Supra-aortic trunk TAVI



CHIRURGIE THORACIQUE CARDIAQUE ET VASCULAIRE

P* JEAN-PHILIPPE VERHOYE-ROCCHESANI



Introduction

Alternate Access for TAVI: Stay Clear of the Chest

Pavel Overtchouk¹ and Thomas Modine¹

TF-TAVI is favoured

15-20 % non TF TAVI needed

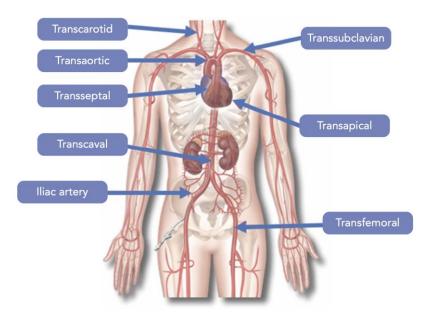
Vascular complications as high as 6% in Partner 2

Transthoracic approaches developped first

Time of Transvascular non TF TAVI

First description of Trans carotid by Modine et al. 2010

Figure 2: Overview of the alternative approaches





Sizing and Planning

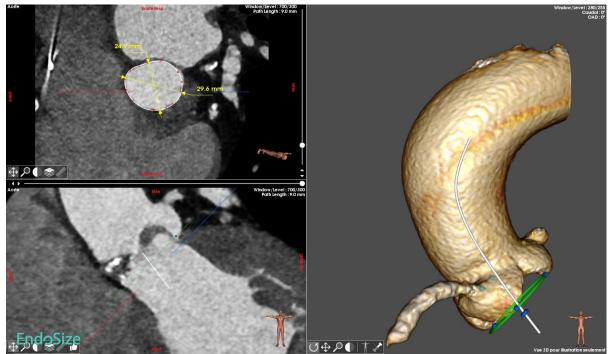
Format: Abstract -

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Minim Invasive Ther Allied Technol, 2019 Jun;28(3):157-164. doi: 10.1080/13645706.2018.1488734. Epub 2018 Jul 24.

Automatic aortic root segmentation and anatomical landmarks detection for TAVI procedure planning.

Lalys F¹, Esneault S¹, Castro M^{2,3}, Royer L¹, Haigron P^{2,3}, Auffret V^{2,3,4}, Tomasi J⁴.



Am J Cardiol. 2019 May 1;123(9):1501-1509. doi: 10.1016/j.amjcard.2019.01.040. Epub 2019 Feb 8.

Comparison of the Transarterial and Transthoracic Approaches in Nontransfemoral Transcatheter Aortic Valve Implantation.

Beve M¹, Auffret V², Belhaj Soulami R³, Tomasi J³, Anselmi A³, Roisne A⁴, Boulmier D¹, Bedossa M¹, Leurent G¹, Donal E¹, Le Breton H¹, Verhoye JP³.

May 2009 – September 2017

104 transthoracic 87 transarterial (83.9 % trans-subclavian and 16.1% transcarotid)

Mortality lowered in transarterial at 30 days but no difference at 1 year Composite end-point 30-day (death, need for open, tamponade, stroke, major bleeding, AKI stage 2 or 3, coronary obstruction) 25% vs 11.5 % Shorter lenght of stay 6 vs 7 days

Femoral vs non Femoral peripheral TAVI France TAVI

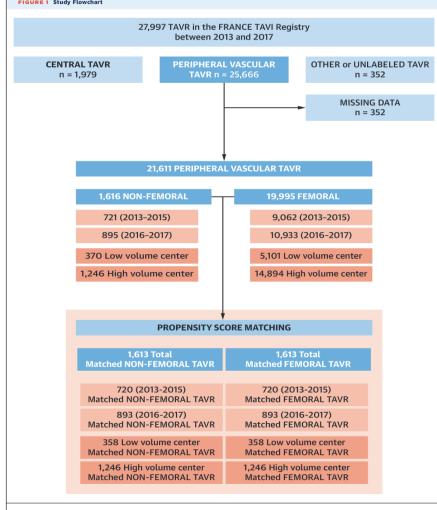
- 21611 patients
 - -92.5 % femoral (19,995 pts)
 - -7.5 % non femoral (1,616 pts)
 - 914 carotids
 - 702 sub clavian

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Femoral Versus Nonfemoral Peripheral Access for Transcatheter Aortic Valve Replacement

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VOL. 74,



Among 27,997 patients included in the FRANCE TAVI (French Transcatheter Aortic Valve Implantation) registry, 21,611 patients were included in the study. Patients who underwent nonfemoral peripheral (n-FP) transcatheter aortic valve replacement (TAVR) (n = 1,613) with complete data were matched with 1,613 patients who underwent FP TAVR for comparison purposes.

