Overview on ongoing RCLs in TAVI?

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Disclosure related to this presentation: None
Evidence Base Derived From Clinical Trials

Risk

Inoperable
- PARTNER 1B n=358
- CoreValve ER n=489

High
- PARTNER 1A n=699
- CoreValve HR n=795

Intermediate
- PARTNER 2A n=2032
- SURTAVI n=1746

Low
- NOTION n=280

Time

Evidence Base Derived From Clinical Trials

- **PARTNER 1B**
  - Risk: Inoperable
  - n=358
  - Corevalve ER
  - TAVI superior to medical Rx

- **PARTNER 1A**
  - Risk: High
  - n=699
  - CoreValve HR
  - TAVI noninferior or superior to SAVR

- **PARTNER 2A**
  - Risk: Intermediate
  - n=2032
  - SURTAVI
  - n=1746

- **NOTION**
  - Risk: Low
  - n=280

- **NOTION II**

- **PARTNER III**

**Timeline:**
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
Evidence Base Derived From Clinical Trials

- PARTNER 1B (n=358)
  - Corevalve ER (n=489) 
  - TAVI superior to medical Rx

- PARTNER 1A (n=699)
  - CoreValve HR (n=795)
  - TAVI noninferior or superior to SAVR

- PARTNER 2A (n=2032)
  - SURTAVI (n=1746)
  - TAVI noninferior or superior (TF access) to SAVR

- NOTION (n=280)
  - NOTION II
  - PARTNER III

Timeline:

- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
TAVI and Guidelines: European and US Timeline

First in human TAVI

2002

PARTNER 1A

2011

PARTNER 1B

2012

CoreValve ER

2014

CoreValve HR

PARTNER 2A

2016

NOTION I

SURTAVI

2017

Extreme risk

I

B

High-risk

IIa

B

Extreme risk

I

B

Increased risk

I

B

Prohibitive risk

I

B

High-risk

IIa

B

Prohibitive risk

I

A

High-risk

I

A

Intermediate risk

IIa

B-R

ESC

European Society of Cardiology

EACTS

European Association for Cardio-Thoracic Surgery

American Heart Association

American College of Cardiology
META-ANALYSIS OF RCTs

Pagnesi et al JACC Cardiovasc Interv. 2017 Sep 25;10(18):1899-1901

**High-risk**

<table>
<thead>
<tr>
<th></th>
<th>Risk Ratio (95% CI)</th>
<th>TAVR Events</th>
<th>TAVR Patients</th>
<th>SAVR Events</th>
<th>SAVR Patients</th>
<th>% Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTNER 1</td>
<td>0.98 (0.75-1.26)</td>
<td>89</td>
<td>344</td>
<td>83</td>
<td>313</td>
<td>21.9</td>
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<tr>
<td>US CoreValve High Risk</td>
<td>0.73 (0.54-0.98)</td>
<td>63</td>
<td>390</td>
<td>79</td>
<td>357</td>
<td>20.8</td>
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<tr>
<td>Subtotal</td>
<td>0.86 (0.70, 1.04)</td>
<td>152</td>
<td>734</td>
<td>162</td>
<td>670</td>
<td>42.7</td>
</tr>
<tr>
<td></td>
<td>(I-squared = 52.2%, p = 0.148)</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Intermediate-risk**

- **high-risk vs. intermediate-risk** $p_{interaction} = 0.89$

<table>
<thead>
<tr>
<th></th>
<th>Risk Ratio (95% CI)</th>
<th>TAVR Events</th>
<th>TAVR Patients</th>
<th>SAVR Events</th>
<th>SAVR Patients</th>
<th>% Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARTNER 2</td>
<td>0.85 (0.69-1.05)</td>
<td>139</td>
<td>994</td>
<td>155</td>
<td>944</td>
<td>40.0</td>
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<tr>
<td>SURTAVI</td>
<td>0.92 (0.66-1.28)</td>
<td>66</td>
<td>864</td>
<td>66</td>
<td>796</td>
<td>17.3</td>
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<tr>
<td>Subtotal</td>
<td>0.87 (0.73-1.04)</td>
<td>205</td>
<td>1858</td>
<td>221</td>
<td>1740</td>
<td>57.3</td>
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<tr>
<td></td>
<td>(I-squared = 0.0%, p = 0.692)</td>
<td></td>
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</tr>
</tbody>
</table>

