Trials and Tribulations of Alternative Access

Raj Tayal MD MPH

Director, Cardiac Catheterization Lab
Director, Structural Heart Disease Program
Clinical Assistant Prof of Medicine
Icahn School of Medicine, Mount Sinai
Valley Health System
Paramus, NJ

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Grant/Research Support	none
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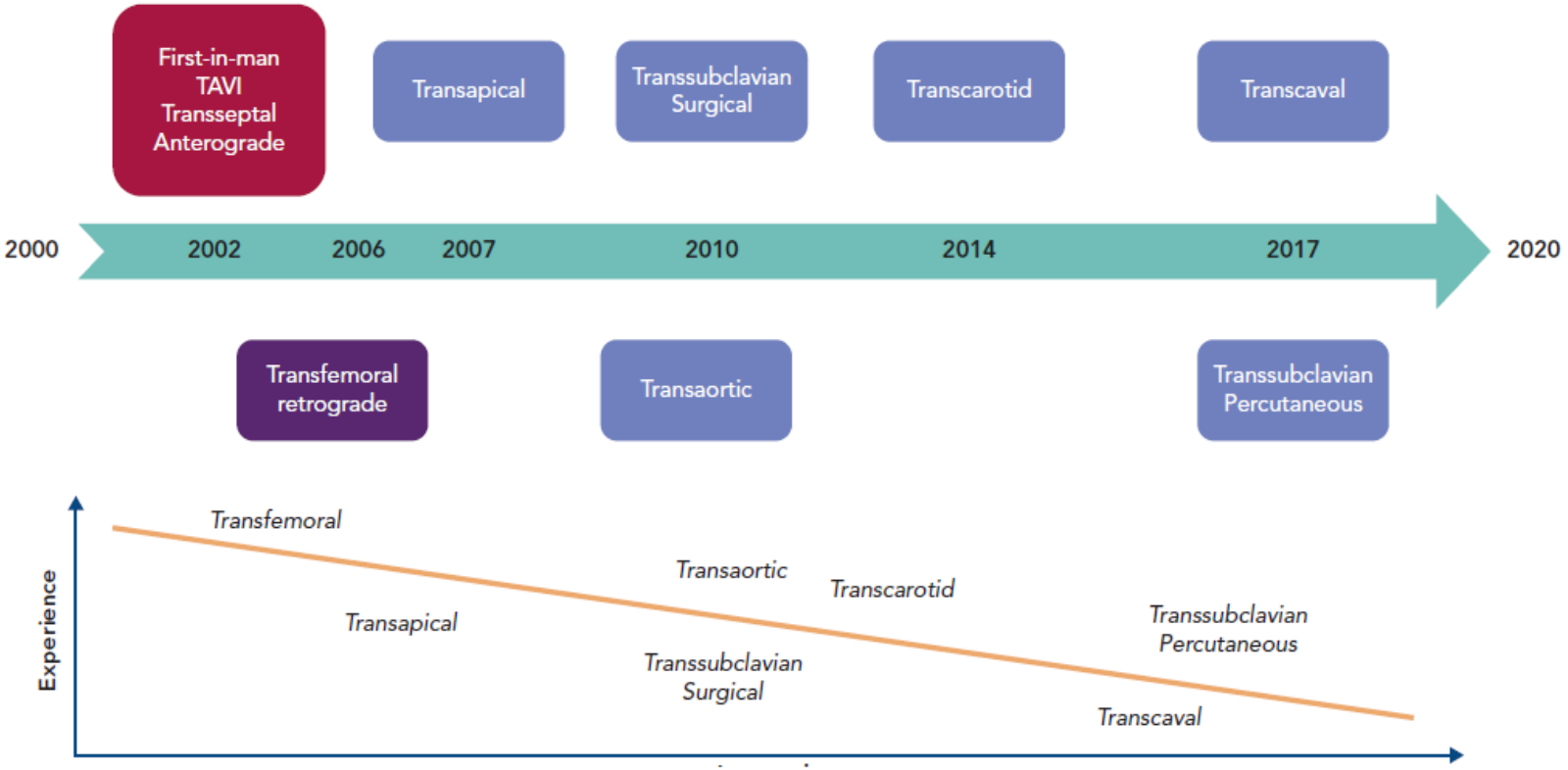
Major Stock Shareholder/Equity	none
Royalty Income	none
Ownership/Founder	none
Intellectual Property Rights	none
Other Financial Benefit	none

All relevant financial relationships have been mitigated.

Faculty disclosure information can be found on the app

The Evolution of Alternative Access

Figure 1: Timing of published cohorts regarding alternative approaches for transcatheter aortic valve implantation and relative experience with respect to the abundance of data of each alternative approach



TAVI = transcatheter aortic valve implantation.

Overtchouk P, Modine T. ICR 2018.

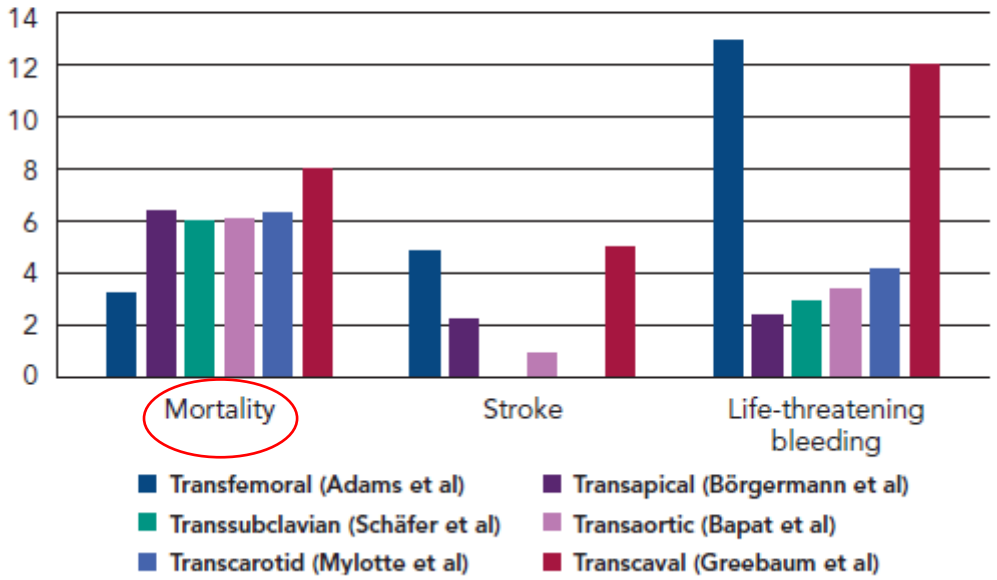
Mortality for TAx, TA, and TAo higher

Table 3: Unadjusted 30 day outcomes by access route

	Transfemoral	TAx	TA/TAo
All-cause mortality	1288 (2.4)	62 (5.4)	147 (8.5)
All stroke	1049 (1.9)	74 (6.1)	51 (2.9)
New-onset atrial fibrillation	930 (1.6)	24 (2.0)	219 (12.4)
All readmissions	4511 (8.7)	131 (12.0)	248 (15.6)
New requirement for dialysis	301 (0.6)	9 (0.8)	43 (2.5)
New pacemaker	5221 (9.3)	144 (12.0)	183 (10.4)
Life-threatening bleeding	56 (0.1)	5 (0.5)	8 (0.5)
Major vascular complication	643 (1.1)	31 (2.5)	34 (1.9)

Values are n (%)

Figure 4: Comparative 30-day all-cause mortality, stroke and life-threatening bleeding rates in high-risk patients treated with the different transcatheter aortic valve implantation approaches



Frequency and Outcomes of Trans-Subclavian and Axillary Access for Transcatheter Aortic Valve Replacement Using SAPIEN 3 THV. A Report from the STS/ACC TVT Registry Thom G. Dahle, MD a Tsuyoshi Kaneko, MD b James M. McCabe MD

