgitation: *Natural History*

Asymptomatic	%/Y
• Normal LV function (~good prognosis)	
– Progression to symptoms or LV dysfunction	< 6
– Progression to asymptomatic LV dysfunction	< 3.5
– 75% 5-year survival	< 0.2
– Sudden death	
• Abnormal LV function	25
– Progression to cardiac symptoms	
• Symptomatic (Poor prognosis)	> 10
– Mortality	





## Indications for surgery in (A) severe aortic regurgitation and (B) aortic root disease (irrespective of the severity of aortic regurgitation)

Indications for surgery	Class <sup>a</sup>	Level <sup>b</sup>
<b>A. Severe aortic regurgitation</b>		
Surgery is indicated in symptomatic patients. <sup>57,58,66,67</sup>	I	B
Surgery is indicated in asymptomatic patients with resting LVEF ≤50%. <sup>57,58</sup>	I	B
Surgery is indicated in patients undergoing CABG or surgery of the ascending aorta or of another valve.	I	C
Heart Team discussion is recommended in selected patients <sup>c</sup> in whom aortic valve repair may be a feasible alternative to valve replacement.	I	C
Surgery should be considered in asymptomatic patients with resting ejection fraction >50% with severe LV dilatation: LVEDD >70 mm or LVESD >50 mm (or LVESD >25 mm/m <sup>2</sup> BSA in patients with small body size). <sup>58,66</sup>	IIa	B

