Non-TF Accesses for TAVI

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TCTAP 2018, Seoul

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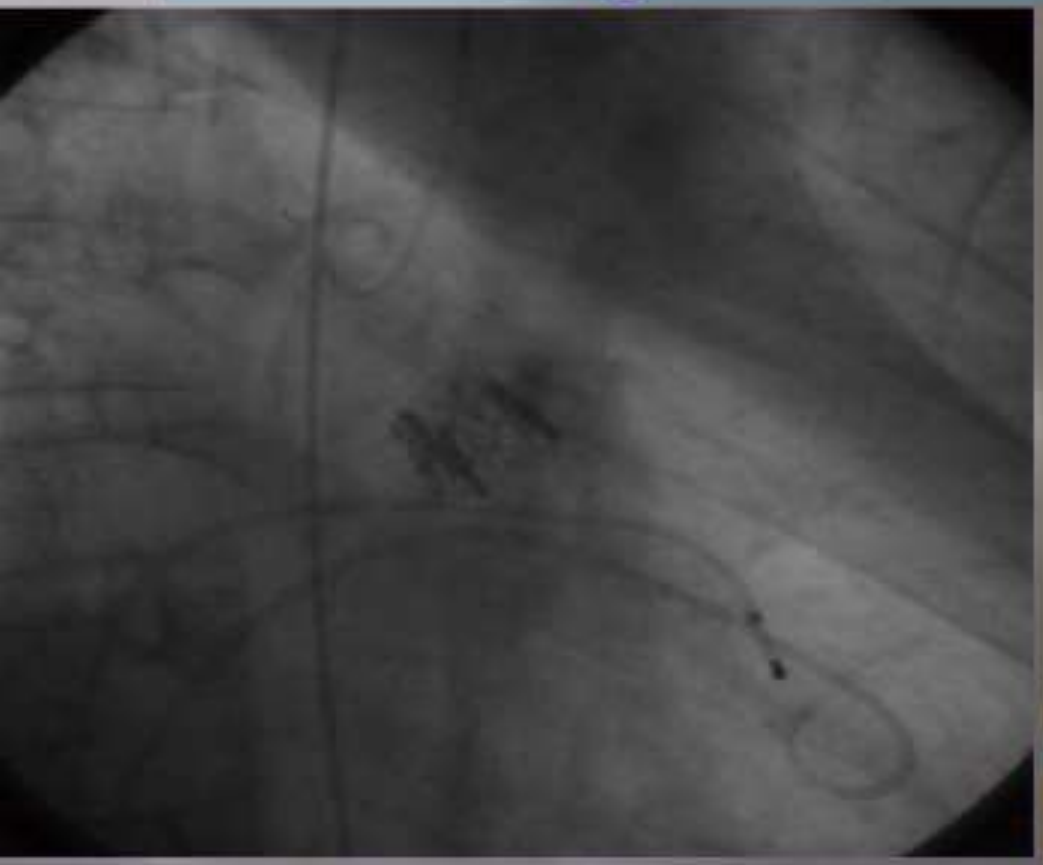
HEART CENTRE AT ST. PAUL'S HOSPITAL

Disclosure

Consultant: **Edwards Lifesciences**

JC Medical Inc.

First human implantation: Alain Cribier
April 16, 2002 (France)



Bovine pericardium valve
23mm in diameter

Transseptal TAVI

First Transfemoral TAVI
J. Webb, Vancouver

Webb JG, Munt B, Makkar R, Naqvi T, Dang N. A percutaneous stent-mounted valve for treatment of aortic or pulmonary valve disease. *Cathet Cardiovasc Interv*. 2004;63:89–93.

Percutaneous Aortic Valve Implantation Retrograde From the Femoral Artery

John G. Webb, MD; Mann Chandavimol, MD; Christopher R. Thompson, MD; Donald R. Ricci, MD; Ronald G. Carere, MD; Brad I. Munt; Christopher E. Buller, MD; Sanjeevan Pasupati, MD; Samuel Lichtenstein, MD

(*Circulation*. 2006;113:842-850.)

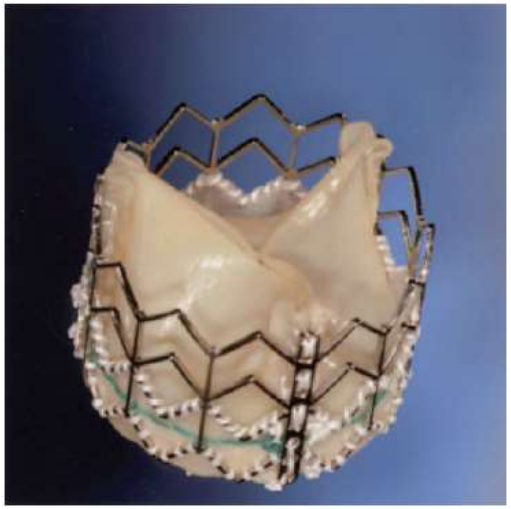
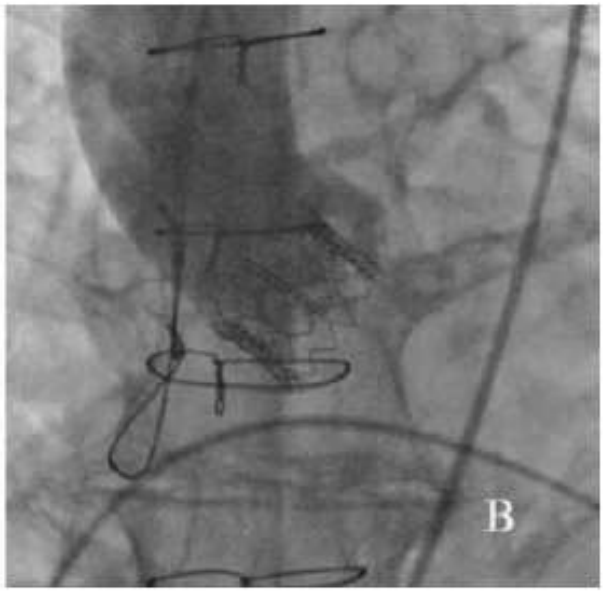