Total

- **Total** $p_{interaction} = 0.87$ (0.76-0.99)
“The favourable results of TAVI have been reproduced in multiple large-scale, nationwide registries supporting the generalizability of outcomes observed in randomized controlled trials. This favours the use of TAVI over surgery in elderly patients at increased surgical risk. However, the final decision between SAVR and TAVI (including the choice of access route) should be made by the Heart Team.”
“The favourable results of TAVI have been reproduced in multiple large-scale, nationwide registries supporting the generalizability of outcomes observed in randomized controlled trials. This favours the use of TAVI over surgery in elderly patients at increased surgical risk. However, the final decision between SAVR and TAVI (including the choice of access route) should be made by the Heart Team.”
Level of Evidence Pertaining to Prosthetic Valve Management ACC/AHA-2017 and ESC-2017 guidelines

A=level of evidence ‘A’, B=level of evidence ‘B’, C=level of evidence ‘C’
Gaps in Evidence: Expanding Clinical Indications
Gaps in Evidence: Expanding Clinical Indications

**Low Risk Patients**
- **PARTNER 3** (NCT02675114)
- **Evolut R Low Risk Trial** (NCT02701283)
- **NOTION-2** (NCT02825134)

**Asymptomatic Patients**
- **EARLY TAVR TRIAL** (NCT03042104)

**Moderate Aortic Stenosis and Congestive Heart Failure**
- **TAVR UNLOAD TRIAL** (NCT02661451)
The PARTNER 3 Trial
Study Design

Symptomatic Severe Calcific Aortic Stenosis

Low Risk ASSESSMENT by Heart Team
(STS < 4%, TF only)

1:1 Randomization (n=1,228)

TF - TAVR (SAPIEN 3)
  CT Imaging Sub-Study (n=200)
  Actigraphy/QoL Sub-Study

Surgery (Bioprosthetic Valve)
  CT Imaging Sub-Study (n=200)
  Actigraphy/QoL Sub-Study

PARTNER 3 Registries

Alternative Access (n=100)
(TA/TAo/Subclavian)

Bicuspid Valves (n=50)

SAVR or TAVR ViV (n=100/25)

Mitral ViV or ViR (n=50/50)

PRIMARY ENDPOINT:
Composite of all-cause mortality, all strokes, or re-hospitalization at 1 year post-procedure

Follow-up: 30 days, 6 mos, 1 year and annually through 10 years
**Patient Population: Low Risk Cohort**
- Determined by Heart Team to be low surgical risk

**Primary Endpoint:**
- Safety: Death, all stroke, life-threatening bleeding, major vascular complications, or AKI at 30 days
- Efficacy: Death or major stroke at 2 years

**Sample Size:** ~1200 Subjects

**Follow-up Evaluations:**
- 30-days, 6-month, 18-month, and 1 thru 5 years

**Number of Sites:** Up to 80 sites
Asymptomatic AS: When Should We Offer AVR?

Aortic stenosis progression

- **TOO EARLY**
  - UNECESSARY EXPOSURE TO RISK OF:
    - Complications of surgery / TAVI
    - Living with a prosthetic valve
    - Anticoagulation
    - Repeat intervention for structural valve deterioration

- **OPTIMAL TIMING**
  - JUST AS LEFT VENTRICULAR DECOMPENSATION IS STARTING TO DEVELOP

- **TOO LATE**
  - IRREVERSIBLE DAMAGE TO THE MYOCARDIUM:
    - Sudden cardiac death
    - Increased peri-operative risk
    - Heart failure
    - Hospital admissions
    - Increased mortality
    - Major financial burden
**EARLY TAVR Trial**

Flow Chart

**Asymptomatic Severe AS**
- Ineligible if patient < age 65, has Class 1 indication for AVR, bicuspid valve, or STS ≥ 10

Clinical and Echo Screening

Treadmill Stress-Test

- Unable to Perform Stress-Test

**Stress-Test Normal**
- CT Scan and Angiography eligibility

Randomization 1:1
- Stratified by STS (<5 vs. ≥5)

