Lifetime Management After TAVR: Younger, Low Risk Patients: Later ViV

Thanks to Gilbert Tang and Kendra Grubb for Slides

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TAVR 2020 – STS-ACC TVT Registry

Over 60,000 SAVRs annually, prior to 2019

>60% Bioprosthetic Valves

The volume of isolated surgical aortic valve replacement (SAVR) (blue line), all forms of SAVR (SAVR + coronary artery bypass grafting, Bentall procedures, and SAVR plus other surgical procedures, red line), and transcatheter aortic valve replacement (TAVR) (gray line) are shown from 2012 until 2018. The 2 red arrows denote transition points: Arrow #1—the volume of TAVR first exceeded isolated SAVR between 2015 and 2016 with the beginning of a decline in isolated SAVR volume that in 2019 was 9,801 fewer cases than the peak in 2013. TAVR in intermediate-risk patients was approved in 2016. Arrow #2—the volume of TAVR exceeded all forms of SAVR between 2018 and 2019 with a 1-year decline in 2019 from 2018 of 7,078 for all types of SAVR cases. TAVR for low-risk patients was approved in 2019. Source of SAVR data is the Society of Thoracic Surgeons National Database. AVR – aortic valve replacement.

TAVR vs SAVR in a Young, Low Risk Patient

- Anatomy: transfemoral? Can we achieve surgical-like result?
- Paravalvular leak: is mild OK?
- Coronary reaccess for CAD: straightforward?
- Lifetime management of AV disease: reintervention feasible?
Calcified raphe and excessive leaflet Ca associated with higher procedural complications, more PVL and 2-year mortality
# US TVT Registry Discharge ECHO Outcomes

## Propensity-Matched

<table>
<thead>
<tr>
<th>Outcome</th>
<th>SAPIEN 3 Ultra (N = 1324)</th>
<th>SAPIEN 3 (N = 1324)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Gradient (mmHg)</td>
<td>11.9 ± 5.03</td>
<td>11.9 ± 5.07</td>
<td>0.77</td>
</tr>
<tr>
<td>AV Area (cm²)</td>
<td>1.90 ± 0.67</td>
<td>1.79 ± 0.53</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Paravalvular Regurgitation (N=1115)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>90.9</td>
<td>85.7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Mild</td>
<td>8.9</td>
<td>13.9</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Moderate/Severe</td>
<td>0.2</td>
<td>0.4</td>
<td>0.45</td>
</tr>
</tbody>
</table>

*Nazif T. TVT Connect, 2020*
Figure 2: Paravalvular Leak at 30 Days

Echocardiographic core laboratory paravalvular leak at 30 days for patients treated with CoreValve bioprosthesis (1), the Evolut R valve (13), and the Evolut PRO valve.

Forrest JK et al. J Am Coll Cardiol Intv 2018;11:160-8
Bioprosthetic SAV Failure
Limitations to TAV in SAV

• VIVID Registry 1612 VIV procedures
  – 37 patients (2.3%) had clinical evidence of coronary obstruction
  – Valve to Coronary Distance of <4mm is predictive
  – More common in stented valves with externally mounted leaflets (6.1% vs 3.7% stentless vs 0.8% stented internally mounted leaflets; p<0.001)

• Coronary obstruction was associated with a 30-day mortality of 52.9% vs 3.9%; p<0.001
# TAV in SAV Mortality: 0 – 22.5% 30-day