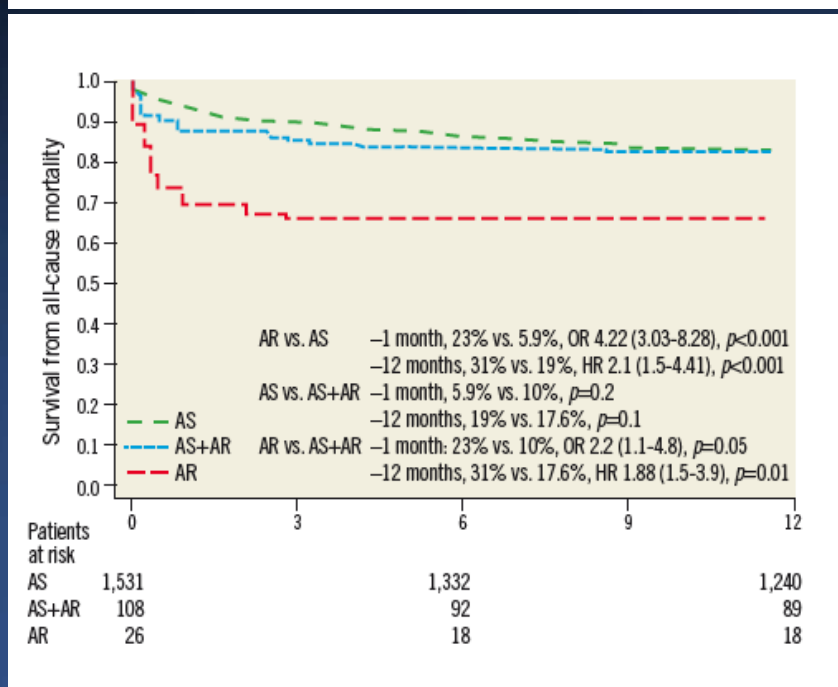
# **Aortic regurgitation:**

## *Management*

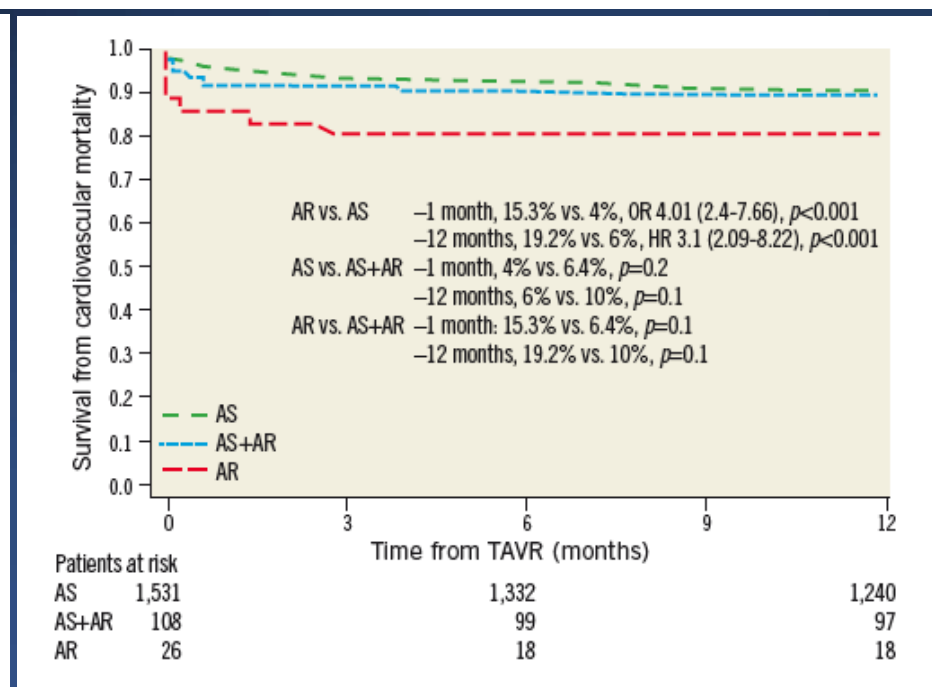
- **Is there a place for TAVI or re-TAVI ?**
- Patients with severe aortic regurgitation and at high or extreme surgical risk for whom conventional surgical aortic valve replacement may be unsuitable and who might benefit from transcatheter-based therapy.
- Patients with severe aortic regurgitation following TAVI or AVR
- Still an off-label indication?

# CoreValve implantation for severe aortic regurgitation: a multicentre registry

Luca Testa<sup>1\*</sup>, MD, PhD; Azeem Latib<sup>2</sup>, MD; Marco Luciano Rossi<sup>3</sup>, MD; Federico De Marco<sup>4</sup>, MD; Marco De Carlo<sup>5</sup>, MD; Claudia Fiorina<sup>6</sup>, MD; Jacopo Oreglia<sup>4</sup>, MD; Anna Sonia Petronio<sup>5</sup>, MD; Federica Etti<sup>6</sup>, MD; Stefano De Servi<sup>7</sup>, MD; Silvio Klugmann<sup>4</sup>, MD; Gian Paolo Ussia<sup>8</sup>, MD; Corrado Tamburino<sup>8</sup>, MD; Paolo Panisi<sup>1</sup>, MD; Nedy Brambilla<sup>1</sup>, MD; Antonio Colombo<sup>2</sup>, MD; Patrizia Presbitero<sup>3</sup>, MD; Francesco Bedogni<sup>1</sup>, MD



All-cause mortality



Cardiovascular mortality



# ***Native aortic regurgitation and TAVI***

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**CLINICAL RESEARCH**

**Interventional Cardiology**

## **Transcatheter Aortic Valve Implantation for Pure Severe Native Aortic Valve Regurgitation**

David A. Roy, MD,\* Ulrich Schaefer, MD, PhD,† Victor Guetta, MD,‡ David Hildick-Smith, MD,\$ Helge Möllmann, MD,|| Nicholas Dumonteil, MD,¶ Thomas Modine, MD,# Johan Bosmans, MD,\*\* Anna Sonia Petronio, MD,†† Neil Moat, MBBS, MS,‡‡ Axel Linke, MD,§§ Cesar Moris, MD,|||| Didier Champagnac, MD,¶¶ Radosław Parma, MD, PhD,## Andrzej Ochala, MD,## Diego Medvedofsky, MD,‡ Tiffany Patterson, MD,‡‡ Felix Woitek, MD,§§ Marjan Jahangiri, MD,\* Jean-Claude Laborde, MD,\* Stephen J. Brecker, MD\*

