



Transcatheter Aortic Valve Replacement: Update on Patient Selection and Valve Prostheses

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Disclosure:

- Consulting/Employment:
Consulting for Edwards Lifesciences
- Other Relationships:
Advisory Board: Phillips Imaging and
Steering Committee of Partner 2 Clinical
Trial

Outline

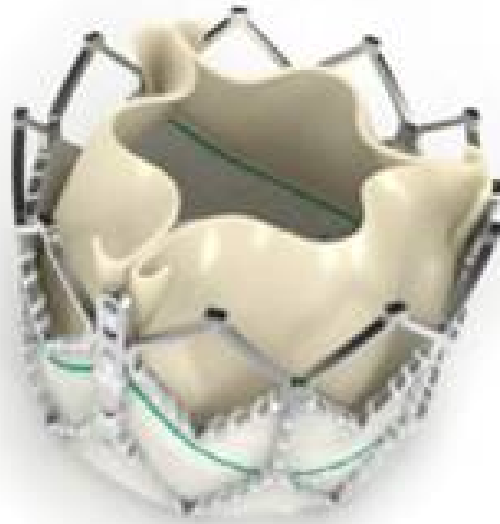
- Introduction
- Factors influencing patient outcomes and selection
 - Sex
 - Coronary disease
 - Diabetes
 - Coronary obstruction
 - Aortic insufficiency
 - Chronic lung disease
- Futility
- New prostheses

Introduction

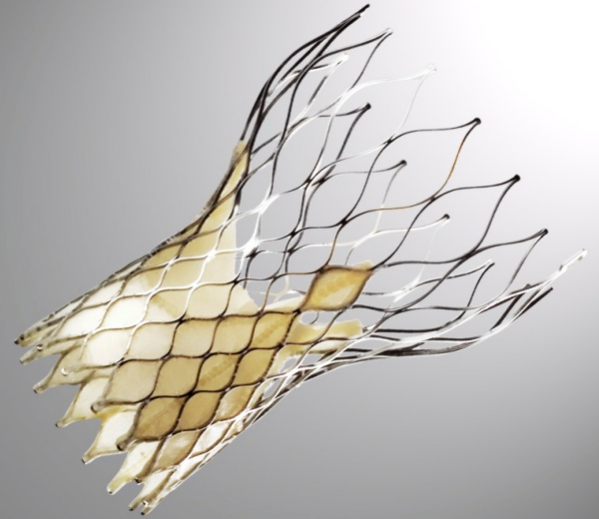
Edwards SAPIEN valve



Edwards SAPIEN XT valve

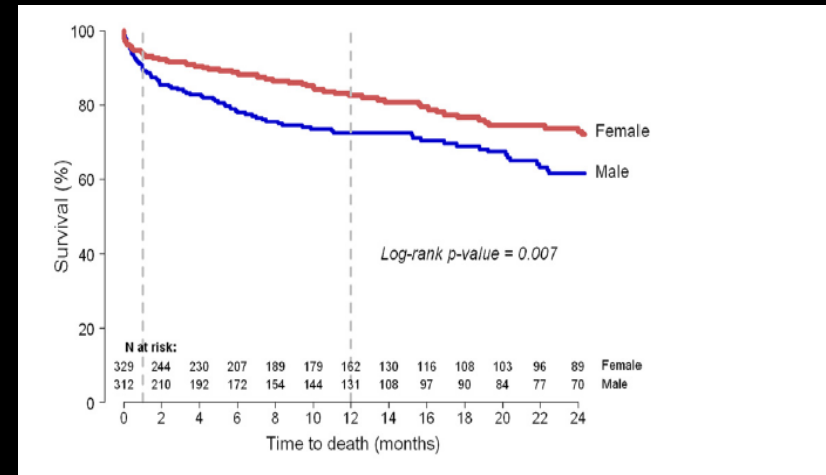


CoreValve Revalving system



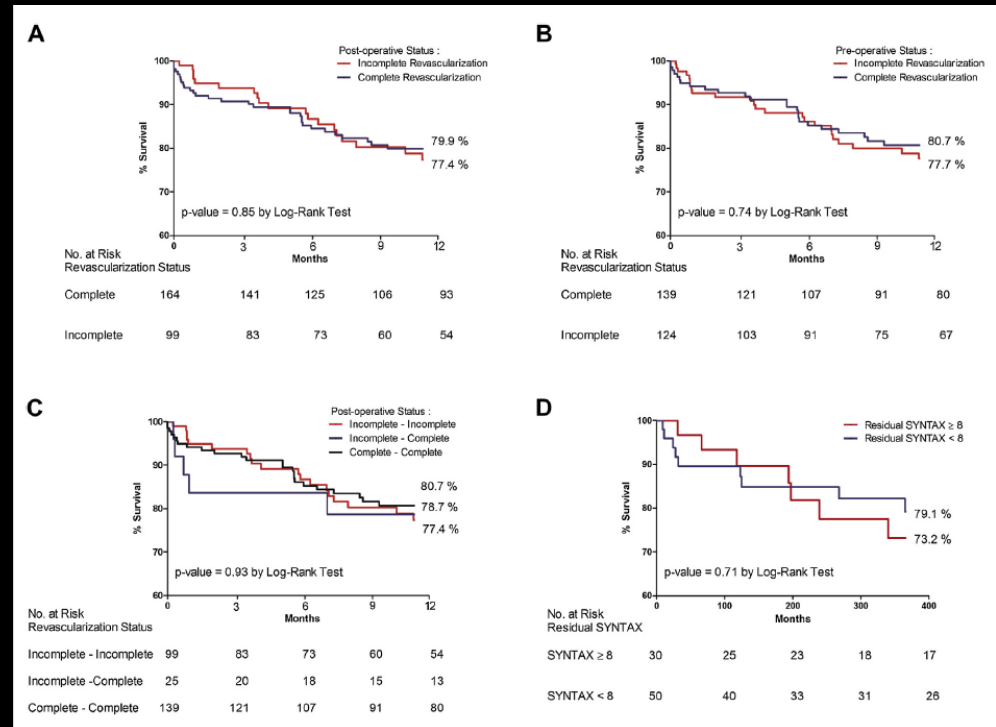
Sex Differences in Mortality after TAVR

- Women 51.3%
 - Frail
 - Smaller AVA
 - Lower GFR
- Similar procedural success
- Procedural Complications
 - Vascular complications 12% vs. 5% (p=0.003)
 - Blood transfusion: 9.5% vs. 3.6% (p=0.005)
 - 30 day mortality: 6.5% vs. 11.2% (p=0.05)
- In PARTNER Cohort A
 - TAVR mortality: 18.4% vs. 28.4% p=0.03
 - SAVR mortality: 27.2% vs. 24.2% p=0.54
- Mechanism
 - Less fibrosis?
 - LV hypertrophy regression



