An Update on Radial Artery Access and Best Practices for Transradial Coronary Angiography and Intervention

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Thirty years of transradial coronary interventions

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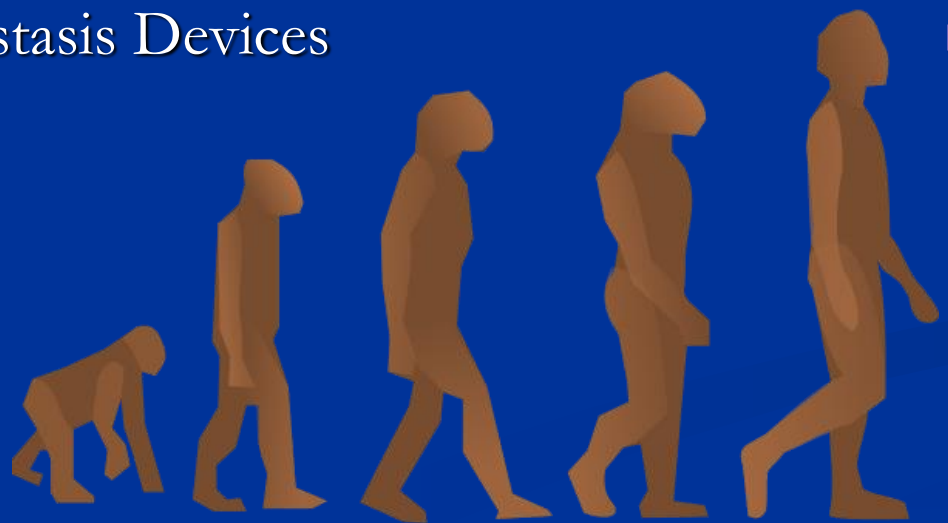
1. Interventional Cardiologist, Bussum, the Netherlands; 2. Dipartimento di Scienze Cardiovascolari, Fondazione Policlinico Universitario A. Gemelli IRCCS, Università Cattolica del Sacro Cuore, Rome, Italy; 3. Clinique Pasteur, Toulouse, France

30 Years : Radial Evolution

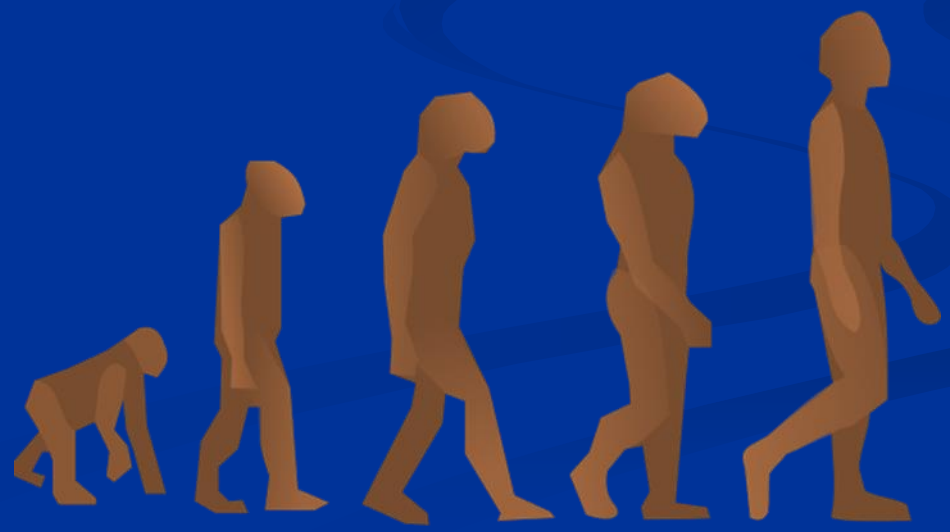
- Dedicated Devices
  - Dedicated Radial Sheath
  - Thin Wall Sheath
  - Sheath less Catheters
  - Universal Catheters
  - Support Devices
  - Hemostasis Devices
- Refined Techniques
  - Ulnar
  - Distal Radial
  - Vascular US
  - Spasm Management Cocktail
  - Tortuosity Management
  - Patent Hemostasis



Years :Interventional Cardiology Evolution 30

- Primary PCI for STEMI
- Invasive Assessment for ACS /N
- Complex PCI
  - Bifurc
  - CTO
  - Calcifi d Lesions
  - CHIP patients
- Structural Interventions

RADIAL ????



ACUTE CORONARY SYNDROME

-

TABLE 1. RANDOMIZED TRIALS OF TRA VERSUS TFA ACCESS IN PATIENTS WITH ACS

Trial (Year)	Design	Population	Primary Endpoint: Rate (TRA vs TFA)	All-Cause Mortality at 30 Days (TRA vs TFA)
RIVAL[2] (2011)	Multicenter, 32 countries, 1:1 randomization, open label	7,021 with ACS	Composite of death, MI, stroke, or non-CABG bleeding (30 days): 3.7% vs 4% ($P = .50$)	1.3% vs 1.5% ($P = .47$)
RIVAL: STEMI subgroup analysis[13] (2012)	Multicenter, 32 countries, 1:1 randomization, open label	1,958 with STEMI	Composite of death, MI, stroke, or non-CABG bleeding (30 days): 3.1% vs 5.2% ($P = .026$)	1.26% vs 3.19% ($P = .006$)
RIFLE-STEACS[3] (2012)	Multicenter, European centers, 1:1 randomization, open label	1,001 with STEMI	Composite of cardiac death, recurrent MI, stroke, TLR, or non-CABG bleeding (30 days): 13.6% vs 21% ($P = .003$)	5.2% vs 9.2% ($P = .02$)*
STEMI-RADIAL[1] (2014)	Multicenter, national (Canada), randomized	707 with STEMI	Composite of major bleeding and vascular complications: 1.4% vs 7.2% ($P = .0001$)	2.3% vs 3.1% ($P = .64$)
MATRIX[4] (2015)	Multicenter, European centers, 1:1 randomization, open label	8,404 with ACS	Coprimary composite endpoints of: • Death, MI, or stroke: 8.8% vs 10.3% ($P = .0307$) • Death, MI, stroke, or BARC non-CABG major bleed (30 days): 9.8% vs 11.7% ($P = .0092$)	1.6% vs 2.2% ($P = .045$)

Abbreviations: ACS, acute coronary syndrome; BARC, Bleeding Academic Research Consortium; CABG, coronary artery bypass grafting; MI, myocardial infarction; STEMI, ST-segment elevation myocardial infarction; TFA, transfemoral access; TLR, target lesion revascularization; TRA, transradial access.
*Cardiac mortality (not all-cause mortality).

- 2017 – ESC guidelines for STEMI : Radial Approach Class I (A) recommendation

- 2020- ESC guidelines for NSTEMI: Radial Approach Class I (A) recommendation

- 2021 ACC/AHA for ACS or in SCAD : Radial Approach Class I (A)

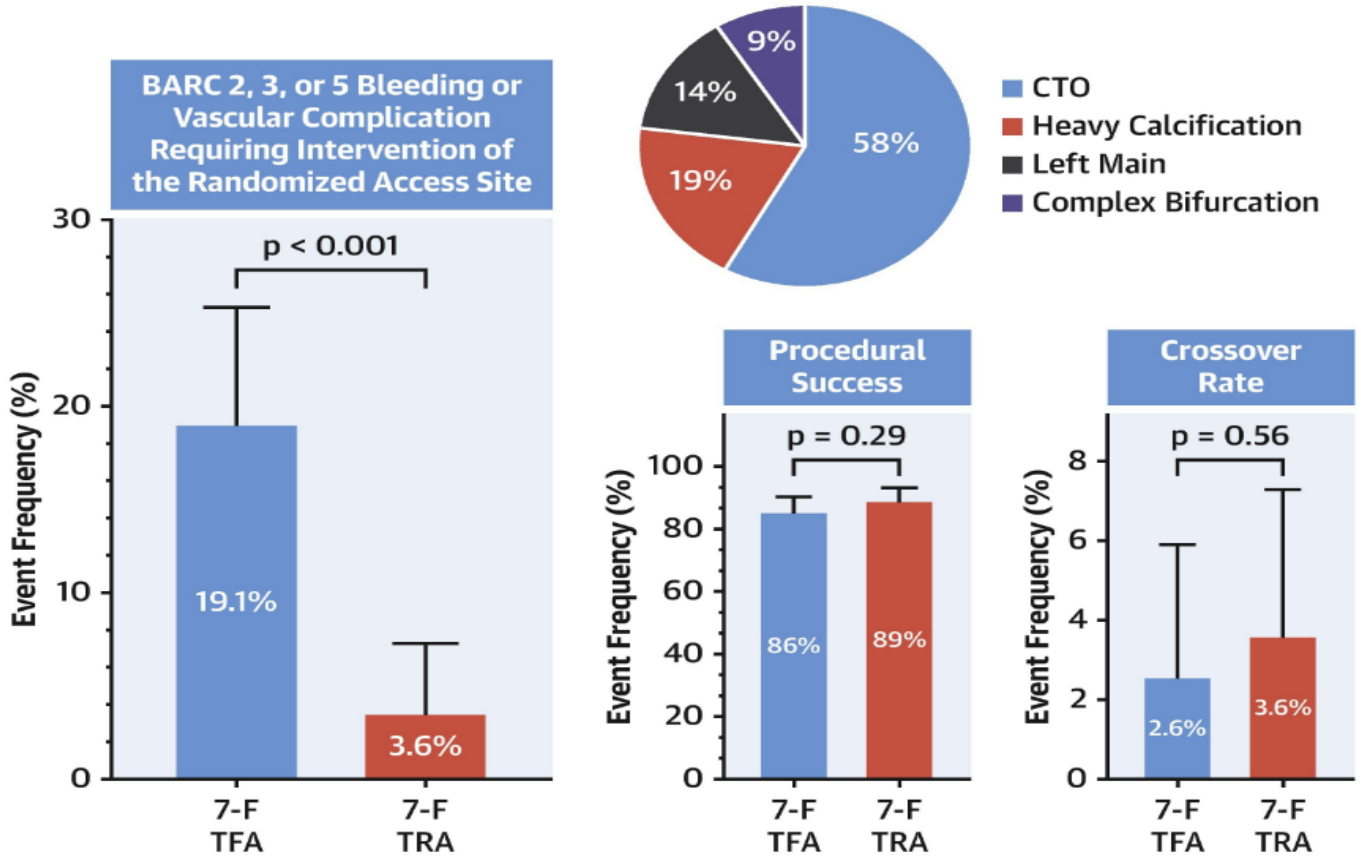
COMPLEX PCI

JACC: Cardiovascular Interventions
Volume 14, Issue 12, 28 June 2021, Pages 1293-1303

New Research Paper
Coronary

Randomized Comparison Between Radial and Femoral Large-Bore Access for Complex Percutaneous Coronary Intervention

CENTRAL ILLUSTRATION: Access Site-Related Clinically Significant Bleeding or Vascular Complications in Large-Bore Percutaneous Coronary Intervention



Meijers, T.A. et al. J Am Coll Cardiol Intv. 2021;14(12):1293-303.

COMPLEX PCI


carlos cafri
AUTHOR CENTRE
ABOUT
SERVICES
JACC: Cardiovascular Interventions
JACC Journals › JACC: Interventions › Archives › Vol. 12 No. 4
Previous
Procedural Outcomes of Percutaneous Coronary Interventions for Chronic Total Occlusions Via the Radial Approach: Insights From an International Chronic Total Occlusion Registry
Focus On CTO
Peter Tajti, Khaldoon Alaswad, Dimitri Karmpaliotis, Farouc A. Jaffer, Robert W. Yeh, Mitul Patel, Ehtisham Mahmud, James W. Choi, M. Nicholas Burke, Anthony H. Doing, Phil Dattilo, Catalin Toma, A.J. Conrad Smith, ... SEE ALL AUTHORS
J Am Coll Cardiol Intv. 2019 Feb, 12 (4) 346–358
dergoing PCI for left
EXCEL trial
American Heart Association.
nal Atherectomy
ames Nolan, MD, and Keith
MPOSIUM (CIT)
oral Method of Two-Stent Implantation for
omparison of Immediate and Long-Term
A UK Obs
Jonathan Watt,
G. Oldroyd, MD
CHINA
Transradial Versu
True Bifurcation Lesion
Outcomes

Remain Radial Approach Challenges

FAILURE/CROSSOVER

RADIAL ARTERY OCCLUSION

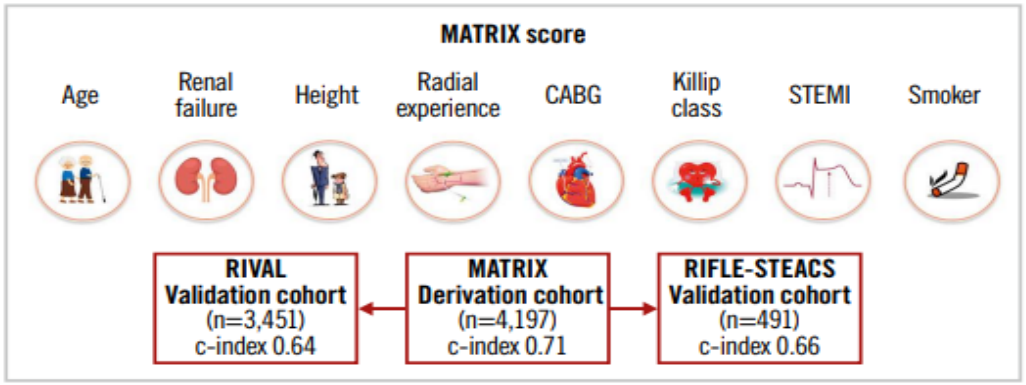
Radial Failure/Crossover

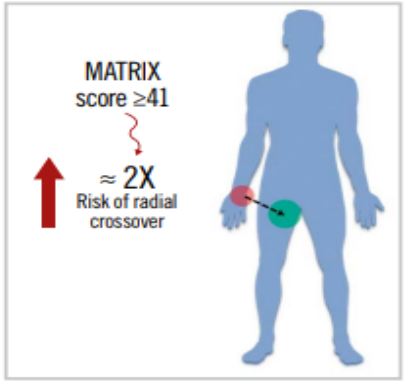
Failure to either start or complete coronary angiography or intervention via radial access and subsequent crossover to other access

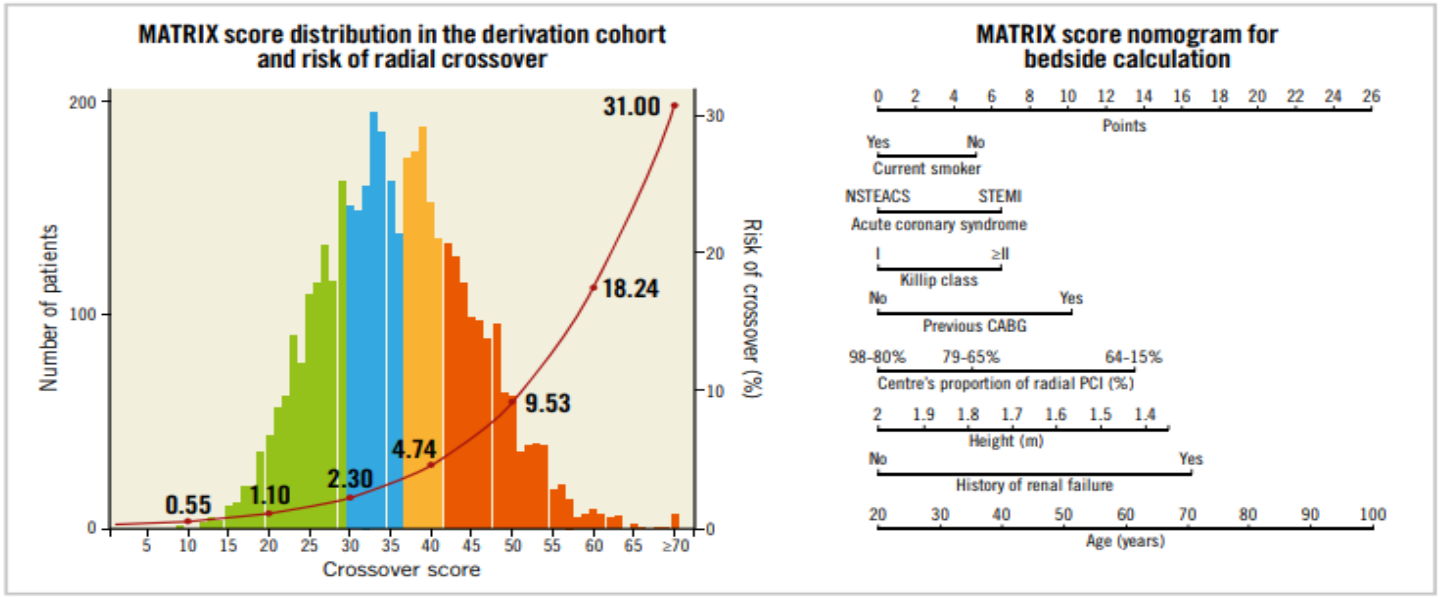
- 4-10% of the cases

1. Associated with:
    1. Discomfort
    2. Radiation Exposure
    3. Delayed Revascularization
    4. Worse Clinical Outcome

Predictors of Radial Crossover







EuroIntervention 2021;17:e971-e980.

