Aortic stenosis is the most common heart valve disease in adults, and valve replacement is the treatment of choice for severe symptomatic aortic stenosis. The mainstay of treatment has been surgical aortic valve replacement, but since the introduction of transcatheter aortic valve implantation (TAVI), these high-risk patients may now be offered an alternative therapeutic option using a less invasive technique without the need for cardiopulmonary bypass.1

For the purpose of valve delivery, transfemoral and transapical access routes are used most widely. There is a common perception that transapical may result in a higher long-term mortality than transfemoral, and clinical registries, such as SOURCE 1/2, FRANCE2, UK TAVR, SENTINEL, and a large Canadian Registry,2–10 have partially shown considerable differences in 30 day mortality. Available published reports directly comparing either access route usually include data of centers with a low volume followed for 30 days and ≤4 year. They report comparable survival rates over a short term and moderate aortic insufficiency. Stage 1 renal complications were more common in transapical patients (odds ratio, 2.81; 95% confidence interval, 1.93–4.09), whereas major vascular complications were less common (odds ratio, 0.14; 95% confidence interval, 0.06–0.29). Survival probability over the long term was not statistically different (hazard ratio, 0.89; 95% confidence interval, 0.72–1.10; log-rank Test, P=0.27).

Conclusions—The data demonstrate that in an experienced multidisciplinary heart team, either access route can be performed with comparable results. (Circ Cardiovasc Interv. 2015;8:e000761. DOI: 10.1161/CIRCINTERVENTIONS.113.000761.)

Key Words: aortic valve replacement ■ mortality ■ transcatheter

Received August 6, 2013; accepted November 26, 2014.
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Circ Cardiovasc Interv is available at http://circinterventions.ahajournals.org

© 2014 American Heart Association, Inc.
DOI: 10.1161/CIRCINTERVENTIONS.113.000761
WHAT IS KNOWN

- Transfemoral and transapical access routes are used most commonly for transcatheter aortic valve implantation (TAVI); both access routes have distinct advantages.
- Transapical TAVI is perceived to be associated with more complications and a worse prognosis based on several registries.
- This is thought to be associated to the patient risk profile and procedural experience.

WHAT THE STUDY ADDS

- In our experience, there was no significant difference in short- or long-term mortality in patients undergoing transfemoral or transapical TAVI.
- Patients undergoing transapical TAVI at our center, by an experienced heart team, had comparable procedural outcomes to patients undergoing transfemoral TAVI, with few minor differences in specific adverse events.

prospectively documented a consecutive series of 1000 patients who underwent TAVI in our center starting April 2008. In our report we (1) aimed to evaluate and compare access-related complications between the transfemoral and transapical approach in a single center with a high TAVI volume and (2) to compare long-term survival with either access route.

Methods

Analyses were based on the prospective, open TAVI-Karlsruhe registry of consecutive patients undergoing TAVI between April 30, 2008, and April 3, 2012 (4 years). Details of this registry have been published earlier.17–19 The study was approved by the local ethics committee and the subjects gave informed consent.

Patient Assignment

Joint discussions between cardiologists and cardiac surgeons established the method of valve replacement/implantation. Patients were assigned to the TAVI group if (1) the logistic EuroSCORE was ≥15 irrespective of age; (2) they had an age ≥75 years, a logistic EuroSCORE ≤15, but had additional predisposing risks. This risk was defined as (a) prior open heart surgery, (b) additional comorbidities, such as malignancy with a life expectancy of >1 year, liver cirrhosis, severe pulmonary disease with long-term oxygen provision or Karnofsky Performance index between 50 and 70 or (c) frailty10,21 (based on subjective assessment); or (3) patients had a porcelain aorta. In addition, patients were considered for TAVI if they had an indication for aortic valve replacement, but denied to undergo surgery. TAVI was not considered if the native aortic valve annulus was not considered appropriate or life expectancy and quality of life were seriously affected by comorbidities, such as malignancy with a <1-year life expectancy, major stroke, dementia with disability, uncontrolled congestive heart failure, or cardiogenic shock.

Access

The decision for either transapical or transfemoral was based on an interdisciplinary consensus by members of the heart team. There was neither a transapical nor transfemoral first approach, and the preferred access route of the referring physician was evaluated by the following criteria: (1) diameter of peripheral vessels; (2) availability of valves (Edwards SAPIEN, CoreValve, Symetis); (3) localization of calcification (valves, marginalized); (4) severity of calcification; (5) anatomic situation (distance between coronaries, plane sinus).