TAVR and Coronary Artery Disease (CAD)

- Presence of CAD affects survival in patients undergoing TAVR and AVR.
- Concomitant revascularization increases surgical risk and survival.
- Multidisciplinary discussion is key to patient selection
 - Type of revascularization
 - Timing
 - Data



TAVR and Paravalvular AI

■ Moderate AI



- 7-24% of patients
- mortality and heart failure

■ Aortic annulus measurement

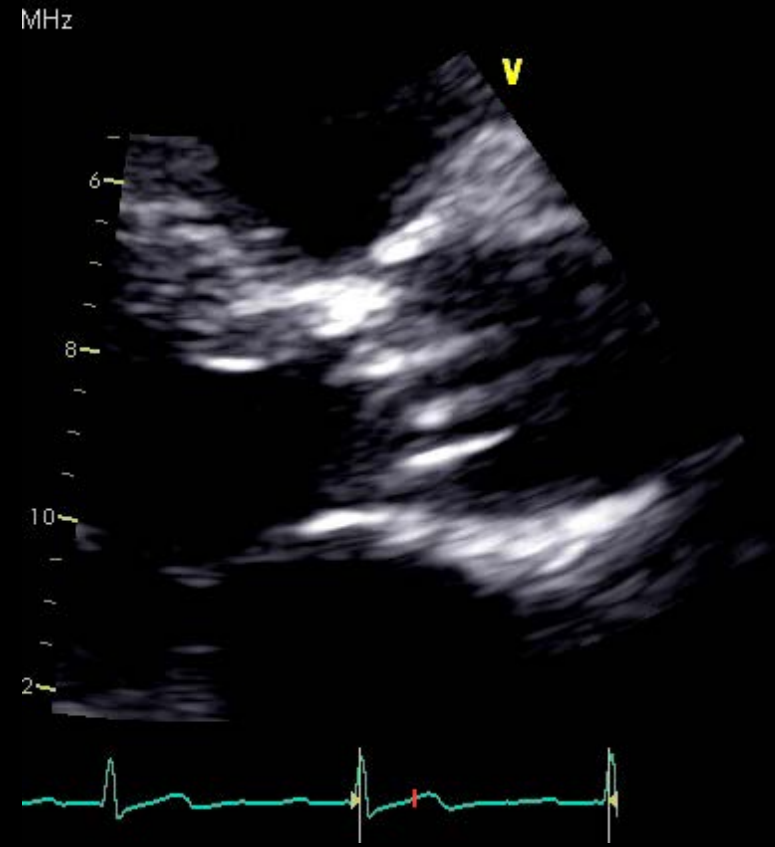
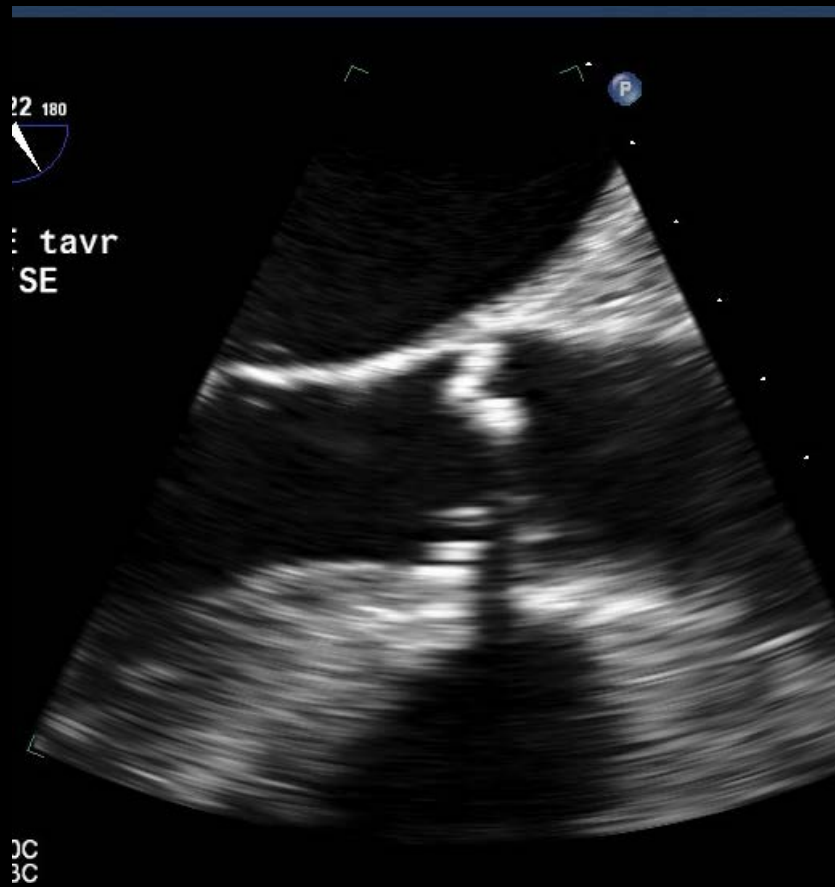
- 2D vs. 3D
- TTE vs. TEE
- Role of MSCT
- Perimeter vs. Area

■ Quantification

■ Factors:

- Cover Index
- Annular size
- Annular eccentricity
- Leaflet calcification
- Malposition