Radial Artery Occlusion

- 7.7% (1-33%-66 studies)
- Predischarge assessment suboptimal: 70% (50% only palpation)
  - Recommendation
    - Assessment into initial 24 hours
    - Oximetry-plethysmography
    - Vascular Ultrasound
    - Reassessment a week later – Reopening 10-65%

Prevention of Radial Artery Occlusion: Why?

- Hand Ischemia
- Re-catheterization- Ipsilateral side
- Preservation Radial artery for CABG
- Preservation Radial artery for AV fistula

Failure/RAO Relationship

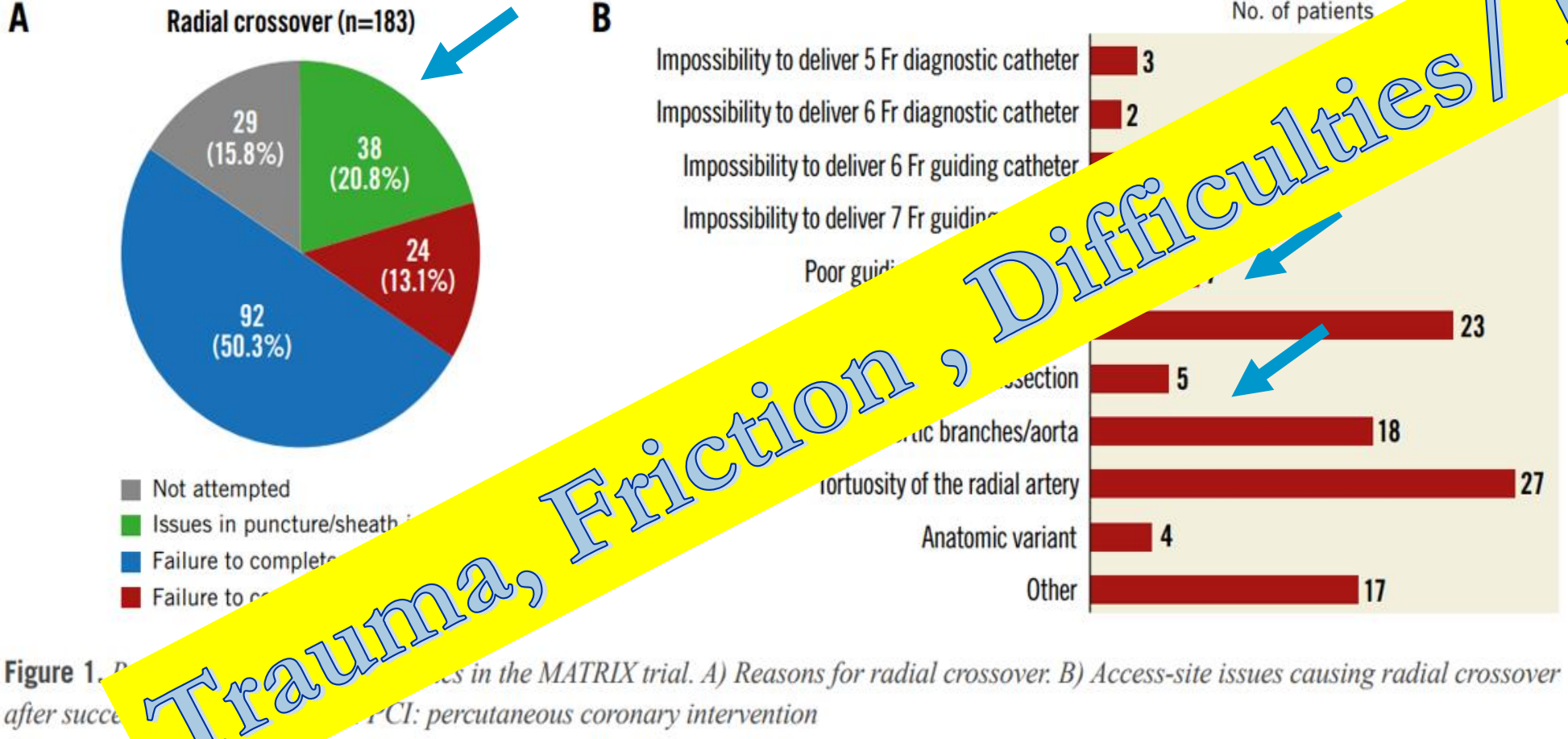
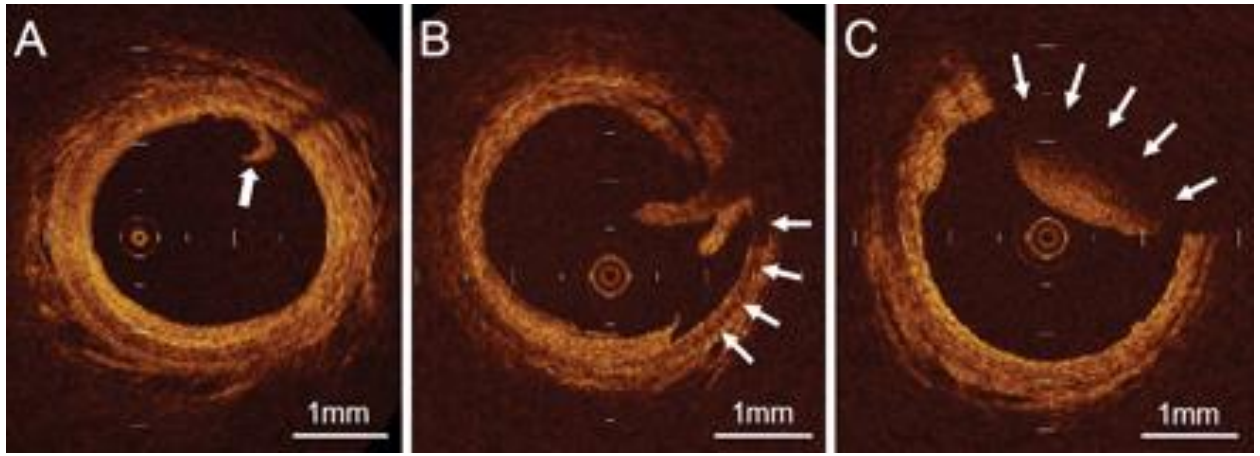


Figure 1. *Reasons for radial crossover in the MATRIX trial. A) Reasons for radial crossover. B) Access-site issues causing radial crossover after succe PCI: percutaneous coronary intervention*

Trauma, Friction , Difficulties / RAO

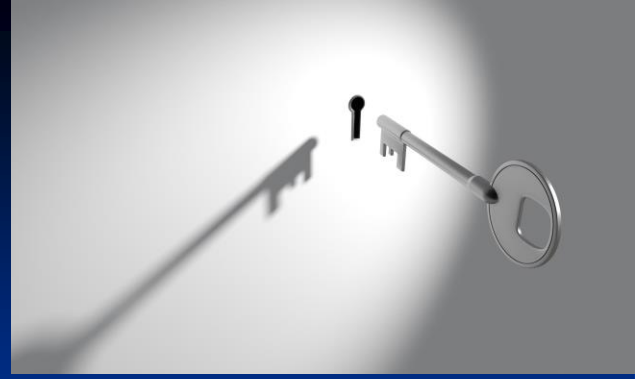
EuroIntervention 2021;17:e971-e980.

Assessment of acute injuries and chronic intimal thickening of the radial artery after transradial coronary intervention by optical coherence tomography



Eur Heart J, Volume 31, Issue 13, July 2010, Pages 1608–1615, https://doi.org/10.1093/eurheartj/ehq102

The Access Issue



CANNULATION FAILURE RATES

A reduction in cannulation failure was demonstrated with the use of PO-FMD, with cannulation failure rates of 2.7% in the PO-FMD group and 5.8% in the sham PO-FMD group (p=0.01) **(Figure 2)**. These patients required crossover to the left radial or femoral approach. Cannulation failures were associated with smaller preprocedural radial artery diameters when compared to those in whom cannulation was successful (p<0.001).

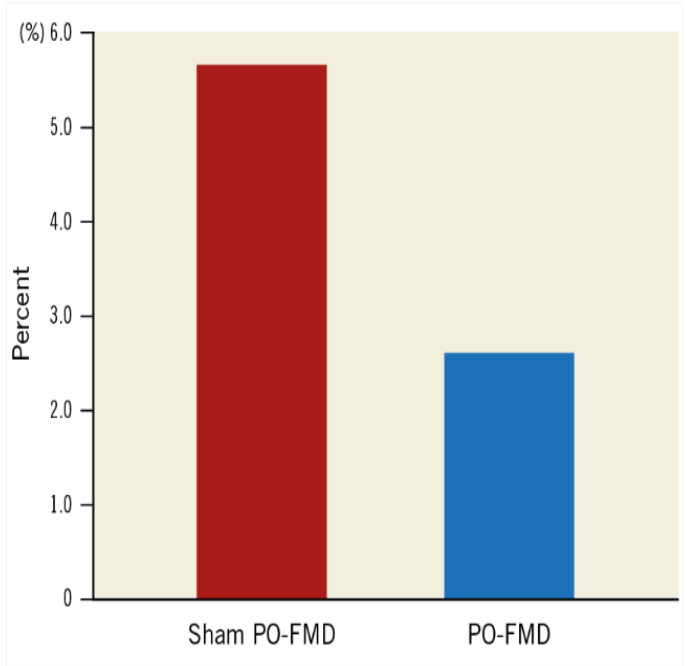
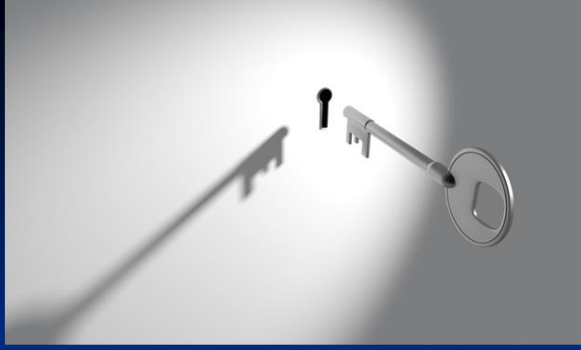


Figure 2. Cannulation failure rates.

CORONARY INTERVENTIONS - MINI FOCUS ON RADIAL ACCESS

Radial artery dilatation to improve access and lower complications during coronary angiography: the RADIAL trial

The Access Issue



ELSEVIER

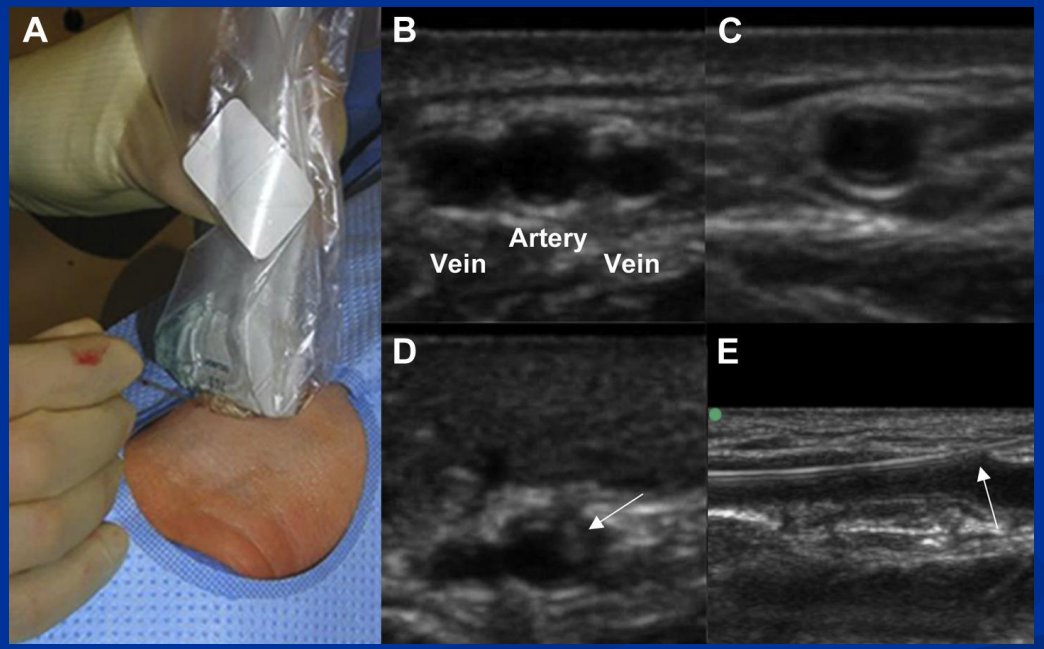
JACC: Cardiovascular Interventions

Volume 8, Issue 2, February 2015, Pages 283-291

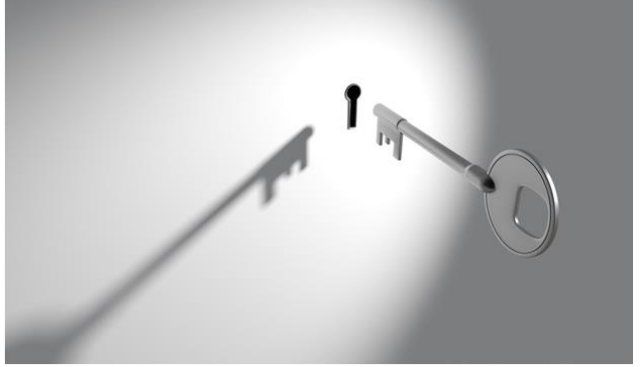
Clinical Research

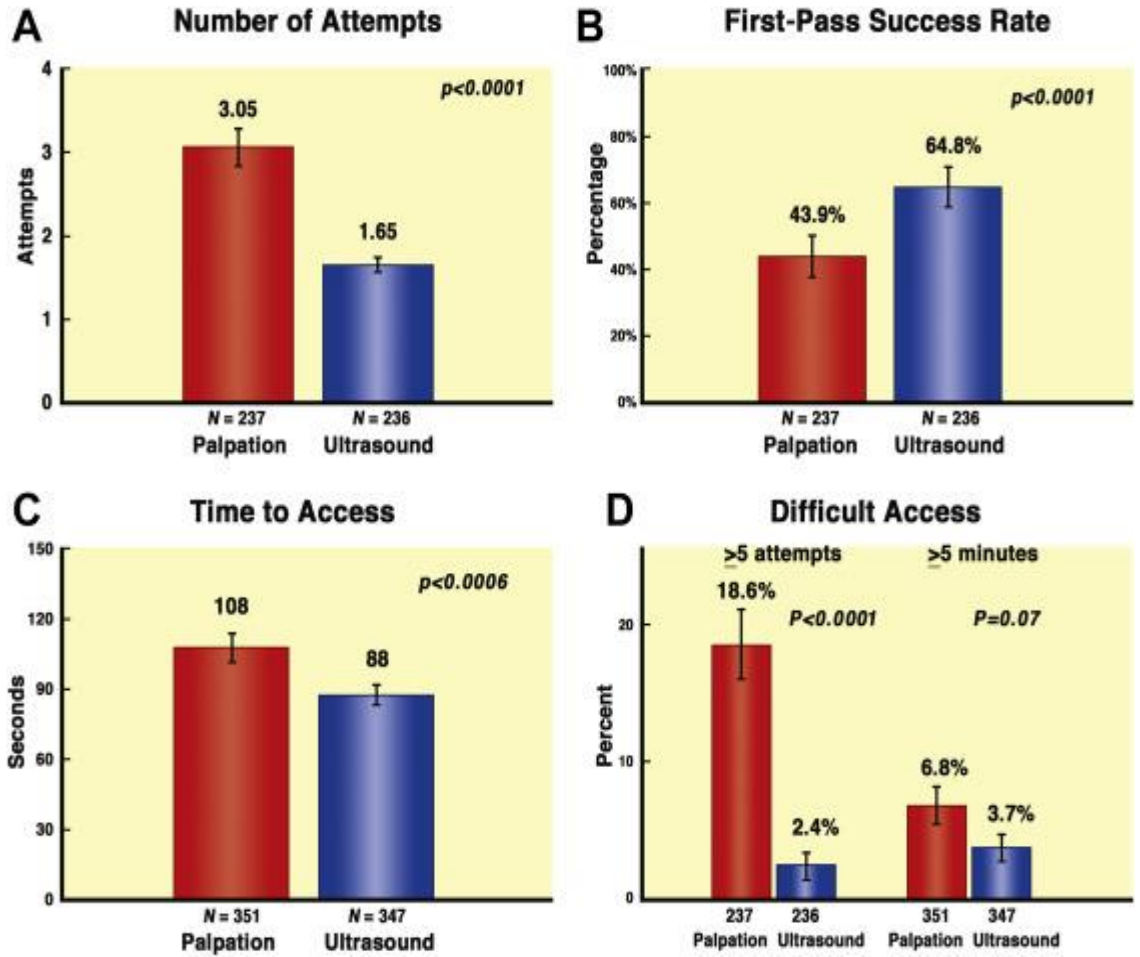
Coronary

Real-Time Ultrasound Guidance Facilitates Transradial Access: RAUST (Radial Artery Access With Ultrasound Trial)