Figure 1. Cribier-Edwards percutaneous valve. An equine pericardial valve is sewn within a stainless steel frame. A fabric skirt covers the bottom third of the stent.



First CoreValve implantation

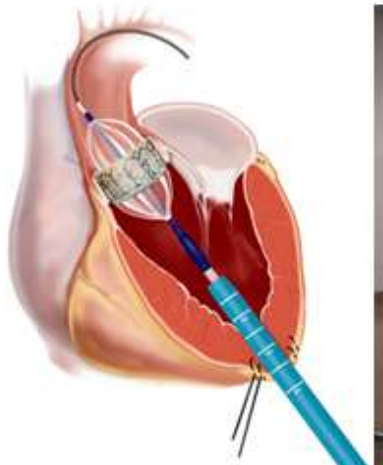
July 12, 2004

First Successful Transcatheter Transapical AVI

Transapical aortic valve implantation in humans

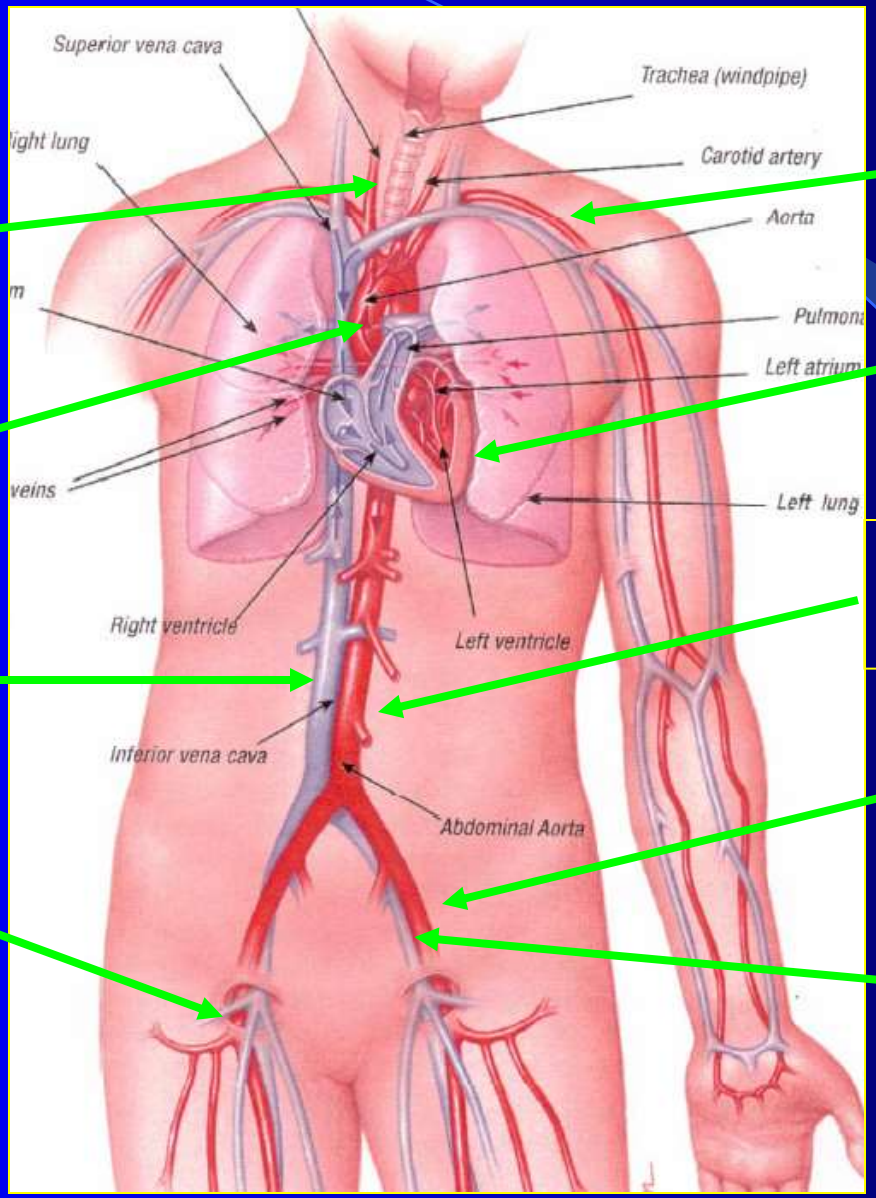
Jian Ye, MD, Anson Cheung, MD, Samuel V. Lichtenstein, MD, PhD, Ronald G. Carere, MD,
Christopher R. Thompson, MD, Sanjeewan Pasupati, MD, and John G. Webb, MD, Vancouver, BC, Canada

J Thorac Cardiovasc Surg 2006;131:1194-6



October 2005

Multiple Access Options for TAVI



Carotid A.