TEE vs. TTE



MSCT and Annulus sizing



** NOT FOR CLINICAL USE **

- Allows for multiplanar reconstruction
- Gated to 25-35% RR interval
- Area and Perimeter
- Ellipse vs. Circular

TAVR and Chronic Lung Disease

■ Mortality

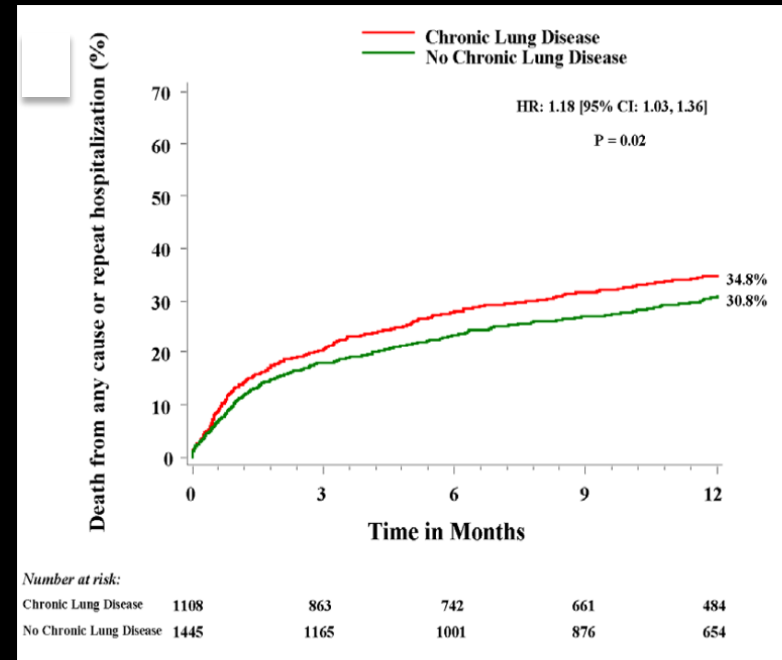
- Cohort B 52% vs. 69% $p=0.04$
 - Cohort A 64.8% vs. 66.4% $p=0.92$
- No difference between TA vs. TF

■ All TAVR patients (Continued access + RCT)

- 1 Yr mortality: 23.4 vs. 19.6% $p=0.02$
- Oxygen dependence: 29.7% vs. 21.4% $p=0.004$

■ Factors associated with mortality

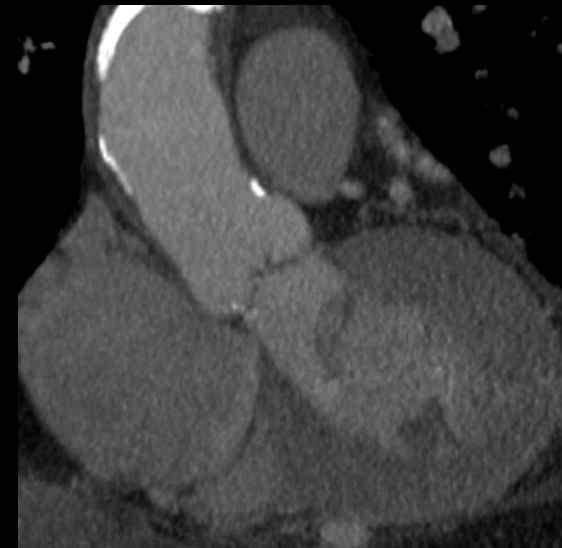
Variable	OR
• 6 minute walk < 50 m	1.67
• O ₂ dependence	1.44
• BMI	0.97
• Cr > 2mg/dl	1.43
• mPAP	1.26



Coronary Obstruction

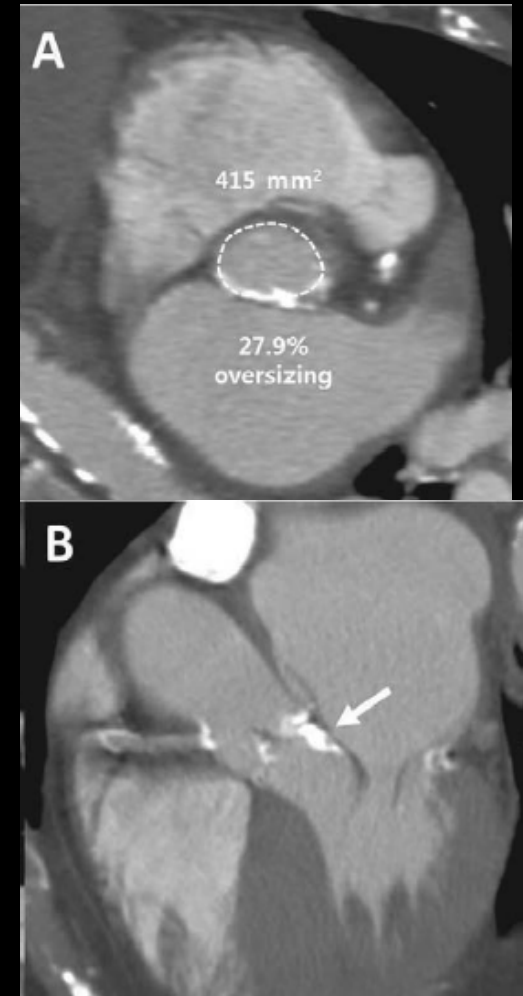
- Incidence: 0.66%
- Procedural death: 16%
- 30 day mortality: 40%

- Risk factors:
 - Women
 - Without CABG
 - Valve in Valve
 - Smaller Sinus of Valsalva < 30 mm
 - Low coronary ostia < 12 mm
 - Small aortic annulus
 - Balloon expandable prosthesis



Aortic Root and Annular Rupture

- Incidence: 1%
- 48% in hospital mortality rate
- Seen during valve deployment or post-dilation
- Recognized by refractory hypotension or bleeding
- Risk Factors
 - LVOT or subannular calcification
 - Agatston score 181 vs 22 ($p < 0.001$)
 - $>20\%$ oversizing (annular area)
 - 79% vs. 29% ($p < 0.001$)
 - Postdilation
 - 22% vs. 0% ($p < 0.005$)



What is treatment futility in TAVR?