Declining Trends in TA TAVR

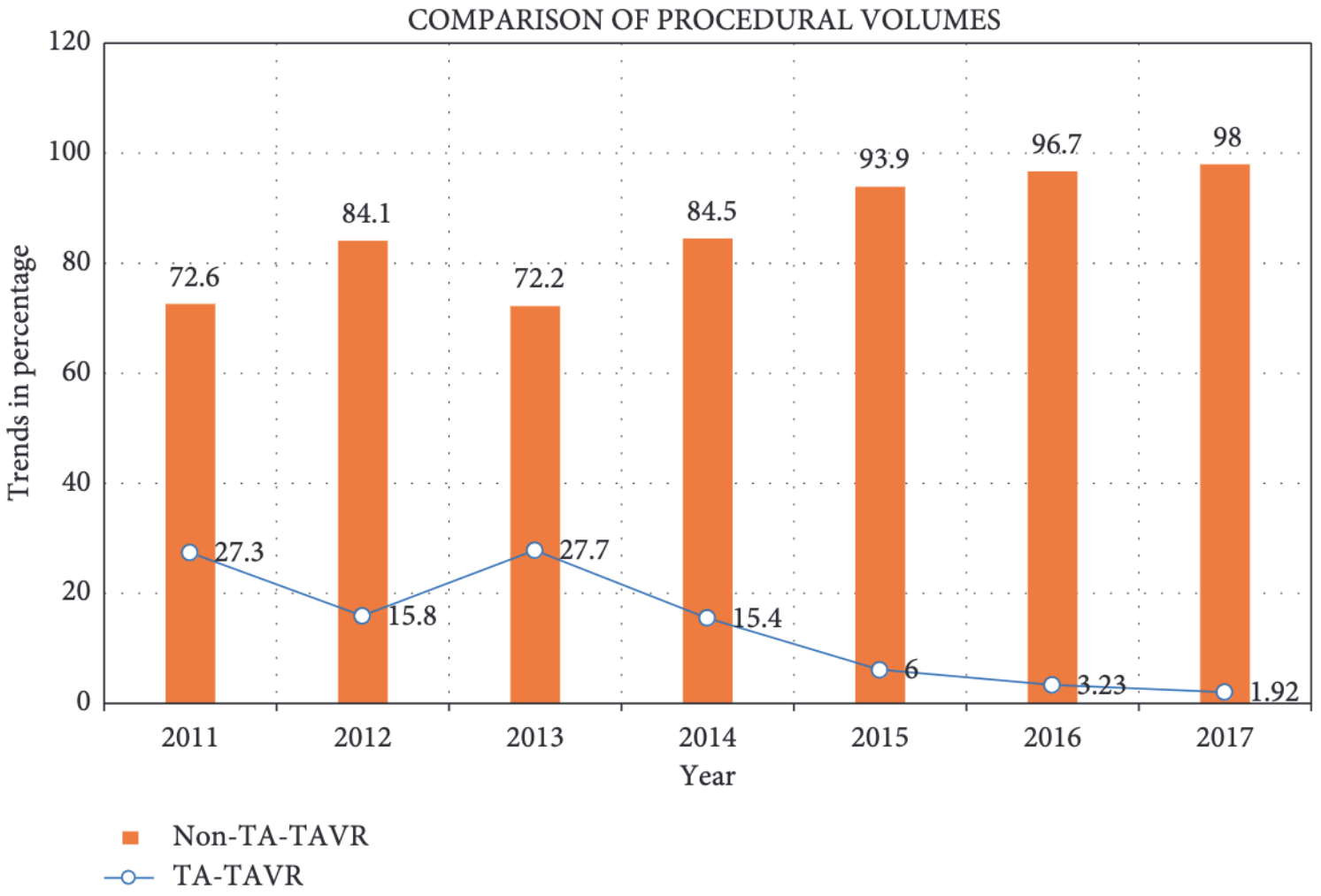


FIGURE 1: Comparison of procedural volumes from 2011–2017.

Sohal S et al. JIC 2022.

Alternative Access: Where Are We in 2025?

- In 2024, over 100k TAVR procedures were performed
- Of those, only 4.7% required the use of alternative access
- Comparatively, 28% of cases were non-TF based in 2011
- 2.1%, or approximately 50% of the alternative access cases were performed via a transcarotid approach

1.SCAI Expert Consensus Statement on Alternative Access for Transcatheter Aortic Valve Replacement
2.Sherwood, Matthew et al.
3.Journal of the Society for Cardiovascular Angiography & Interventions, Volume 4, Issue 3, 102514

Consensus Document on Alternative Access

JSCAI
The official journal of the Society for Cardiovascular Angiography & Interventions

Standards and Guidelines

SCAI Expert Consensus Statement on Alternative Access for Transcatheter Aortic Valve Replacement

Matthew Sherwood, MD, MHS, FSCAI [a,*], Keith B. Allen, MD [b], Thom G. Dahle, MD, FSCAI [c], Chandan M. Devireddy, MD, FSCAI [d], Jeffrey Gaca, MD [e], Santiago Garcia, MD, FSCAI [f], Kendra J. Grubb, MD, MHA [d], Tsuyoshi Kaneko, MD [g], Chad A. Kliger, MD, FSCAI [h], Robert J. Lederman, MD [i], John C. Messenger, MD, FSCAI [j], Puja B. Parikh, MD, MPH, FSCAI [k], Marie-France Poulin, MD, FSCAI [l], Carlos Sanchez, MD, FSCAI [m], Anene Ukaigwe, MD, FSCAI [n], James J. Yun, MD [o], Paul D. Mahoney, MD, FSCAI [p]

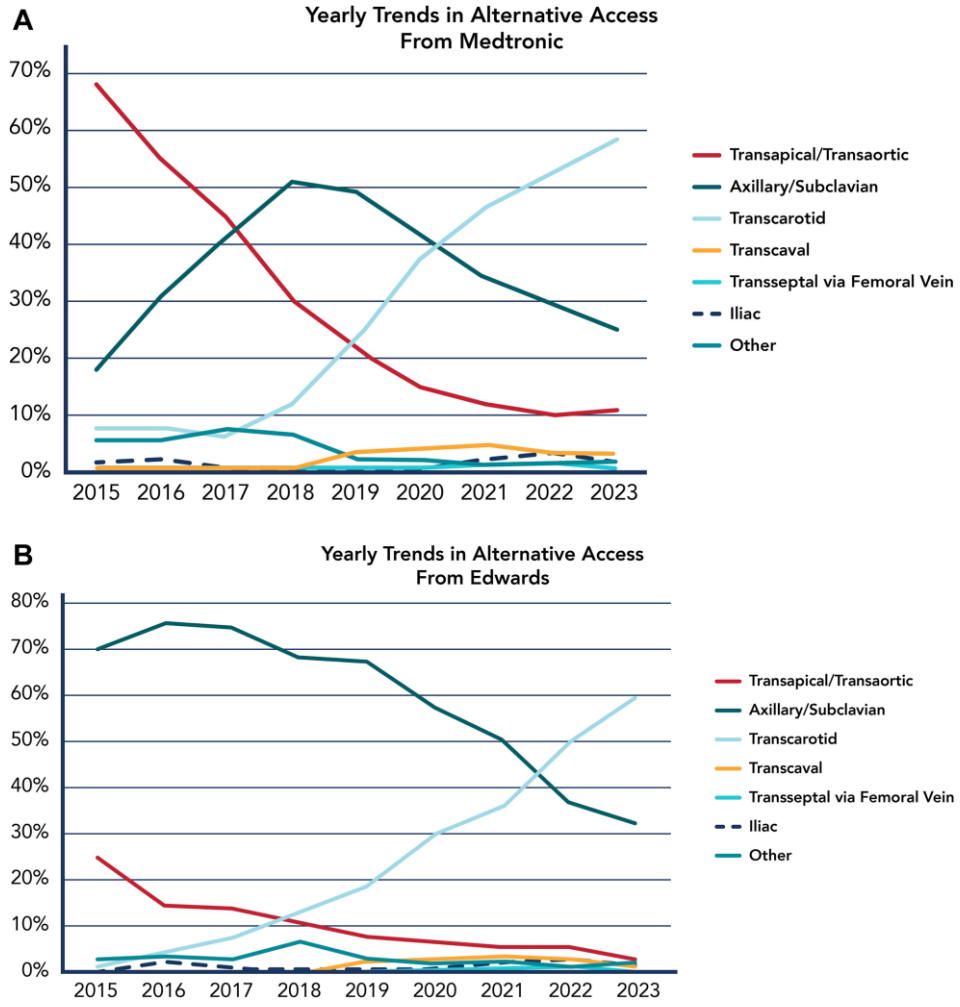
[a] *Inova Heart and Vascular Institute, Fairfax, Virginia;* [b] *Saint Luke's Mid America Heart Institute, Kansas City, Missouri;* [c] *CentraCare Heart and Vascular Center, St. Cloud, Minnesota;* [d] *Emory University School of Medicine, Atlanta, Georgia;* [e] *Duke University Hospital, Durham, North Carolina;* [f] *The Christ Hospital Health Network, Cincinnati, Ohio;* [g] *Washington University in St. Louis, St. Louis, Missouri;* [h] *Northwell Health, New Hyde Park, New York;* [i] *Division of Intramural Research, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland;* [j] *University of Colorado Medicine, Aurora, Colorado;* [k] *Stony Brook University Hospital, Stony Brook, New York;* [l] *Beth Israel Deaconess Medical Center, Boston, Massachusetts;* [m] *Riverside Methodist Hospital, Columbus, Ohio;* [n] *Case Western Reserve University Hospital, Cleveland, Ohio;* [o] *Cleveland Clinic, Cleveland, Ohio;* [p] *East Carolina University, Greenville, North Carolina*