- TF - TAVR (~550 pts)
- Clinical Surveillance (~550 pts)

Clinical and Echo Follow-up:
- 30 days (TAVR only), 1 year, 2 years, and 5 years

**Stress-Test Abnormal**

Commercial AVR (TAVR or SAVR), Clinical Trial (P3)

Registry (1000 pts)

Telephone Follow-up:
- 1 year, 2 years, and 5 years

**Primary Endpoint (superiority):**
- 2-year composite of all-cause death, all stroke, and repeat cardiovascular hospitalization

Principal Investigators:
Philippe Généreux, MD, Robert Bonow, MD
Moderate AS with Low LVEF and HF (Stage B2?)

Rest

SV = 36 ml
Q_{mean} = 139 ml/s
LVEF = 20%
\Delta P = 35 / 22 \text{ mmHg}
AVA = 0.85 \text{ cm}^2

DSE

SV = 55 ml
Q_{mean} = 243 ml/s
LVEF = 30%
\Delta P = 63 / 32 \text{ mmHg}
AVA = 1.1 \text{ cm}^2
TAVR UNLOAD Trial

Study Design

(600 patients, 1:1 Randomized)

Primary Endpoint

Hierarchical occurrence of:
- All-cause death
- Disabling stroke
- Hospitalizations for HF, aortic valve disease
- Change in KCCQ

Follow-up:
- 1 month
- 6 months
- 1 year

Clinical endpoints
- Symptoms
- Echo
- QoL

OHFT Alone

R

TAVR + OHFT

Heart Failure
- LVEF < 50%
- NYHA ≥ 2
- Optimal HF therapy (OHFT)
- Moderate AS

International Multicenter Randomized

TAVR UNLOAD Trial

Reduced AFTERLOAD
- Improved LV systolic and diastolic function

NewYork-Presbyterian
Columbia University Medical Center

Erasmus MC
Universiteit Medisch Centrum Rotterdam

Institut Universitaire Cardiologie et de Pneumologie de Québec

Université Laval
Gaps in Evidence: Off-Label Use

→ Bicuspid Anatomy

→ Failes Surgical Prosthesis
Why Bicuspid are Problematic for TAVR?

- Bulky Eccentric Calcification
  - Incomplete valve expansion
  - Paravalvar leak
  - Annulus rupture
  - Higher PPM Rate
- Abnormal/lower coronary orifices
- Ascending Aortopathy- 25%
  - Needs Treatment
  - Risk of rupture/dissection
- Ovality of annulus
  - Risk of paravalvar leak
  - Long-term durability of the TAVI valve?

- For these reasons bicuspid valves had been excluded from all randomized trials
- Relative contraindication for TAVI according to guidelines
TAVI in Bicuspid Anatomy

**BIVOLUT-X**

Bicuspid aortic Valves with eVOLUT platform international eXperience

**PI’s:** Didier Tchétché, Toulouse /Nicolas van Mieghem, Rotterdam

**Design:** Prospective registry

**Endpoint:** Valve performance and VARC-2 outcomes at 30 days and 1 year

**Centres:** Up to 20 European Centers

**Update:** 10/150 patients recruited
• This meta-analysis of non-randomized studies with modest number of patients suggested that ViV-TAVI had similar 30-day survival compared with redo-SAVR for aortic BPV dysfunction
TAVI Procedure: – Will cerebral embolic protection become the standard for TAVR in the future?
TAVI Procedure and CerebroVascular Events

PROCEDURAL FACTORS

**Acute STROKE**
- Atheromatous and calcific emboli:
  - Wire, catheter and valve manipulation; BAV; valve deployment.
- Nonatheromatous emboli:
  - Air embolism, Thromboembolism.
- Nonembolic issues:
  - Cerebral ischemia due to sustained hypotension.

