TAVR or SAVR: Beyond the STS Score

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Patient Selection for SAVR vs TAVR

Risk Profile
STS PROM + Frailty + Other Comorbidities

Low Risk
Intermediate Risk
High Risk
Extreme Innoperable Risk

SAVR

TAVR

Moving Beyond Risk

- Age-Life Expectancy-Valve Durability
- Concomitant cardiac disease
  - Mitral valve disease
  - Coronary artery disease
- Valve and Aortic Root Anatomy
  - Bicuspid Aortic Valve
  - LVOT Calcification
  - Small root-low lying coronary ostia
Moving Beyond Risk

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Age and Life Expectancy: Longer Survival

Surgical Valve Durability
Freedom from Structural Valve Deterioration: Surgical AVR


Age and Life Expectancy: Longer Survival

Survival
General Population

Survival
after Surgical AVR


Freedom From SVD: Surgical AVR
Age and Life Expectancy: Longer Survival

**Survival General Population**

- 32% at 50 years
- 24% at 60 years
- 17% at 70 years
- 8% at 80 years

**Survival after Surgical AVR**

- 32% at 50 years
- 21% at 60 years
- 12% at 70 years
- 3% at 80 years

Freedom From SVD: Surgical AVR


TAVR Durability

5-year outcomes of transcatheter aortic valve replacement compared with standard treatment for patients with inoperable aortic stenosis (PARTNER 1B): a randomised controlled trial

Dr. Gabriel Scopinaro, MD, PhD, and colleagues evaluated the outcomes of transcatheter aortic valve replacement (TAVR) in patients with inoperable aortic stenosis. The study compared TAVR with standard care and found that TAVR was associated with improved survival and reduced hospitalization rates. The 5-year outcomes showed that patient survival was significantly better in the TAVR group compared to the standard care group. The study concluded that TAVR is a viable alternative for patients with inoperable aortic stenosis, offering improved quality of life and reduced mortality.
TAVR Durability

Freedom from THV degeneration

Age and Life Expectancy: Longer Survival

Survival
General Population

Survival
after Surgical AVR

HIGHER REOPERATION RATE

Freedom From SVD: TAVR
Moving Beyond Risk

- Age-Life Expectancy-Valve Durability
- **Concomitant cardiac disease**
  - Mitral valve disease
  - Coronary artery disease
  - Ascending aortic aneurysms
  - Other
- Valve and Aortic Root Anatomy
  - LVOT Calcification
  - Small root-low lying coronary ostia
  - Bicuspid Aortic Valve
Annular and LVOT Calcification

Valve Underexpansion
Paravalvular Leak
Annular Rupture

Paravalvular Leak
- opposing side
Annular and LVOT Calcification

- Finite element modeling
- Crimping stores energy into the nitinol valve frame
- Valve frame does work to push calcified leaflets open

Annular and LVOT Calcification

- Stent conformation over calcification results in flow paths
- Potential for predictive modeling to optimize
  - Placement
  - Device selection
Annular and LVOT Calcification

- Potential to couple fluids simulations with finite element modeling for pre-operative planning

Moving Beyond Risk

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- Concomitant cardiac disease
  - Mitral valve disease
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- Valve and Aortic Root Anatomy
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  - Small root-low lying coronary ostia
  - Bicuspid Aortic Valve
Small Root – Low Lying Coronary Ostia

- 1-3% of population
- More common in women

The flow area for coronary bound flow can be complex due to:
- Height, calcification, and width
- Simulations and/or geometrically aligned indices better predict than just height
Small Root – Low Lying Coronary Ostia

- Device specific variation in leaflet position
- Possible room for device selection and coronary protection for inoperable patients

Moving Beyond Risk

- Age-Life Expectancy-Valve Durability
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  - Bicuspid Aortic Valve
Bicuspid Aortic Valve

- 2-3% of population
- More common in the young
- 20% elderly patients with AS

Bicuspid Aortic Valve

- Asymmetric cusps
- More calcified
- Asymmetric calcification
- More circular annulus
- Larger
  - Sinuses of Valsalva
  - STJ
  - Ascending aorta
Bicuspid Aortic Valve

- Device under-expansion
- Higher rate of
  - Paravalvular leak
  - Second device
  - Annular rupture
  - Conversion to surgery

- Improved with newer devices
- Simulations?
- Fate of the ascending aorta?

Summary – So what is beyond STS score?

- Clinical outcomes
  - Durability
  - Concomitant diseases
    - Mitral, Coronary, Other

- Valve and Aortic Root Factors
  - LVOT Calcification
  - Low Lying Ostia
  - Bicuspid

Directly impacts hemodynamics and valve durability
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