The Access Issue





ULTRASOUND (347) vs. PALPATION (341)

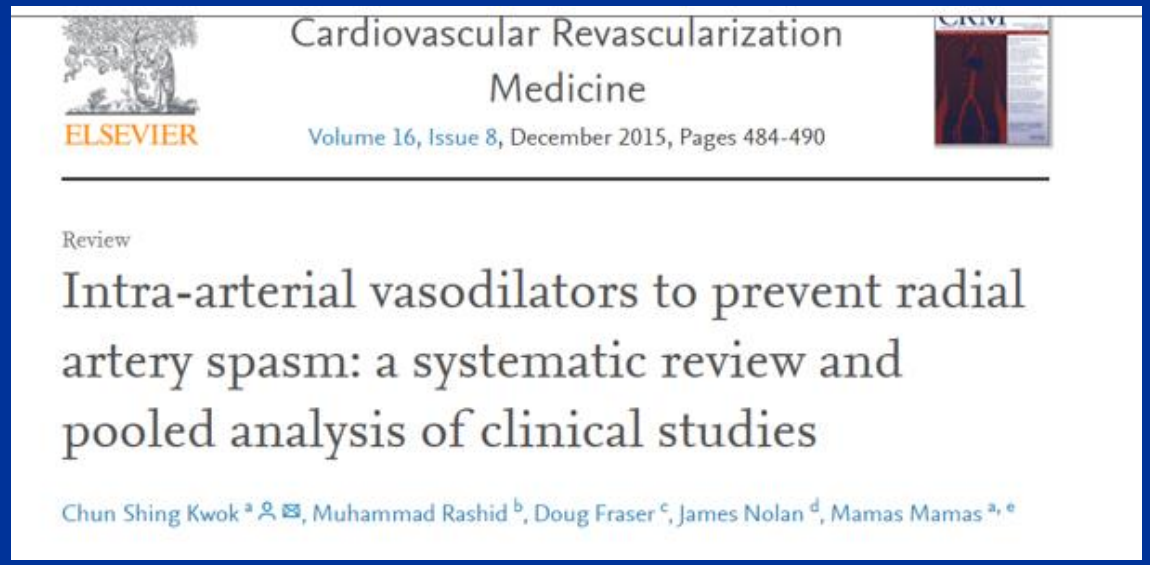
- **Failure to Sheath Insertion**

  3 pts vs 15 pts p:0.007

- **Any Crossover**

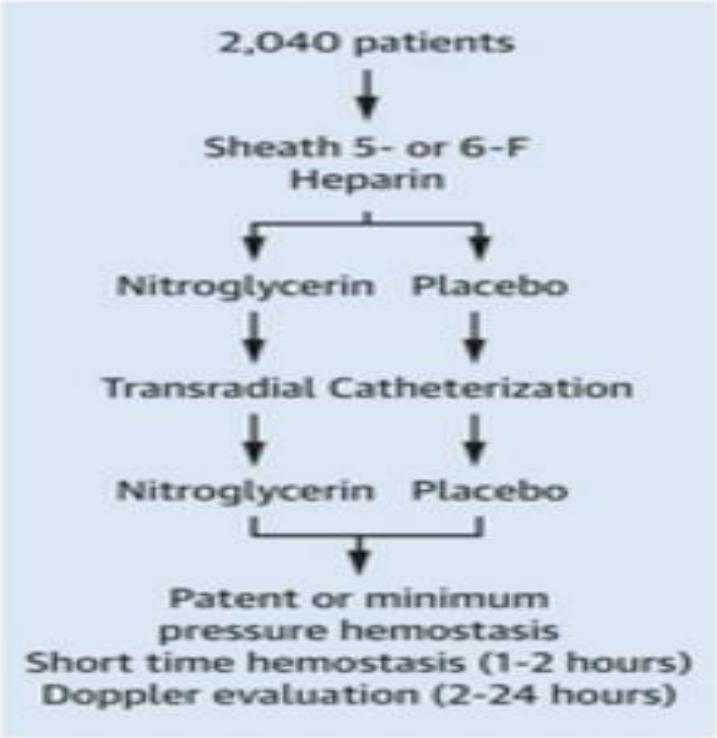
  5 pts vs 20 pts p:004

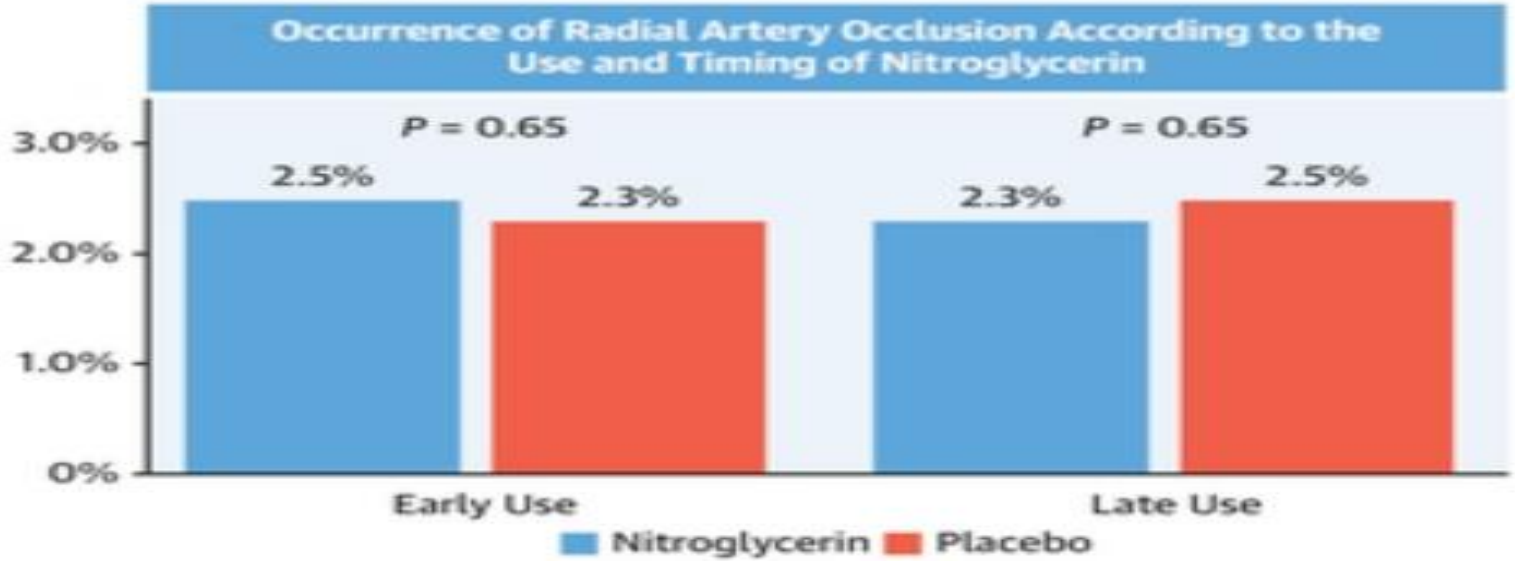
The Spasm Issue



- **Best Practice**
  - Verapamil 5 mg and Nitroglycerin 100-200 mcg.

Randomized Clinical Trial on Prevention of Radial Occlusion After Transradial Access Using Nitroglycerin: PATENS Trial





da Silva RL, et al. J Am Coll Cardiol Intv. 2022;15(10):1009–1018.

Sheath Issues

- Best Practice
  - Use of the lowest profile system necessary to complete the procedure
    - Sheath Artery Mitsmach
      - Vascular wall stretch and injury
    - Relationship OD sheath and RAO (1% to 11%)
    - Minituarization
      - Thin Walled Sheath
      - Sheathless
      - Limitate information about prevention of RAO

FIGURE 1 Recommendations for the Use of Current Sheaths and Sheathless Catheters According to Outer Diameters and Clinical Indications

Sheath / Sheathless	OD (mm)	
Sheathless 5Fr	1.75	Diagnostic angiography Small RA (women) Non-complex PCI
Thin-walled 5Fr	2.13-2.14*	
Standard 5 Fr	2.22-2.52*	
Sheathless 6.5 Fr	2.16-2.20*	Complex PCI (bifurcation, rotablation with < 2mm burrs, non-complex CTO, …)
Thin-walled 6Fr	2.44-2.47*	
Standard 6Fr	2.62-2.88*	
Sheathless 7.5 Fr	2.49	Highly complex PCI (Left main, complex bifurcation, rotablation with large burrs, complex CTO,…)
Thin-walled 7Fr	2.77-2.8*	
Standard 7Fr	2.97-3.19*	

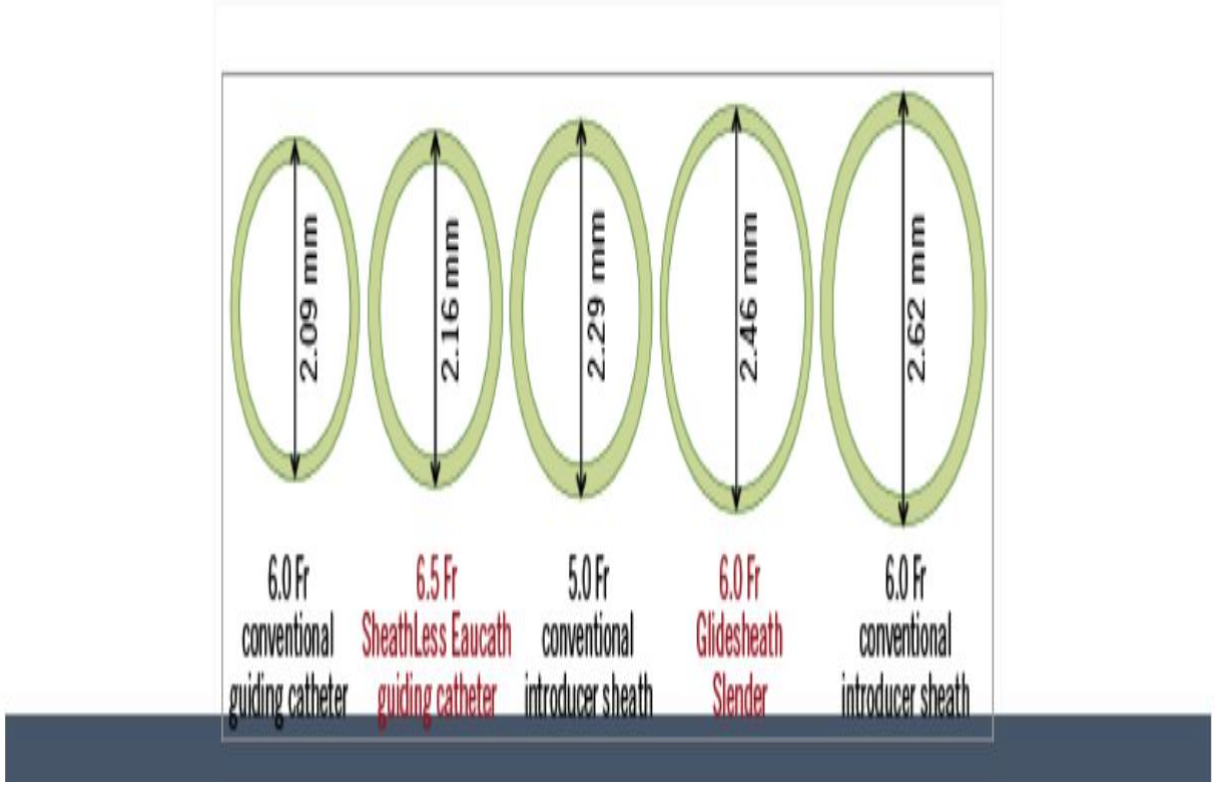
*Variations in OD according to sheath/sheathless brands. CTO = chronic total occlusion; OD = outer diameters; PCI = percutaneous coronary

Sheath Issues

CORONARY INTERVENTIONS

A randomised comparison of incidence of radial artery occlusion and symptomatic radial artery spasm associated with elective transradial coronary intervention using 6.5 Fr SheathLess Eaucath Guiding Catheter vs. 6.0 Fr Glidesheath Slender

EuroIntervention 2018;13:2018-2025 published online August 2017 DOI: 10.4244/EIJ-D-17-00239



Sheath Issues

	SH-GC (300)	6.0 F GSS	p value
Radial Artery Occlusion	0%	1.7%	0.062
Symptomatic RAS	0.3%	2.3%	1.000
RAO and RAS	0.7%	3.7%	0.021
RAO and RAS grade 4	0%	2%	0.031
Bleeding	1%	4%	0.033

Anticoagulation Issues

- **Best Practice**
  - Drug : 93% Unfractionated Heparin
  - Via: Intrasheath or IV

    Dose: Higher is Better than lower

    > 75 U/kg is better than < 50U /kg

    Patients treated with NOAC, Coumadin, Lysis, LMWH: Unclear management

Anticoagulation Issue

JACC: Cardiovascular Interventions

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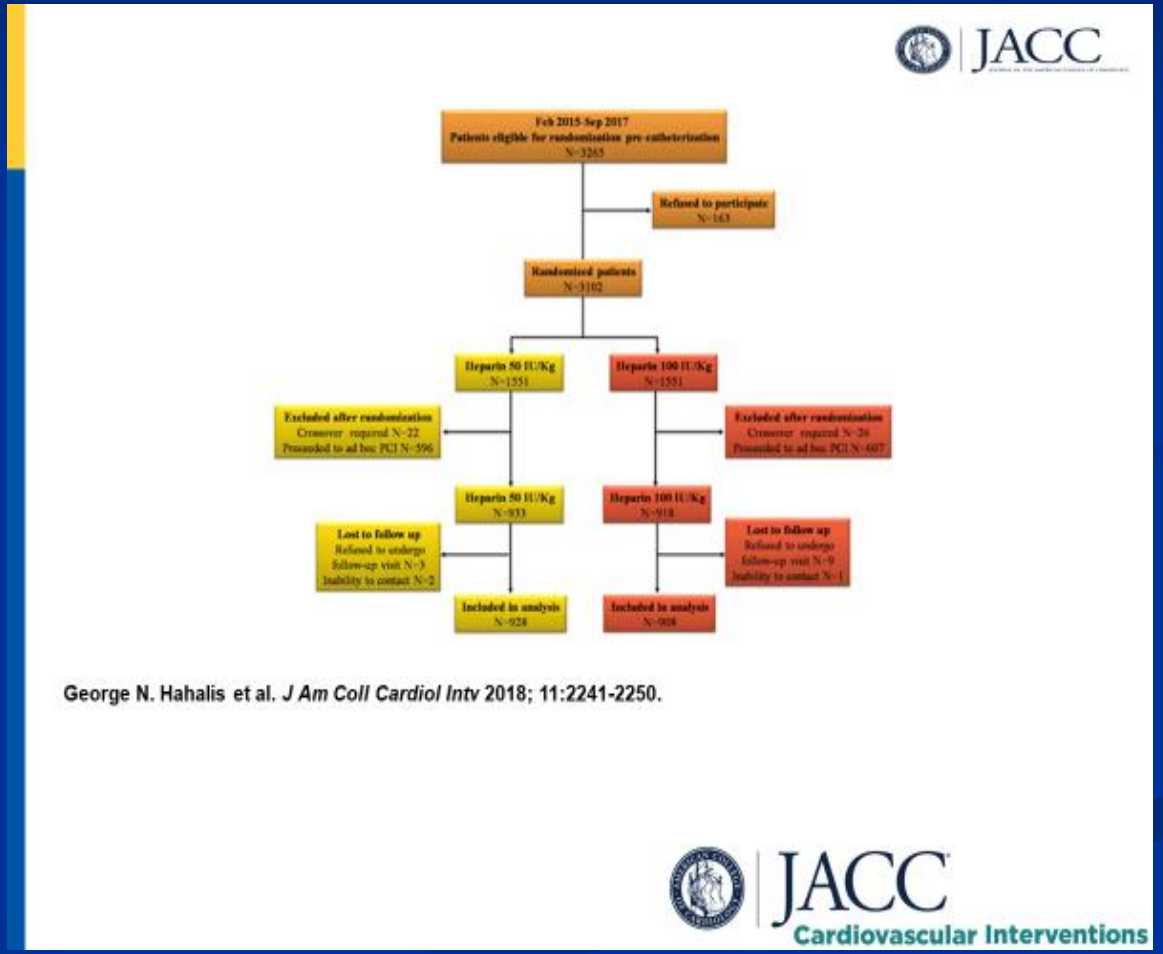
Previous | Next