Having in mind that TAVI is an evolving field and the reporting period spans 4 years, no clinical trial like triage was consistently applied during the period, but rather the treatment decisions evolved in that period of time based on actual progress of the technique and our experience. No other alternative access routes (subclavian, transaortic, or transcarotid) were performed.

Procedures and Devices

A multidisciplinary team of an interventional cardiologist, cardiac surgeon, anesthesiologist specialized in cardiac surgery together with personnel of the catheterization laboratory and operating room was trained to perform the TAVI procedure.

Patients with severe aortic stenosis considered for an intervention underwent cardiac catheterization, angiographic cardiac and peripheral vessels computed tomography, and a transesophageal echocardiogram. The computed tomography was carefully reviewed to determine both the distance between coronary arteries and the aortic valve annulus and the diameters of the aorta and the iliofemoral vessels. The native aortic valve annulus diameter was measured using computed tomography and also using the transesophageal echocardiogram long-axis view at the level of leaflet insertion.

Both the Edwards SAPIEN and SAPIEN XT THV and Medtronic CoreValve were used in patients suitable for transfemoral access. For a transapical delivery, the Edwards SAPIEN THV or the Symetis ACURATE was used (Figure 1).

Study End Points and Definitions

The primary objective of this analysis was to determine 30 day and long-term mortality in patients undergoing transapical versus transfemoral TAVI. Secondary objectives included the descriptions of 30 day complications using the Valve Academic Research Consortium (VARC) end point definitions version II.22 The follow-up was conducted on an outpatient basis or by telephone interview.

Statistical Analysis

For the descriptive analysis of the population, means±standard deviations were used. The P value was determined for the full cohort in case of continuous variables and in relative numbers using a t test and in case of counting variables using χ²-tests.

For the propensity score–matched cohort, means±standard deviations were also used. In case of continuous variables and relative numbers, mean differences were computed (Table 1). For age and ejection fraction, difference of means was indicated. For the log
**Results**

Out of 1003 documented patients, 1000 were considered evaluable for the present analysis (Figure 1). The remaining 3 patients had concomitant interventions of the mitral valve (n=2) or an atrial septal defect (n=1). Patients were not considered for surgery because of a EuroSCORE >15 (n=581), porcelain aorta (52), dementia (33), active or inactive cancer (140), liver cirrhosis (12), severe COPD (n=16), post cardiac surgery (192), severe pulmonary hypertension (72), EF <30% (65), and surgery denial (n=567).

A total of 413 patients received TAVI using the transapical route (Edwards SAPIEN/SAPIEN XT THV n=402; Symetis Acurate n=11). TAVI using the transfemoral route was completed in 587 patients (Edwards SAPIEN/SAPIEN XT THV n=402; Symetis Acurate n=11). Patients were not considered for surgery because of a EuroSCORE >15 (n=581), porcelain aorta (52), dementia (33), active or inactive cancer (140), liver cirrhosis (12), severe COPD (n=16), post cardiac surgery (192), severe pulmonary hypertension (72), EF <30% (65), and surgery denial (n=567).

Out of 1000 patients, 1 patient in the transapical group (none in the transfemoral group) was lost to follow-up during the first year. The follow-up for the remaining 999 patients was complete, and the duration of follow-up was only determined
by the date of the intervention. The follow-up was updated in September 2014 for the 533 patients still alive (median 1371 days; range 153–2241 days; 1st quartile of 1094.5 days and 3rd quartile of 1718.5 days). The mean follow-up time was 1421±372.8 days.

Full Cohort

In a first step, we evaluated the full cohort of 1000 patients based on their assignment to transapical or transfemoral access. Patients undergoing transapical TAVI were less often female and had less pulmonary hypertension defined as systolic pressure of >60 mm Hg; Table 1). They further presented more frequently with peripheral arterial disease, coronary artery disease, carotid stenosis, and recurrent cardiac surgery than patients undergoing transfemoral TAVI. New York Heart Association class III/IV was equally frequent in either group (90.8% transapical, 87.7% transfemoral). Transapical patients had a higher logistic EuroSCORE I (24.3±16.2% versus 22.2±16.2%; P<0.01). Procedural mortality was 11 for the transapical TAVI group and 15 for the transfemoral TAVI group. Overall, 35 patients received a valve in valve (11 transapical and 15 transfemoral). Three patients were converted from transfemoral to transapical access.