FIGURE 2 Patients' Factors Associated With n-FP TAVR Versus FP TAVR

	OR	Lower Cl	Upper Cl	OR Plot (Log Scale)
General Characteristics				
Age	0.97	0.97	0.98	
Male	2.05	1.84	2.28	Hel
BMI (underweight)	1.38	1.06	1.76	⊢ •−1
BMI (overweight)	0.99	0.89	1.11	Here and the second sec
Logistic EuroSCORE	1.02	1.01	1.02	
Indication (operative CI)	1.83	1.54	2.18	H+++
Indication (high surgical risk)	1.28	1.14	1.45	H
Indication (other)	1.59	1.24	2.03	⊢ ⊷⊣
Non-elective procedure	0.90	0.75	1.08	<u>⊢+</u> 1
Extra Cardiac History				
Previous stroke/TIA	1.14	0.98	1.33	
Peripheral vascular disease	4.39	3.96	4.87	
Chronic pulmonary disease	1.55	1.38	1.74	
Diabetes mellitus	1.17	1.04	1.31	
Renal failure (moderate)	1.15	1.03	1.29	I#1
Renal failure (severe)	1.29	1.08	1.53	
Renal failure (dialysis)	1.73	1.23	2.37	⊢ ⊷-1
Cardiac History				
Cardiac symptoms	1.11	0.91	1.37	
Coronary disease	2.00	1.80	2.22	Hel
Previous cardiac surgery	1.86	1.64	2.10	let.
Previous permanent pacemaker	0.98	0.84	1.13	H
Previous SV arrhythmia	1.03	0.92	1.14	Her .
Ejection fraction	0.99	0.99	0.99	
Pulmonary HT (moderate)	0.89	0.79	1.01	H=
Pulmonary HT (severe)	0.81	0.66	0.98	
Pulmonary HT (non-measurable	0.87	0.75	1.01	H+-
or non-available)				
Aortic Valve Characteristics				
Mean aortic gradient	0.99	0.99	0.99	
Aortic valve area	1.40	1.1	1.75	⊢ •−1
Aortic annulus	1.09	1.07	1.11	
Moderate or severe AR	1.13	0.99	1.29	
Valve Type				
Balloon-expandable	0.29	0.26	0.32	Hel
Center Size				
Low-intermediate volume quartile	1.33	1.06	1.68	⊢ ⊷–∣
High-intermediate volume quartile	0.99	0.80	1.25	→
High volume quartile	1.63	1.33	2.01	H+++
Study Period				
	1.02	0.03	114	
2016-2017	1.03	0.93	1.14	in the second se
				0.1 0.2 0.5 1 2 5

Odds ratios (ORs) expressing the probability of having n-FP TAVR. AR = aortic regurgitation; BMI = body mass index; CI = confidence interval; HT = hypertension; SV = supraventricular; TIA = transient ischemic attack; other abbreviations as in Figure 1.

 Among peripheral vascular TAVR

- Similar results
- 2-fold lower rate of major vascular complications
- N-FP is safe reproducible, at least as good

CENTRAL ILLUSTRATION Femoral or Nonfemoral Peripheral TAVR

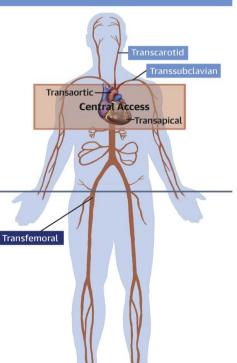
Non-Femoral Peripheral Vascular Access N = 1,616 Mean Logistic EuroSCORE I = 19.95%

Complications	
Operative mortality	64 (3.96)
Stroke	54 (3.34)
Unplanned vascular repair	51 (3.16)