Multicenter Randomized Evaluation of High Versus Standard Heparin Dose on Incident Radial Arterial Occlusion After Transradial Coronary Angiography: The SPIRIT OF ARTEMIS Study

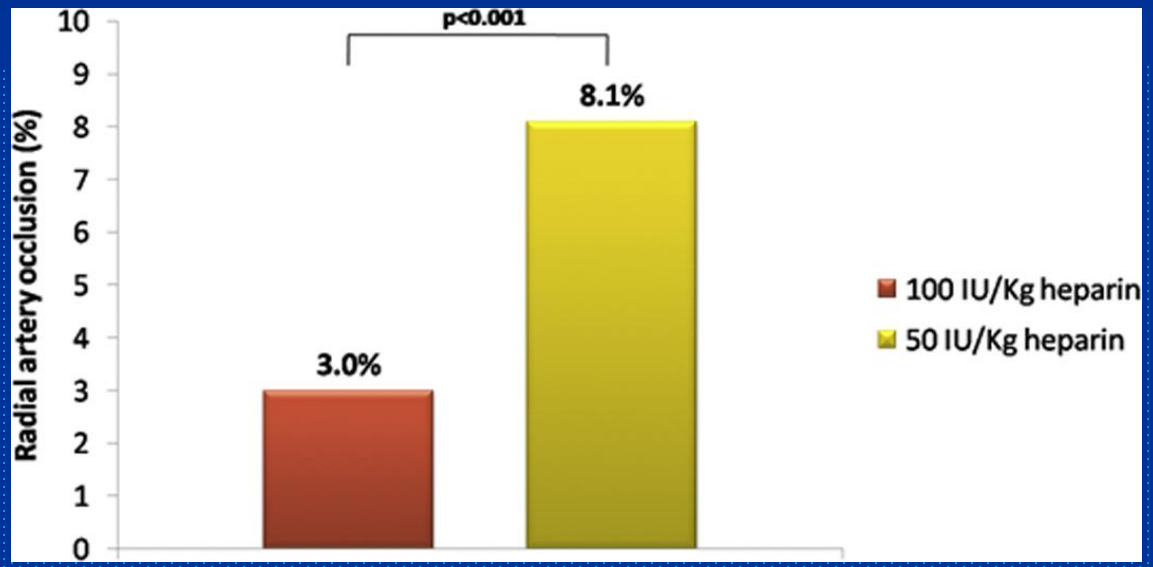
Coronary

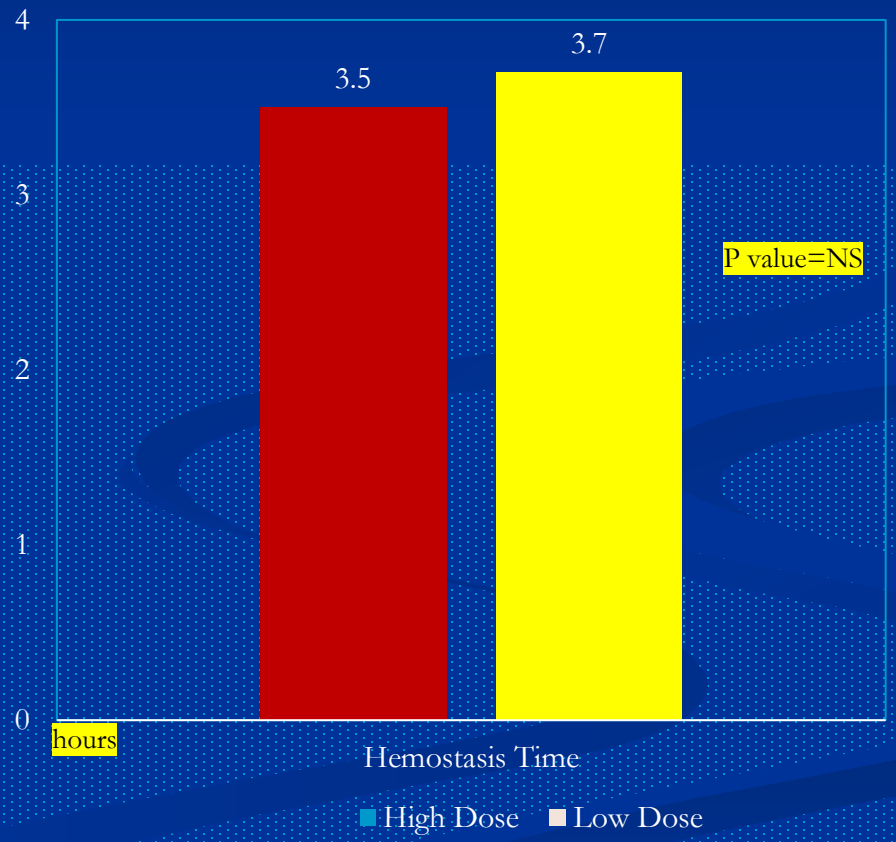
George N. Hahalis, Marianna Leopoulou, Grigorios Tsigkas, Ioanna Xanthopoulou, Sotirios Patsilinakos, Nikolaos G. Patsourakos, Antonios Ziakas, Nikolaos Kafkas, Michalis Koutouzis, Ioannis Tsiafoutis, Ilias Athanasiadis, ... SEE ALL AUTHORS

J Am Coll Cardiol Intv. 2018 Nov, 11 (22) 2241–2250



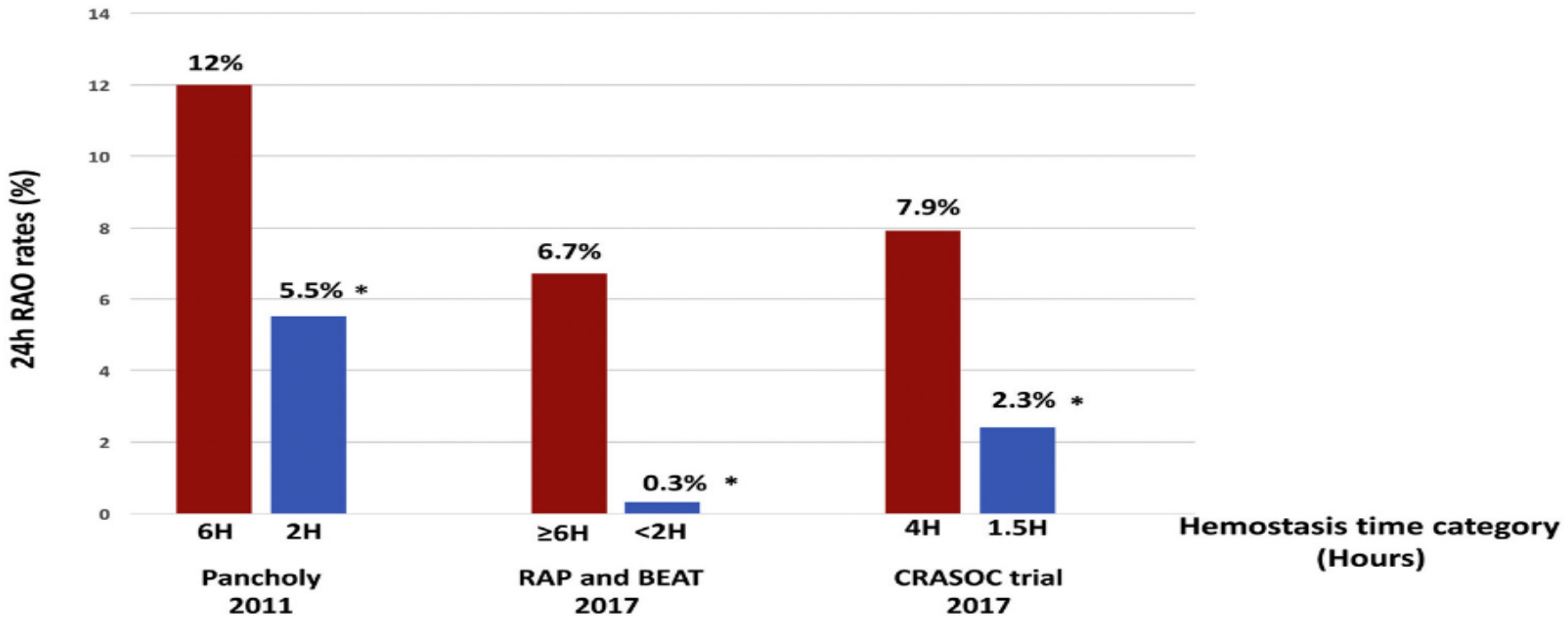
Anticoagulation Issues





Duration of Hemostatic Compression Issue

FIGURE 3 Impact of Shorter Hemostasis Times on RAO Rates



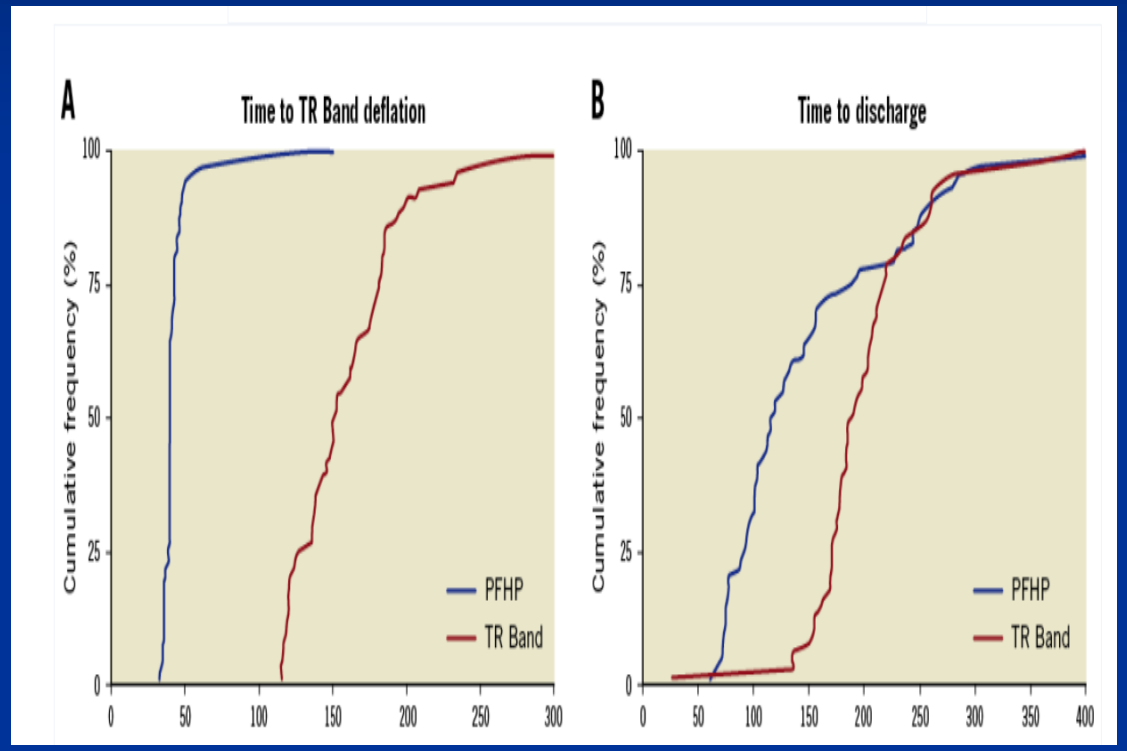
*p < 0.05 for all comparisons. CRASOC = Compression of Radial ArterieS without Occlusion; RAO = radial artery occlusion; RAP and BEAT = Radial Artery Patency and Bleeding, Efficacy, Adverse event.

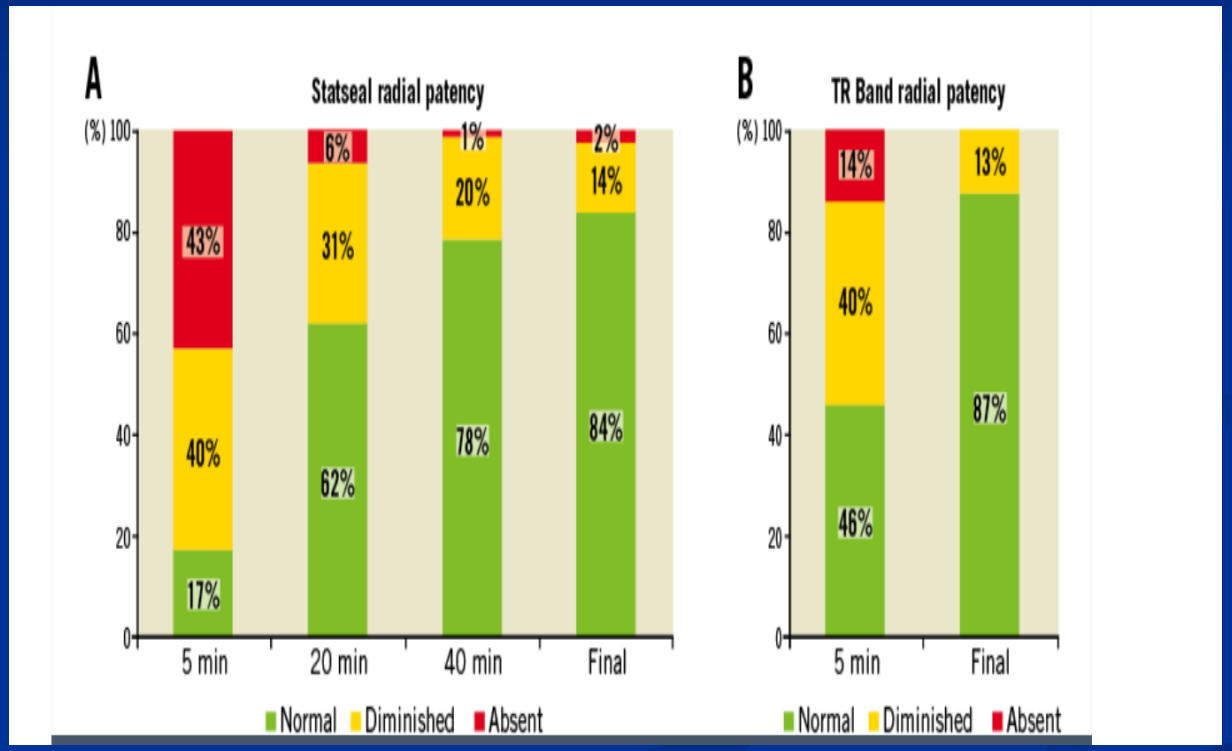
Duration of Hemostatic Compression Issue

CORONARY INTERVENTIONS

Radial haemostasis is facilitated with a potassium ferrate haemostatic patch: the Statseal with TR Band assessment trial (STAT)