V ARC II defined 30 day complications (Table 2) were largely comparable between groups with no difference in 30 day mortality, the rate of MI or stroke. Stage 1 renal complications were more common (OR, 2.43; 95% CI, 1.79–2.89), whereas major bleeding complications (OR, 0.46; 95% CI, 0.24–0.87), major vascular complications (OR, 0.12; 95% CI, 0.06–0.22), new pacemaker (OR, 0.64; 95% CI, 0.44–0.94), and moderate aortic insufficiency (OR, 0.30; 95% CI, 0.11–0.80) were less common in the transapical group. Moderate aortic valve insufficiency was more frequent in the transfemoral group using the CoreValve (6.9%) versus the Edwards valves (2.5%) as was a need for pacemaker implantation (31.4 versus 10.1%). Differences were largely based on complications with the

Table 2. V ARC II Complications (30 Days)

<table>
<thead>
<tr>
<th></th>
<th>Full Cohort (n=1000)</th>
<th>Propensity Score Matched Cohort (n=708)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Transapical (n=413), %</td>
<td>Transfemoral (n=587), %</td>
</tr>
<tr>
<td>Fatal events</td>
<td>6.1*</td>
<td>6.5</td>
</tr>
<tr>
<td>CV mortality</td>
<td>4.1</td>
<td>5.1</td>
</tr>
<tr>
<td>Non-CV mortality</td>
<td>1.9</td>
<td>1.4</td>
</tr>
<tr>
<td>Periprocedural MI</td>
<td>2.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Stroke or TIA</td>
<td>1.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Disabling stroke</td>
<td>1.2</td>
<td>1.9</td>
</tr>
<tr>
<td>Non-disabling stroke</td>
<td>0.5</td>
<td>0.0</td>
</tr>
<tr>
<td>TIA</td>
<td>0.0</td>
<td>0.4</td>
</tr>
<tr>
<td>Bleeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor bleeding</td>
<td>17.9</td>
<td>16.7</td>
</tr>
<tr>
<td>Major bleeding</td>
<td>5.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Life-threatening</td>
<td>5.3</td>
<td>5.3</td>
</tr>
<tr>
<td>Renal complications</td>
<td>35.1</td>
<td>19.9*</td>
</tr>
<tr>
<td>Stage 1</td>
<td>30.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Stage 2</td>
<td>1.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Stage 3</td>
<td>4.1</td>
<td>4.8</td>
</tr>
<tr>
<td>Vascular access site and access related complications</td>
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<td></td>
</tr>
<tr>
<td>Major vascular complications</td>
<td>2.4</td>
<td>17.5</td>
</tr>
<tr>
<td>Minor vascular complications</td>
<td>0.5</td>
<td>1.5</td>
</tr>
<tr>
<td>New pacemaker (all patients)</td>
<td>10.7</td>
<td>15.7</td>
</tr>
<tr>
<td>SAPIEN/SAPIEN XT†</td>
<td>10.4</td>
<td>10.1</td>
</tr>
<tr>
<td>CoreValve†</td>
<td>31.4</td>
<td></td>
</tr>
<tr>
<td>Symetis†</td>
<td>66.7</td>
<td></td>
</tr>
<tr>
<td>Moderate aortic insufficiency</td>
<td>1.2</td>
<td>3.9</td>
</tr>
<tr>
<td>SAPIEN/SAPIEN XT†</td>
<td>1.2</td>
<td>2.5</td>
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<tr>
<td>CoreValve†</td>
<td>6.9</td>
<td></td>
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<tr>
<td>Symetis†</td>
<td>0.0</td>
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</tr>
</tbody>
</table>

CI indicates confidence interval; CV, cardiovascular; MI, myocardial infarction; n.a., not applicable; OR, odds ratio; TIA, transient ischemic attack; and V ARC, Valve Academic Research Consortium.

*Rounded: the actual value is 6.053% for transapical and 6.473% for transfemoral.
†Numbers correspond to the percent of patients with new pacemaker or moderate aortic insufficiency in the subgroup of patients having received a SAPIEN, CoreValve, and Symetis, respectively.
CoreValve because there was no statistical significant difference with the Edwards valves. Survival probability over the long term (Figure 2, top) was lower in the transapical than in the transfemoral group (log-rank test \( P = 0.0388 \)).