Aorta

IVC-AA Transcaval

Femoral A. TF

Subclavian or Axillary A.

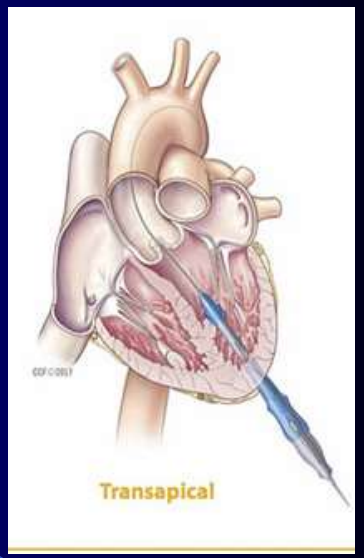
Apex of LV TA

Abdominal Aorta (Direct)

Iliac A.

Femoral V.

Transapical Access



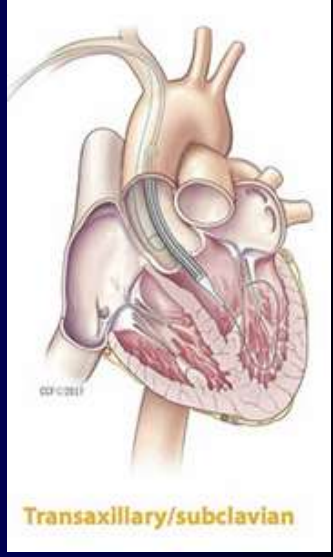
Major advantages:

- **Shortest distance to aortic valve**
- **Fine adjustment for optimal position**
- **Minimal fluoroscopy time**
- **Easiest way to reach MV**
- **Probably best way for transcatheter multiple valve procedure**
- **Only contraindication: apical thrombus and new apical/anterior MI**

Major disadvantages:

- **General anesthesia and more invasive than TF**
- **Outcome - Surgeon dependent**

Transaxillary/subclavian Access



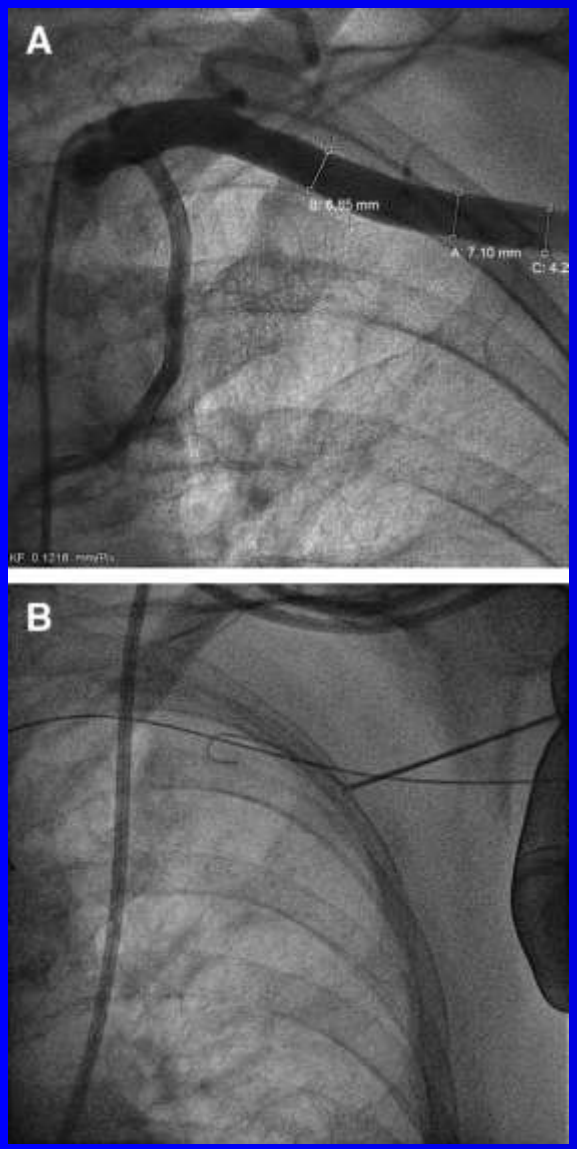
Major advantages:

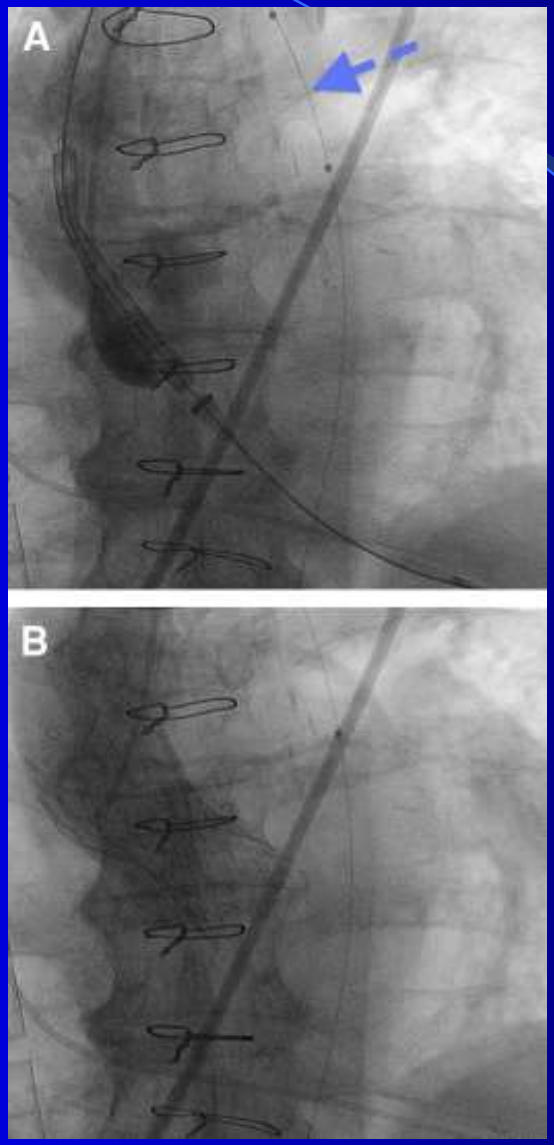
- **Shorter distance to aortic valve compared to TF, potentially allowing precise position of THV**
- **Less invasiveness compared to other non-femoral accesses**
- **Feasibility of percutaneous approach**
- **Feasibility of local anesthesia + systemic sedation**
- **Quick recovery, potential for early discharge**

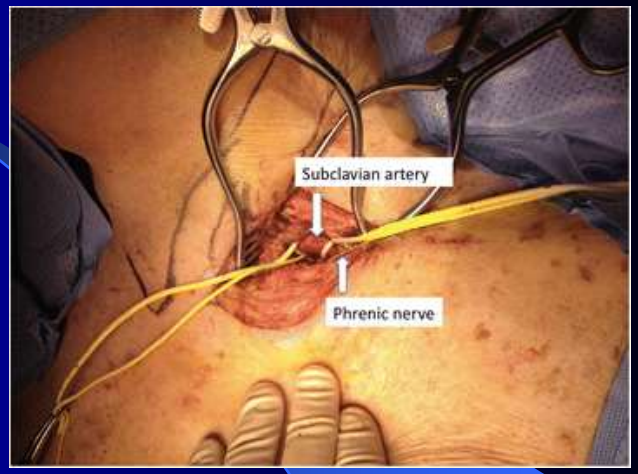
Potential contraindications and complications:

- **Patent LIMA or BIMA**
- **Axillary or subclavian artery disease/calcification**
- **Injury to brachial plexus**

Transaxillary/subclavian Access



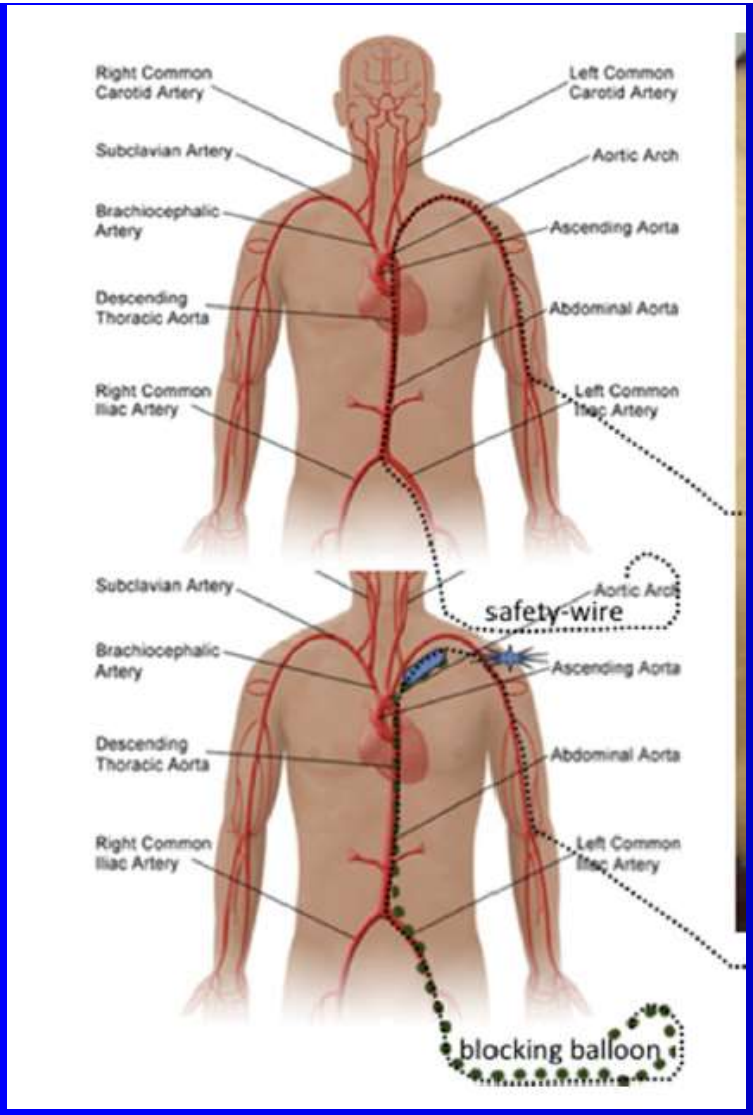




JACC intv 2012;5:477-86

Safety and efficacy of the percutaneous transaxillary access for transcatheter aortic valve implantation using various transcatheter heart valves in 100 consecutive patients

U. Schäfer [a,*], F. Deuschl [a], N. Schofer [a], C. Frerker [c], T. Schmidt [c], K.H. Kuck [c], F. Kreidel [c], J. Schirmer [b], I. Mizote [a], H. Reichenspurner [b], S. Blankenberg [a], H. Treede [b], L. Conradi [b]



International Journal of Cardiology 232 (2017) 247–254

Procedural Outcomes

Procedural details and outcomes.