■ Quality of life

SF-12 MCS
Mean gradient
Mod-Severe MR
BMI
6MWT distance
O2-dependent COPD
Creatinine
Diabetes
Mod-Severe AR
KCCQ
Arrhythmia
Age

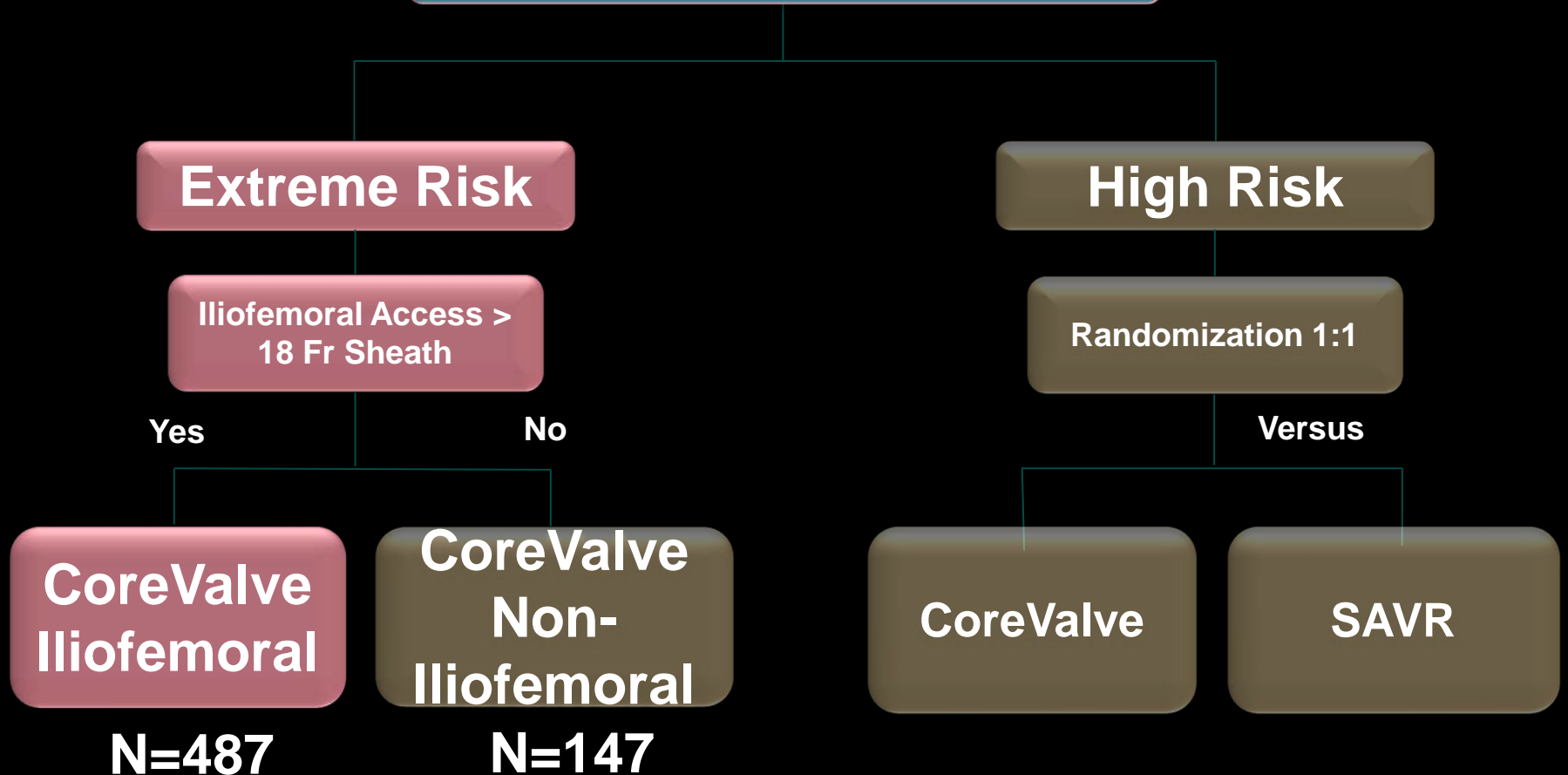
■ Early mortality

Decreasing BMI
Coagulopathy
Liver disease
Lower BMI
Decreasing MMSE
Renal disease
IABP during procedure
Non-fata major complications

US COREVALVE Trial

Pivotal Trial Design

CoreValve US Pivotal Trials



Baseline Demographics

Characteristic	N=471
Age, years	83.1 ± 8.6
Men, %	49.0
STS Predicted Risk of Mortality, %	10.3 ± 5.6
Logistic EuroSCORE, %	22.7 ± 17.4
New York Heart Association (NYHA)	
NYHA Class III/IV, %	91.9
Diabetes Mellitus, %	42.5
Insulin Requiring Diabetes, %	19.1
Prior Stroke, %	13.8
Modified Rankin 0 or 1, %	71.9
Modified Rankin > 1, %	28.1

Baseline Co-Morbidities

Co-Morbidity Assessment	N=471
Any Chronic Lung Disease (STS Criteria), %	58.8
Moderate, %	15.3
Severe*, %	24.0
Home Oxygen, %	30.4
FEV1 ≤ 1000 cc, %	23.1
Diffusion Capacity < 50%, %	22.3
Charlson Co-Morbidity Score**, %	5.3 ± 2.3
Moderate (3, 4), %	32.9
Severe (≥ 5), %	58.6