## TABLE 7  Studies on ViV TAVR Procedures

<table>
<thead>
<tr>
<th>First Author, Year (Ref. #)</th>
<th>N</th>
<th>THV</th>
<th>Age (Yrs)</th>
<th>STS Score</th>
<th>Logistic EuroSCORE</th>
<th>Procedural Success (%)</th>
<th>Mean Gradient Post-ViV (mm Hg)</th>
<th>AR &gt; Moderate</th>
<th>30-Day Mortality (%)</th>
<th>1-Yr Mortality (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kempfert et al., 2010 (74)</td>
<td>11</td>
<td>SAPIEN</td>
<td>78</td>
<td>7.2</td>
<td>31.7</td>
<td>100</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Webb et al., 2010 (75)</td>
<td>10</td>
<td>SAPIEN</td>
<td>82.1</td>
<td>10</td>
<td>30.4</td>
<td>100</td>
<td>12.8</td>
<td>0</td>
<td>0</td>
<td>NR</td>
</tr>
<tr>
<td>Pasic et al., 2011 (76)</td>
<td>14</td>
<td>SAPIEN</td>
<td>73.3</td>
<td>21.9</td>
<td>45.3</td>
<td>100</td>
<td>13.1</td>
<td>0</td>
<td>0</td>
<td>14.3</td>
</tr>
<tr>
<td>Eggebrecht et al., 2011 (77)</td>
<td>47</td>
<td>SAPIEN/CoreValve</td>
<td>79.8</td>
<td>11.6</td>
<td>35</td>
<td>98</td>
<td>17</td>
<td>2</td>
<td>17</td>
<td>NR</td>
</tr>
<tr>
<td>Bedogni et al., 2011 (78)</td>
<td>25</td>
<td>CoreValve</td>
<td>82.4</td>
<td>8.2</td>
<td>31.5</td>
<td>100</td>
<td>13.8</td>
<td>0</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Bapat et al., 2012 (79)</td>
<td>23</td>
<td>SAPIEN</td>
<td>76.9</td>
<td>7.6</td>
<td>31.8</td>
<td>100</td>
<td>9.1</td>
<td>0</td>
<td>0</td>
<td>12.5</td>
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<tr>
<td>Seiffert et al., 2012 (80)</td>
<td>11</td>
<td>SAPIEN</td>
<td>79.3</td>
<td>12.5</td>
<td>31.8</td>
<td>100</td>
<td>17.9</td>
<td>0</td>
<td>NR</td>
<td>16.6</td>
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<tr>
<td>Latib et al., 2012 (81)</td>
<td>18</td>
<td>SAPIEN</td>
<td>75</td>
<td>8.2</td>
<td>37.4</td>
<td>94</td>
<td>12.4</td>
<td>0</td>
<td>0</td>
<td>5.6</td>
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<tr>
<td>Linke et al., 2012 (82)</td>
<td>27</td>
<td>CoreValve</td>
<td>74.8</td>
<td>NR</td>
<td>31.3</td>
<td>100</td>
<td>18</td>
<td>7.4</td>
<td>7.4</td>
<td>12</td>
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<tr>
<td>Gaia et al., 2012 (83)</td>
<td>14</td>
<td>Braillo Tavera</td>
<td>69.8</td>
<td>38.6</td>
<td>42.9</td>
<td>100</td>
<td>12.8</td>
<td>NR</td>
<td>14.3</td>
<td>NR</td>
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<tr>
<td>Dvir et al., 2014 (84)</td>
<td>459</td>
<td>CoreValve/SAPIEN</td>
<td>77.6</td>
<td>9.8</td>
<td>31.1</td>
<td>93.1</td>
<td>15.8</td>
<td>5.4</td>
<td>7.6</td>
<td>16.8</td>
</tr>
<tr>
<td>Ihberg et al., 2013 (85)</td>
<td>45</td>
<td>CoreValve/SAPIEN</td>
<td>80.6</td>
<td>14.6</td>
<td>NR</td>
<td>95.6</td>
<td>16.4</td>
<td>2</td>
<td>4.4</td>
<td>11.9</td>
</tr>
<tr>
<td>Subban et al., 2014 (86)</td>
<td>12</td>
<td>SAPIEN/CoreValve</td>
<td>78.5</td>
<td>7.4</td>
<td>NR</td>
<td>100</td>
<td>15</td>
<td>8.3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Camboni et al., 2015 (87)</td>
<td>31</td>
<td>SAPIEN/CoreValve/others</td>
<td>77.8</td>
<td>20.9</td>
<td>NR</td>
<td>88</td>
<td>16.1</td>
<td>NR</td>
<td>22.5</td>
<td>NR</td>
</tr>
</tbody>
</table>

Adapted with permission from Paradis et al. (7).

AR = aortic regurgitation; AS = aortic stenosis; LVEF = left ventricular ejection fraction; STS = Society of Thoracic Surgeons; TA = transapical; TAO = transaortic; Tax = transaxillary; TF = transfemoral; THV = transcatheter heart valve; TS = transseptal; ViV = valve-in-valve; other abbreviations as in Tables 2 and 4.