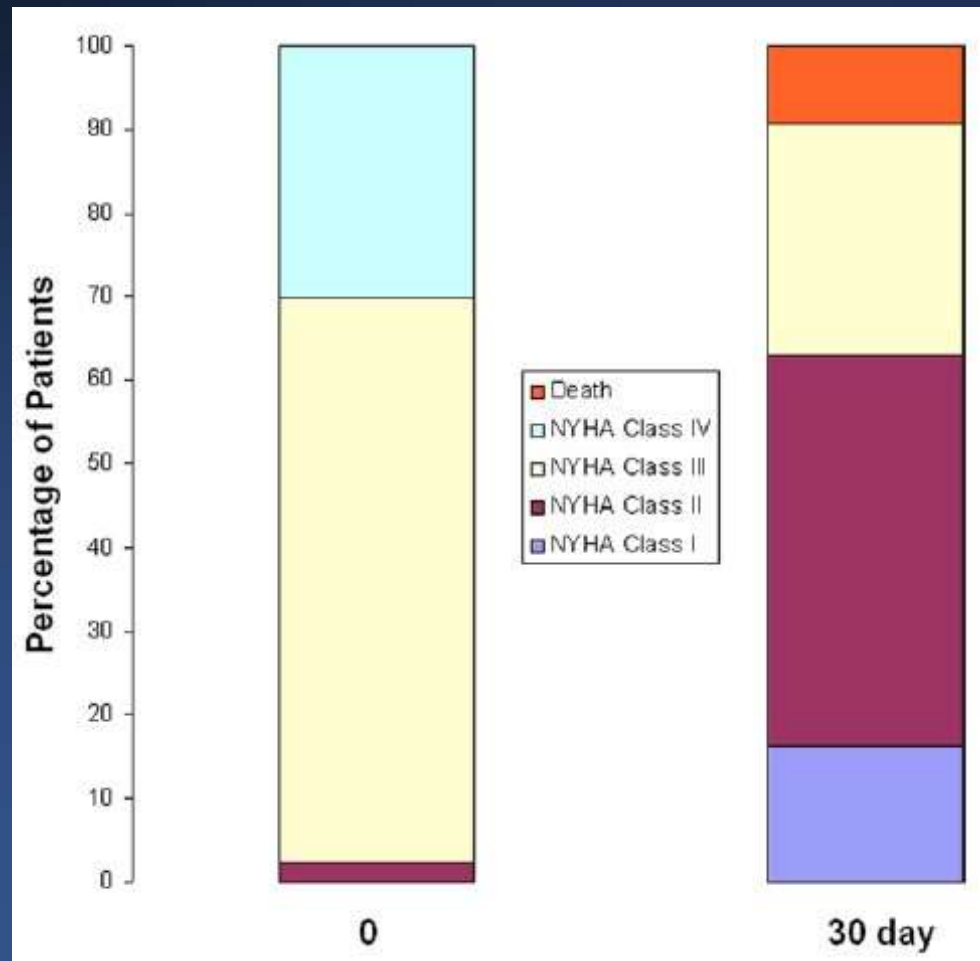
# *Native aortic regurgitation and TAVI*

43 patients

## Clinical and Safety Outcomes According to VARC

### Mortality

30-day all-cause	4 (9.3%)
30-day cardiovascular	1 (2.3%)
12 month all-cause	6/28 (21.4)
12-month cardiovascular	3/28 (10.7)
Major stroke (30 days)	2 (4.7)
Major bleeding	8 (18.6)
Acute kidney injury (stage 3)	2 (4.7)
Myocardial infarction	0
Access site complications	6 (14.0)
Major	3 (7.0)
Minor	3 (7.0)
VARC procedure success	32 (74.4)



