Unanimous verdict: non TF patient but requires TAVR.

Access selection path

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Δεν έχω σχέσεις με φαρμακευτικές εταιρείες
TAVR now generally accepted Tx for pts with severe AoV stenosis, not suitable for sAVR because of a high risk of operative mortality.

**TF TAVR** most widely adopted technique for retrograde TAVR

Some pts do not have suitable femoral anatomy
- small-calibre vessels
- excessive peripheral or aortic atherosclerosis
- severe tortuosity
- previous peripheral arterial stenting or surgery

Vascular and access site-related complications influence the outcome in TF TAVR.

Multiple alternative approaches have been extensively described.
All of these have applications but also limitations.
The decision that the TF approach is appropriate is based on peripheral angiography and multi-detector computed tomography (MDCT).

Currently available TAVI delivery catheters (14 – 20F), the minimal femoral and iliac diameter should be 6 – 6.5 mm.

In addition, limited vessel calcification and tortuosity.
UNSUITABLE VESSELS FOR TF TAVI
After seeing this...

I believe that ANY alternative access is better than TF if the patient has poor Femoral access.
Sixty-four patients (15.3%) had major VC and 50 patients (11.9%) had minor VC within 30 days of the procedure.
Vascular complications occur frequently after TAVI with an incidence of around 10%.
### Table 2
Hospital volume quartile and outcomes

<table>
<thead>
<tr>
<th>Variables</th>
<th>Quartile</th>
<th>Overall</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
</tr>
<tr>
<td>Died</td>
<td>6.4%</td>
<td>5.9%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Any complications</td>
<td>48.5%</td>
<td>44.2%</td>
<td>39.7%</td>
</tr>
<tr>
<td>Any complications + death</td>
<td>49.7%</td>
<td>46.0%</td>
<td>40.2%</td>
</tr>
<tr>
<td>Any Vascular complications</td>
<td>24.6%</td>
<td>22.7%</td>
<td>19.1%</td>
</tr>
</tbody>
</table>

**Vascular access site complications**

<table>
<thead>
<tr>
<th>Variables</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular</td>
<td>10.1%</td>
<td>7.7%</td>
<td>8.3%</td>
<td>9.8%</td>
<td>9.1%</td>
</tr>
<tr>
<td>Pacemaker insertions</td>
<td>7.0%</td>
<td>9.6%</td>
<td>10.6%</td>
<td>6.6%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Respiratory Complications</td>
<td>11.1%</td>
<td>7.2%</td>
<td>7.7%</td>
<td>5.8%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Neurological Complications</td>
<td>1.2%</td>
<td>1.3%</td>
<td>1.8%</td>
<td>1.4%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Acute Renal Failure requiring dialysis</td>
<td>1.8%</td>
<td>2.1%</td>
<td>1.0%</td>
<td>0.8%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Pulmonary Embolism and Deep Venous Thrombosis</td>
<td>0.9%</td>
<td>1.3%</td>
<td>0.8%</td>
<td>1.4%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Infectious complications</td>
<td>2.1%</td>
<td>2.6%</td>
<td>2.6%</td>
<td>3.6%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Mechanical Valve prosthetic related complications</td>
<td>0.6%</td>
<td>1.8%</td>
<td>0.5%</td>
<td>1.7%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Open heart surgery + Extra corporeal</td>
<td>14.6%</td>
<td>6.7%</td>
<td>3.6%</td>
<td>4.4%</td>
<td>7.2%</td>
</tr>
</tbody>
</table>
The Society of Thoracic Surgeons/ American College of Cardiology TVT (Transcatheter Valve Therapy) Registry
TAVR Access Site

(\% of total)

Source: STS/ACC TVI Registry Database
as of 1-17-16
Courtesy John Carroll, MD

- 2012 October: FDA extends Sapien approval to high-risk patients using femoral or other access.
- 2013 September: FDA extends Sapien using registry data to inoperable patients for all vascular access.
- 2014 January: FDA approves CoreValve for extreme-risk patients.
- 2014 June: FDA approves Sapien XI and extends CoreValve for high-risk patients.

Graph showing the percentage of TAVR procedures by access method from 2012Q1 to 2015Q4.

- Femoral
- Transapical
- Transaortic
- Other
SAPIEN 3 valve
Used TF in about 90% of pts

SAPIEN XT valve
Used TF in 76% of pts
Transcatheter aortic valve implantation access routes. Data from the UK TAVI Registry illustrating the change in access route choice over the years 2007–12, emphasizing the rapid rise in trans-femoral procedures (figure courtesy of Dr Peter Ludman).
Transapical access (TAp)

- Reserved when TF access is impossible
- Pts are at higher risk (heavily calcified pelvic arteries/high ‘atheroma burden’)
- The TAp access allows close control of the valve during deployment (for ViV on MV and Ao bioprostheses)

**Less favourable** for the TAp approach are:
Pts with severe pulmonary disease, chest wall deformity, severe LV dysfunction, intracavitary thrombus and obesity.
Transaortic access (TAo)

- **Pts** not ideal for either TF or TAp
- **MDCT** analysis of the Asc Ao important!
  - **TAo zone** calcium free (the purse-string sutures are placed)
  - **In Re-do pts**, the proximity of the innominate vein and/or aorta to the sternum should be analysed (In close proximity, (R) anterior thoracotomy)

**Porcelain aorta** — in the majority of pts the calcification is patchy

**Distance from the Ao annulus** -> **TAo zone**:
- Edwards SAPIEN-XT valve 5 – 7 cm
- CoreValve 6 – 7 cm for valve deployment
MDCT for procedural planning of TAo access

Thoracotomy or Sternotomy?