Impact of Access Type on Outcome of the Matched Population

	OR* (95% CI)	P Value		
Operative mortality	1.29 (0.87-1.94)	0.21		
STEMI	0.81 (0.19-3.87)	0.77		
Stroke	1.38 (0.88-2.19)	0.16		
Annulus rupture	0.14 (0.00-1.62)	0.13		
Aortic dissection	1.63 (0.32-10.45)	1.63		
Tamponade	1.38 (0.73-2.65)	0.32		
PM insertion	0.95 (0.78-1.16)	0.61		
Renal failure	1.39 (0.92-2.11)	0.12		
Major bleeding	1.06 (0.81-1.39)	0.68		
Unplanned vascular repair	0.41 (0.29-0.59)	<0.001		
Major vascular complications	0.45 (0.21-0.93)	0.03		
Surgery under bypass	0.41 (0.09-1.52)	0.18		

Complications	n (%)
Operative mortality	583 (2.92)
Stroke	362 (1.81)
Unplanned vascular repair	1,288 (6.44)



Femoral Peripheral Vascular Access N = 19,995 Mean Logistic EuroSCORE I = 16.99%

Beurtheret, S. et al. J Am Coll Cardiol. 2019;74(22):2728-39.

Comparison of patients from the FRANCE TAVI (French Transcatheter Aortic Valve Implantation) registry (2013 to 2017) who underwent transcatheter aortic valve replacement (TAVR) aither through a femoral peripheral or a ponfemoral peripheral (n-EP) access After propensity score, based matching, both provide addininiar

<u>J Cardiol.</u> 2018 Jun;71(6):525-533. doi: 10.1016/j.jjcc.2018.01.010. Epub 2018 Mar 2.

Transcarotid transcatheter aortic valve implantation: A systematic review. <u>Wee IJY</u>¹, <u>Stonier T</u>², <u>Harrison M</u>³, <u>Choong AMTL</u>⁴.

- 8 trials 650 patients 2012-2017
- 364 trans carotid mortality 6.5 %, Strokes 3.8 %
- Vascular complications 7.7 %

• Alternative to other routes

EuroIntervention. 2019 Jun 11. pii: EIJ-D-18-01192. doi: 10.4244/EIJ-D-18-01192. [Epub ahead of print]

Transcarotid Route: the Ideal Alternative Access for TAVI?

Verhoye JP¹, Belhaj Soulami R, Tomasi J, Di Perna D, Leurent G, Rosier S, Biedermann S, Anselmi A.

- 50 first cases in Rennes
- No mortality
- 5 PPM (10%)
- 2% of AR <u>></u> 2

Characteristic	
Mortality	None
Acute Myocardial Infarction	None
Composite Endpoints	
- Device Success	46 (92%)
- Early Safety	48 (96%)
- Clinical Efficacy	46 (92%)
Stroke	1 (2%)
AIT	1 (2%)
Bleeding complications	
- Life-threatening	1 (2%)
- Major	2 (4%)
- Minor	5 (10%)
AKI Stage 3	2 (4%)
Vascular access complications	2 (4%) None 5 (10%) 2 (4%) 3 (6%)
- Major	None
- Minor	5 (10%)
Details of minor vascular access complications	
- Access-related	2 (4%)
- Non access-related	3 (6%)
New PPM implantation	5 (10%)
New onset AF/Flutter	2 (4%)
Mean transvalvular gradient (mmHg)	11.9 ± 4.8
Aortic regurgitation ≥2	1 (2%)
Aortic valve area (cm ²)	1.84 ± 0.45
LVEF (%)	56.1 ± 12.7

AKI: Acute Kidney Injury. PPM: Permanent Pacemaker. AF: Atrial Fibrillation.



• Safe and reproducible approach

• Beware of bovine arch

Carotid versus femoral access for transcatheter aortic valve implantation: a propensity score inverse probability weighting study.

Folliguet TA¹, Teiger E¹, Beurtheret S², Modine T³, Lefevre T⁴, Van Belle E⁵, Gilard M⁶, Eltchaninoff H⁷, Koning R⁸, lung B⁹, Verhoye JP¹⁰, Leprince P¹¹, Le Breton H¹², Lafont A^{13,14,15}, Parolari A¹⁶, Barili F¹⁷.