EuroIntervention 2018;14:e1236-e1242 published online May 2018 published online e-edition December 2018. DOI: 10.4244/EIJ-D-18-00101


A
Time to TR Band deflation
Cumulative frequency (%)
100
75
50
25
0
0
50
100
150
200
250
300
PFHP
TR Band
B
Time to discharge
Cumulative frequency (%)
100
75
50
25
0
0
50
100
150
200
250
300
350
400
PFHP
TR Band


A
Statseal radial patency
(%) 100
80
60
40
20
0
43%
40%
17%
6%
31%
62%
1%
20%
78%
2%
14%
84%
5 min
20 min
40 min
Final
Normal
Diminished
Absent
B
TR Band radial patency
(%) 100
80
60
40
20
0
14%
40%
46%
13%
87%
5 min
Final
Normal
Diminished
Absent

Non Occlusive- Patent Hemostasis

- **Best Practice**
  - Patent Hemostasis: Persistence of Radial artery flow during hemostatic compression
  - PROPHET trial : early RAO rates(12% vs5%) and late (30 days) 7% vs 1.8%
  - RACOMAP trial : early RAO = 11% vs.1 %
  - No attempts or failure: 20% to 50 % of cases

JACC: Cardiovascular Interventions

JACC Journals › JACC: Interventions › Archives › Vol. 15 No. 10

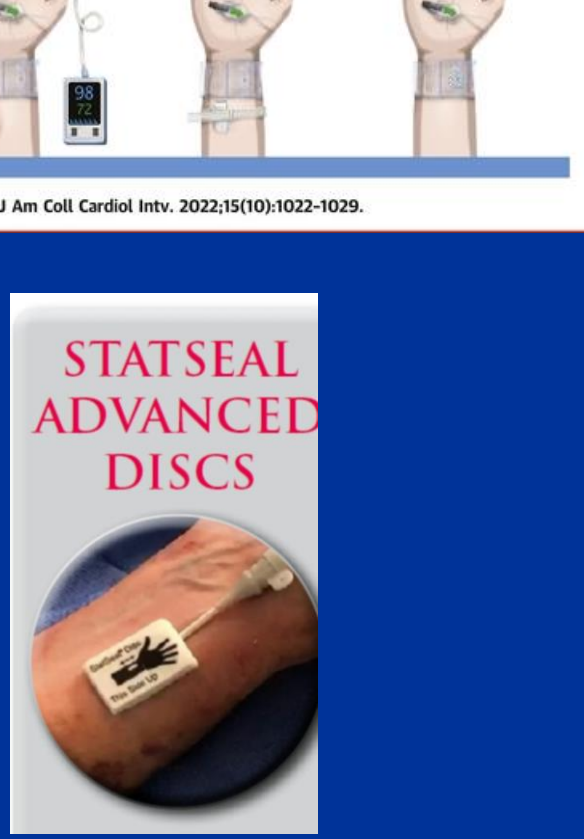
Prevention of Radial Artery Occlusion of 3 Hemostatic Methods in Transradial Intervention for Coronary Angiography

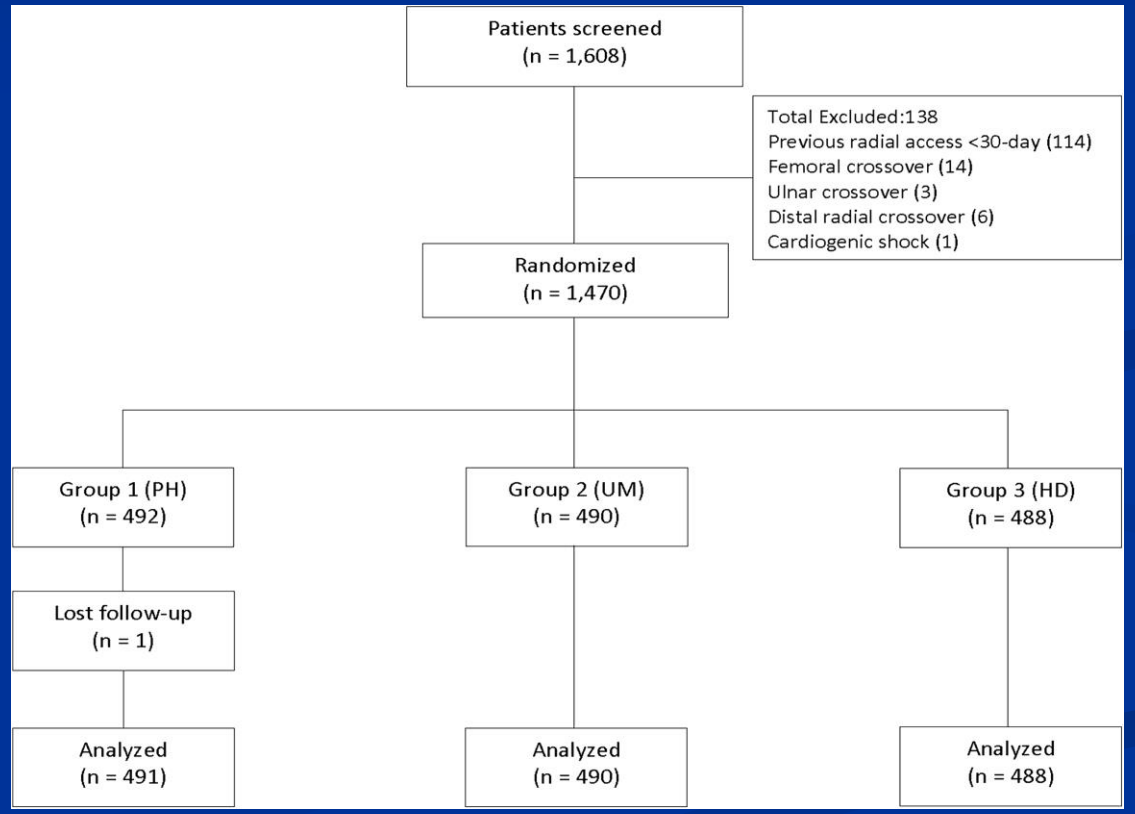
Coronary

Guering Eid-Lidt, Jesús Reyes-Carrera, Julio I. Farjat-Pasos, Arnoldo Loaisiga Saenz, Carlos Aguila Bravo, Sara Niet
Daniel Zazueta Salido, Norman Said Vega Servin, Maria Elena Soto-López, and Jorge Gaspar

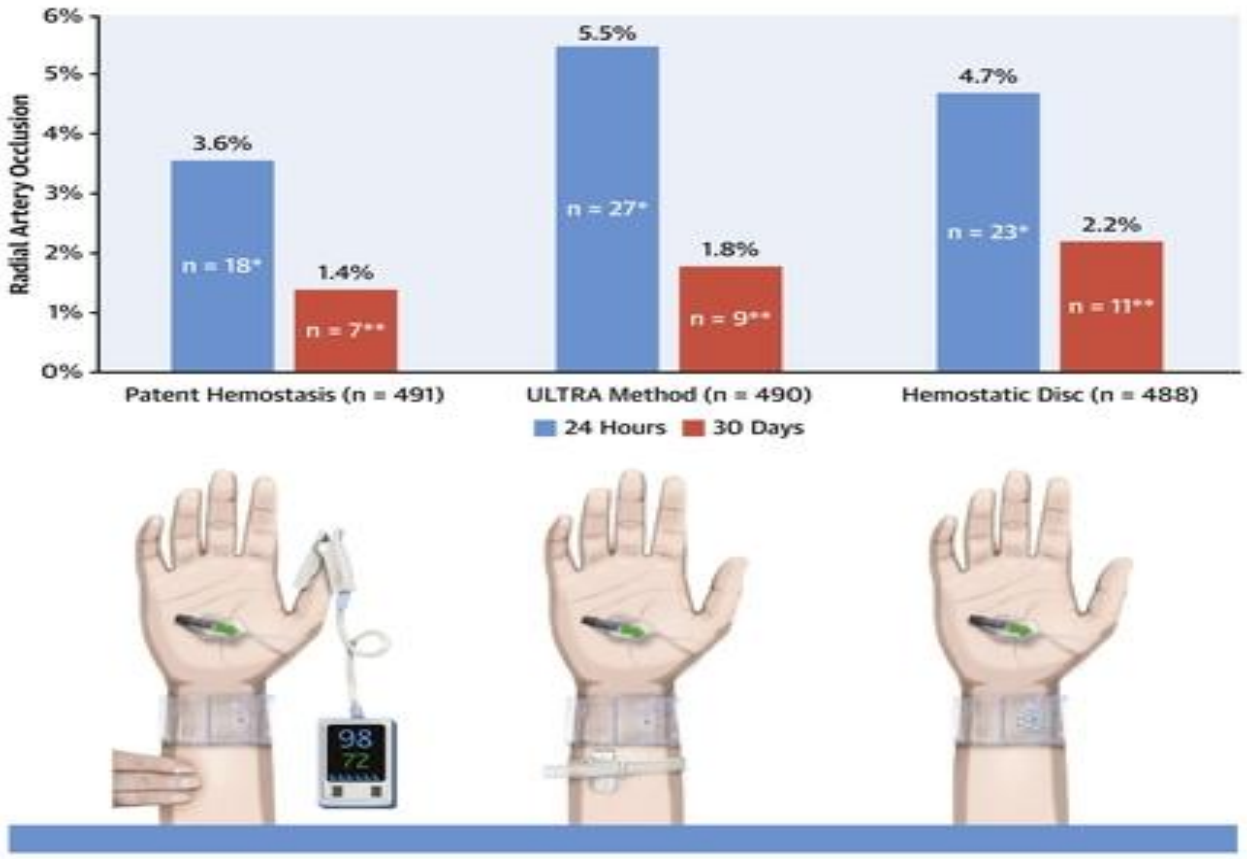
J Am Coll Cardiol Intv. 2022 May, 15 (10) 1022–1029

Eid-Lidt G, et al. J Am Coll Cardiol Intv. 2022;15(10):1022-1029.





CENTRAL ILLUSTRATION: Radial Artery Occlusion Occurrence at 24 Hours and 30 Days After Proximal Transradial Procedure Using Patent Hemostasis, Patent Hemostasis With Ulnar Compression, and Facilitated Hemostasis With a Hemostatic Disc



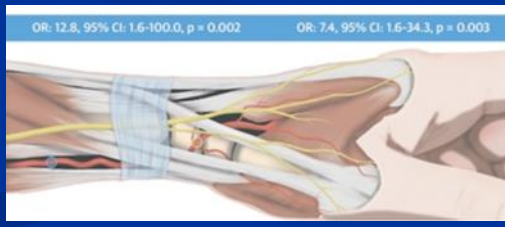
Eid-Lidt G, et al. J Am Coll Cardiol Intv. 2022;15(10):1022–1029.

Guering Eid-Lidt et al. *J Am Coll Cardiol Intv* 2022; 15:1022-1029.

Distal Radial Access Issue

Advantages

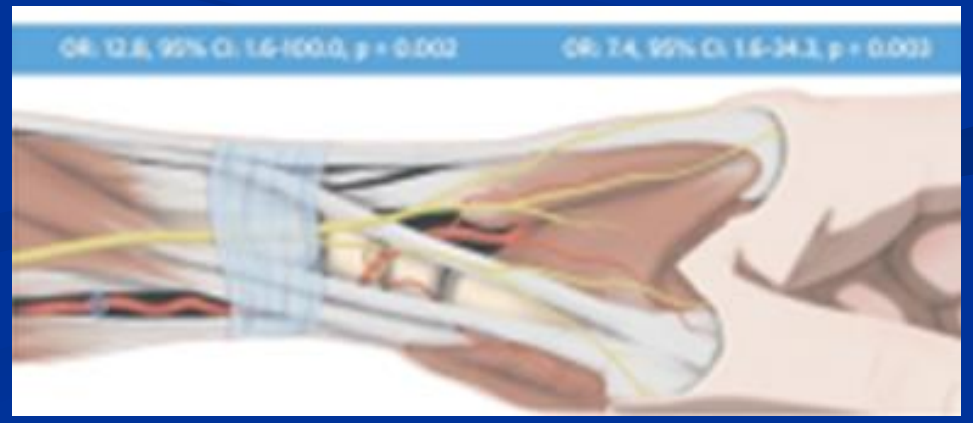
- Distal to Superficial Palm Arch: Less Ischemic Risk
- More Superficial: Easier Hemostasis
- Allows Movements of the Wrist during Recovery
- Friendly Setup for Left Radial
- Less RAO

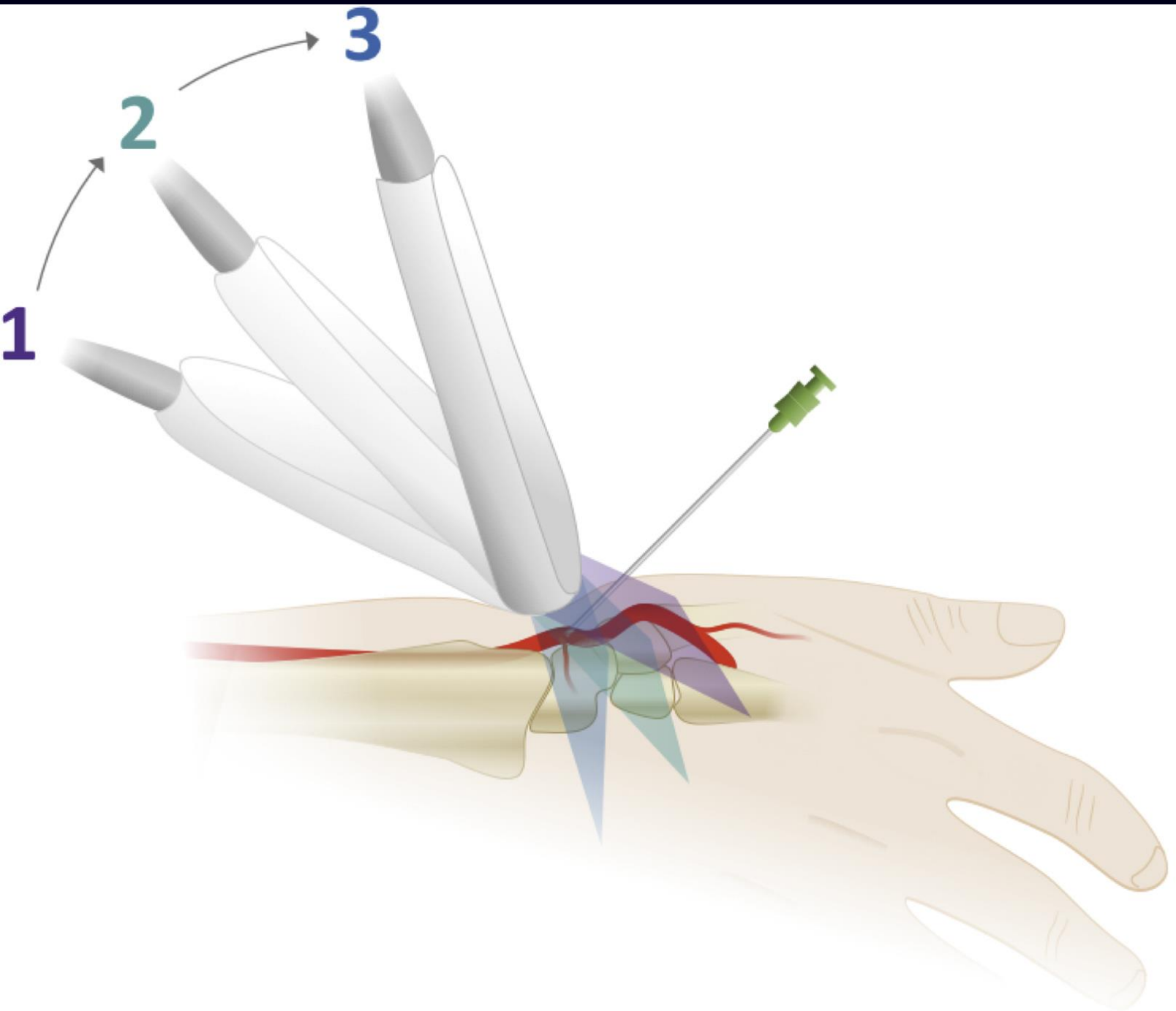


Distal Radial Issue

Disadvantages

- More Failure and Crossover
- More Time
- More Radiation
- US is Essential





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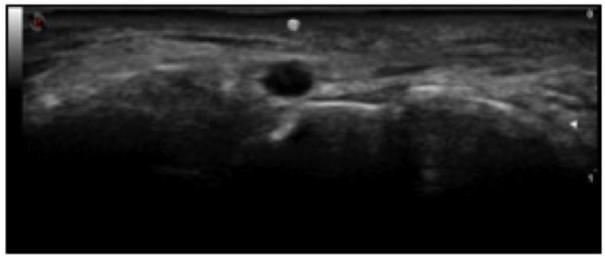