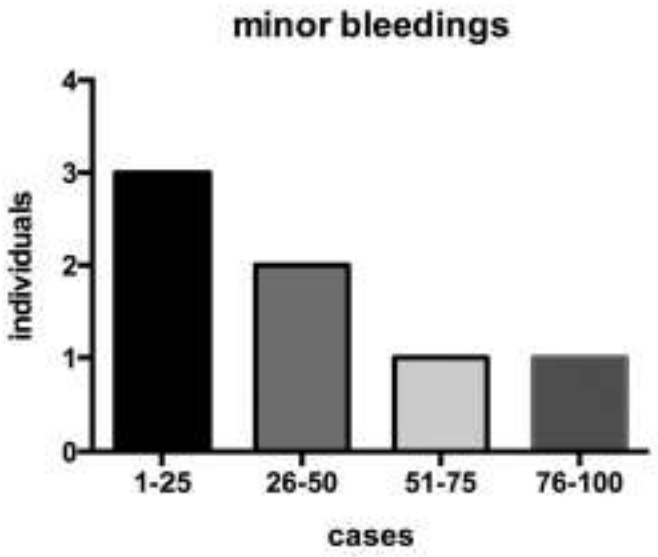
Procedural characteristics and outcome		
General anesthesia	%	72
Access left axillary artery	%	85
Sheath	Cook Checkflow (18F)	6
	Cook (18F)	57
	Boston (18F)	12
	Boston (20F)	2
	eSheath (14 Fr)	13
	eSheath (16 Fr)	10
Stiff wire	Safari	17
	Amplatz extra stiff (ST3)	21
	Amplatz super stiff (ST1)	62
Procedure time	min	85 ± 10.1
Fluoro time	min	24.1 ± 7.7
Contrast agent	ml	167 ± 27.3
Pre-dilatation	%	91
Post-dilatation	%	27
Rapid pacing for implantation	%	32
PVL > 1+	%	2*
VARC 2 device success	%	95
Procedural mortality	%	1***
THV malposition	%	2**
Need for a second valve	%	2
Length of ICU stay	days	1.4 ± 0.5
Length of hospital stay	days	7.9 ± 4.3

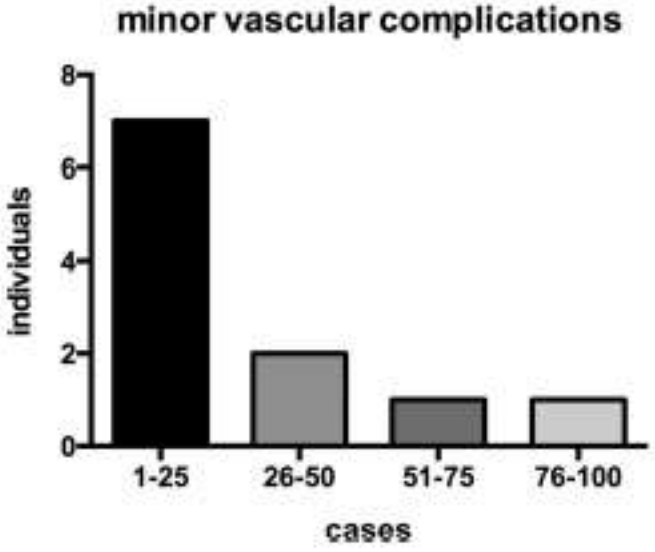
30-day Outcomes

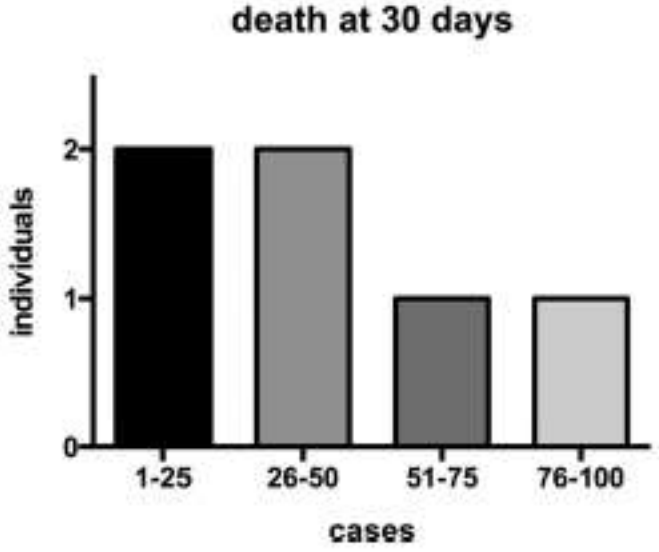
Procedural outcome at 30 days.