Valve-in-Valve Optimization

- Valve malposition will place the supra-annular leaflets within the annulus = elevated gradients
TAV-in-TAV is Different from TAV-in-SAV

After SAVR

- No native leaflets left behind
- Commissural alignment ~100% of the time => BASILICA feasible

After TAVR

- Different devices have different frame and leaflet profiles
- No commissural alignment => BASILICA not always feasible
Transvalvular Gradients

- THV under-expansion is common in ViV implants
  - Mean gradients are typically higher (10-25 mmHg)
  - Valve In Valve International Data (VIVID) Registry - 28.4% MG >20 mmHg
Transvalvular Gradients

- Elevated MG >20 mmHg are more common in smaller surgical valves (ID <20mm)
  - SAPIEN 59%, CoreValve 20%
  - Elevated MG after SAPIEN VIV highly related to size of surgical valve
  - Intra-annular leaflets constrained by SAVR frame

Five-Year PARTNER 2

- 5-Year Follow up from PARTNER 2 Aortic Valve-in-Valve Registry
  - 365 patients (mean age 79; 64% men), high risk (mean STS 9.1%)
  - Symptomatic severe dysfunction of a SAVR larger than 21mm
  - Treatment with 23 or 26mm Sapien XT
    - Balloon fracture was not typically done
  - At 5 years, all-cause mortality 50.6%
  - Rate of hemodynamic valve failure 4.7%, bioprosthetic valve failure related to SVD 2.3%
Coronary Obstruction with VIV TAVR
TAVR Explant is a Potentially Risky Operation

Surgical EXPLANTation After TAVR Failure: The EXPLANT-TAVR International Registry
42 Centers, 269 Patients

Indication and Clinical Outcomes with Surgical Explanation of Chronically Implanted TAVR Prostheses
Amalin Soraja, Christopher Meduri, Andreas Rück, Nawzad Saleh
Karolinska Institutet, Stockholm, Sweden

ABSTRACT
Background. With the emergence of transcatheter aortic valve replacement (TAVR), patients may present with a need for surgical explanation of the implanted prostheses. Presently, there is a paucity of data on the indications and outcomes for surgical explanation.

Methods. The SVENTRY registry, a national-level repository for all TAVR patients in Sweden, was used to identify patients between May 2014 and October 2020. In this study, we enrolled patients who subsequently had cardiac surgery >30 days after TAVR to focus on chronic indications for explanation. Patient characteristics, surgical indications, and in-hospital outcomes were examined.

Results. Of 6,091 TAVR patients in Sweden during the study period, 21 (0.34%) underwent surgical explanation of their prosthesis for chronic indications. Median time from TAVR to surgery was 408 days (range, 49 to 2,053 days). The cohort was relatively young (73.1±17.7 yrs; 5 women), but with urgent or emergent clinical indications present in 14 patients (66.7% Table). The predominant indication for explanation was endocarditis, which was present in 11 patients (52.3%), of whom 10 had active infection. Concomitant cardiac surgery was undertaken in 8 patients. Adverse events were uncommon, with one in-hospital death. Successful surgical aortic valve replacement with TAVR explantion was achieved in 20 patients, with bioprostheses used in 17 patients (81.0%).

Conclusions. The need for surgical explanation of chronically implanted TAVR prostheses is rare, but can be early after the procedure and is most commonly associated with endocarditis in these scenarios. For those undergoing such surgery, the clinical outcomes were favorable in high-risk population.

BACKGROUND
- Surgical explanation of transcatheter aortic valve replacement (TAVR) after 30 days of successful implantation is rare, occurring in 0.3% of TAVR patients.
- Possible indications for procedure include active endocarditis, valve dysfunction, and stenosis.
- Though TAVR-in-TAVR is a less invasive reintervention option, surgical explanation remains the primary treatment option.

METHODS
Patients
- The SVENTRY registry, a national-level repository for all TAVR patients in Sweden, was used to identify patients between May 2014 and October 2020.
- Identified 21 TAVR patients also present in the surgical registry who underwent TAVR explanation.
- Excludes patients who received surgical procedure within 30 days of index TAVR.
- Clinical, prior TAVR procedure, and in-hospital surgical data were analyzed.