**Subacute STROKE**
- Thrombogenic factors:
  - Disruption of the calcified native valve
  - Lack of stent’s valve endothelization
  - Atrial arrhythmias
  - General atherothrombotic burden

**Late STROKE**
- Preventive STRATEGIES

PATIENT FACTORS

- Chronic AF
- Prior stroke
- Peripheral vascular disease
- CKD
- Female
- Atheroma burden

**PROCEDURAL STRATEGIES**
- Balloon postdilation
- Valve embolization / Second valve
- Smaller AVA
- Higher gradients
- Aortic Atheroma
- Learning Curve

PREVENTION OF ATRIAL ARRHYTHMIAS ANTITROMBOTHINIC TREATMENT
TAVI Procedure and Cerebrovascular Events

Stortecky, Windecker. Circulation 2012;126:2921-4
# Embolic Protection Devices and TAVI

## Evidence from Randomized Trials

<table>
<thead>
<tr>
<th>Device</th>
<th>Study Details</th>
<th>Participants</th>
<th>Key Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embrella Deflector</td>
<td>Rodés-Cabaú et al. JACC Cardiovasc Interv. 2014</td>
<td>41 patients</td>
<td>Average volume of ischemic lesion</td>
</tr>
<tr>
<td>Montage 2 Capture Device</td>
<td>Haussig et al. JAMA 2016</td>
<td>100 patients</td>
<td>Frequency of ischemic cerebral lesions</td>
</tr>
<tr>
<td>Triguard Cerebral Deflector</td>
<td>Lansky et al. European Heart Journal 2015</td>
<td>85 patients</td>
<td>New ischemic brain lesions and neurologic deficits</td>
</tr>
<tr>
<td>Sentinel</td>
<td>Kapadia et al. JACC 2017</td>
<td>363 patients</td>
<td>No significant reduction of lesion volume on MRI</td>
</tr>
</tbody>
</table>

**Note:** The diagram illustrates the use of embolic protection devices during transcatheter aortic valve implantation (TAVI) procedures to mitigate the risk of cerebral emboli. The devices include Embrella, Montage 2, and Triguard. Each device comes from different manufacturers: Embrella (Edwards LifeSciences), Montage 2 (Claret Medical), and Triguard (Keystone Heart). The table summarizes key findings from randomized trials comparing different devices in terms of minimizing lesion volume and cerebral ischemic events.
• “In conclusion, the totality of the data suggests that use of EP during TAVR appears to be associated with a non-significant trend towards reduction in death or stroke.”
REFLECT US IDE Trial

A prospective multicenter randomized trial of TriGuard™ neuro protection vs no protection in patients undergoing TAVR at clinical centers in EU and US

PI: Jeff Moses and Andreas Baumbach

Subjects with AS undergoing TAVR via Femoral or TransApical Access

Randomized 1:1

TriGuard™

Control

Clinical Follow-up
DWMRI: baseline and pre-discharge
Clinical Evaluation 30 days
Neurocognitive Eval: baseline, pre-discharge, 30 days

Secondary Safety Endpoint
VARC Device safety at 30 days

Primary Efficacy Endpoint
Total Volume of new DWMRI Lesions

MACCE: Composite of all cause death, Stroke, life threatening bleed, AKI 2-3, major vascular complications

- Death
- Stroke
- Life threatening bleed
- Non-fatal myocardial infarction
- Ischemic stroke
- Non-fatal revascularization
TAVR Adjunct Pharmacology
Customized Patient-Based Therapy
**Subclinical Leaflet Thrombosis in Bioprosthetic Valves**


- **Incidence:** 17 of 132 patients (13%)
- **Reduced incidence with oral anticoagulation** (0% vs 29%, \( p=0.04 \))
  Restoration of leaflet motion in all 11 patients who received oral anticoagulation
- **Higher incidence of stroke/TIA in patients with leaflet motion abnormality** (18% vs 1%, \( p=0.007 \))

**Hypoattenuating Opacities**

**Reduced Leaflet Motion**
SUBCLINICAL LEAFLET THROMBOSIS IN BIOPROSTHETIC VALVES

Chakravarty et al. Lancet 2017

- 890 patients with interpretable CT scans were included (RESOLVE registry, n=626; SAVOR Registry, n=264)
- Incidence: 12%: 4% after SAVR and 13% after TAVR (p<0.001)
**Subclinical Leaflet Thrombosis in Bioprosthetic Valves**