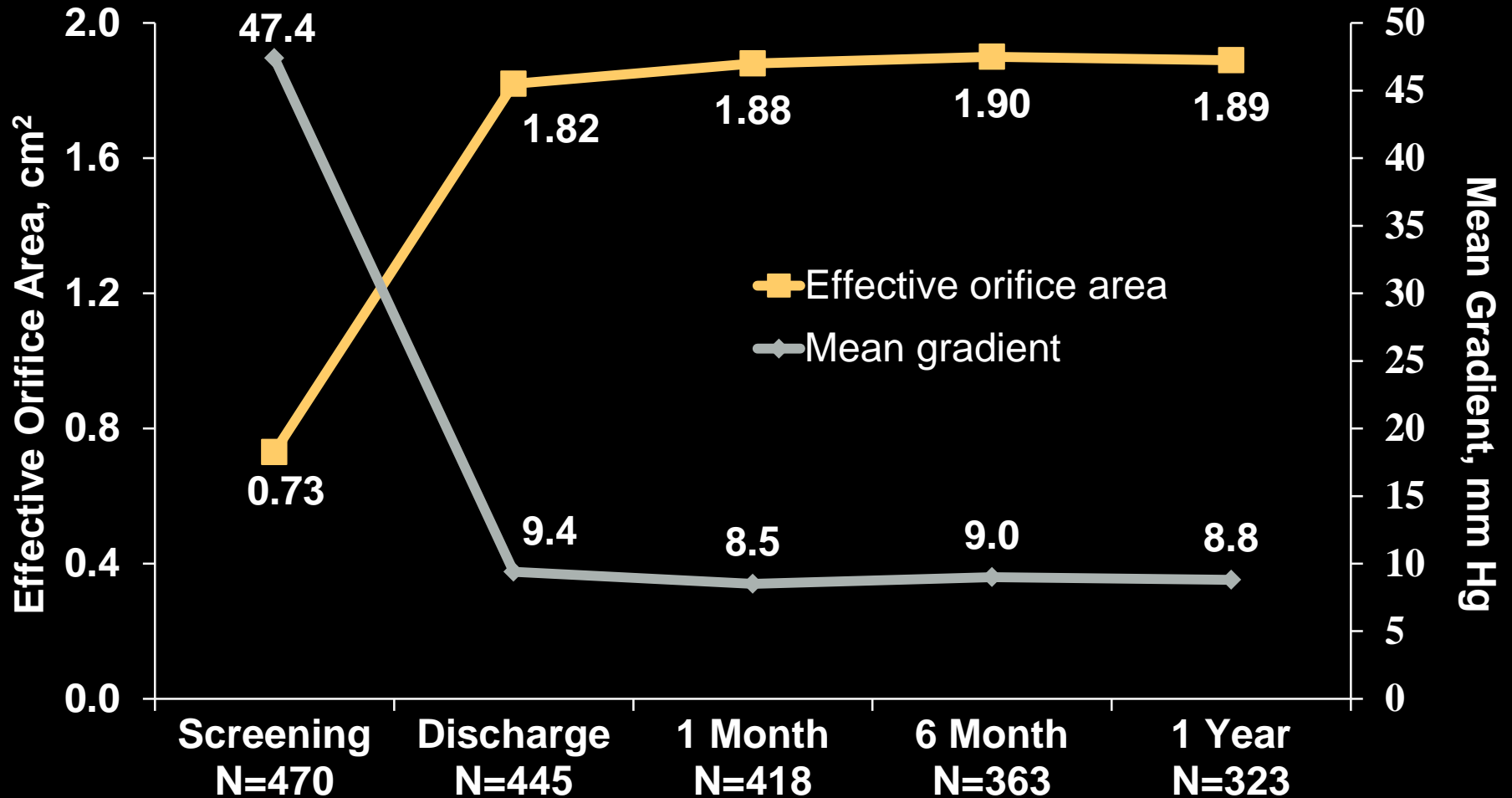
*STS Criteria: Severe = FEV1 < 50% predicted and/or RA pO₂ < 60 or pCO₂ > 50

**Charlson Score: = 1 MI, CHF, PVD, CVD, dementia, chronic lung disease, connective tissue disease, ulcer, mild liver disease, DM; = 2 hemiplegia, mod-severe kidney disease, diabetes with end organ damage, leukemia, lymphoma; = 3 moderate or severe liver disease; = 6 metastatic solid tumor, AIDS

Frailty Assessment

Frailty Characteristic	N=471
Anemia With Prior Transfusion, %	22.9
BMI < 21 kg/m ² , %	7.6
Albumin < 3.3 g/dL, %	18.5
Unplanned Weight Loss > 10 pounds, %	16.9
Falls in Past 6 Months, %	17.8
5 Meter Gait Speed > 6 secs, %	84.2
Grip Strength < Threshold, %	67.6