(A and B) The TAo zone for cannulation of the aorta along the upper lateral quadrant allowing perpendicular alignment to the AoV (C)

Spatial relationship between sternum and the Asc Aorta, the approach can be: **mini-J sternotomy** (D)
Asc Ao in the midline or left sided and >6 cm below the sternum (E)

**Mini-right sternotomy**
Asc Ao is right-sided and < 6 cm below the sternum
Advantages of TAo access include:

✓ familiarity to cardiothoracic surgeons

✓ avoidance of access site problems (apical rupture and delayed pseudoaneurysm formation)

✓ avoidance of interference with post-operative respiratory dynamics due to thoracotomy

✓ rib retraction and pleural effusions

✓ avoidance of effects on LV function
Subclavian artery access

Min Ø: 6 mm uncalcified artery
7 mm with significant calcification

Clinical experience shows

- Vertical Asc Ao suitable for RSA
- Horizontal Asc Ao favours LSA approach
- Assessment of Subcl. Art diameter:
  - tortuosity
  - calcification
  - exclusion of stenoses

- Patent LIMA Bypass - ? flow obstruction and ischaemia
- Graft/ no graft ?
Subclavian comparable results to TF access (data from a 2-year Italian study) Circ Cardiovasc Interv 2010;3:359–366

The surgical cut down replaced in some centers with a percutaneous approach
A new access for transcatheter aortic valve implantation: Distal axillary artery

Giuseppe Bruschi, Paola Colombo, Bruno Merlanti, Stefano Nava, Oriana Belli, Francesco Musca, Francesco Soriano, Luca Botta, Angelo Calini, Daniele F. De Carlo, Fabrizio Oliva, Claudio F. Russo

*De Carpentis* Cardiac Centre, ASST Niguarda Casalino Hospital, Italy

Axillary Cannulation via 10mm Graft
Anatomical landmarks in the decision for partial upper sternotomy
Transcarotid access does not require division of the chest or any major muscle groups.
Left carotid (88.5%)
Mortality  6.3% at 30 days
      16.7% at 1 year

- Neurological event rate at 30 days of 6.3%
- Procedure in 1 of 2 ways (standard approach with GA or a minimally invasive strategy (MIS) (local anesthesia and conscious sedation)
- Fairly extensive training required, considerable experience managing carotid artery surgery

**In France,** transcarotid approaches do not have regulatory approval but has already surpassed subclavian as the access route of choice after transfemoral and is nearly on par with direct aortic and transapical approaches.

Sources:
Caval-Aortic Access to Allow Transcatheter Aortic Valve Replacement in Otherwise Ineligible Patients
Initial Human Experience

Adam R. Greenbaum, MD,* William W. O'Neill, MD, Gaetano Panne, MD,†
Mayra E. Guerrero, MD,* Janet F. Wyman, DNP,* R. Lebron Cooper, MD,† Robert J. Lederman, MD†
Detroit, Michigan; and Bethesda, Maryland
Proposed Physiology of Transcaval Access

Retroperitoneal pressure is higher than venous, so aortic bleeding decompresses into corresponding venous hole

Follow up CT scan

1 day 1 month 1 year
Long-Term Results of Transapical Versus Transfemoral TAVI in a Real World Population of 1000 Patients With Severe Symptomatic Aortic Stenosis

Gerhard Schymik, MD; Alexander Würth, MD; Peter Bramlage, MD; Tanja Herbinger, MD; Martin Heimeshoff, MD; Lothar Pilz, MSc; Jan S. Schymik, MSc; Rainer Wondraschek, MD; Tim Süselbeck, MD; Jan Gerhardus, MD; Armin Luik, MD; Bernd-Dieter Gonska, MD; Herbert Posival, MD; Claus Schmitt, MD; Holger Schröfel, MD

Background—Transapical transcatheter aortic valve implantation is generally perceived to be associated with increased morbidity compared with transfemoral transcatheter aortic valve implantation. We aimed to compare access-related complications and survival using propensity score matching.