ABSTRACT

Transcatheter aortic valve replacement (TAVR) has become a widely accepted procedure for treating patients with symptomatic aortic stenosis. While transfemoral access remains the primary route due to its lower complication rates and favorable outcomes, a subset of patients have anatomical or clinical factors precluding this approach. For these patients, alternative access routes such as transaxillary, transcarotid, and transcaval provide viable options. This expert consensus statement aims to provide a comprehensive review of case selection, technical considerations, and outcomes associated with these alternative access routes in TAVR. Additionally, this document highlights the advancements in device technology and imaging guidance that have contributed to improving the safety and efficacy of alternative access TAVR. This consensus statement serves as a practical guide on best practices for interventional cardiologists, cardiothoracic surgeons, and heart teams in selecting patients and performing alternative access TAVR.

1.SCAI Expert Consensus Statement on Alternative Access for Transcatheter Aortic Valve Replacement
2.Sherwood, Matthew et al.
3.Journal of the Society for Cardiovascular Angiography & Interventions, Volume 4, Issue 3, 102514

SCAI Consensus Document



	Transaxillary or Trans-subclavian	Transcarotid	Transcaval
Mortality	Similar among extra-thoracic	Similar among extra-thoracic	Similar among extra-thoracic
Stroke	Higher than transfemoral	Similar or possibly more common than transfemoral	Similar or possibly more common than transfemoral
Bleeding	Higher than transcarotid	Standard for comparison	Higher than transcarotid
Vascular complications	Covered stents variable	Standard for comparison	Covered stents uncommon
Anesthesia	General anesthesia common	General anesthesia common	Moderate sedation common
Postoperative discomfort	Similar or elevated	Similar orelevated	Modest
Length of stay	Similar or elevated	Similar to transfemoral	Similar to transfemoral
Discharge directly to home	~80%	>90%	>90%
Ergonomics of TAVR ("operator comfort")	Less comfortable than transfemoral	Less comfortable than transfemoral	Same as transfemoral
Proximity to x-ray source and scatter (operator Radiation)	Closer to x-ray source and scatter than transfemoral	Closer to x-ray source and scatter than transfemoral	Same as transfemoral
Fully percutaneous option	Yes	No	Yes
Additional contrast and risk of acute kidney injury	More than transfemoral	Less than transfemoral	More than transfemoral
Cost of disposable and implanted devices	More than transcarotid	No implant	More than transcarotid
Cost of operating room or procedure space	Similar across approaches	Similar across approaches	Similar across approaches
Eligibility for embolic protection device	Sentinel eligible for left-sided only	Index carotid may be protected; Sentinel ineligible	Eligible
Training requirements	Comparable; requires specific training	Comparable; requires specific training	Comparable; requires specific training
Quality of supportive evidence	Observational; no randomized comparisons	Observational; no randomized comparisons	Systematic evaluation including CT; no randomized comparisons

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Transcaval vs Transaxillary

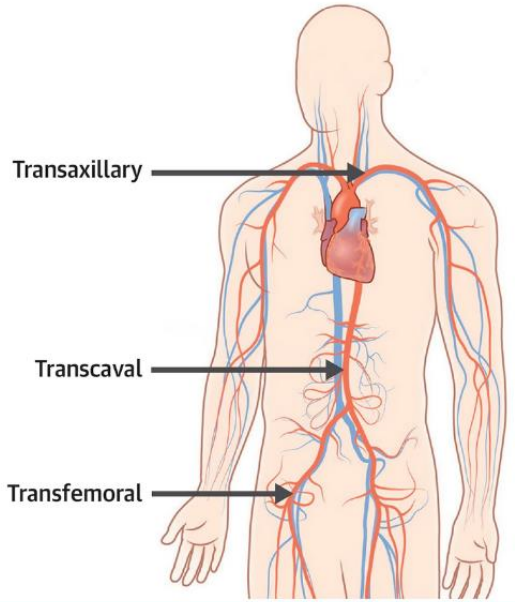
TABLE 1 Enrollment Sites and Transcatheter Aortic Valve Replacement Access Site Counts

Site	All	Transfemoral	Transcaval	Transaxillary	Carotid	Thoracic	Nonfemoral (%)
Site 1	1,439	1,405	34	0	0	0	2.4
Site 2	1,250	1,193	5	48	1	3	4.6
Site 3	1,242	1,133	80	7	20	2	8.8
Site 4	952	889	63	0	0	0	6.6
Site 5	866	828	15	0	0	23	4.4
Site 6	728	682	28	14	4	0	6.3
Site 7	568	536	4	18	4	6	5.6
Site 8	494	466	9	19	0	0	5.7
All	7,539	7,132	238	106	29	34	5.4

Values are n or %.

CENTRAL ILLUSTRATION: Key Outcomes After Transcaval Versus Transaxillary Access in Contemporary Practice

Transcaval vs Transaxillary Access for TAVR, N = 344



In-Hospital Events	Transcaval (n = 238)	Transaxillary (n = 106)	Transfemoral (n = 7,132)
Stroke or TIA	3% *	13%	2%
Bleeding †	10%	13%	4%
Death	4%	4%	1%
Discharge home without stroke/TIA	88% *	62%	90%

* $P < 0.001$ Transcaval vs Transaxillary
† Major or life-threatening bleeding (VARC-3 ≥ Type 2)

Lederman RJ, et al. J Am Coll Cardiol Intv. 2022;15(9):965-975.

Lederman RJ et al. JACC Interventions 2022.

Trends in Transcarotid vs Transaxillary

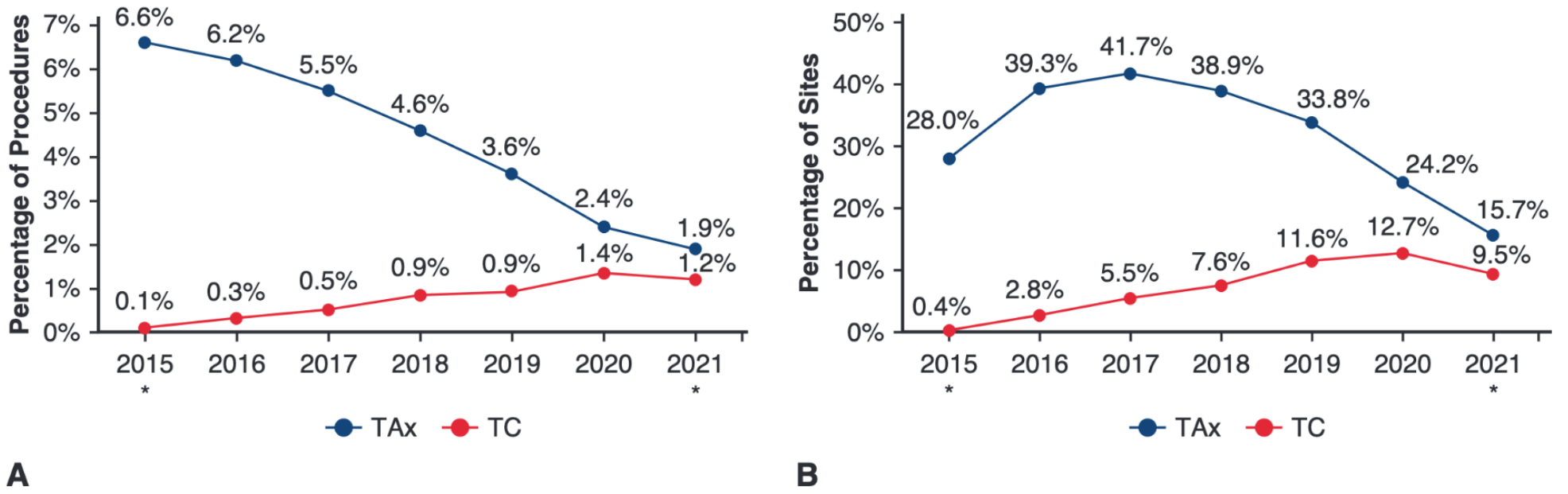


FIGURE 1. Percentage of TAx and TC procedures and procedure sites in the United States. The percentage of TAx and TC access procedures (A) and percentage of clinical sites performing at least 1 TAx or TC case (B) are reported in yearly intervals. The number TC procedures and clinical sites performing TC procedures increased over the study period, whereas the corresponding percentages for TAx procedures decreased over the same period. Percentages were calculated from among all TVT Registry patients who received a self-expanding Evolut R, PRO, or PRO + valve from July 2015 through June 2021. *Incomplete yearly data. *TAx*, Transaxillary; *TC*, transcarotid; *CI*, confidence interval; *TVT*, transcatheter valve therapy.