RESULTS
Patient Characteristics

<table>
<thead>
<tr>
<th>Patient Characteristics</th>
<th>All Patients</th>
<th>All Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years old)</td>
<td>73.0±17</td>
<td>73.0±17</td>
</tr>
<tr>
<td>Women, n (%)</td>
<td>5 (23.8)</td>
<td>5 (23.8)</td>
</tr>
<tr>
<td>Male, n (%)</td>
<td>16 (76.2)</td>
<td>16 (76.2)</td>
</tr>
<tr>
<td>Diabetes (yes), n (%)</td>
<td>7 (33.3)</td>
<td>7 (33.3)</td>
</tr>
<tr>
<td>Hypertension (yes), n (%)</td>
<td>13 (61.9)</td>
<td>13 (61.9)</td>
</tr>
<tr>
<td>Atrial fibrillation (yes), n (%)</td>
<td>9 (42.9)</td>
<td>9 (42.9)</td>
</tr>
<tr>
<td>Coronary artery disease (yes), n (%)</td>
<td>1 (4.8)</td>
<td>1 (4.8)</td>
</tr>
<tr>
<td>Stroke, n (%)</td>
<td>1 (4.8)</td>
<td>1 (4.8)</td>
</tr>
<tr>
<td>Bicuspid aortic valve, n (%)</td>
<td>2 (9.5)</td>
<td>2 (9.5)</td>
</tr>
<tr>
<td>Paraprosthetic leak, n (%)</td>
<td>3 (14.3)</td>
<td>3 (14.3)</td>
</tr>
<tr>
<td>Data from index TAVR (yes), n (%)</td>
<td>16 (76.2)</td>
<td>16 (76.2)</td>
</tr>
<tr>
<td>Indication (yes), n (%)</td>
<td>18 (85.7)</td>
<td>18 (85.7)</td>
</tr>
</tbody>
</table>

Surgical Procedure Data

<table>
<thead>
<tr>
<th>Surgical Procedure Data</th>
<th>All Patients</th>
<th>All Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to first TAVR (days)</td>
<td>373±117</td>
<td>373±117</td>
</tr>
<tr>
<td>Time to second TAVR (days)</td>
<td>41±24</td>
<td>41±24</td>
</tr>
<tr>
<td>Time to explantion (days)</td>
<td>408±117</td>
<td>408±117</td>
</tr>
<tr>
<td>Time to explantion (days)</td>
<td>408±117</td>
<td>408±117</td>
</tr>
<tr>
<td>Time to explantion (days)</td>
<td>408±117</td>
<td>408±117</td>
</tr>
</tbody>
</table>

Data Analysis
- Post-discharge outcomes and baseline characteristics of initial TAVR were assessed and compared between those who underwent surgical explanation within 30 days and those who did not.

CONCLUSIONS
- The need for surgical explanation of chronically implanted TAVR prostheses is rare but can be early after the procedure and is most commonly associated with endocarditis in these scenarios.
Coronary Issues in Low Risk Patients

- Sinus sequestration
- Coronary access for future procedures
Coronary Artery Disease in the TAVR Patient

- Coronary artery disease is highly prevalent in the TAVR population, possibly affecting up to 80% of the cohort.

It is essential to know how to access coronaries to treat coronary artery disease (CAD) long-term post-TAVI.
Approximately one-tenth of patients undergoing TAVR were readmitted for an ACS after a median follow-up of 25 months.


Incidence, Clinical Characteristics, and Impact of Acute Coronary Syndrome Following Transcatheter Aortic Valve Replacement
Victoria Vilalta, MD,⁎ Luís Assenzato, MD, Alfredo Nunes Ferreira-Neto, MD, Frederic Macq, MD, Leonardo de Freitas Campos Guimarães, MD, Thomas Couture, MS, Jean-Michel Paradis, MD, Siamak Mohammadi, MD, Eric Dumont, MD, Dimitri Kalavrezos, MD, Robert Delanoe-Delhez, MD, Josep Rodés-Cabau, MD
# PCI After TAVR: Frequency and Success

In current practice, post-TAVI PCI remains an uncommon (but feasible) procedure.