Echocardiographic Findings



Secondary Endpoints

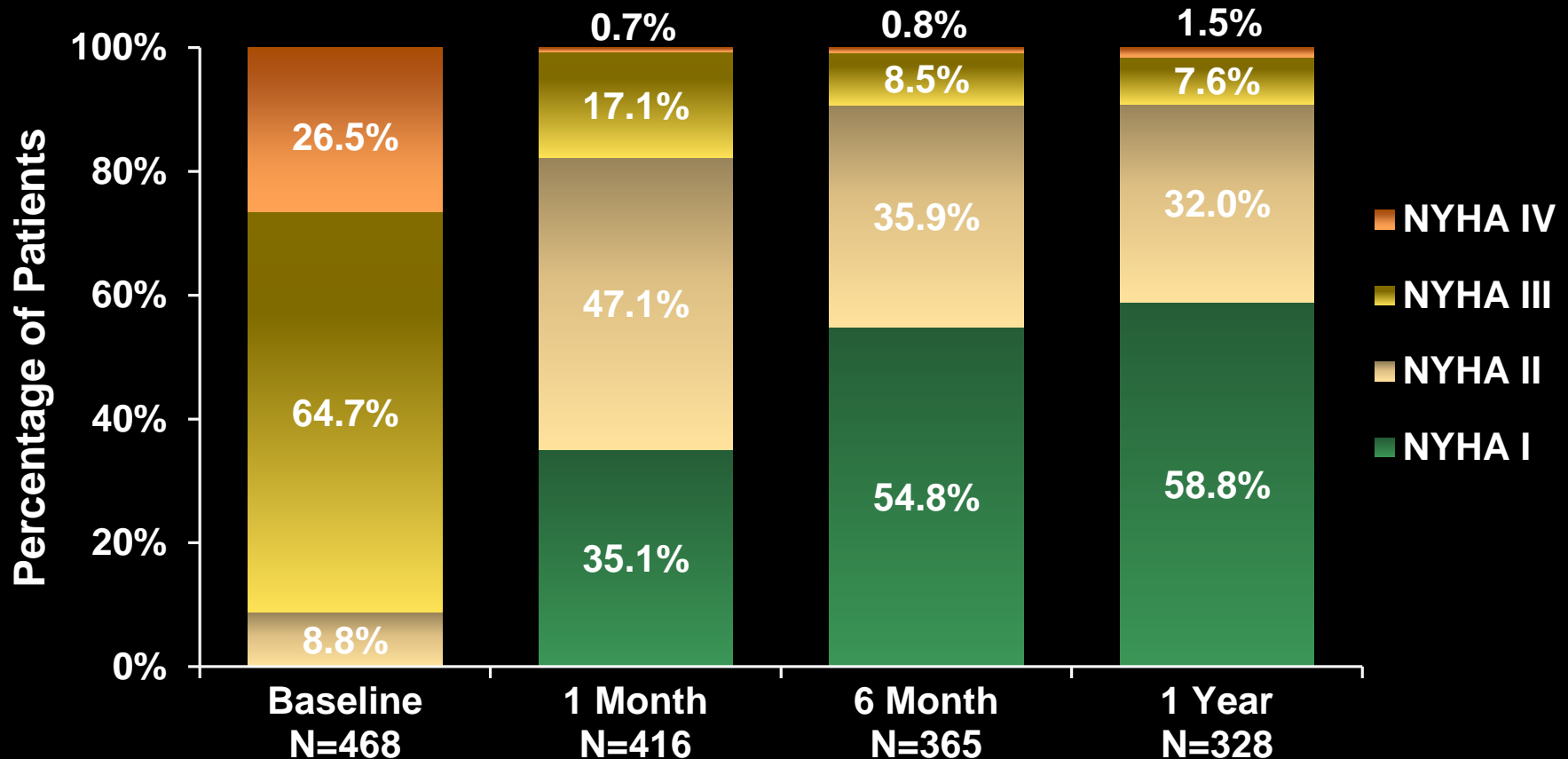
Events*	1 Month	1 Year
Any Stroke, %	3.9	6.7
Major, %	2.4	4.1
Minor, %	1.7	3.1
Myocardial Infarction, %	1.3	2.0
Reintervention, %	1.3	2.0
VARC Bleeding, %	35.1	41.4
Life Threatening or Disabling, %	11.7	16.6
Major, %	24.1	27.6
Major Vascular Complications, %	8.3	8.5
Permanent Pacemaker Implant, %	22.2	27.1
Per ACC Guidelines, %	17.4	19.9