Allen KB et al. JTCVS 2023.

Transcarotid vs Transfemoral

Comparable Outcomes for Transcarotid and Transfemoral Transcatheter Aortic Valve Replacement at a High Volume US Center

Brandon M. Jones, MD, Vishesh Kumar, MD, Shih Ting Chiu, PhD, Ethan Korngold, MD, Robert W. Hodson, MD, Kateri J. Spinelli, PhD, and Eric B. Kirker, MD

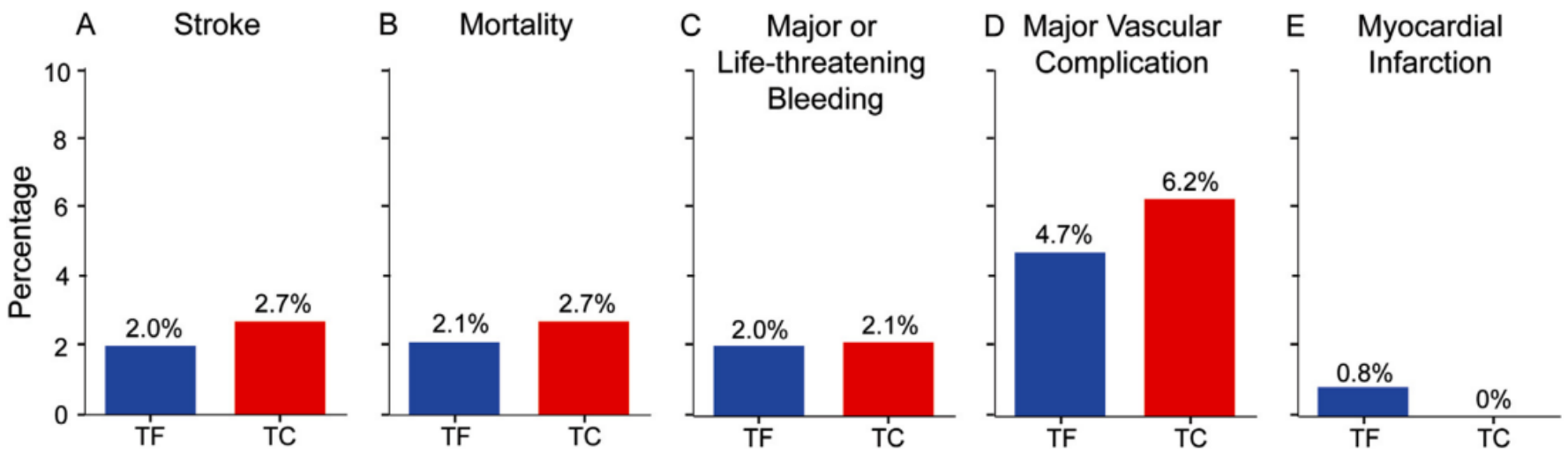
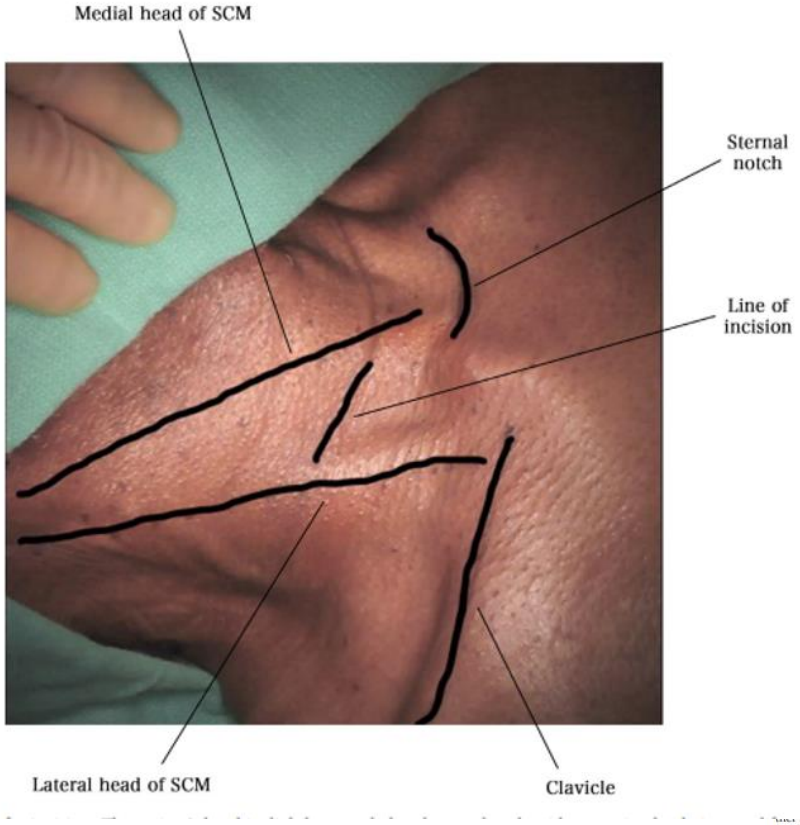


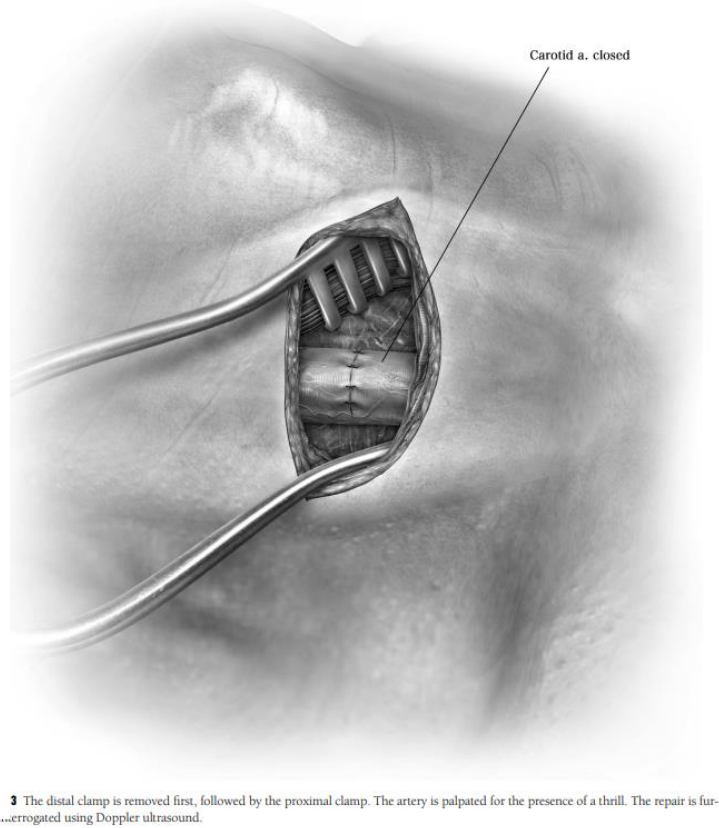
Figure 1. Unadjusted 30-day outcomes. Rates of 30-day (A) stroke, (B) mortality, (C) major/life threatening bleeding, (D) major vascular complications, and (E) myocardial infarction did not differ between TF and TC groups. Groups were compared using Chi-square tests. Stroke $P = 0.536$, mortality $P = 0.629$, major/life threatening bleeding $P = 0.995$, major vascular complications $P = 0.435$, MI $P = 0.996$. TF = transfemoral, TC = transcarotid.

Semin Thoracic Surg 34:467–474

Regardless…

Transcarotid Access





3 The distal clamp is removed first, followed by the proximal clamp. The artery is palpated for the presence of a thrill. The repair is fur- ...errogated using Doppler ultrasound.

Risk of cranial nerve injury

- Laryngeal branch of the vagus nerve – dysphonia
- Facial nerve injury

Courtesy : Clint Kent MD
Sentara Health System

McKiernan et al. Transcarotid transcatheter aortic valve replacement. Operative Techniques In Thoracic and Cardiovascular Surgery. 2020.