30 Day clinical outcome	%
Mortality	6
Cardiac mortality[#]	2
Myocardial infarction	0
Any stroke or TIA	1
Significant paravalvular leakage	2*
Second valve	2**
Renal failure > AKIN stage 2	3
Major access site complication	0
Minor access site complication	11[#]
Life threatening bleeding	3***
Major bleeding	0
Minor bleeding	6
New permanent pacemaker	23
Reintervention (vascular)	2
VARC 2 combined safety endpoint	7

Learning Curve







Conclusion

Condensed abstract: We investigated In 100 consecutive patients undergoing percutaneous transaxillary transcatheter aortic valve implantation thereby demonstrating that this approach is technically feasible and safe with acceptable numbers of minor vascular complications.

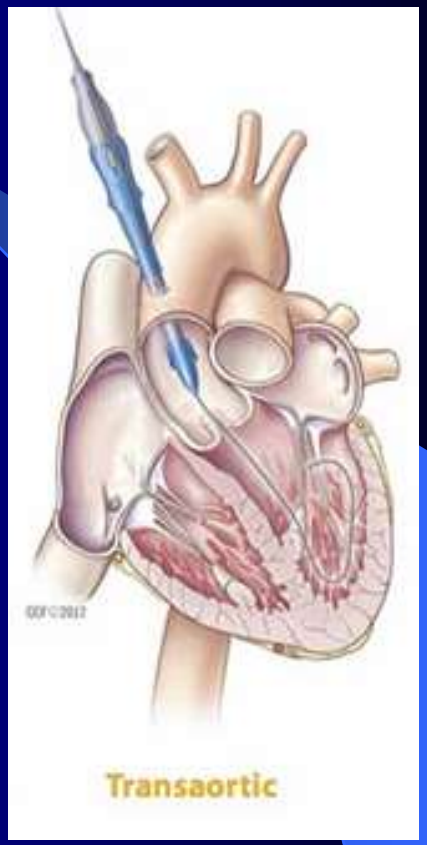
Transaortic Access

Major advantages:

- **Familiar to cardiac surgeons**
- **Short learning curve**

Major disadvantages:

- **Most invasive**
- **No roles in future**



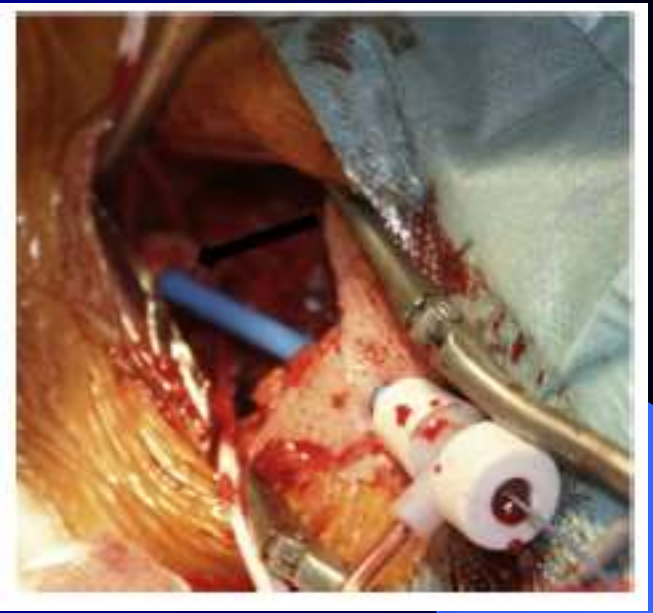
Transcarotid Access

Major advantages:

- **Short distance to AV**
- **Possibility of local anesthesia**

Major concerns:

- **CVA**
- **Potential catastrophic vascular complications**



Transcarotid transcatheter aortic valve implantation: multicentre experience in France

Thierry Folliguet[a,*], Nicolas Laurent[a], Maxime Bertram[a], Konstantinos Zannis[b], Mazen Elfarra[a], Fabrice Vanhuyse[a], Pablo Maureira[a] and Thomas Modine[c]

European Journal of Cardio-Thoracic Surgery 53 (2018) 157–161

Table 1: Preoperative data

Variables	*n* = 145 (%)
Male	49 (33.8)
Age (years)	79.8 ± 8.7
Body mass index (kg/m^2)	27.5 ± 7.1
Previous CABG	32 (22)
PCI	46 (31.7)
COPD	59 (40.7)
Peripheral arterial disease	82 (56.6)
Previous stroke	8 (5.5)
Frailty	20 (13.8)
Chronic kidney disease	27 (18.6)
Insulin-dependent diabetes	44 (30.3)
Recent MI	19 (13.1)
EuroSCORE	20.7 ± 12.6
Mean aortic gradient (mmHg)	53.1 ± 12.5
Mean aortic valve area (cm^2)	0.86
LVEF	51.9 ± 12.2

30-day Outcomes

Table 2: Survival and complications

Thirty-day survival ($n = 135$) 93.75%	
TIA/cerebral stroke ($n = 8$)	5.5%
Localized carotid dissection, asymptomatic ($n = 1$)	0.6%
PPM implantation ($n = 32$)	22.2%
Infection complication ($n = 6$)	4.1%
Bleeding complication ($n = 37$)	25,6%
Hospital stay (days)	11.7 ± 6.6

CONCLUSIONS: Transcarotid aortic valve implantation is a safe alternative to transfemoral transcatheter aortic valve implantation, with direct access to the aortic valve, which can be performed with limited incision.