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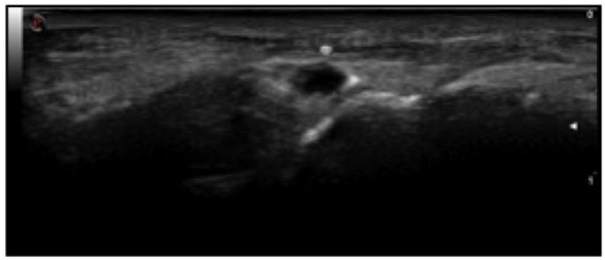

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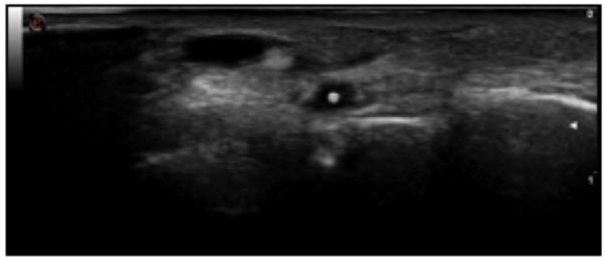


Elastic hemostatic bandage

Adhesive hemostatic pressure pad

Classical radial compression device

Dedicated distal radial hemostasis device

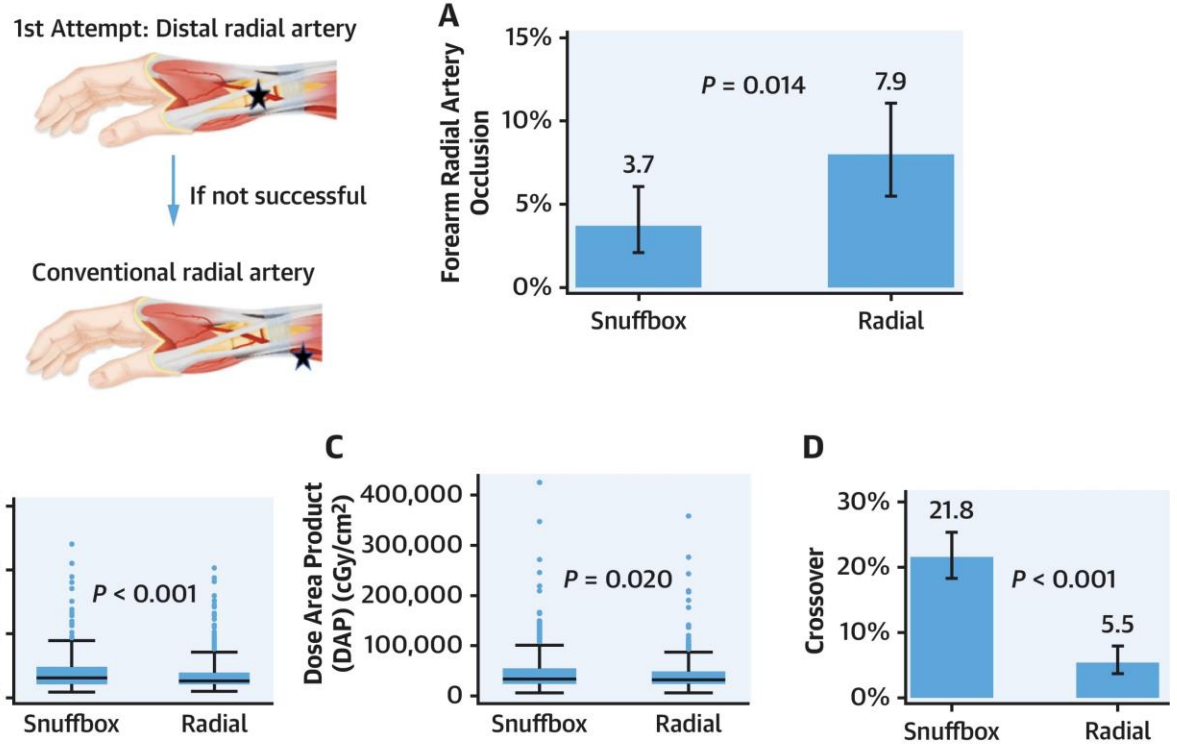
Distal or Traditional Transradial Access Site for Coronary Procedures: A Single-Center, Randomized Study

Coronary

Grigorios Tsigkas, Angeliki Papageorgiou, Athanasios Moulias, Andreas P. Kalogeropoulos, Chrysanthi Papageorgopoulou, Anastasios Apostolos, Amalia Papanikolaou, Georgios Vasilagkos, and Periklis Davlouros

J Am Coll Cardiol Intv. 2022 Jan, 15 (1) 22–32

CENTRAL ILLUSTRATION: Distal Transradial Compared With Traditional Transradial Strategy



Tsigkas, G. et al. J Am Coll Cardiol Intv. 2022;15(1):22-32.

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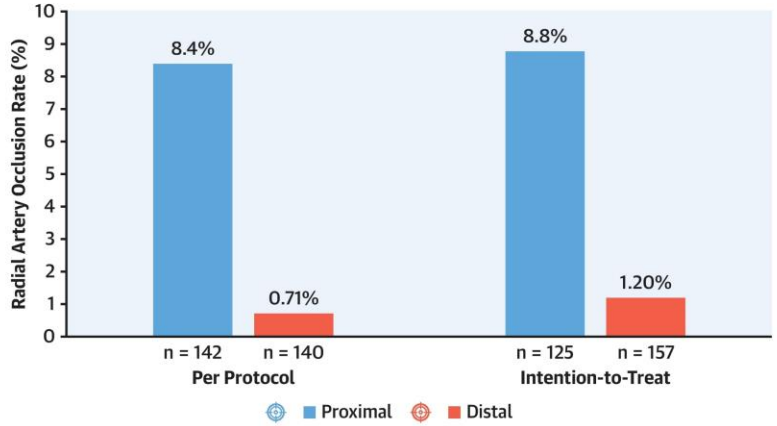
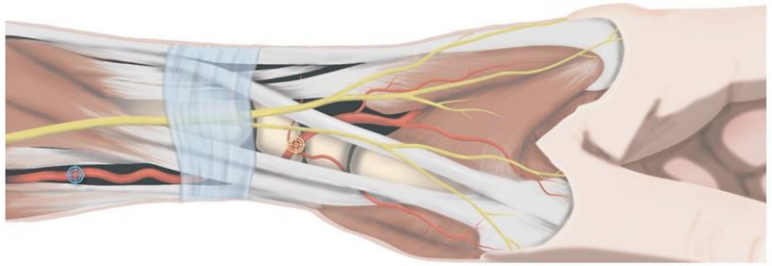
Distal Radial Artery Approach to Prevent Radial Artery Occlusion Trial

Coronary

Guering Eid-Lidt, Agustín Rivera Rodríguez, Joaquín Jimenez Castellanos, Julio I. Farjat Pasos, Kathia E. Estrada L

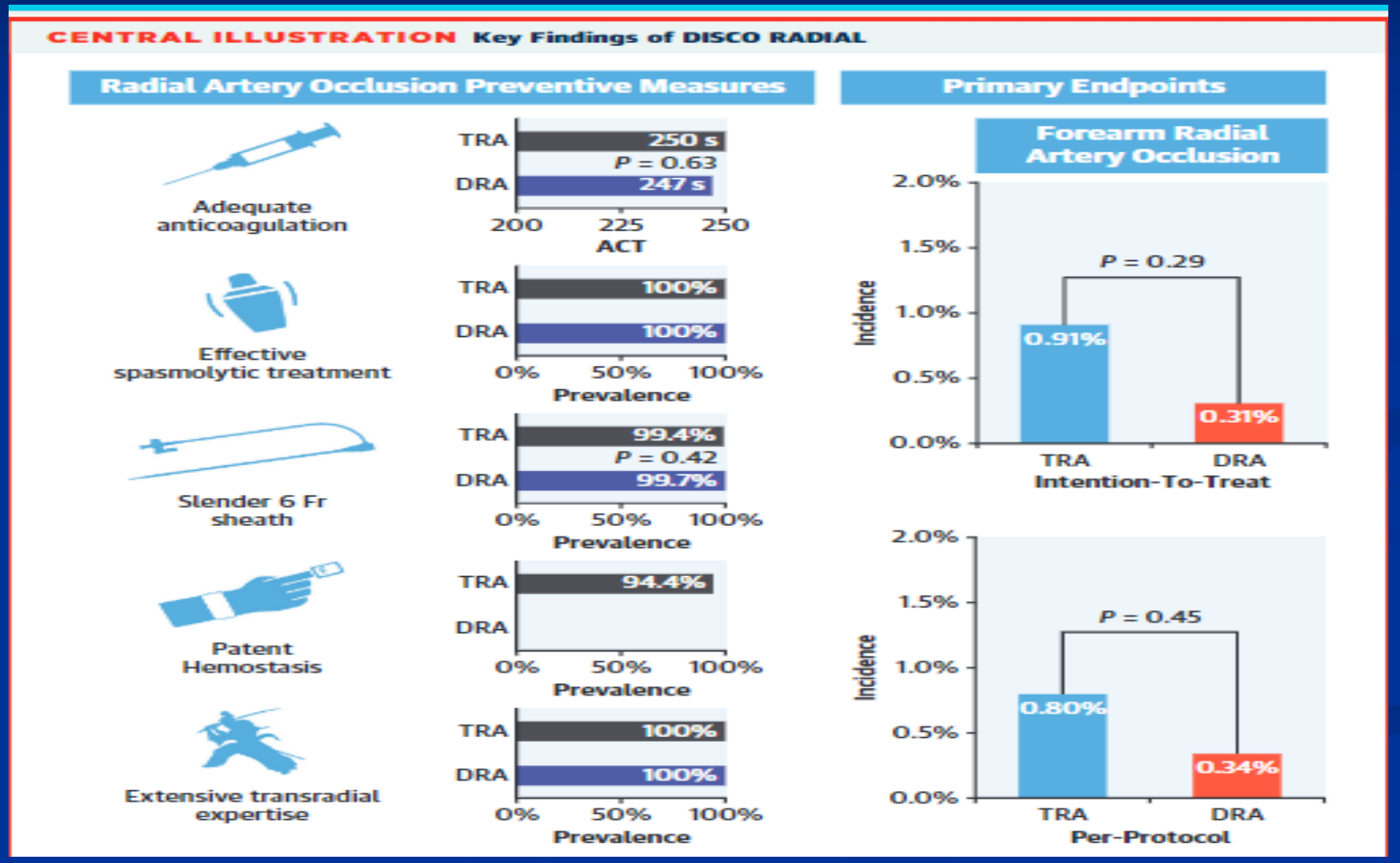
CENTRAL ILLUSTRATION: Proximal (Forearm) Radial Artery Occlusion Rates at 24 h Using the Proximal (Conventional) Versus Distal (Snuffbox) Radial Artery Approach





Eid-Lidt, G. et al. J Am Coll Cardiol Intv. 2021;14(4):378-85.

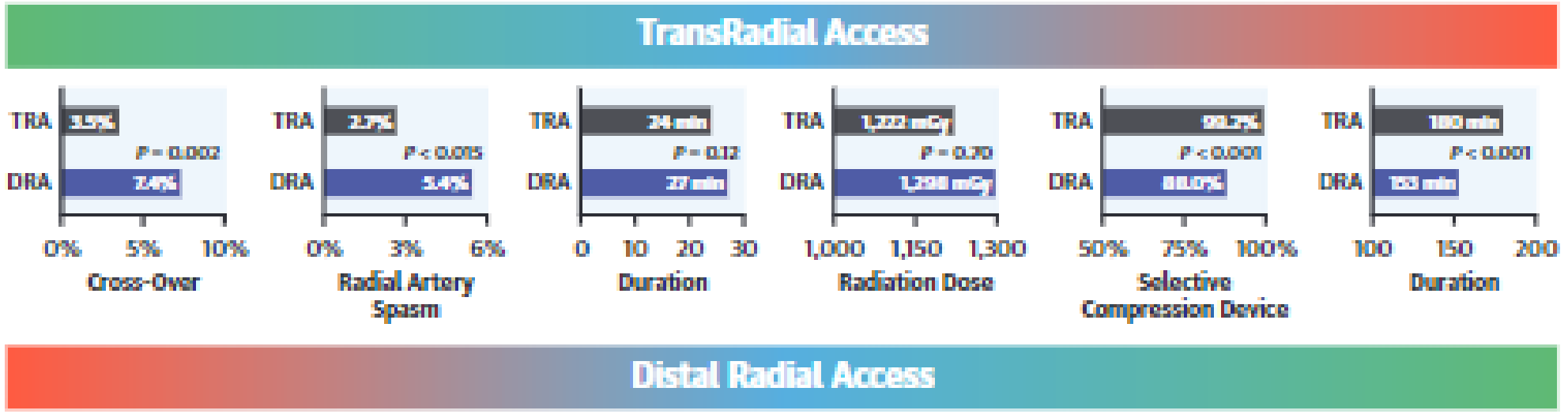
Distal Versus Conventional Radial Access for Coronary Angiography and Intervention (DISCO RADIAL)



Conclusions

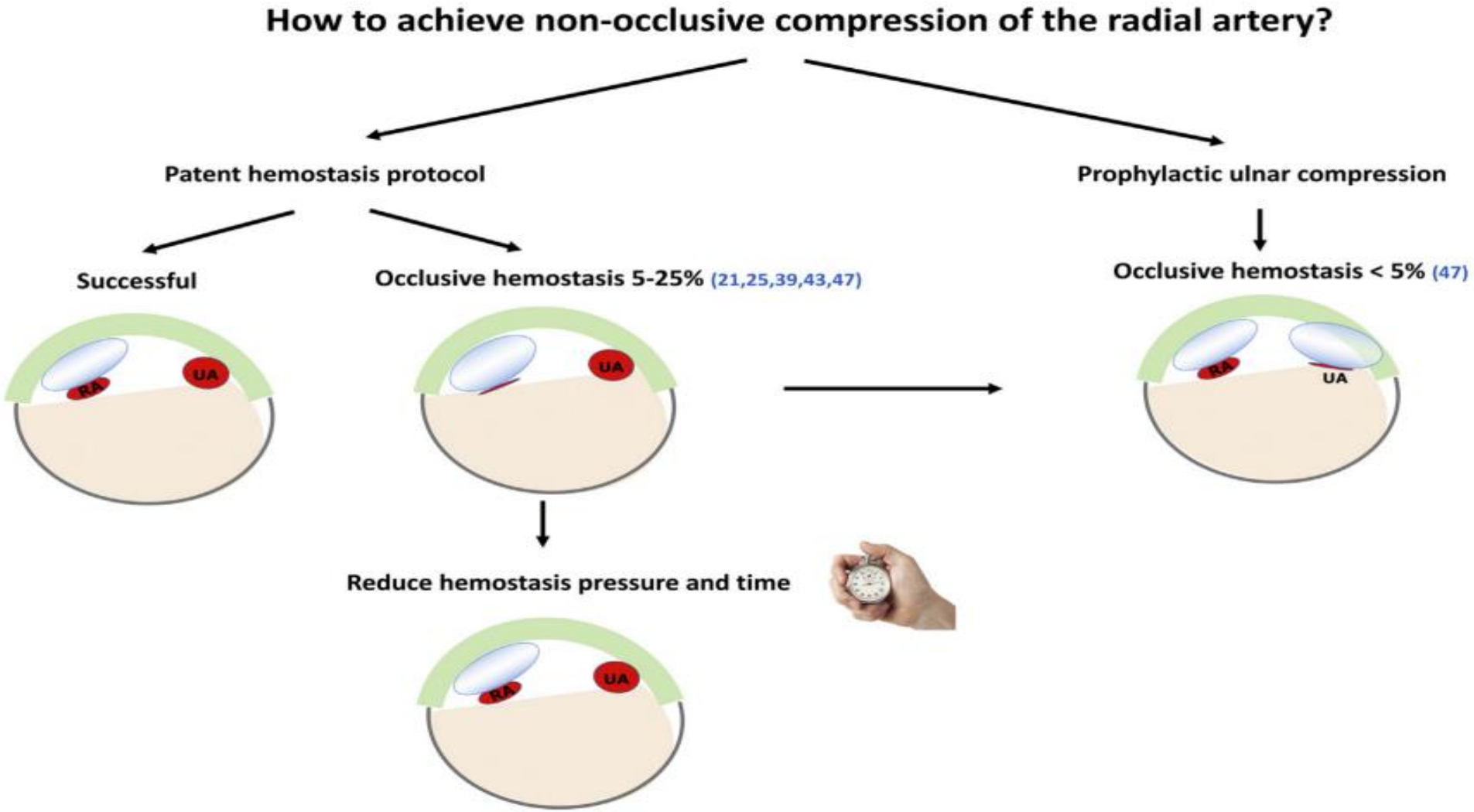
- Radial should not be avoided .. Go for Radial !!!
- Failure and RAO are the last challenges
- RAO should not be forgotten… Think forward !!!!
- Learn Distal Radial ……Gain another access!!!!!!!