# *Native aortic regurgitation and TAVI*

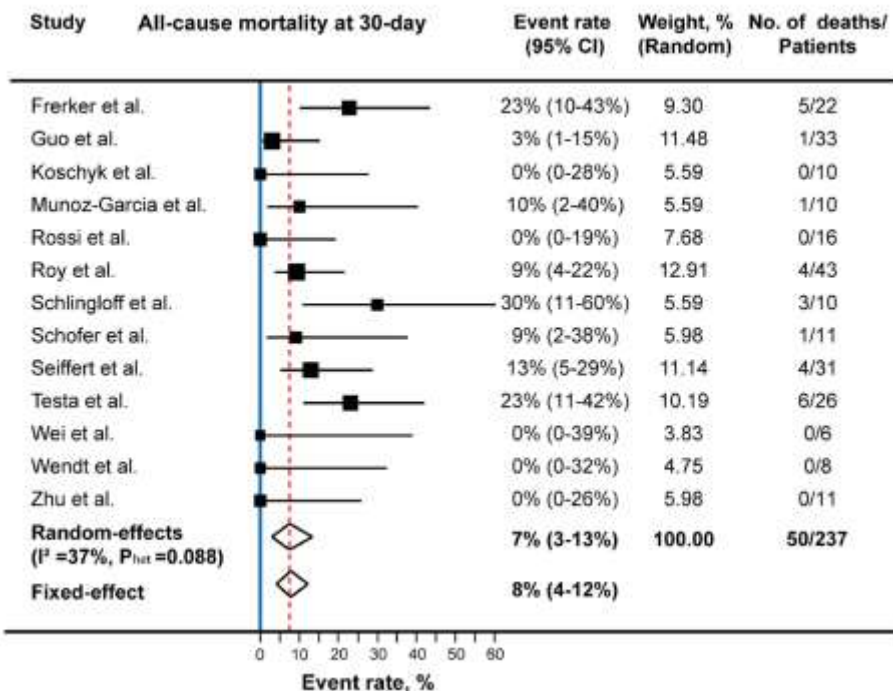
## Transcatheter Aortic Valve Replacement for the Treatment of Pure Native Aortic Valve Regurgitation

### A Systematic Review

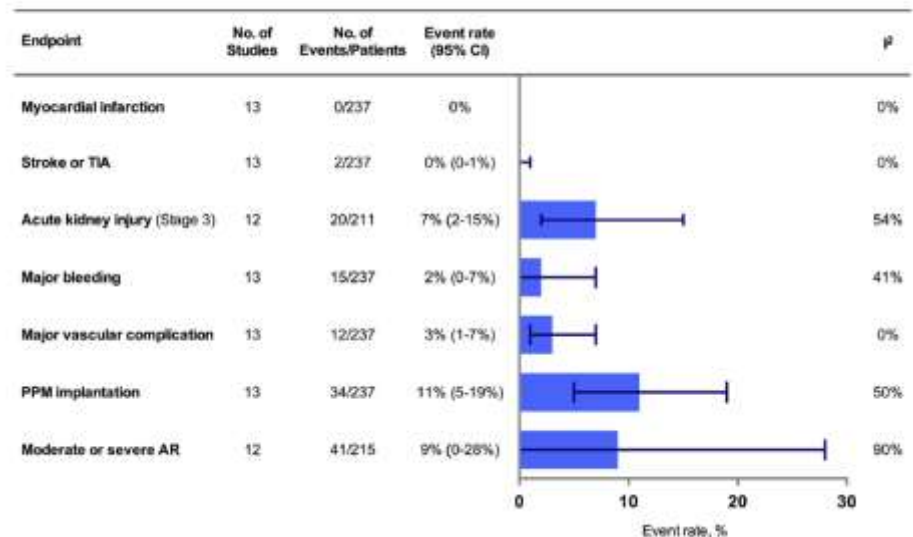
Anna Franzone, MD,<sup>a</sup> Raffaele Piccolo, MD,<sup>a</sup> George C.M. Siontis, MD,<sup>a</sup> Jonas Lanz, MD,<sup>a</sup> Stefan Stortecky, MD,<sup>a</sup>  
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*JACC Interv 2016*

**FIGURE 2** Forest Plot Showing the Individual and Pooled Event Rates for the Primary Endpoint, 30-Day Mortality After TAVR