Chakravarty et al. Lancet 2017

Anticoagulation vs. no anticoagulation: $p < 0.0001$
NOACs vs. no anticoagulation: $p = 0.0002$
Warfarin vs. no anticoagulation: $p = 0.001$
NOACs vs. warfarin: $p = 0.72$

Prevalence of reduced leaflet motion

- Anticoagulation: 8/224 (3.6%)
- NOACs: 3/107 (2.8%)
- Warfarin: 5/117 (4.3%)
- No anticoagulation: 98/666 (14.7%)
# Subclinical Leaflet Thrombosis in Bioprosthetic Valves

Chakravarty et al. *Lancet* 2017

<table>
<thead>
<tr>
<th></th>
<th>Normal leaflet motion (N=784)</th>
<th>Reduced leaflet motion (N=106)</th>
<th>Hazard ratio (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N (%)</td>
<td>Rate per 100 person-years</td>
<td>n/N (%)</td>
<td>Rate per 100 person-years</td>
</tr>
<tr>
<td><strong>All events</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death</td>
<td>34/784 (4.3%)</td>
<td>2.91</td>
<td>4/106 (3.8%)</td>
<td>2.66</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>4/784 (0.5%)</td>
<td>0.34</td>
<td>1/106 (0.9%)</td>
<td>0.67</td>
</tr>
<tr>
<td>Strokes/TIAs</td>
<td>27/784 (3.4%)</td>
<td>2.36</td>
<td>11/106 (10.4%)</td>
<td>7.85</td>
</tr>
<tr>
<td>All strokes*</td>
<td>22/784 (2.8%)</td>
<td>1.92</td>
<td>6/106 (5.7%)</td>
<td>4.12</td>
</tr>
<tr>
<td>Ischemic strokes</td>
<td>21/784 (2.7%)</td>
<td>1.83</td>
<td>6/106 (5.7%)</td>
<td>4.12</td>
</tr>
<tr>
<td>TIAs</td>
<td>7/784 (0.9%)</td>
<td>0.60</td>
<td>6/106 (5.7%)</td>
<td>4.18</td>
</tr>
</tbody>
</table>

TIA—Transient ischemic attack
* All strokes include hemorrhagic and ischemic strokes
TAVR Adjunct Pharmacology
Customized Patient-Based Therapy

**BEFORE**
Acetylsalicylic acid (ASA)

**DURING**
UNFRACTIONATED HEPARIN:
target ACT ≥300"

Bivalirudin:

Low Molecular Weight Heparin

**AFTER**
ASA + CLOPIDOGREL

Acetylsalicylic acid (ASA)
ARTE trial

Non anti-VKA Oral Anticoagulant
± ASA:

BraV O

Low Molecular Weight Heparin

Atlantis

Neoline

GALILEO
AntiThrombotic Therapy

Adapted from Capodanno et JACC Cardiovasc Interv. 2017 Jul 10;10(13):1366-1369

No indication to OAC

- POPular TAVI (NCT02247128): ASA vs. DAPT
- CLOE (Announced): ASA vs. DAPT

Indication to OAC

- AVATAR (NCT02735902): ASA+VKA vs. no VKA
- POPular TAVI (NCT02247128): Clopidogrel+VKA vs. no VKA
- CLOE (Announced): Clopidogrel+VKA vs. VKA

Studies of antiplatelet strategies

- AUREA (NCT01642134): DAPT vs. VKA
- GALILEO (NCT02556203): Rivaroxaban + ASA vs. DAPT
- ATLANTIS (NCT02664649): Apixaban vs. Aspirin or DAPT

Studies of antiplatelet versus anticoagulant strategies

- ATLANTIS (NCT02664649): Apixaban vs. VKA
- ENVISAGE TAVI (NCT02943785): Edoxaban vs. VKA
Study Hypothesis: Monotherapy with Aspirin or OAC monotherapy is safer (non-procedure-related bleeding) than the addition of clopidogrel for 3 months.