Distal Versus Conventional Radial Access for Coronary Angiography and Intervention (DISCO RADIAL)



Aminian A, et al. J Am Coll Cardiol Intv. 2022;■(■):■-■.

FIGURE 2 Flowchart to Achieve Nonocclusive Compression of the Radial Artery Following TRA Procedures



RA = radial artery; TRA = transradial access; UA = ulnar artery.

Patient assessment

- Following distal radial artery palpation, the most appropriate puncture site is selected
- Ultrasound is useful to determine the diameter of the distal radial artery and to select the proper sheath introducer and catheter size

Patient setup

- The arm should be optimally positioned according to access side and operator's preference and/or experience
- Asking the patient to grasp his/her thumb under the other four fingers or holding a handle favors the distal radial artery shifting to the surface
- The puncture area is disinfected and covered with a sterile drape

Local anaesthesia

- Subcutaneous injection of a local anesthetic also helps the radial artery shifting toward the surface
- The depth of infiltration of the numbing agent varies according to the puncture technique (deeper in case of through-and-through technique, shallow in case of anterior wall puncture)

Puncture

- Operator preference and/or experience helps using an open needle or a catheter-covered needle
- The approach differs whether the radial artery is punctured in the anatomical snuffbox or in the dorsum of the hand
- The complex three-dimensional course of the distal radial artery turning around the base of the thumb allows different possible supero-inferior and latero-medial entry angles to achieve vascular access

Mini guidewire

- A mini guidewire is carefully advanced in the vessel lumen
- If resistance is felt, the guidewire should be retracted and rotated to avoid damaging small arterial branches rising between the puncture site and the forearm radial artery
- Thumb adduction straightens the radial artery and may reduce the risk of the guidewire misdirection
- Shaping the mini guidewire tip may alternatively help to overcome distal radial artery tortuosity
- Individual preference directs the choice of a 0.025 inch or a 0.018 inch mini guidewire

Sheath introducer

- A small skin incision may be helpful to favor sheath introducer insertion through di tougher skin of the dorsal side of the hand
- A thin-walled sheath introducer, with a minimal outer diameter in relation to the inner diameter, appears a wise choice
- Administration of a spasmolytic drug right after sheath introducer placement is beneficial to avoid spasm and radial artery occlusion

Angiographic wire

- A 210 cm wire is the best choice for catheter exchanges
- In case of left distal radial access, some resistance can be encountered when the tip of the wire approaches the brachial artery due to the flexed elbow, if it occurs the elbow should be stretched first and a hydrophilic wire could be used

Catheters

- Catheters 110 cm in length may be advantageous in tall subjects
- Universal radial curves should be preferred for diagnostic angiography

Mechanism of RAO

Conclusion

COMPLEX PCI

Radial Access and CHIP: Are They Compatible?

1. Yes
2. Preferable- The highest risk patients benefit most from TRA
3. Lack of pulse or impossible anatomy- only limitations
4. Operator confidence and outcomes improve with experience
5. If there is not enough guide support …

   you have the wrong guide (not the wrong access route)
6. Larger bore access with Slender sheath or sheathless systems
7. Even if LV hemodynamic support is required, 1 TR + 1 F > 2 F

Non Occlusive- Patent Hemostasis

- Patent Hemostasis: Persistence of Radial artery flow during hemostatic compression
- PROPHET trial : early RAO rates(12% vs5%) and late (30 days) 7% vs 1.8
- RACOMAP trial : eartly RAO = 11% vs.1 %

- No attempts or failure: 20% to 50 % of cases

Sheath Issues

eurointervention.pcronline.com/article/a-randomised-comparison-of-incidence-of-radial-artery-occlusion-and-symptomatic-radial-ar...

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access-site crossover was not performed. On the other hand, in two patients treated with a 6.0 Fr GSS, access-site crossover was required because of catheter trapping or failure of system insertion. There were no between-group differences in MACE onset **(Table 5)**. One patient in the SH-GC group required surgery because of a radial artery pseudoaneurysm. However, the other patients in both groups were asymptomatic and did not experience arm ischaemia and/or additional treatment for RAO or arteriovenous fistula. The rate of major or minor access-site haemorrhage was 1.0% in the SH-GC group and 4.0% in the GSS group (p=0.033) **(Table 4)**.

Table 4. Access-site complications.

		6.5 Fr SH-GC (n=300)	6.0 Fr GSS (n=300)	*p*-value
Radial complications	RAO, n (%)	0 (0.0)	5 (1.7)	0.062‡
	Arteriovenous fistula, n (%)	1 (0.3)	4 (1.3)	0.373‡
	Pseudoaneurysm requiring surgery, n (%)	1 (0.3)	0 (0.0)	1.000‡
Symptomatic RAS, n (%)		2 (0.7)	7 (2.3)	0.176‡
Grade 2/3/4, n (%)		2 (0.7)/0 (0.0)/0 (0.0)	2 (0.7)/3 (1.0)/2 (0.7)	
Drug infusion to treat RAS during TRI, n (%)		0 (0.0)	5 (1.7)	0.062‡
Composite rates of RAO and RAS, n (%)		2 (0.7)	11 (3.7)	0.021‡
Composite rates of RAO and grade 4 RAS, n (%)		0 (0.0)	6 (2.0)	0.031‡
Access-site haemorrhage, n (%)		3 (1.0)	12 (4.0)	0.033‡
Major/minor, n (%)		1 (0.3)/2 (0.7)	2 (0.7)/10 (3.3)	
Blood transfusion for radial complications, n (%)		1 (0.3)	2 (0.7)	1.000‡

Data given as n (%). ‡Fisher's exact test. RAO: radial artery occlusion; RAS: radial artery spasm

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Table 3. Clinical Outcomes

	Palpation (n = 351)	Ultrasound (n = 347)	p Value
Spasm	12 (3)	15 (4.3)	0.56
Pain score, 0–10	0 (0–1)	0 (0–1)	0.67
Bleeding complication	4 (1.1)	5 (1.4)	0.75
Crossover to ultrasound rescue attempts after >5 min	10 (8 successful)	NA	NA
Crossover to another site after sheath insertion	5	2	0.45
Crossover to another site before sheath insertion/failed access	7	3	0.34
Failure of sheath insertion with original technique	15	3	0.007
Any crossover in access site or technique at any time	20	5	0.004

Values are n (%), median (interquartile range), or n.

NA = not applicable.

English (United States) US

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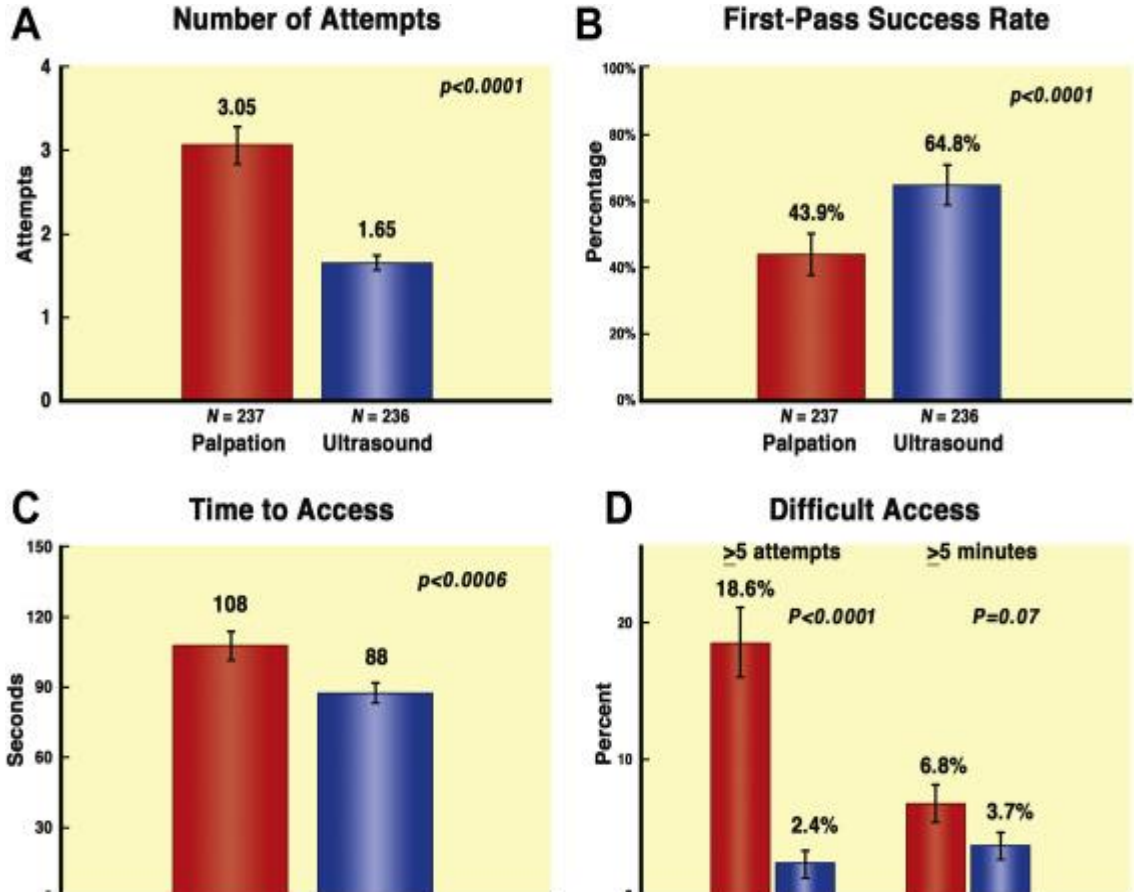
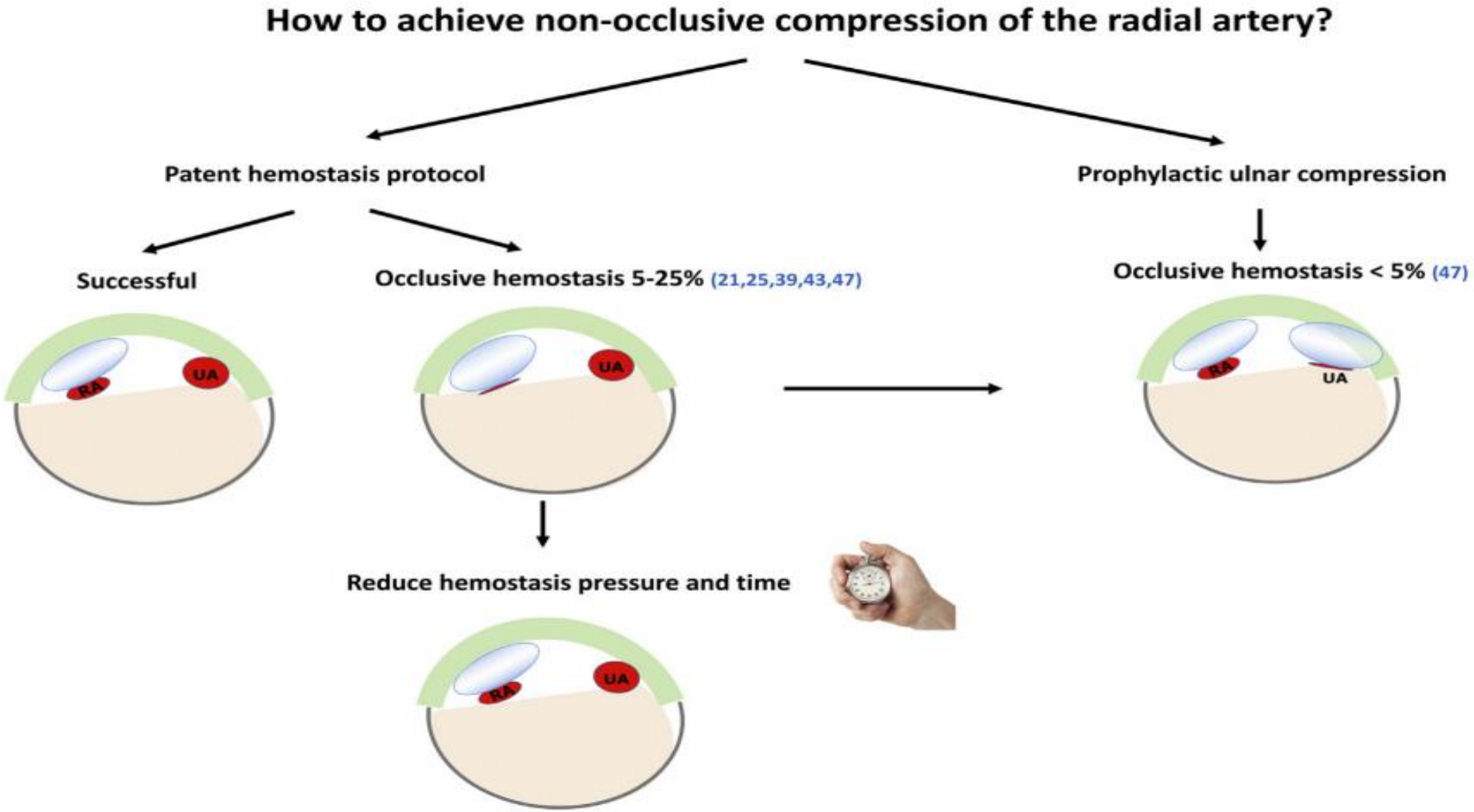


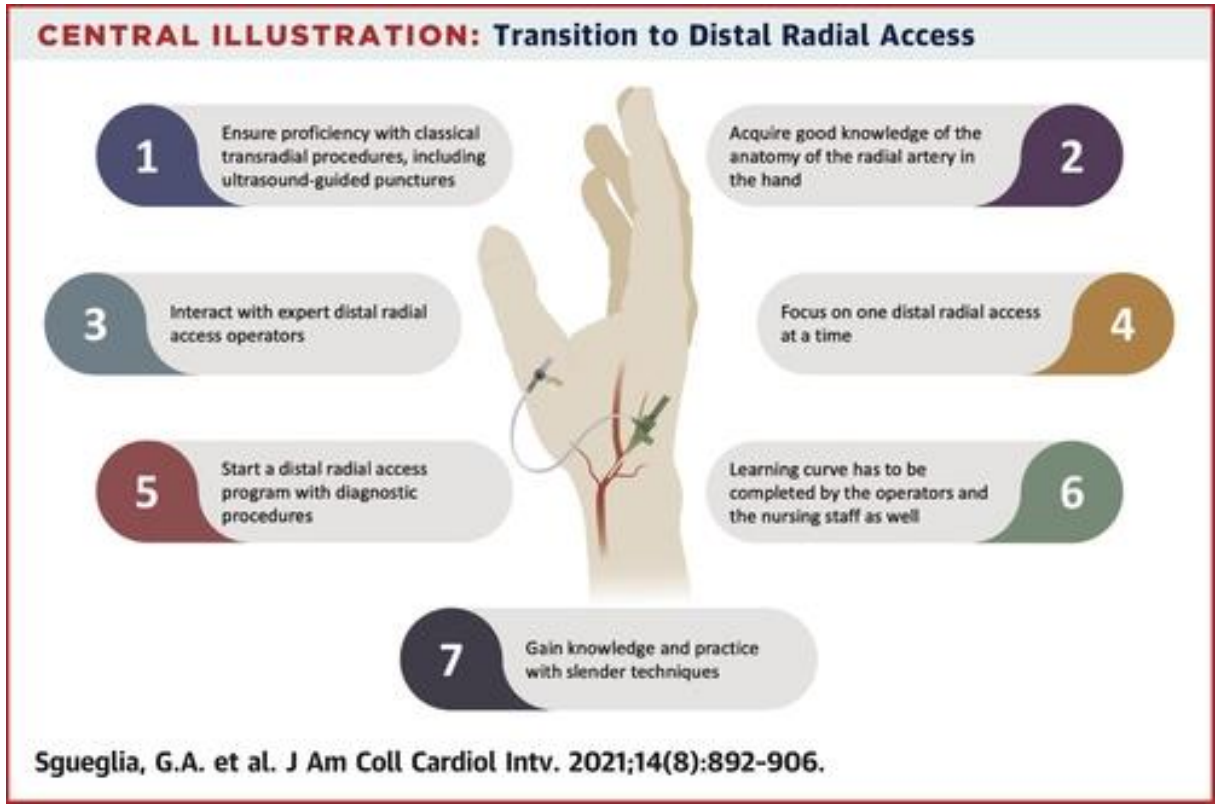
FIGURE 2 Flowchart to Achieve Nonocclusive Compression of the Radial Artery Following TRA Procedures



RA = radial artery; TRA = transradial access; UA = ulnar artery.