Transcarotid: Tribulations

-Focal stenosis at the primary repair site so an interposition graft was placed.

Courtesy : Brandon Jones MD
St. Vincent Providence

Transcarotid: Tribulations

Redundant carotid leading to some tortuosity post primary repair

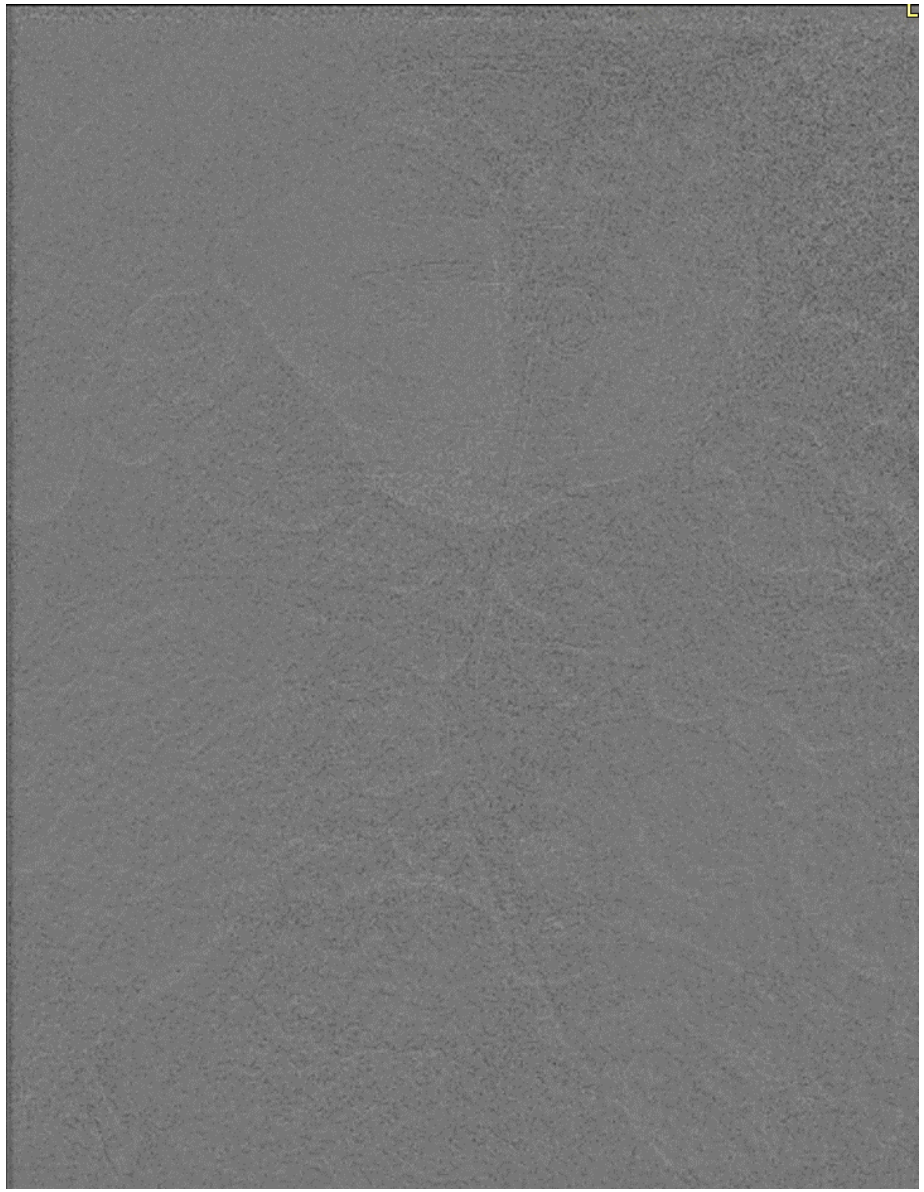
<- In this case, flow was normal, just a bend, not a stenosis.

Another case where we resected 3cm of the common carotid and did an end-to-end anastomosis ->