* Percentages obtained from Kaplan Meier estimates

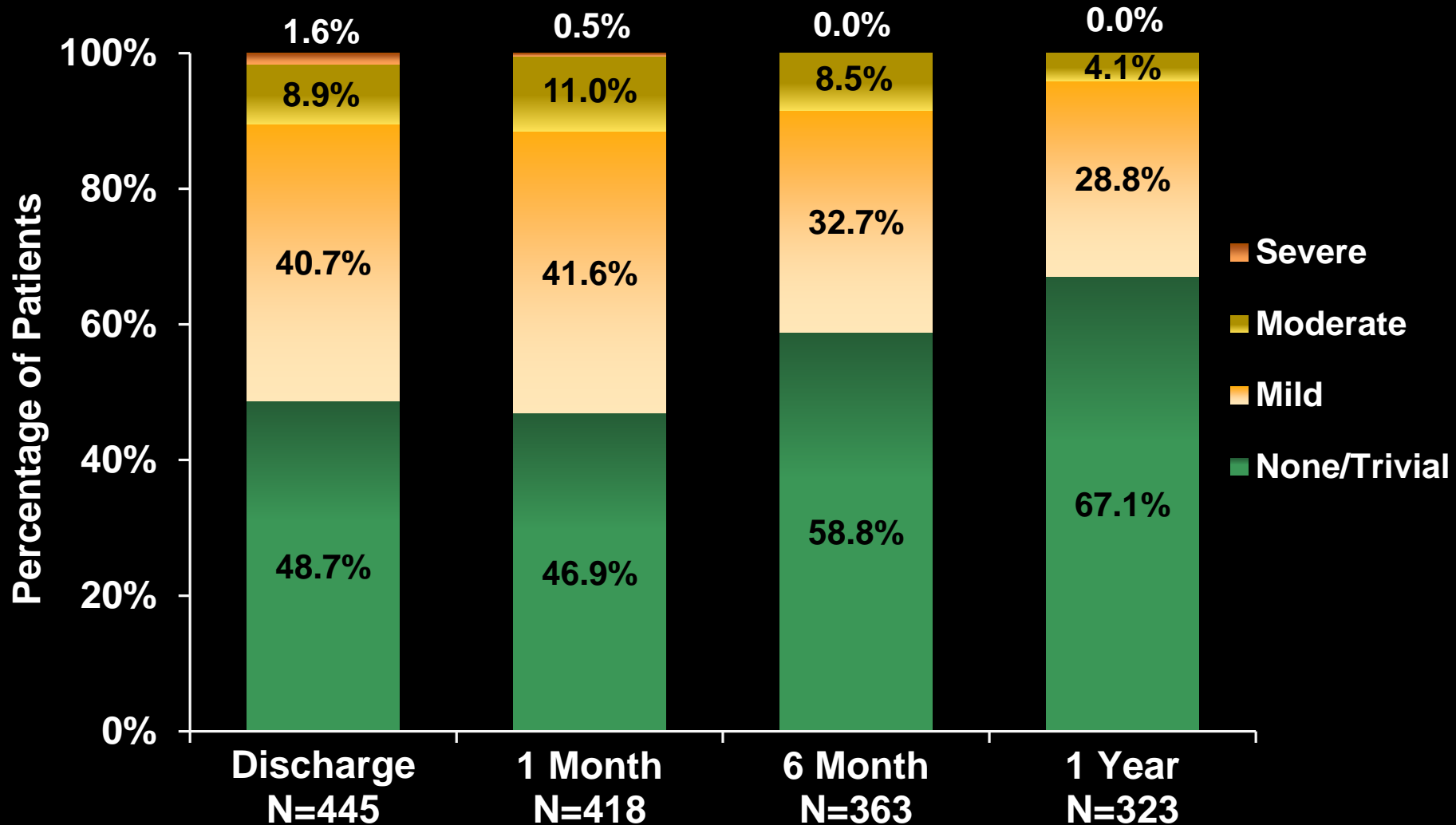
NYHA Class Survivors

90% of Patients Improved at Least 1 NYHA Class by 1 Year

60% of Patients Improved at Least 2 NYHA Classes by 1 Year



Paravalvular Regurgitation



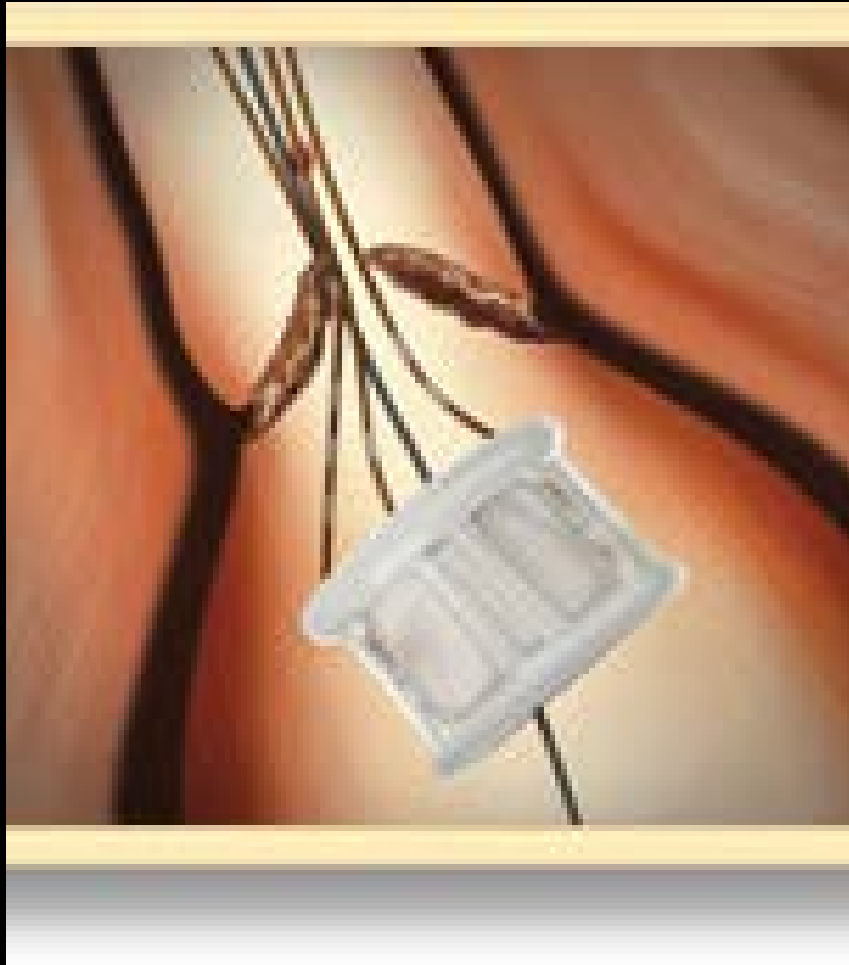
Newer Prostheses

St Jude's Portico Valve

- Self Expanding
- Bovine pericardial leaflets
- Porcine pericardial cuff
- Available in 2 sizes
- Delivery
 - Transfemoral, Subclavian
 - Transapical
- Fully retrievable
- Lower rate of pacemaker or LBBB
- US Trial starting soon