Mortality in risk groups was analyzed in the full cohort in patients having a 2 year follow-up because for this time frame, the complete cohort had a 99.9% follow-up (Table 3). It was demonstrated that there were minor nominal differences in mortality between transapical and transfemoral TAVI with no statistically significant differences between groups, although the low power for this analysis is acknowledged.

Considering individual patient characteristics, such as vessel status, 79 (12.9%) of transapical TAVI patients would have been eligible for transfemoral TAVI. Between patient groups transapical TAVI/transfemoral possible and transapical TAVI/transfemoral not possible, there was no statistical difference in survival rates at 30 days (4.2 versus 5.1%; \( P = 0.76 \)), 1 year (20.4 versus 17.7; \( P = 0.59 \)), and 2 years (29.3 versus 25.3%; \( P = 0.5 \)).

A Cox regression model in the stepwise procedure was applied in the full model with all 1000 patients by using as information all the input parameter of the matching variables of the propensity score model. The model convergence criterion was fulfilled. As influence variables for survival with a strong influence (all \( P < 0.0001 \)) were identified: Euro-Score (HR, 5.85; 95% CI, 0.97–35.20), serum creatinine >200 \( \mu \text{mol/L} \) at baseline (HR, 2.09; 95% CI, 1.47–2.97), and ejection fraction (HR, 5.85; 95% CI, 0.97–35.20). Further influence variables were COPD (HR, 1.23; 95% CI, 0.91–1.66; \( P = 0.0449 \)) and peripheral arterial
disease (HR, 1.25; 95% CI, 0.94–1.64; \( P=0.0387 \)). All other variables had a \( P \) value >0.08.

**Propensity Score–Matched Cohort**

Table 1 illustrates that propensity score matching resulted in 2 groups of 354 patients each. Groups were well balanced with respect to patient characteristics, comorbid disease conditions, and risk as determined by the EuroSCORE.

As in the full cohort, VARC II defined 30 day complications (Table 2) were largely comparable between groups, with no difference in 30 day mortality, the rate of MI, or stroke. Bleeding complications were not statistically different in the adjusted model as opposed to the full cohort. Furthermore, there were no differences in pacemaker implantation rates, but the increase in moderate aortic insufficiency in the transfemoral TAVI group remained significant (OR, 0.30; 95% CI, 0.10–0.93). Moderate aortic valve insufficiency was more frequent in the transfemoral group using the CoreValve (7.6%) versus the Edwards valves (1.7%) as was a need for pacemaker implantation (33.1 versus 21.6%); again complications were more because of the CoreValve use than for the Edwards valves.

Stage 1 renal complications continued to be more common in transapical patients (OR, 2.81; 95% CI, 1.93–4.09), whereas major vascular complications were less common (OR, 0.14; 95% CI, 0.06–0.29). Survival probability over the long term (Figure 2, bottom) was not statistically different in both groups (log-rank rest, \( P=0.27 \)).

**Landmark Analysis**

To assess the outcomes of patients surviving the first 30 days, we conducted a landmark analysis (Figure 3) censoring all patients dying until then. We had 939 patients available for the full cohort (61 died within the first 30 days) and 408 patients for a propensity-matched cohort considering the 30 day outcomes as further variables. The analyses illustrate that, similar to the original survival analysis (Figure 2), there is a reduced survival in the transapical TAVI cohort in the full cohort before matching (HR, 0.79; 95% CI, 0.65–0.95) that becomes statistically nonsignificant after matching (HR, 0.81; 95% CI, 0.61–1.09) with a \( P \) value of 0.17 in the log-rank test.

**Discussion**

Our analyses demonstrated a comparable major cardiovascular event rate at 30 days between transapical and transfemoral TAVI and a significant increased risk of death during the long-term follow-up with transapical TAVI. It seems, however, that this differential long-term risk may be based on the risk profile of transapical TAVI patients as compared with transfemoral TAVI patients, because after propensity score matching, the difference was not statistically significant. The results are in partial disagreement with earlier registry results, although it enforces other analyses. It seems reasonable to assume that this result can be attributed to the experience of this single high TAVI volume center with a transapical TAVI mortality that is less than in many other registries. There was an imbalance in major vascular complications and renal complications as well as moderate aortic insufficiency; however, that are specific for either access route.