**FIGURE 3** Meta-Analysis of Secondary Endpoints



# *Native aortic regurgitation and TAVI*

## Transcatheter Aortic Valve Replacement in Pure Native Aortic Valve Regurgitation

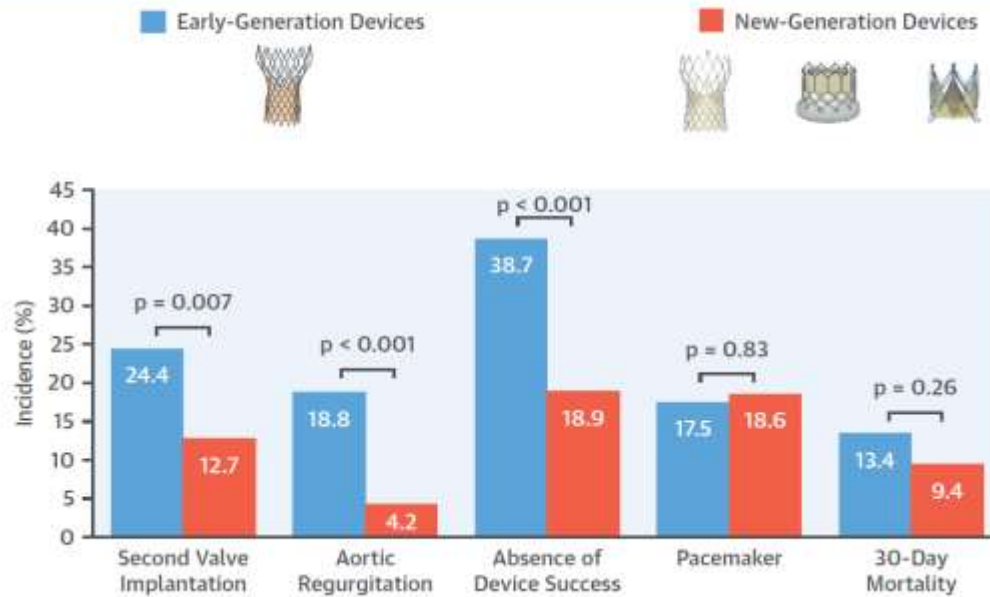


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Harindra C. Wijeyesundera, MD,<sup>aa</sup> Hidehiro Kaneko, MD,<sup>bb</sup> Tarun Chakravarty, MD,<sup>a</sup> Moody Makar, MD,<sup>a</sup> Horst Sievert, MD,<sup>cc</sup>  
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Stephan M. Ensminger, MD,<sup>k</sup> David Hildick-Smith, MD,<sup>o</sup> Anna Sonia Petronio, MD,<sup>v</sup> Wei-Hsian Yin, MD,<sup>kk</sup>  
Federico De Marco, MD,<sup>ll</sup> Luca Testa, MD,<sup>ll</sup> Nicolas M. Van Mieghem, MD,<sup>mm</sup> Brian K. Whisenant, MD,<sup>nn</sup>  
Karl-Heinz Kuck, MD,<sup>b</sup> Antonio Colombo, MD,<sup>l</sup> Saibal Kar, MD,<sup>a</sup> Cesar Moris, MD,<sup>oo</sup> Victoria Delgado, MD,<sup>t</sup>  
Francesco Maisano, MD,<sup>n</sup> Fabian Nietlispach, MD,<sup>n</sup> Michael J. Mack, MD,<sup>pp</sup> Joachim Schofer, MD,<sup>g</sup> Ulrich Schaefer, MD,<sup>d</sup>  
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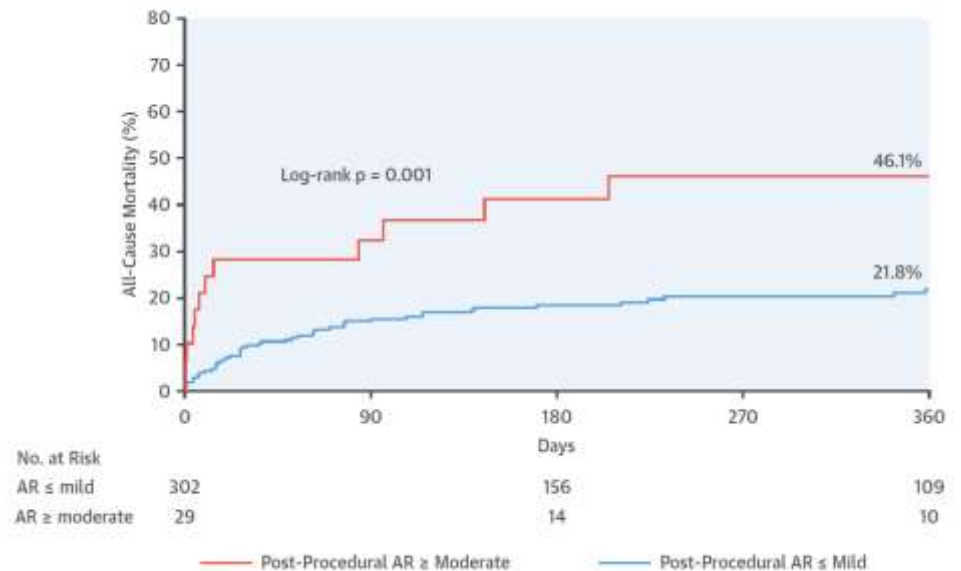
JACC 2017