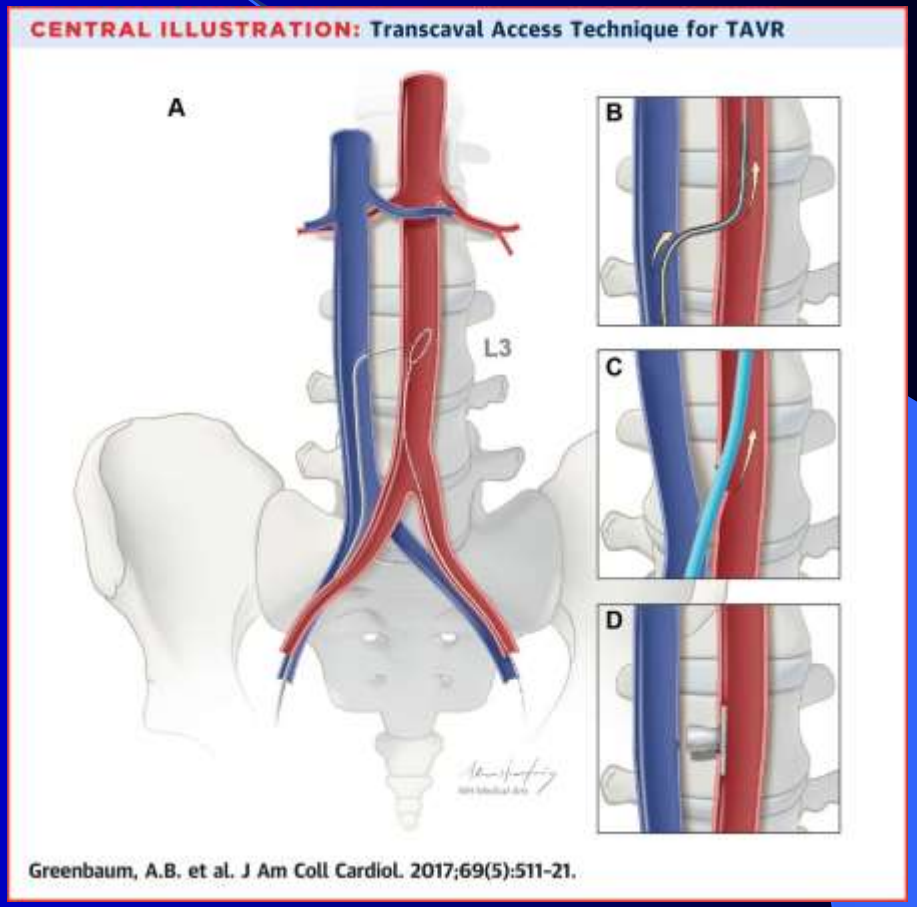
Transcaval Access

Major advantages:

- **Percutaneous approach**

Major concern:

- **Vascular complications**



Transcaval Access and Closure for Transcatheter Aortic Valve Replacement

A Prospective Investigation

Adam B. Greenbaum, MD,[a] Vasilis C. Babaliaros, MD,[b] Marcus Y. Chen, MD,[c] Annette M. Stine, RN,[c] Toby Rogers, PhD, BM BCh,[c] William W. O'Neill, MD,[a] Gaetano Paone, MD,[a] Vinod H. Thourani, MD,[b] Kamran I. Muhammad, MD,[d] Robert A. Leonardi, MD,[e] Stephen Ramee, MD,[f] James F. Troendle, PhD,[c] Robert J. Lederman, MD[c]

J Am Coll Cardiol 2017;69:511-21)

TABLE 3 Outcomes Through 30 Days (N = 100)

Death within 30 days	7 Cardiovascular 1 Noncardiovascular
Stroke	5 Ischemic
Myocardial infarction	2 Peri-procedural
Contrast nephropathy requiring dialysis	2
Acute kidney injury classification	Grade 0 (n = 87) Grade 1 (n = 9) Grade 2 (n = 0) Grade 3 (n = 3)
Thrombocytopenia $<50 \times 10^3$ / μl	5 (4 with patent fistula)
Non-access-related bleeding (e.g., gastrointestinal)	15
Transfusion during TAVR/after TAVR/during or after TAVR	14/30/35
Transfusion units among those transfused (median) (n = 35/100)	2.0 (2.0, 4.0)
Follow-up CT scan before discharge	87
Post-TAVR length of stay (days), median (quartiles)	4 (2-6)
Post-TAVR intensive care unit length of stay (days), median (quartiles)	1 (1-3)
VARC-2 composite early safety*	75