**Mortality**

The 30-day mortality was 6.1% for transapical TAVI and 6.5% for transfemoral TAVI, which is substantially lower than in a Canadian registry (10.4%); SOURCE (8.5%); a FRANCE registry (12.7%); a German registry (8.2%); and slightly higher than in an Italian registry (5.4%). In the PARTNER Trial (cohort B), 30-day mortality was 5%, and it was 5.2% in the PARTNER A cohort. In several clinical multicenter registries, 30-day mortality was usually higher in transapical patients than in those with transfemoral access. The highest difference was observed in UK TAVR (11.2 versus 4.3%) and the lowest in SOURCE 1/2 (10.9 versus 7.5%). The highest mortality overall was observed in FRANCE2, where 30-day mortality rates with transapical TAVI were 13.9%. Against these data, the observed 30-day mortality in our cohort is comparable with the literature for transfemoral, although transapical mortality rates were rather low. A probable explanation for the apparent higher 30-day mortality with the transapical access in other centers may be the learning curve that might be prolonged with transapical versus transfemoral. In a recent analysis of 439 transapical TAVI cases at the Leipzig Heart Center between 2006 and 2011, Holzhey et al reported that short- and long-term mortality was substantially reduced if the first 120 patients were compared with the next 120 patients (patient 121–240), despite a higher EuroSCORE in the latter patient group (33% in the latter versus 29% in the earlier patient group). These data essentially confirm previous reports on an important effect of the learning curve on clinical outcomes. Particularly low 30-day transapical mortality rates were also published by Pasic in a single center series of 500 cases. They reported a 30-day mortality rate of 4.6% with no significant change in the observational period between April 2008 and December 2011. This was attributed to a structured training program that was used to introduce transapical transcatheter aortic valve implantation and then gradually dispersed by internal proctoring.

Thirty-day and long-term mortality rates both were not statistically different after matching patients for patient characteristics using Propensity Scoring. Although this is in

| Table 3. Mortality in Risk Groups (Full Cohort ≤2 Years) |
|---------------------------------|-----------------|----------------|
| Full cohort, 30 days            | Transapical, %  | Transfemoral, %| \( P \) Value |
| Low/intermediate risk (ES<15)   | 0.7             | 1.8            | 0.67         |
| High risk (ES 15 to <30)        | 7.1             | 9.4            | 0.47         |
| Extreme risk (ES≥30)            | 10.7            | 11.8           | 0.79         |
| Full cohort, 1 year             |                 |                |              |
| Low/intermediate risk (ES<15)   | 12.2            | 9.9            | 0.46         |
| High risk (ES 15 to <30)        | 21.4            | 21.6           | 0.96         |
| Extreme risk (ES≥30)            | 25.9            | 29.2           | 0.56         |
| Full cohort, 2 year             |                 |                |              |
| Low/intermediate risk (ES<15)   | 21.1            | 14.7           | 0.10         |
| High risk (ES 15 to <30)        | 28.6            | 30.4           | 0.72         |
| Extreme risk (ES≥30)            | 38.4            | 35.4           | 0.62         |

\( ES \) indicates logistic EuroSCORE I.
contrast to the majority of the aforementioned registries, it is comparable to other data reporting similar mortality rates for either access route. However, Ewe et al reported higher overall mortality rates for 30 days (transfemoral 11.1%, transapical 8.5%; \(P=0.74\)) with no difference between groups. Six and 12 months mortality rates were \(\leq 20\%\), again with no difference between groups. Worth mentioning, Bleiziffer et al reported rather high mortality rates in a 203 patient cohort with 11.2% of patients dying within 30 days for the transfemoral and 8.3% for the transapical route.

In summary, it seems reasonable to conclude that short- and long-term mortality between transapical and transfemoral TAVI can be reduced in an experienced heart team and that procedural considerations may guide treatment decisions and influence complication rates.

**Complications**

Both techniques are associated with certain site-specific access complications that require immediate recognition and qualified management. Among those, previously reported events are major vascular complications and cerebrovascular events. Our own analysis resulted in the key finding that major vascular complications (15.8 versus 2.5%; OR, 0.14—propensity-matched) and moderate aortic insufficiency (1.7 versus 1.2%; OR, 0.30) were more common in patients.
undergoing transapical TAVI, whereas stage 1 renal complications were more frequent in patients undergoing transapical TAVI (31.1% versus 13.8%; OR, 2.81).