Courtesy : Brandon Jones MD
St. Vincent Providence

Transcaval: Tribulations

Aortic Bleeding After Closure with ADO II



Courtesy : Pedro Villablanca MD
Henry Ford Hospital

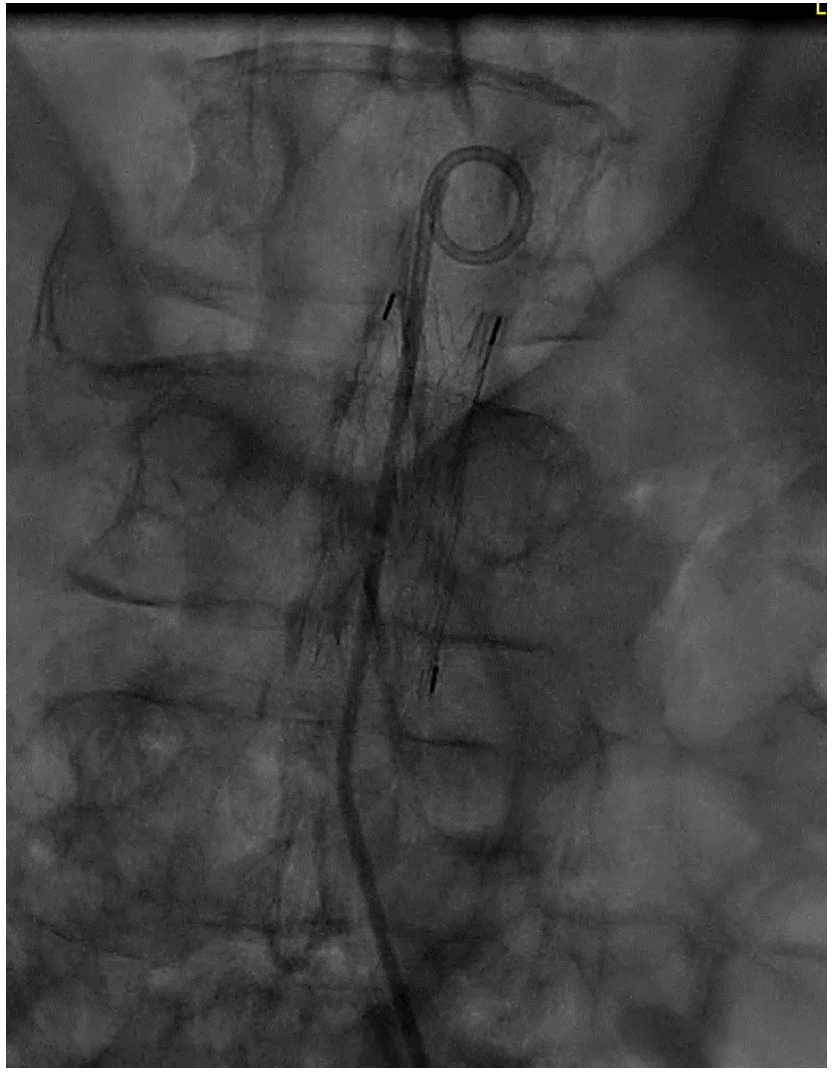
Transcaval: Tribulations

Bleeding persists after placement of Ovation stent graft

Courtesy : Pedro Villablanca MD
Henry Ford Hospital

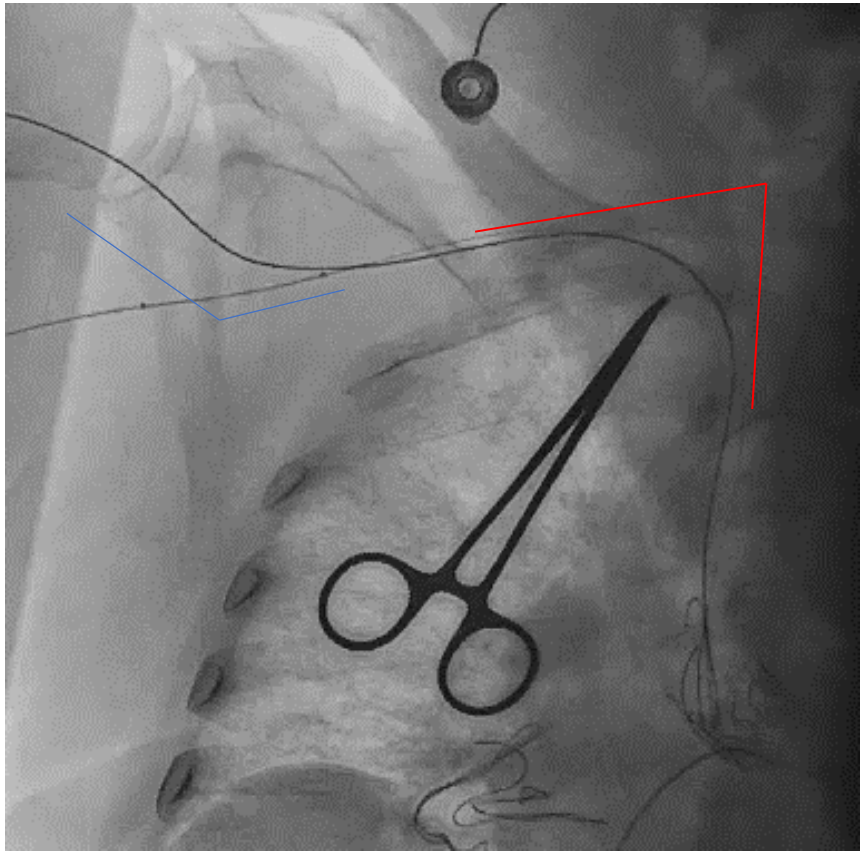
Transcaval: Tribulations

Ultimately resolved with post dilation



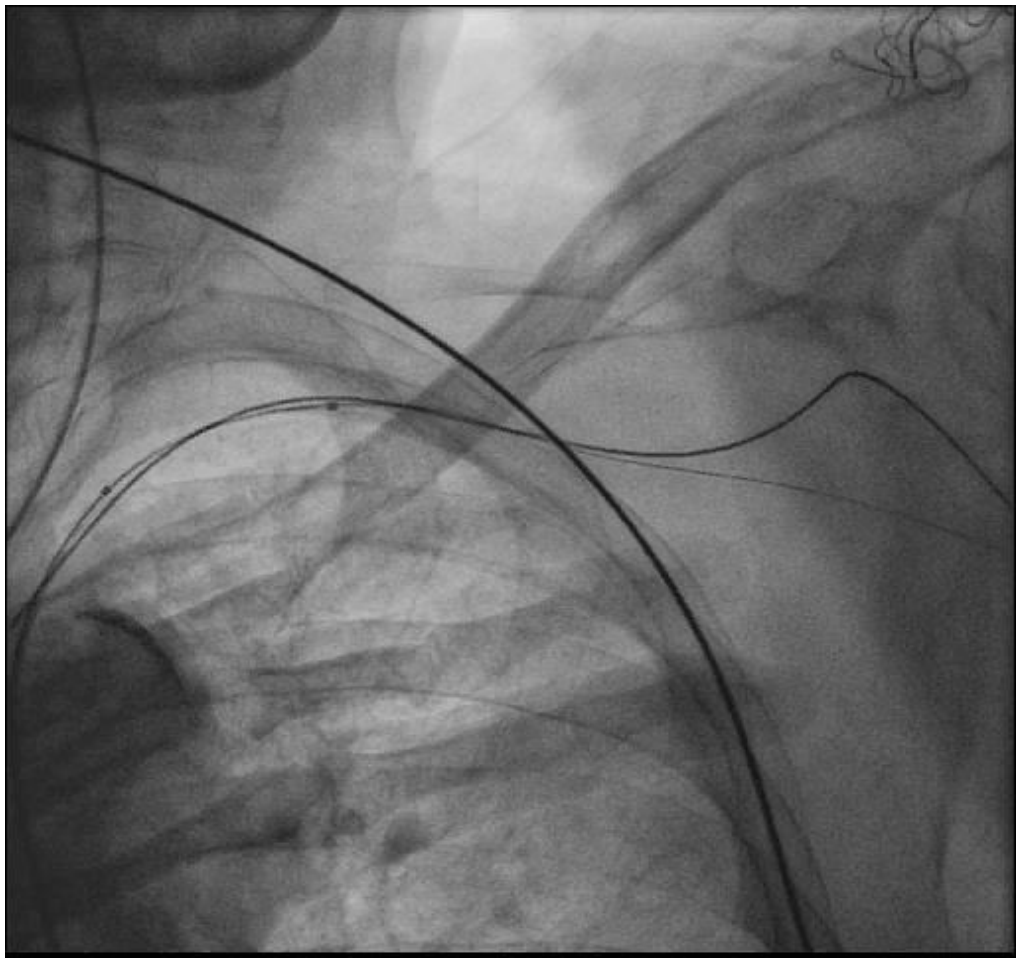
Courtesy : Pedro Villablanca MD
Henry Ford Hospital