<table>
<thead>
<tr>
<th></th>
<th>Kerckhoff-Klinik(^1) (n = 1,000)</th>
<th>Segeberg Registry(^2) (n = 296)</th>
<th>UK Registry(^3) (n = 2,588)</th>
<th>TAVI-LM Registry(^4) (n = 6,405)</th>
<th>Tanaka(^5) (n = 2,170)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post-TAVI PCI Incidence</strong></td>
<td>3.5%</td>
<td>5.7%</td>
<td>0.7%</td>
<td>0.1%</td>
<td>1.4%</td>
</tr>
<tr>
<td><strong>Time to PCI Post-TAVI</strong></td>
<td>233 ± 158 days</td>
<td>17.7 months (range: 1-72)</td>
<td>136 days (range: 1-1092)</td>
<td>368 days (IQR: 204-534)</td>
<td>Not reported</td>
</tr>
<tr>
<td><strong>Type of TAV Implanted</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CoreValve/Evoluit XPR</td>
<td>29%</td>
<td>100%</td>
<td>48%</td>
<td>44%</td>
<td>100%</td>
</tr>
<tr>
<td>SAPIEN XT</td>
<td>45%</td>
<td></td>
<td>52%</td>
<td>55%</td>
<td></td>
</tr>
<tr>
<td>JenaValve</td>
<td>3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symetis</td>
<td>11%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portico</td>
<td>3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Procedural Success</strong></td>
<td>74%</td>
<td>95.8%</td>
<td>Not Reported</td>
<td>100%</td>
<td>93.3%</td>
</tr>
</tbody>
</table>

Frequency of Post TAVR PCI

Post-TAVI PCI in Intermediate-risk Patients

- Follow-up data from the SURTAVI Trial in intermediate-risk patients showed variable length of time between AVR and subsequent PCI.

- Linearized rate of PCI post AVR in patients (per year): TAVI: 0.008 and SAVR: 0.009.

- Mean time from index AVR to PCI procedure:
  - TAVI: 699.8 ± 406.9 days
  - SAVR: 822.1 ± 527.1 days

- Lesion success (<30% residual stenosis):
  - TAVI: 90.9%
  - SAVR: 94.7%

Post-TAVR CT-identified Features of Unfavorable Coronary Access
Coronary Ostium: Below the Skirt or in Front of the THV Commissural Posts

LCA

- Below the Skirt: 12.1%
- In Front of the Three THV Commissural Diamonds: 22.7%
- In Front of the Three THV Commissural Triangles: 0.0%

RCA

- Below the Skirt: 3.0%
- In Front of the Three THV Commissural Diamonds: 21.2%
- In Front of the Three THV Commissural Triangles: 1.5%

LCA

- Below the Skirt: 11.3%
- In Front of the Three THV Commissural Tabs: 4.3%

RCA

- Below the Skirt: 8.1%
- In Front of the Three THV Commissural Tabs: 0.0%

Unfavorable Coronary Access: LCA/RCA = 34.8/25.8%

Unfavorable Coronary Access: LCA/RCA = 15.7/8.1%

Ochiai T et al. JACC Cardiovasc Intv 2020;13:693-705
<table>
<thead>
<tr>
<th></th>
<th>23 mm Sapien XT</th>
<th>26 mm Sapien XT</th>
<th>29 mm Sapien XT</th>
<th>20 mm Sapien 3</th>
<th>23 mm Sapien 3</th>
<th>26 mm Sapien 3</th>
<th>29 mm Sapien 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Frame Height</strong></td>
<td>14 mm</td>
<td>17 mm</td>
<td>19 mm</td>
<td>15.5 mm</td>
<td>18 mm</td>
<td>20 mm</td>
<td>22.5 mm</td>
</tr>
<tr>
<td><strong>B. Inner Skirt Height</strong></td>
<td>6.7 mm</td>
<td>8.7 mm</td>
<td>11.6 mm</td>
<td>7.9 mm</td>
<td>9.3 mm</td>
<td>10.2 mm</td>
<td>11.6 mm</td>
</tr>
<tr>
<td><strong>C. Outer Skirt Height</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>5.2 mm</td>
<td>6.6 mm</td>
<td>7.0 mm</td>
<td>8.1 mm</td>
</tr>
<tr>
<td><strong>D. Valve Diameter</strong></td>
<td>23 mm</td>
<td>26 mm</td>
<td>29 mm</td>
<td>20 mm</td>
<td>23 mm</td>
<td>26 mm</td>
<td>29 mm</td>
</tr>
</tbody>
</table>
Ease of Coronary Access After TAVR: SURTAVI Experience

Among post-AVR percutaneous coronary interventions from the SURTAVI Trial cohort, RCA intervention was more difficult than left system disease.

* Ease of access data available for 42 of the 56 treated lesions.