## Outcomes According to Devices



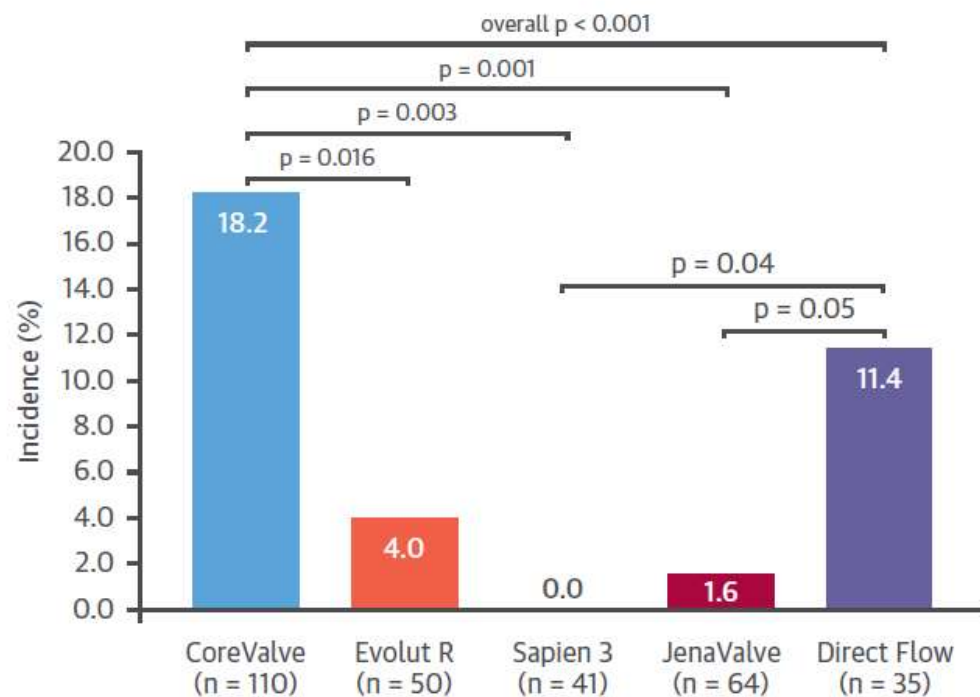
## Mortality and Post-Procedural Aortic Regurgitation