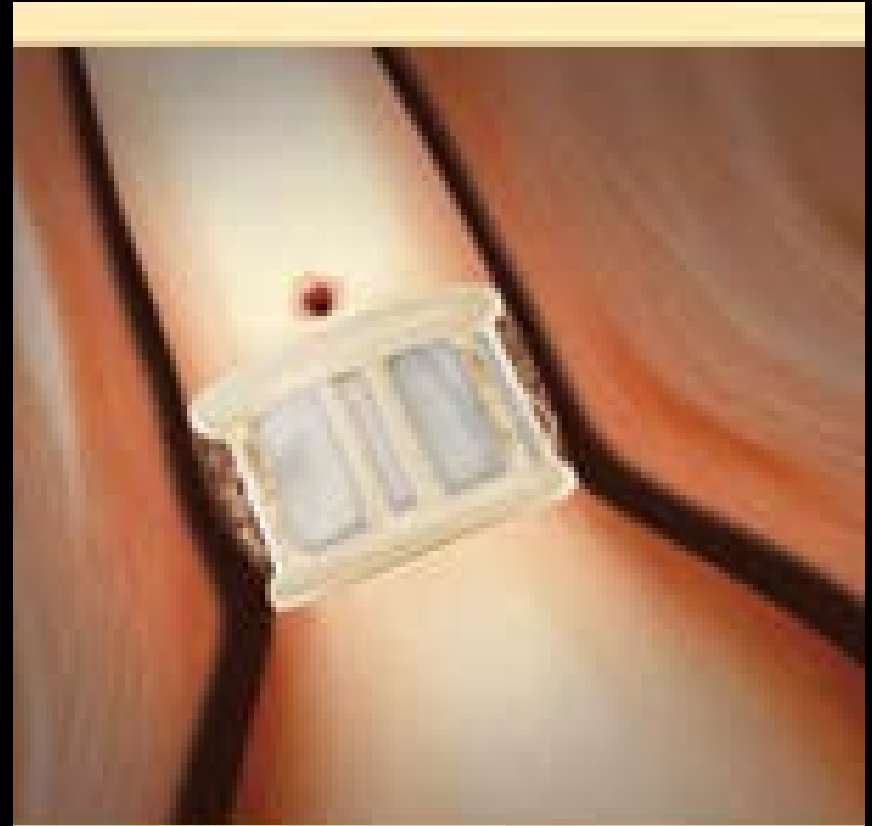
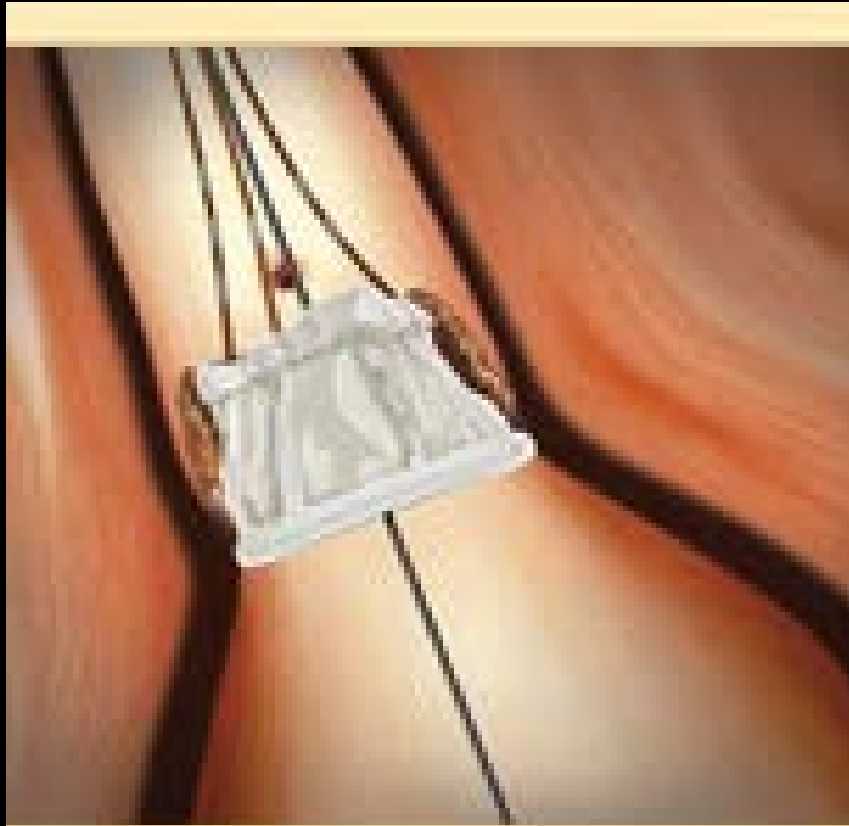


DirectFlow Medical



- Trileaflet
- Bovine pericardium
- 18 Fr delivery system
- No metal
- Retreivable and repositionable
- Can be aligned manually
- Epoxy resin allows fixation
- Size
 - 25 mm (19-24 mm)
 - 27 mm (24-26.5 mm)

Direct Flow Medical

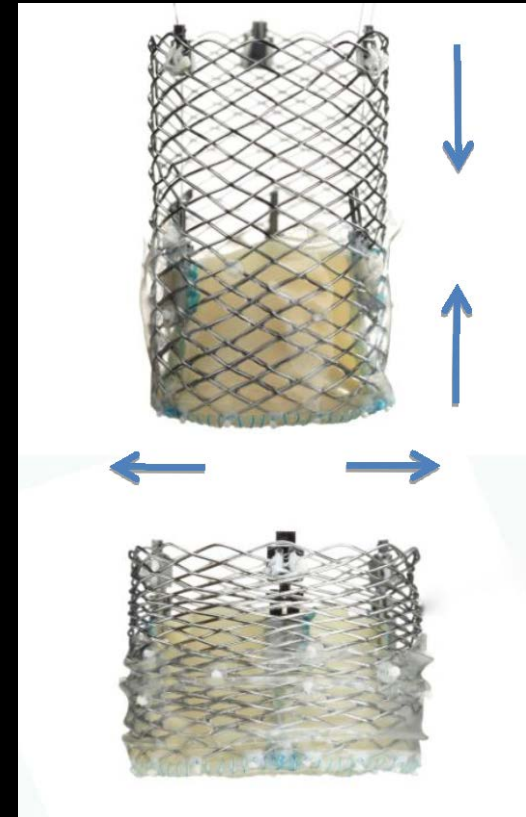


Discover Trial

- N=100
- High risk or extreme high risk
- 6 month follow
 - 96% survival
 - Mean gradient: 12mmHg
 - VARC success: 93%
 - Vascular complications: 2.5%
 - CVA: 4%
 - 90% NYHA @ 6 months

Lotus Valve

- 18 Fr Delivery system
- Flexible
- Predictable and accurate placement
- Repositionable
- Resheathable
- Adaptive seal
- Automated deployment
- Reprise trials



Reprise II Trial

- N=120
- Age: 84 yrs
- High Risk
 - STS plus: 11.8%
 - NYHA III/IV=75%
- AVA=0.7 \pm 0.2 cm²
- Mean Grad: 46 \pm 15 mmHg
- Post Procedure:
 - Procedural success: 100%
 - Valve retrieval: 6 pts
 - No embolization
 - Mean gradient: 11.5 mmHg
 - AVA: 1.7 cm²
 - AI:
 - None: 61%
 - Trace: 20.8%
 - Mild: 16.8%
 - Moderate: 1%
 - All cause mortality: 4.2%
 - Stroke: 5.9%

How do you treat?

- 72 y/o male
- Severe symptomatic AS
 - AVA: 0.7 cm²
 - Mean gradient 45 mmHg
- Porcelain aorta





Options

■ TAVR

- Undersize a balloon expandable prosthesis?
- Utilize a self expanding prosthesis?
- Utilize a inflatable prosthesis?

■ SAVR

- Circulatory arrest?

Conclusions

- TAVR continues to be a promising procedure.
- Special emphasis will be placed on patient selection to improve procedural outcomes and long term survival.
- New prostheses will provide different treatment options, tailored to specific patient characteristics.