TABLE 4 Key Complications

New	Transcaval-Related	Count (n = 99)	Details
Bleeding			
Life-threatening	Yes	6	5 RPH (large [n = 2]; moderate [n = 2]; small [n = 1]) 1 Covered aortic and iliac stents, no RPH
	Indeterminate	1	1 Thoracic aortic dissection from Corevalve Evolut R
	No	5	2 Pericardial tamponade 1 Femoral artery closure device failure 1 Epistaxis related to anesthesia care 1 GI hemorrhage
Major	Yes	5	5 RPH (4 moderate, 1 small) including 1 concurrent GI and jugular access hemorrhage
	No	1	
Minor	Yes	11	
	No	8	
None	—	62	
Vascular complications			
Major	Yes	12	9 RPH (any size) + major or life-threatening bleeding 1 Covered stent for extravasation 1 Primary closure with covered aortic and femoral artery stents 1 Noncovered aortic stent for local dissection
	Indeterminate	1	1 Thoracic aortic dissection from Corevalve Evolut R
	No	6	2 Pericardial tamponade 1 Aortic root hematoma 1 Lower extremity revascularization 1 Femoral artery closure device failure 1 Other
Minor	Yes	13	
	No	4	
None	—	63	

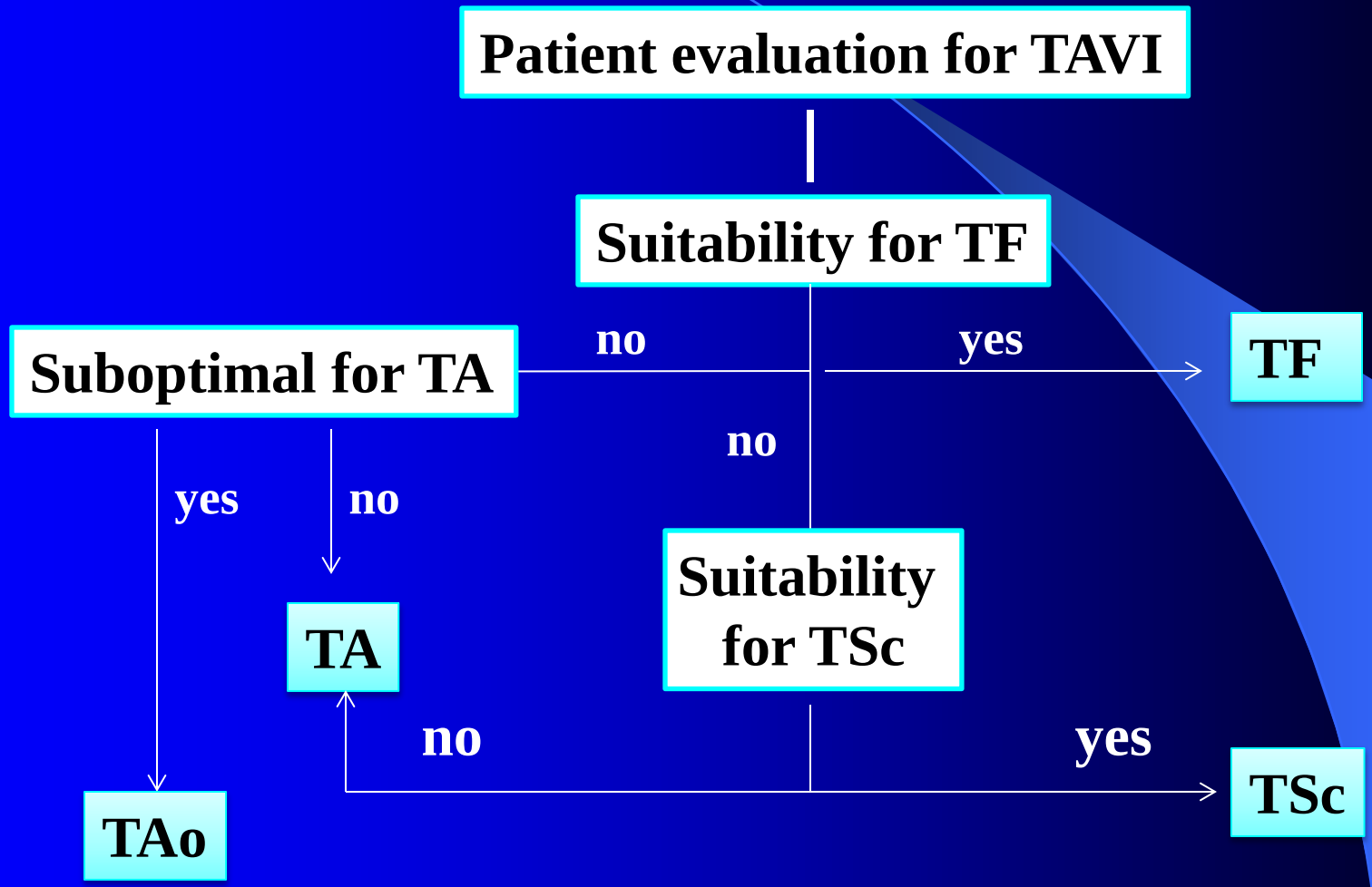
TABLE 5 Computed Tomographic Findings

Aorto-caval fistula			
Timepoint	Occluded	Patent	Indeterminate (noncontrast or poor contrast timing)
Pre-discharge (n = 87)	38	34	15
30 day (n = 76)	48	18	10

Retroperitoneal hematoma				
Timepoint	None	Small	Moderate	Large
Pre-discharge (n = 88)	67 (76)	12 (14)	7 (8)	2 (2)
30 days (n = 76)	72 (95)	3 (4)	0	1 (1)

Values are n or n (%).

Access selection at our center




THANKS!