Recruitment began in February 2014, and the trial will continue until a total of 1,000 patients (684 expected in cohort A and 316 in cohort B) are included and followed up for 1 year.
ATLANTIS (Anti-Thrombotic Strategy to Lower All cardiovascular and Neurologic Ischemic and Hemorrhagic Events after Trans-Aortic Valve Implantation for Aortic Stenosis)

1509 patients after successful TAVI procedure

- Stratum 1: Indication for OAT
  - R: 1:1
  - VKA

- Stratum 2: No indication for OAT
  - R: 1:1
  - Apixaban 5mg bid*

Primary end-point is a composite of death, MI, stroke, systemic emboli, intracardiac or bioprosthesis thrombus, episode of deep vein thrombosis or pulmonary embolism, major bleedings over one year follow-up.

*2.5mg bid if creatinine clearance 15-29mL/min or if two of the following criteria: age≥80 years, weight≤60kg or creatinine≥1.5mg/dL (133μMol).
The GALILEO trial:
Study design

Global study comparing a rivArroxaban-based antithrombotic strategy to an antipLatelet-based strategy after transcatheter aortic valve rEpIacement to Optimize clinical outcomes

Objective
To assess a rivaroxaban-based anticoagulation regimen following successful TAVR balancing ischaemic and bleeding outcome measures

- Stephan Windecker, PI, George Dangas, PI
- Roxana Mehran, Marco Valgimigli
- Pascal Vranckx, Robert Welsh

PI=Principal investigator; TAVR=Transcatheter aortic valve replacement.
Discharge: The “minimalist” TAVR procedure strategy has become imbedded as a preferred treatment approach in the majority of patients.
3M TAVR Study Design

To evaluate the efficacy, feasibility, and safety of next day discharge home in patients undergoing balloon-expandable transfemoral TAVR utilizing the Vancouver 3M Clinical Pathway

Patients undergoing elective Transfemoral TAVR

Considered at *increased surgical risk* by the Heart Team

Vancouver 3M Clinical Pathway (n = 411)
Meet all anatomical, functional, and peri-procedural exclusion criteria

Primary Outcomes: 1) All cause mortality or stroke at 30 days
2) The proportion of patients discharged the next day

Secondary Outcomes: 1) Readmission within 30 days
2) Greater than mild PAR at 30 days
3) New permanent pacemaker at 30 days
4) Major vascular complications, bleed, or repeat valve procedure at 30 days
5) Conversion to GA/Intubation
6) KCCQ and SF 12 at 2 weeks, 30 days, and 1 year
7) All cause mortality and stroke at 1 year
GAPS IN IMPLEMENTATION: GEOGRAPHICAL DISPERSION AND SOCIOECONOMIC INEQUALITIES - TAVI

Pilgrim T et al. Eur Heart J 2018

Estimates for Q1–Q4 2017 (Western Europe) or Q4 2016–Q3 2017 (all other regions) including moving annual total (MAT) data. Data are subject to end of year adjustment.
149 Studies found for: **TAVI | Recruiting, Not yet recruiting Studies**

Also searched for **Transcatheter aortic valve implantation and Transcatheter aortic valve replacement.** See Search Details

<table>
<thead>
<tr>
<th>Row</th>
<th>Study Title</th>
<th>Conditions</th>
<th>Interventions</th>
<th>Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>NYT ALLEGRA TAVI System TF in Failing Surgical Aortic Bioprosthesis</td>
<td><em>Transcatheter Aortic Valve Implantation</em></td>
<td><em>Device: Transcatheter Aortic Valve Implantation (TAVI)</em></td>
<td>University of Freiburg-Bad Krozingen, Germany</td>
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<tr>
<td>12</td>
<td>Safety and Efficacy Comparison Of Two TAVI Systems in a Prospective Randomized Evaluation</td>
<td><em>Aortic Valve Stenosis</em></td>
<td><em>Device: Symetis ACURATE neo™ transfemoral TAVI system</em></td>
<td>Heart Center, Rigshospitalet, University of Copenhagen, Denmark</td>
</tr>
</tbody>
</table>
Gaps in Evidence

• Expanding Clinical Indications
  • Low risk
  • Asymptomatic pts.
  • Moderate AS with CHF
  • Off-Label Use
    • Bicuspid Anatomy
    • Pure Native Aortic Regurgitation
    • Failes Surgical Prosthesis
• TAVI Procedure
  • Cerebral Protection
  • Valve Thrombosis → Anticoagulation
• Others
  • Valve Durability
  • Geographic inequalities
  • Comparision between valves
Thanks