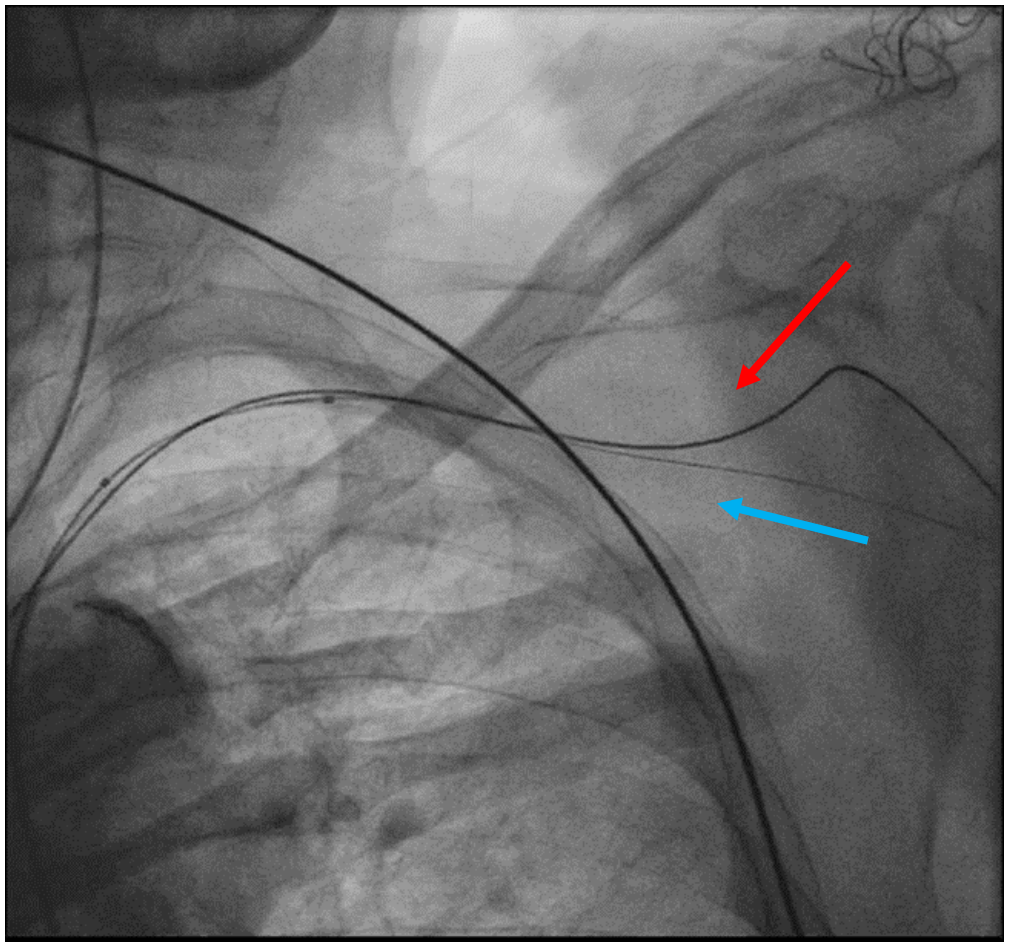
Transaxillary: Tribulations



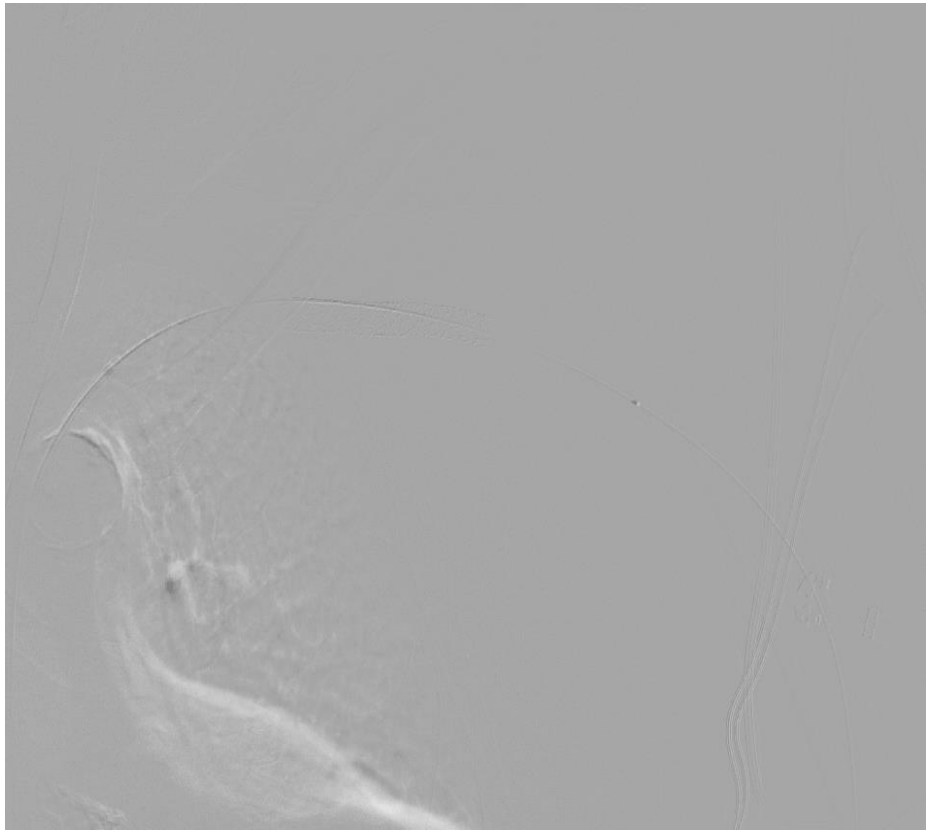
Transaxillary: Tribulations

Transaxillary: Tribulations



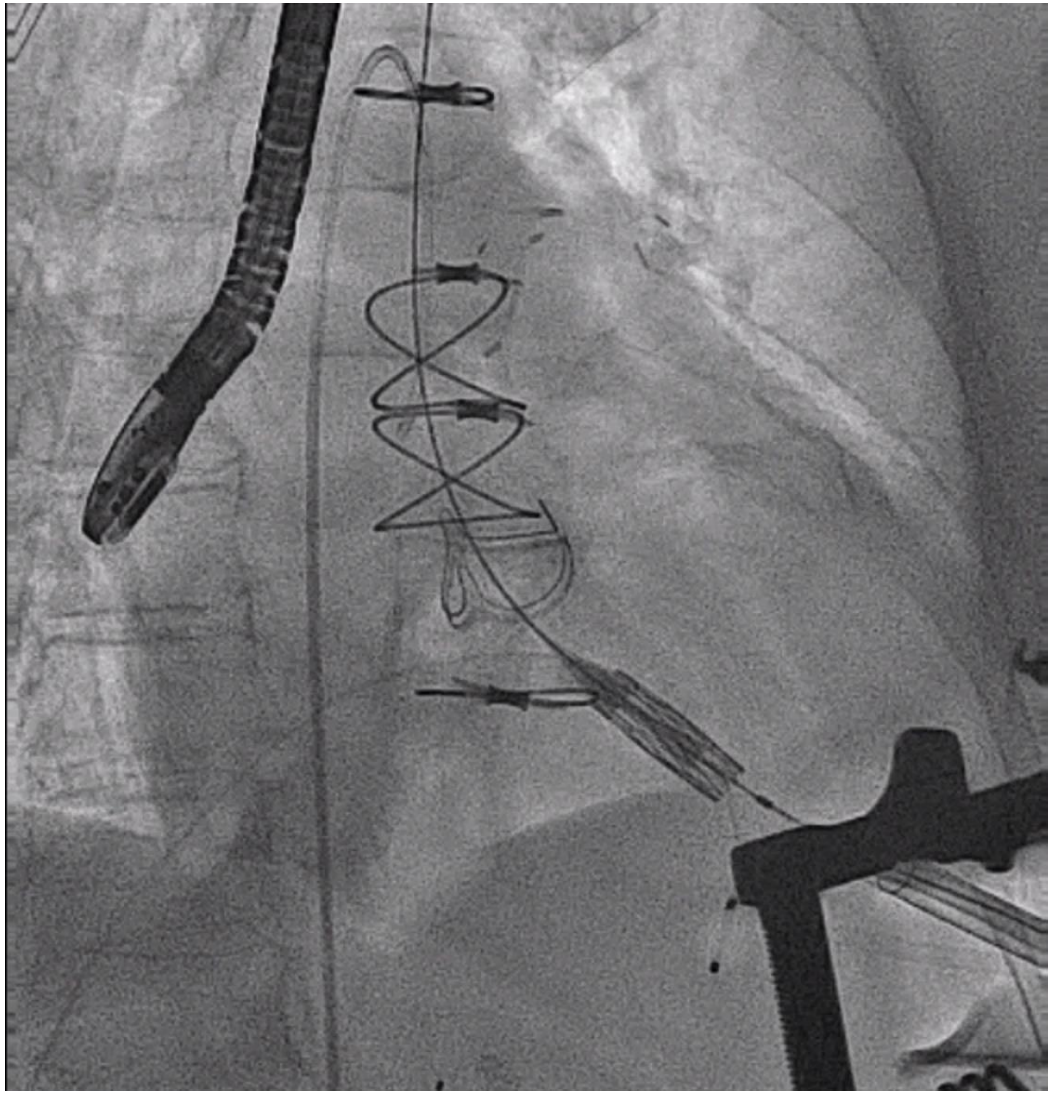


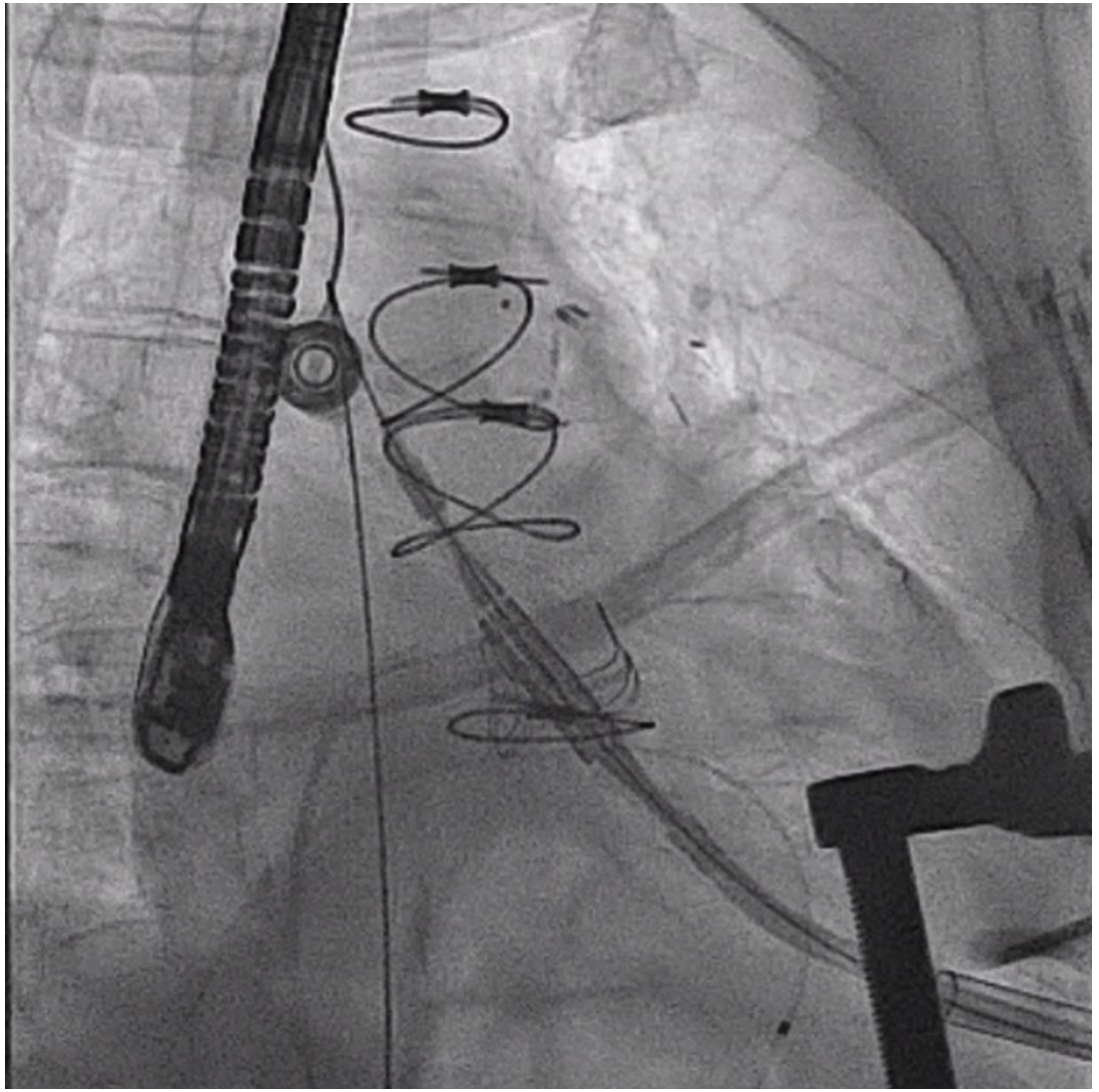
Transaxillary: Tribulations



Viabahn stent placed

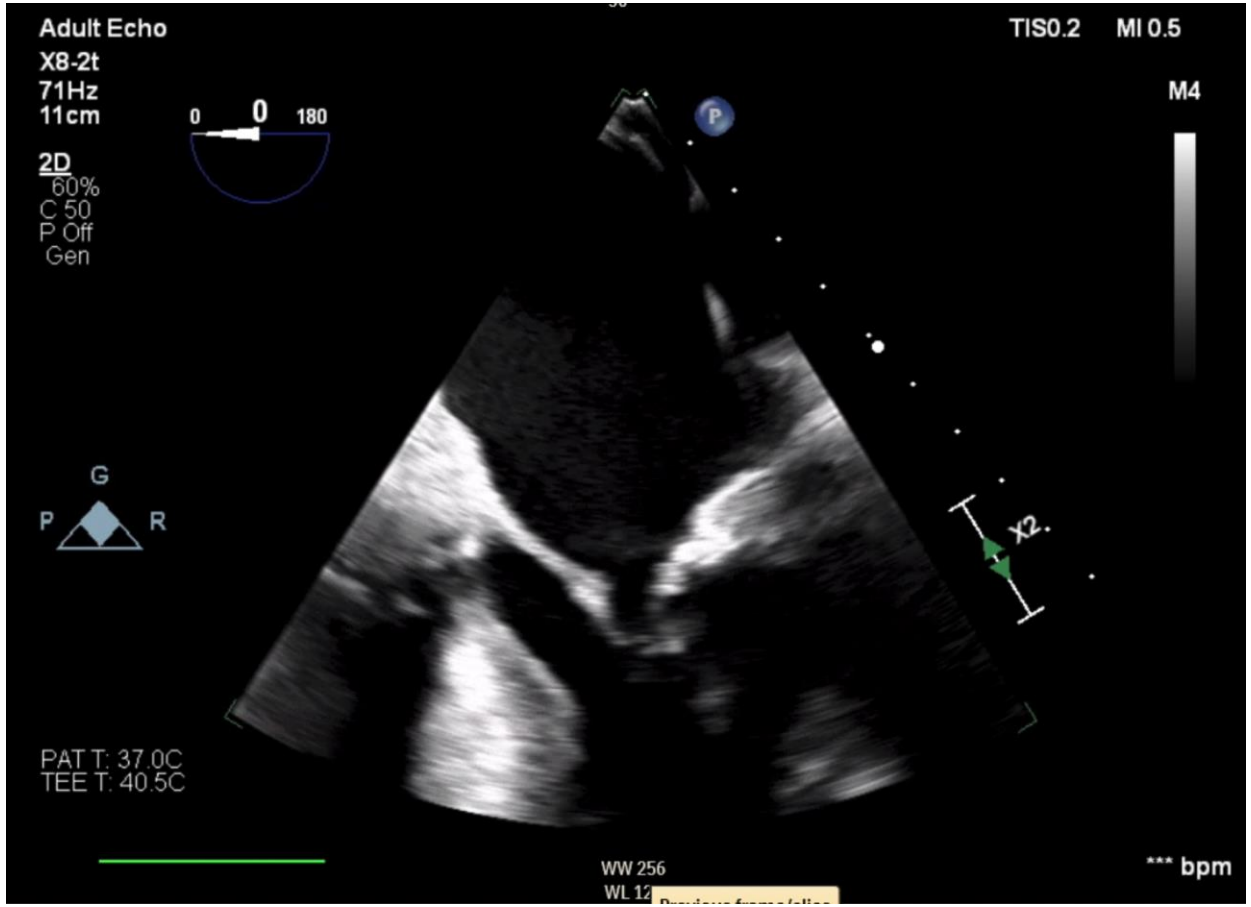
Transapical Tribulations

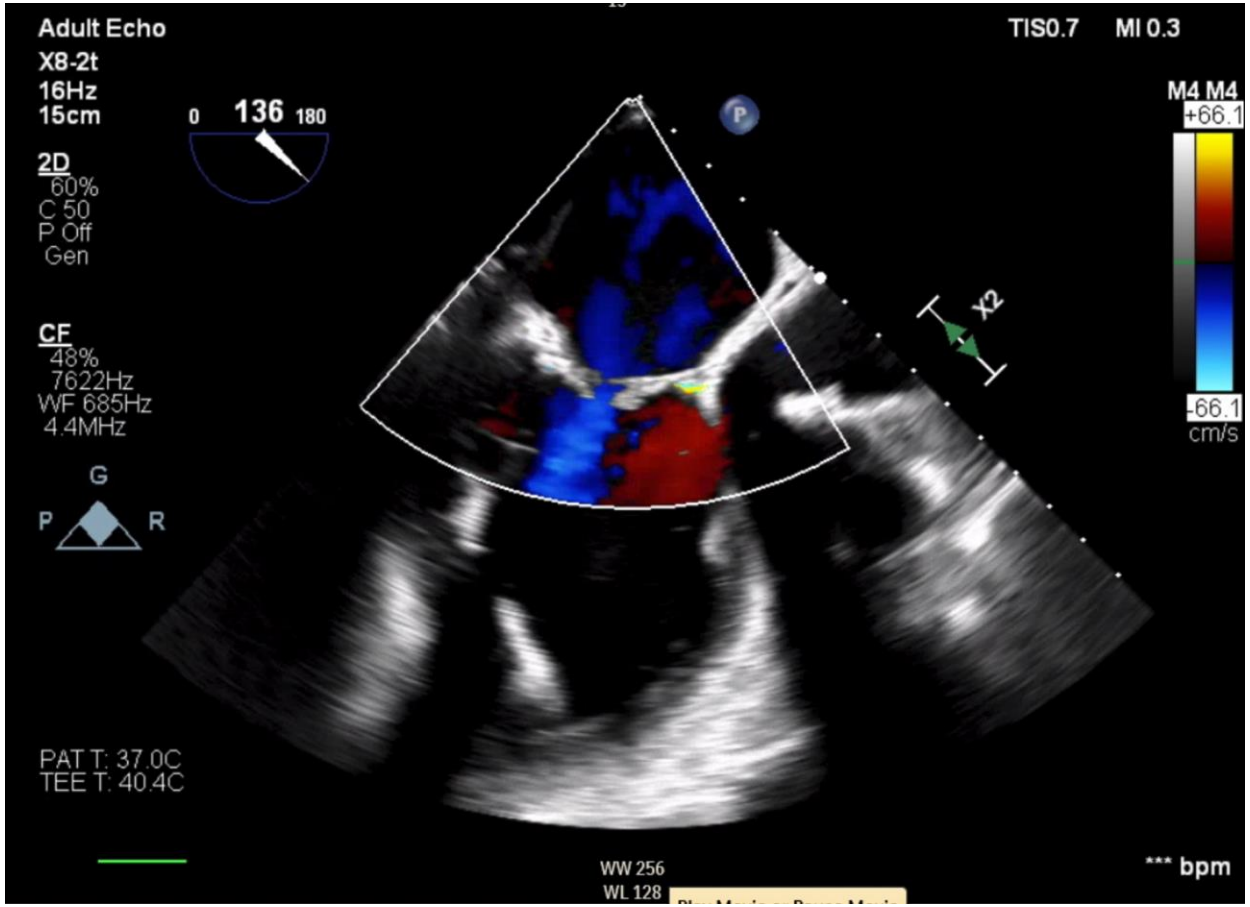




Courtesy : Michael Young MD
Dartmouth Health

Wire entanglement -> Torn Chordae





Courtesy : Michael Young MD
Dartmouth Health

Alternative Access: In 2025

Transcarotid/Transcaval

Transapical

Transaxillary

Conclusions

- In contemporary practice, alternative access TAVR is reserved for a small proportion of patients.
- Preferred mode of access depends on anatomical factors and institutional experience/operator capabilities.
- There are differential risk/outcome profiles based on access route.
- Just because you have a hammer doesn’t mean everything is a nail…