Coronary Angiography and PCI after TAVR with Edwards S3

6F access from either femoral or radial (left preferred)

- Use standard diagnostic catheters to engage coronary arteries LCA JL4/JL3.5 RCA - JR4
- Use standard guide catheters to engage coronary arteries LCA - VL3.5/EBU 3.5/FL4 - - RCA- FR4/IM
Coronary obstruction: A devastating complication of TAVR

As TAVI in TAVI-in-TAVI becomes more prevalent in the next years.

In case of a TAVI-in-TAVI, the stent frames of the 2 prostheses will overlap, and the new stent will push and spread the previous leaflets over the original stent, converting it into a “covered” stent up to the edge of the leaflets.

Stent frame overlap and loss of free-flow may impair both coronary flow and cannulation.
**TABLE 1**  Factors to Consider in Determining the Feasibility of Coronary Access and Redo TAVR After Initial TAVR

<table>
<thead>
<tr>
<th>Coronary Access</th>
<th>Redo TAVR</th>
</tr>
</thead>
<tbody>
<tr>
<td>THV frame height relative to coronary ostium</td>
<td>THV leaflet height relative to coronary ostium</td>
</tr>
<tr>
<td>THV frame height relative to STJ facing the coronary ostium</td>
<td>THV leaflet height relative to STJ facing the coronary ostium</td>
</tr>
<tr>
<td>Native leaflet as a barrier to coronary ostium</td>
<td>THV commissural alignment</td>
</tr>
<tr>
<td>THV commissural alignment</td>
<td>Final THV position relative to aortic root and coronary ostium (e.g., THV pivot, tilt)</td>
</tr>
</tbody>
</table>

STJ = sinotubular junction; TAVR = transcatheter aortic valve replacement; THV = transcatheter heart valve.
Lifetime Management of Patients With Symptomatic Severe Aortic Stenosis

Background

Transcatheter heart valves (THVs) will inevitably degenerate and may require additional intervention. Redo transcatheter aortic valve replacement (TAVR) is an attractive strategy but carries a risk of coronary obstruction. Herein, we analyzed evaluable paired computed tomography (CT) scans (baseline and 30 days post-TAVR) from patients enrolled in the LRT trial (Low Risk TAVR - NCT02628680, NCT0357242) and the EPROMPT registry (CoreValve Evolut PRO Prospective Registry - NCT03424545) to validate accuracy of CT simulation and to model serial TAVR procedures using different THV (balloon-expandable and self-expanding) combinations.

Methods

We analyzed paired CT scans (baseline and 30 days post-TAVR) from patients in the LRT (Low Risk TAVR - NCT02628680, NCT0357242) trials and EPROMPT registry (CoreValve Evolut PRO Prospective Registry - NCT03424545). We implanted virtual THVs on baseline CTs, comparing predicted valve-to-coronary (VTC) distances to 30-day CT VTCs to evaluate the accuracy of CT simulation. We then simulated implantation of a second virtual THV within the first to estimate risk of coronary obstruction and need for leaflet modification.

Results

Determining the Future Risk of Sinus Sequestration with TAVR-in–TAVR Using Baseline CTs

- First THV
  - BEV-in-BEV (n=213)
  - SEV-in-BEV (n=213)
  - 72.3% Would Not Require Leaflet Modification
  - 27.7% Might Require Leaflet Modification

- Second THV
  - BEV-in-SEV (n=213)
  - SEV-in-SEV (n=213)
  - 8.9% Would Not Require Leaflet Modification
  - 91.1% Might Require Leaflet Modification

Discussion

A total of 213 patients with evaluable paired CTs were included. There was good agreement between virtual (baseline) and actual (30 days) CT measurements for THVs. CT simulation of TAVR followed by TAVR-in–TAVR predicted low coronary obstruction risk in 20.4% of patients and high-risk likely necessitating leaflet modification in 27.7% of patients using either THV. The remaining 48.9% patients could have TAVR-in–TAVR if the first THV was balloon-expandable but would likely require leaflet modification if the first THV self-expanding.

Conclusion

Using baseline CT scans, it is possible to plan not only the first TAVR but also to predict feasibility of future reintervention with TAVR-in–TAVR should the first THV fail. CT simulation could provide a personalized lifetime management strategy for younger patients with symptomatic severe aortic stenosis and inform decision making.

Disclosures

Toby Rogers – Patient and Consultant, Medtronic, Edwards Lifesciences; Advisory Board: Medtronic
Ron Wakeman – Advisory Board: Medtronic; Consultant: Medtronic
All other authors have no conflicts to disclose.