Yoon et al, JACC 2017

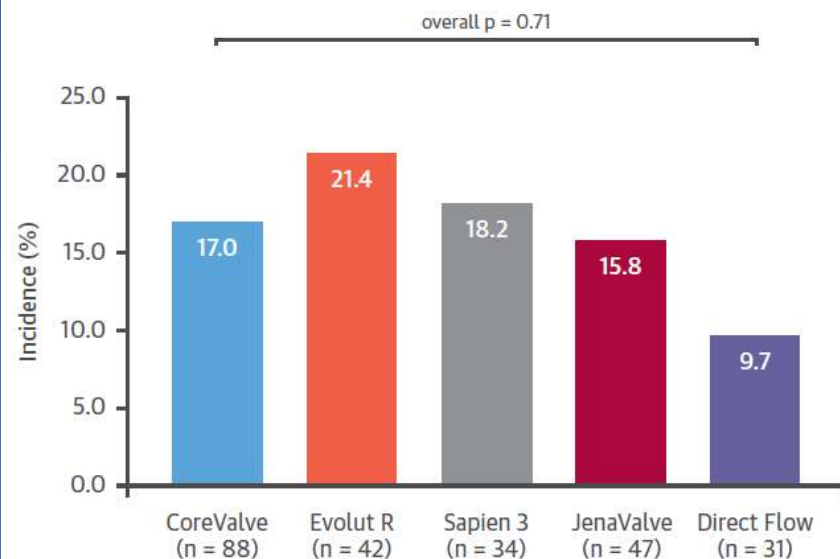
B

### Post-Procedural Aortic Regurgitation $\geq$ moderate



D

### New Permanent Pacemaker



# *Technical Challenging in TAVI for aortic regurgitation*

## Morphological Features of Aortic Valve Stenosis or Regurgitation

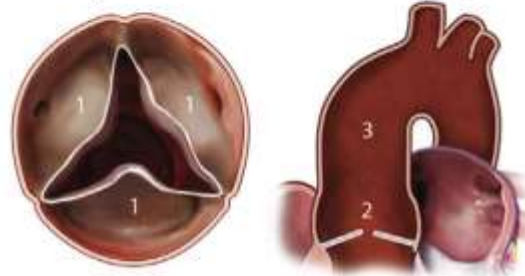
### Calcific Aortic Valve Stenosis

- 1- Nodular calcific deposits on aortic side



### Aortic Valve Regurgitation

- 1- Minimal or absent cusp calcification  
2- Dilated aortic root  
3- Frequent coexistence of dilated ascending aorta



## Technical Challenges of TAVR in Aortic Valve Regurgitation




Suboptimal Fluoroscopic Visualization of the Native Valve


Insufficient Anchoring and Sealing of the Transcatheter Device

Risk of Misplacement and Migration of the Device

Risk of Residual Valvular Regurgitation

# *Tips and Tricks*

- Suboptimal fluoroscopic visualization of cuspid  use two pigtails as reference
- Insufficient anchoring due to lack of calcifications   
use repositionable and retrievable devices. Considering pacing during implant
- Risk of residual valvular regurgitation  oversize the valve and use device with perianular skirt

B	Device	Design; Delivery Access	Features
	ACURATE (Symetis)	Self-expandable nitinol stent; Transapical Transfemoral	Self-positioning at supra-annular level; fixed in a waistlike manner, thereby covering the aortic annulus (hourglass design); tactile feedback reducing the risk of malpositioning; possibility of partial resheating
	JenaValve* (JenaValve Technology)	Self-expandable nitinol stent; Transapical	Feeler-guiding positioning and clip fixation mechanism of the native aortic valve leaflet; retrievable and repositionable
	CoreValve Revalving System (Medtronic)	Self-expandable nitinol frame; Transfemoral	The lower portion of the prosthesis has high radial force to expand and exclude the native leaflets and to avoid recoil; the middle portion is constrained to avoid the coronary arteries and the upper portion is flared to center and fix the stent frame firmly in the ascending aorta and to provide longitudinal stability and coaxial positioning
	Direct Flow (Direct Flow Medical)	Non-metallic framework and two inflatable rings; Transfemoral	Peculiar anchoring mechanisms (inflatable rings) not requiring calcium for sealing; repositionability and retrievability; functional during positioning (ensures hemodynamic stability); fully retrievable
	Engager** (Medtronic)	Self-expandable nitinol stent; Transapical	Trapping of valve leaflets in order to stabilize the system and to avoid coronary ostia occlusion
	Helio dock** (Edwards Lifesciences)	Self-expandable nitinol stent; Transfemoral	The dock is fixed inside the aortic root and assists in annular fixation of a standard balloon-expandable SAPIEN XT transcatheter heart valve by incorporating and entrapping the native cusps
	CoreValve Evolute R** (Medtronic)	Self-expandable; Transfemoral	Recapturability and repositionability; supra-annular position
	J-Valve (JieCheng Medical Technology)	Self-expandable nitinol stent; Transapical	Featured by three U-shape anatomically oriented devices-graspers-which facilitate 'self-positioning' during implantation and provide extra-radial fixation by embracing the native valve leaflets (clip mechanism). The two stages releasing design facilitates accurate position
	Lotus** (Boston Scientific)	Nitinol frame with an Adaptive SealTM Technology; Transfemoral	Mechanically deployed with possibility to retrieve and reposition; early functional during deployment



# *Conclusions*

- Preliminary experiences (registries) are available for the use of TAVI in patients with severe aortic regurgitation at high risk for surgery.
- TAVI represents a valid option for the treatment of para- valvular regurgitation and intra-prosthetic regurgitation as a valve-in-valve procedure.
- New generation and repositioning devices are able to limit residual AR following TAVI.
- Ad hoc studies are necessary to evaluate outcome of new generation devices and to consider TAVI as a frontline treatment option for high risk patients with native severe AR.

*Thanks for your attention*