Methods and Results—Prospective, single-center registry of 1000 consecutive patients undergoing transapical and transfemoral transcatheter aortic valve implantation between May 2008 and April 2012. Transapical was performed in 413 patients and transfemoral in 587 patients. Patients with transapical access were less often women and less had pulmonary hypertension. Further they had more peripheral arterial disease, coronary artery disease, carotid stenosis, and recurrent surgery and a higher logistic EuroSCORE I (24.3%±16.2% for transapical versus 22.2%±16.2% for transfemoral; P<0.01). After building 2 propensity score–matched groups of 354 patients each with either access route (total 708 patients), baseline characteristics were comparable. In this analysis, there was no significant difference in 30 day mortality (5.9% transapical versus 8.5% transfemoral; P=0.19), the rate of myocardial infarction (2.5% transapical versus 2.0% transfemoral; P=0.61), stroke (2.0% transapical versus 2.3% transfemoral; P=0.79), bleeding complications, pacemaker implantation rates, or moderate aortic insufficiency. Stage I 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 transapical and transfemoral transcatheter aortic valve replacement can be performed with comparable results.
Long-Term Results of Transapical Versus Transfemoral TAVI in a Real World Population of 1000 Patients With Severe Symptomatic Aortic Stenosis

Gerhard Schymik, Alexander Wirth, Peter Bramlage, Tanja Herbinger, Martin Heimeshoff, Lothar Pilz, Jan S. Schymik, Rainer Wondraschek, Tim Stüselbeck, Jan Gerhardus, Armin Luik, Bernd-Dieter Gonska, Herbert Posival, Claus Schmitt and Holger Schnöfel
because of its feasibility and given the simplicity of the procedure, the TAo approach has become increasingly used as a preferred approach among non-TF patients.
Conclusion: The outcomes associated with TAO TAVR compare favorably with TAP TAVR. Our results appear to corroborate the long-term safety and efficacy of the TAO approach in TAVR patients with inadequate iliofemoral access.
Conclusion

Comparison of TAo and TA approaches revealed equivalent outcomes in 30-day mortality, procedural success, major bleeding, stroke/TIA incidence, pacemaker insertion rates and paravalvular leak. Heart teams should be familiar with the use of both TA and TAo access and tailor their selection on a case-to-case basis.

(J Card Surg 2015;30:381–390)
No conclusive evidence of a difference in stroke risk between TA and TF approaches
the question remains: In patients who need an alternative route for TAVR, does one or the other route have an advantage?
TAp and TAo approaches are employed roughly equally.

Subclavian access gaining popularity.

Trends in favor of TAo/TAVR compared with TAp/TAVR.

Each approach depends on risk factors like:

- ventriculotomy and low EF
- heavy calcification of Asc Aorta
- previous CABG
- severe COPD

Other alternatives to TAo and TAp studied in small series.

Experienced centers developed their own comfort level with their favored alternative access (TAo or Subclavian) if TAp contraindicated.
CONCLUSIONS Although the 30-day mortality and 1-year survival rates were similar between TF and TAo TAVR patients, a trend in favor of the TF approach was observed. In addition, the TAo approach can be considered as an alternative to the TA approach when the TF approach seems unsuitable. (J Am Coll Cardiol Intv 2016;9:2320-5) © 2016 by the American College of Cardiology Foundation.
ΥΒΡΙΔΙΚΟ ΧΕΙΡΟΥΡΓΕΙΟ ΥΓΕΙΑ
Transcatheter Aortic Valve Implantation Access Routes

HYGEIA THV DEPARTMENT

% of total

M: 55.4%
F: 44.6%

- TF: 86.9%
- TAp: 5.3%
- TAo: 7.1%
- Tsbcl: 0.7%
Pt 77y ♂

Clinical History: iliac-femoral arteries diseased; Porcelain aorta;
Pt 79 y♀
Clinical History: peripheral arteries disease;
77y, O severe AoSt
1992: CABGX4 (LIMA->Diag, SVG->LAD, SVG->OM1, SVG->RCA)
(Recent Cor.Angio: ok)
2011: EVAR (Bifurcated Aortoiliac Graft + PCI Left branch)
OPTIMAL APPROACH: TAp

BUT

PT STRICTLY AGAINST INCISIONS (THORACOTOMY)
Future Perspective

- Enhanced imaging and closure devices will continue to improve the performance and safety of alternative access routes for TAVR.

- Next-generation TAVR platforms will likely become smaller in size (14 F or less) and more maneuverable, which may reduce the need for nonfemoral access.

- Percutaneous subclavian access is currently performed by several groups in Europe.

- Closure devices for LV apex are under development and percutaneous transapical access is already a reality in the lab.
<table>
<thead>
<tr>
<th>Future Perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoracoscopic port access and DA access have been accomplished in humans and could someday become a common reality</td>
</tr>
<tr>
<td>Further studies with larger cohorts and long-term follow-up are required to investigate the impact of each individual approach on long-term outcomes</td>
</tr>
</tbody>
</table>
Femoral access is not a religion...

... you are allowed to convert to alternative access!
Demonstrate Superior Judgement not Superior Skill

Superior Skill

Poor Judgment

Thanks !!!