Author information

 Table 2:
 Non-parametric comparison of outcomes between access routes: transcarotid versus transfemoral transcatheter aortic valve implantation

Variables	All patients (11 033), n (%)	Transcarotid access (435), <i>n</i> (%)	Transfemoral access (10 598), n (%)	P-value
Procedural and 30-day deaths	419 (3.8)	18 (4.1)	401 (3.8)	0.73
Procedural deaths	103 (0.9)	3 (0.7)	102 (1)	0.80
30-Day deaths	315 (2.9)	15 (3.4)	300 (2.8)	0.46
Annulus rupture	50 (0.4)	0 (0)	50 (0.5)	0.27
Aortic dissection	37 (0.3)	0 (0)	37 (0.3)	0.40
Valve migration	121 (1.1)	6 (1.4)	115 (1.1)	0.48
Cardiac tamponade	234 (2.1)	7 (1.6)	227 (2.1)	0.61
Coronary obstruction	33 (0.3)	0 (0)	33 (0.3)	0.64
Urgent surgery	50 (0.4)	2 (0.5)	48 (0.5)	0.99
Stroke	219 (2.0)	19 (4.4)	200 (1.9)	0.001
STEMI	22 (0.2)	3 (0.7)	19 (0.2)	0.05
Permanent pacemaker implantation	1689 (15.3)	82 (18.9)	1607 (15.2)	0.04
Vascular complications	827 (7.5)	14 (3.2)	813 (7.7)	< 0.001
Infections	449 (4.1)	29 (6.7)	420 (4.0)	0.01
Bleeding	535 (4.8)	40 (9.2)	495 (4.7)	< 0.001
Pulmonary embolism	15 (0.1)	1 (0.2)	14 (0.1)	0.45
Renal failure	376 (3.4)	22 (5.1)	354 (3.3)	0.06
Renal dialysis	349 (3.2)	22 (5.1)	327 (3.1)	0.03

Table 3: ORs derived by logistic regression model in unadjusted cohort and after adjustment with propensity score weighting

Variables	Unadjusted OR	P-value	Adjusted OR	P-value
Death	0.95 (0.59–1.54)	0.84	1.02 (0.62–1.68)	0.99
Stroke	2.37 (1.47-3.84)	< 0.001	2.42 (2.01-2.92)	< 0.001
STEMI	3.87 (1.14–13.1)	0.03	7.32 (3.87–13.87)	< 0.001
Permanent pacemaker implantation	1.30 (1.01–1.66)	0.04	1.05 (0.96–1.15)	0.28
Vascular complications	0.40 (0.23-0.69)	0.001	0.37 (0.32-0.43)	< 0.001
Infections	1.73 (1.17–2.56)	0.006	2.36 (2.04-2.71)	< 0.001
Bleeding	2.07 (1.48-2.90)	< 0.001	2.01 (1.76–2.29)	< 0.001
Renal failure	1.54 (0.99–2.40)	0.06	2.23 (1.90-2.60)	< 0.001
Renal dialysis	1.74 (1.09–2.78)	0.02	2.36 (2.01–2.76)	<0.001

OR: odds ratio; STEMI: ST-segment elevation myocardial infarction.

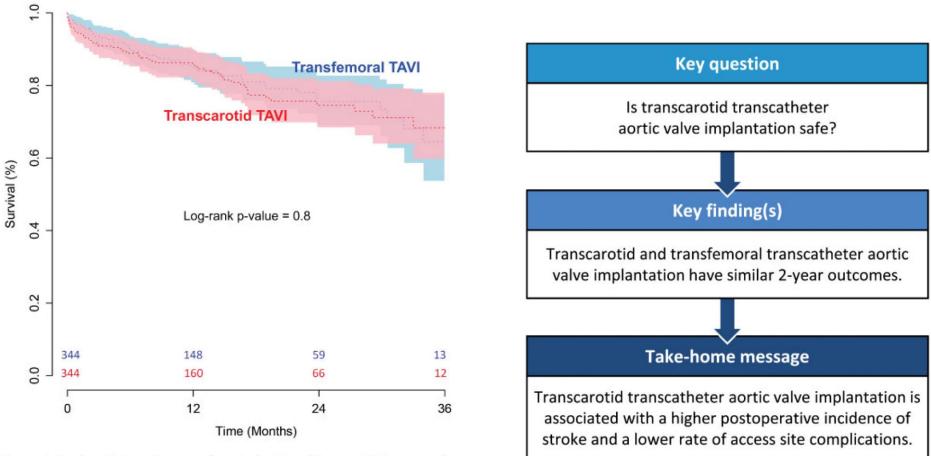


Figure 1: Kaplan-Meier estimates of survival at 1 and 2 years. TAVI: transcatheter aortic valve implantation.

Conclusion

• TA non TF-TAVI are as safe as TF

• TA should be preferred to trans thoracic approaches

• Results are excellent

• Trans carotid is supplanting trans subclavian