Major vascular complications associated with the transapical approach have been related to the large diameter introducer sheath and stiffness of the delivery system, in combination with vascular calcification and tortuosities in an elderly population (mean age in our cohort 82 years). A device with a smaller diameter was shown to reduce the risk of vascular access complications. A specific analysis of transapical-related vascular complications was published by Hayashida et al. Using the sheath to femoral artery ratio, which was defined as the sheath outer diameter (in millimeters) to the minimal femoral artery diameter (in millimeters), they found that at a mean sheath to femoral artery ratio of 0.99±0.16 with a sheath to femoral artery ratio threshold of 1.05 (area under the curve =0.727) predicted a higher rate of VARC II major complications (30.9% versus 6.9%; \(P=0.001\)) and 30-day mortality (18.2% versus 4.2%; \(P=0.016\)). Therefore, a further improvement of transapical success and survival rates might relate to the prevention of major vascular events, which have been shown to affect survival.

Moderate/severe paravalvular leak is a frequent adverse outcome, which is described in the literature to occur in 3.4% of cases. Paravalvular leak is usually detected during the procedure, immediately after valve deployment. It may diminish or disappear within a short time period; however, there is the possibility to improve the quality of the seal between the prosthesis and the native annulus by using postimplantation dilation and by an improved valve design. Rates of paravalvular leak can also be reduced by developments of the device, such as the third generation SAPIEN 3 valve with the COMMANDER (transfemoral access) and CERTITUDE delivery systems (transapical/transaortic access). Compared with the SAPIEN XT, it has a lower profile delivery system to reduce major vascular complications, a revised frame to maintain circularity, and a new outer skirt to decrease the risk of paravalvular leak.

Finally, stage 1 acute renal complications were more frequent in those undergoing transapical TAVI, and this confirms similar findings from other recent reports. Saia et al in particular investigated the incidence, predictors, and the clinical effect of acute kidney injury defined according to VARC II. In their single-center cohort of 102 consecutive patients, 42 developed perioperative acute renal complications with 32.4% in stage 1, 4.9% in stage 2, and 3.9% at stage 3. This occurred almost twice as often in transapical (66.7%) than in transfemoral (30.3%) procedures. The only independent predictor of acute kidney injury was transapical access, with a hazard ratio between 4.57 and 5.18 based on the model used. Only stage 3 translated into a meaningful effect on 1-year mortality.

Limitations

The most important limitation of the present study is the lack of a random assignment to treatment groups. Evaluating the effect of a specific treatment using a registry can lead to incorrect conclusions because of the influence of unknown confounding variables. Because there are no randomized, controlled trials comparing either access route to date, we had to adjust for known differences in baseline variables using the propensity score. This method is usually accurate to eliminate differences between groups, but there is a potential for unconsidered or even unknown confounders that were not considered. So there is a residual risk that a potential learning curve that might be different for transapical and transfemoral could influence the result. A further limitation is the missing adjustment for valve types (Symetis Acurate, Edwards SAPIEN/SAPIEN XT, Medtronic CoreValve). We were not able to consider these for propensity matching, and because they were not equally distributed between groups, they may have had an effect on the results, which generally relates to complications, such as pacemaker implantations or aortic insufficiency. Finally, we are a high volume center with vast experience in doing both transapical and transfemoral TAVI. It can be expected that we have optimized our implant technique for either access route considerably and thus the results may not apply to low volume centers where one approach may need more experience than the other to perform equally well.

Conclusions

The present single-center, consecutive case series of 1,000 patients undergoing transapical or transapical transcatheter aortic valve implantation demonstrated that there is no statistically significant incremental mortality risk using the transapical versus the transfemoral access route in a high volume center when compared using propensity score matching. Major vascular complications and aortic insufficiency were more common in patients undergoing transfemoral TAVI and stage 1 acute renal complications in those with transapical TAVI. The data demonstrate that an experienced multidisciplinary heart team can consistently and safely perform TAVI by either access route.

Acknowledgments

We thank Monica Meyer for her valuable advice.

Disclosures

Gerhard Schymik and Holger Schröfel are proctors and Peter Bramlage consultant for Edwards Lifesciences. The other authors report no conflicts.

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10.1016/j.amjcard.2008.06.061.

Am J Cardiol


Schymik et al

TAVIK: Transapical Versus Transfemoral TAVI

10.1016/j.amjcard.2008.06.061.


Long-Term Results of Transapical Versus Transfemoral TAVI in a Real World Population of 1000 Patients With Severe Symptomatic Aortic Stenosis

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Circ Cardiovasc Interv. 2015;8:
doi: 10.1161/CIRCINTERVENTIONS.113.000761

Circulation: Cardiovascular Interventions is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 1941-7640. Online ISSN: 1941-7632

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