Treatment of RAO

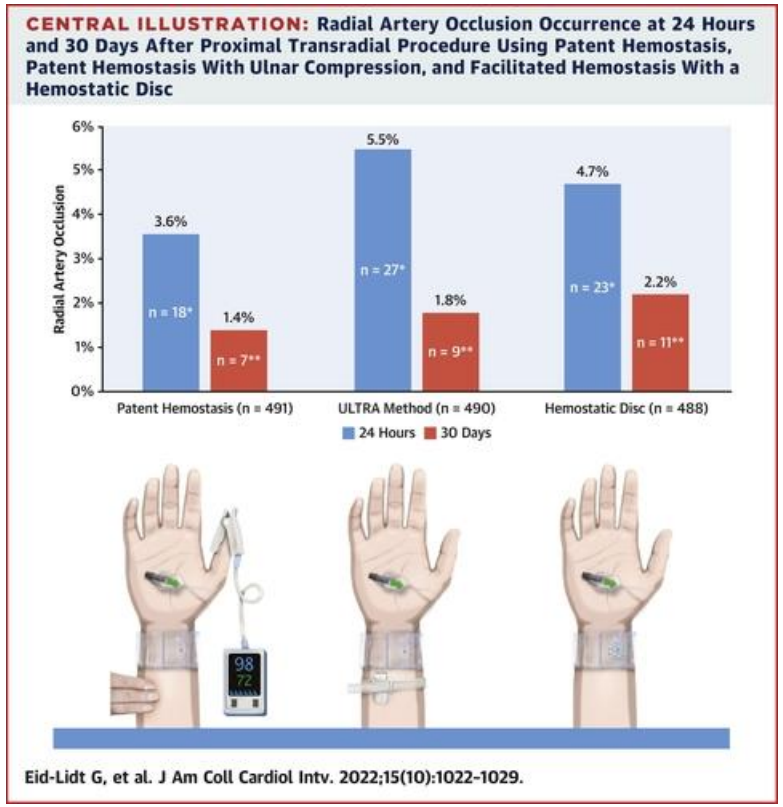
- LMWH : Reopening 66% to 87%
- Ulnar Compression and UFH IV 5000 units: Reopening 70%
- Invasive antegrade or regrograde: Ischemic Hand



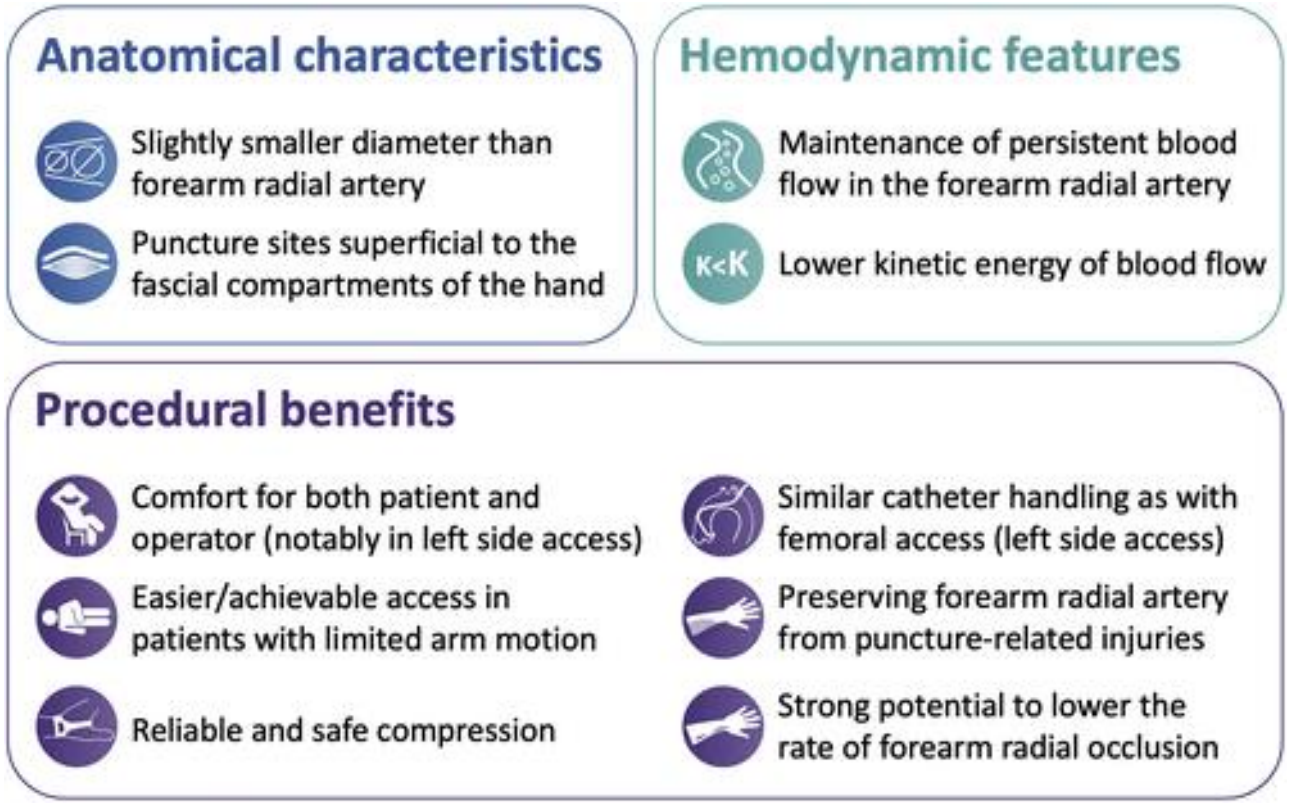
Gregory A. Sgueglia et al. *J Am Coll Cardiol Intv* 2021; 14:892-906.

- Yet the totality of data from 12 randomized clinical trials over the past decade found particularly in those with acute coronary syndrome, a lower bleeding rate translated into lower mortality [3]. This prompted a radial first approach by the American Heart Association for those with acute coronary syndrome [3].

Vascular Ultraosund



Guering Eid-Lidt et al. *J Am Coll Cardiol Intv* 2022; 15:1022-1029.



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RAO/PREVENTION

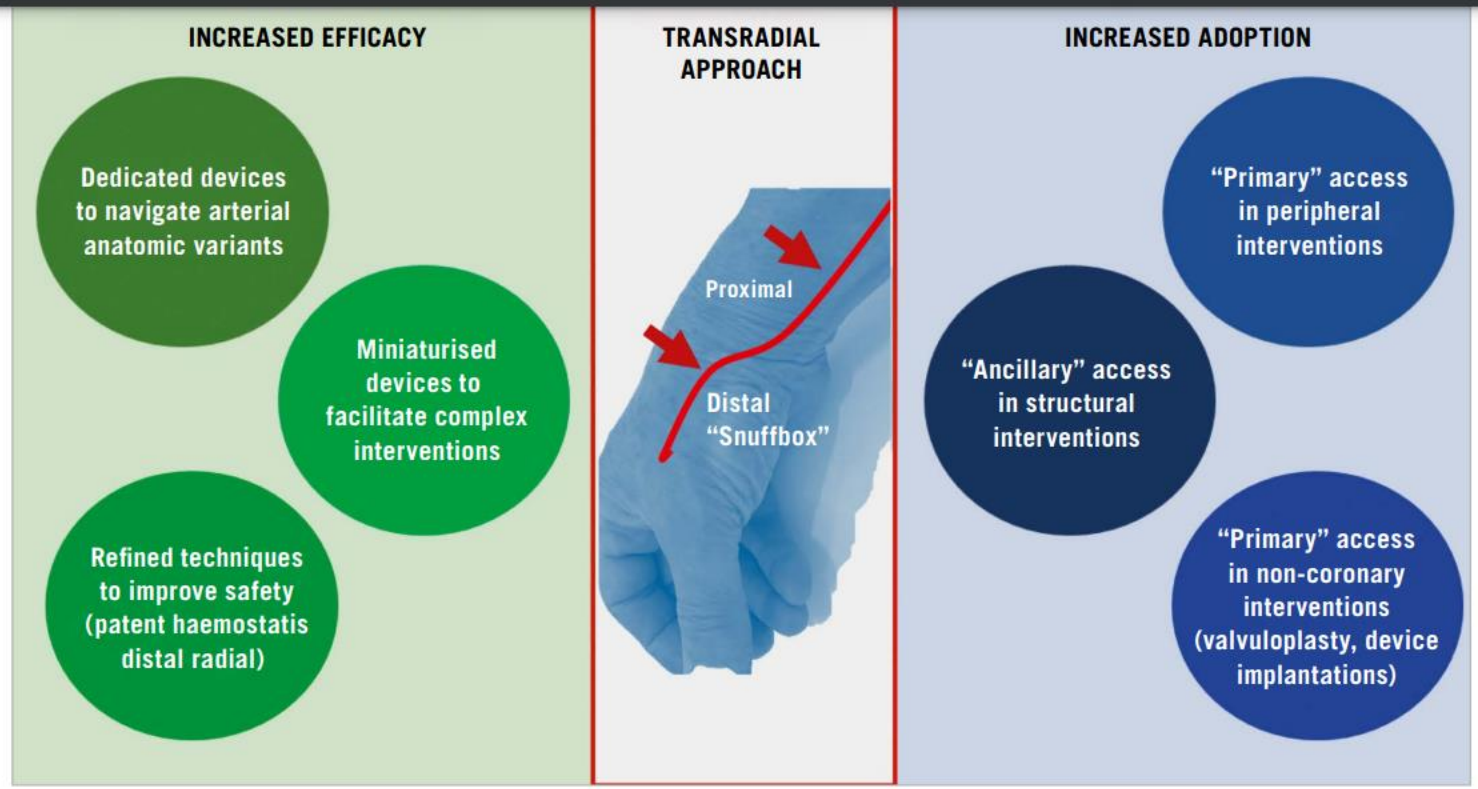
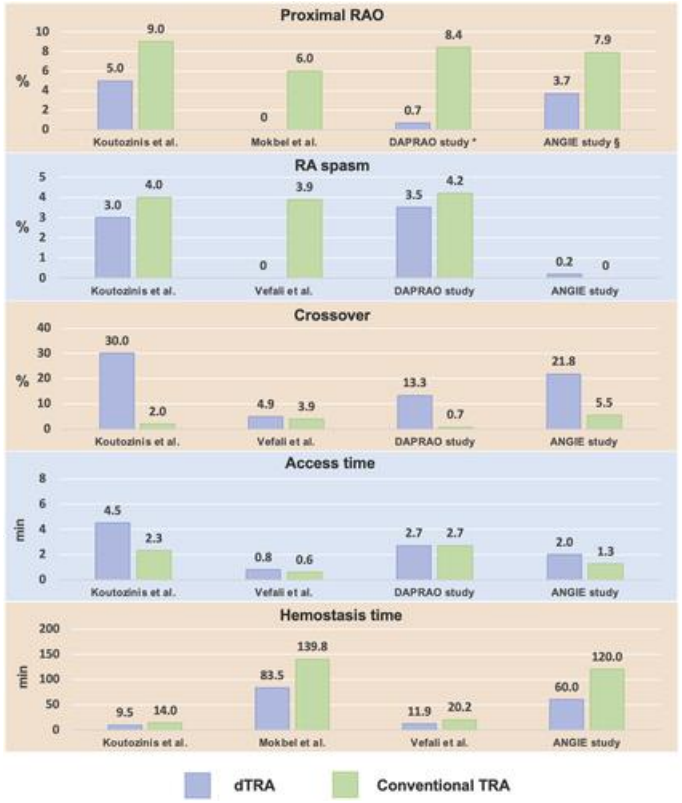
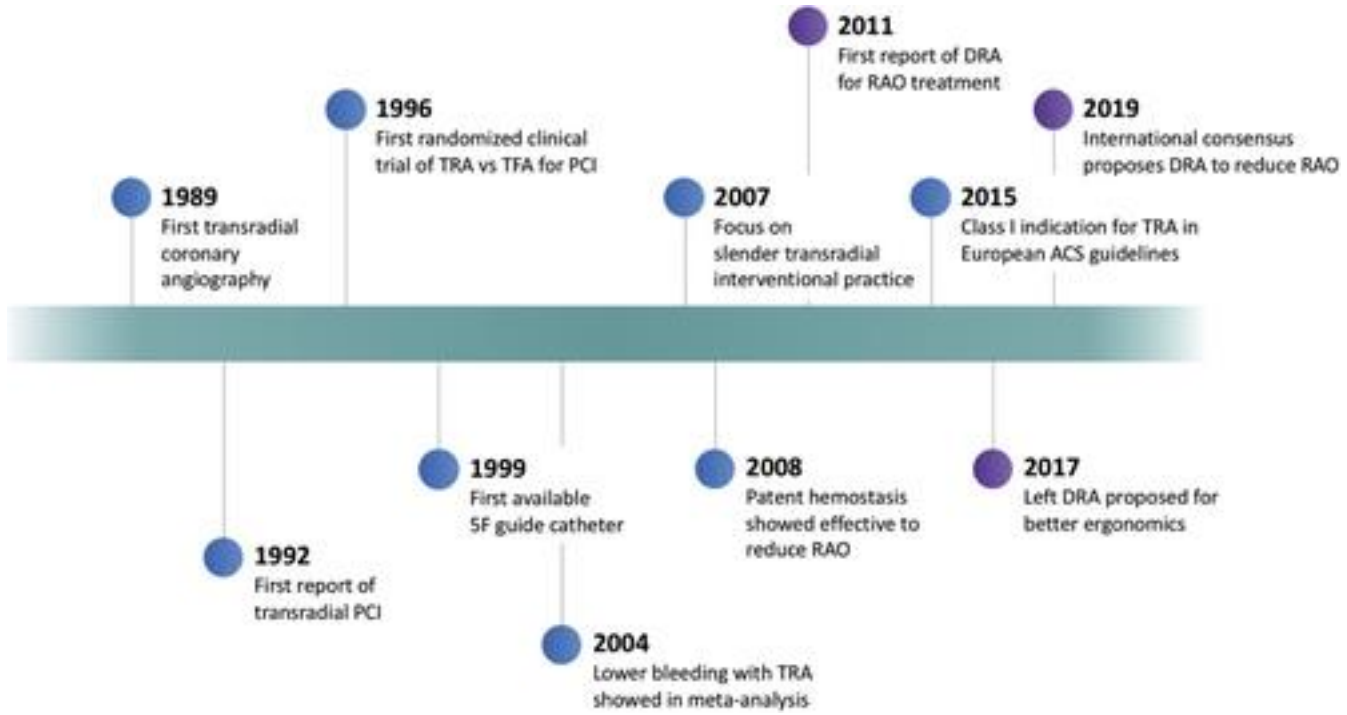


Figure 1. *TThirty years in the evolution of transradial coronary interventions: "first-in-man" in 1992 to increased efficacy and adoption in the guidelines in 2022.*



Marco Valgimigli et al. *J Am Coll Cardiol Intv* 2021; 15:33-38.



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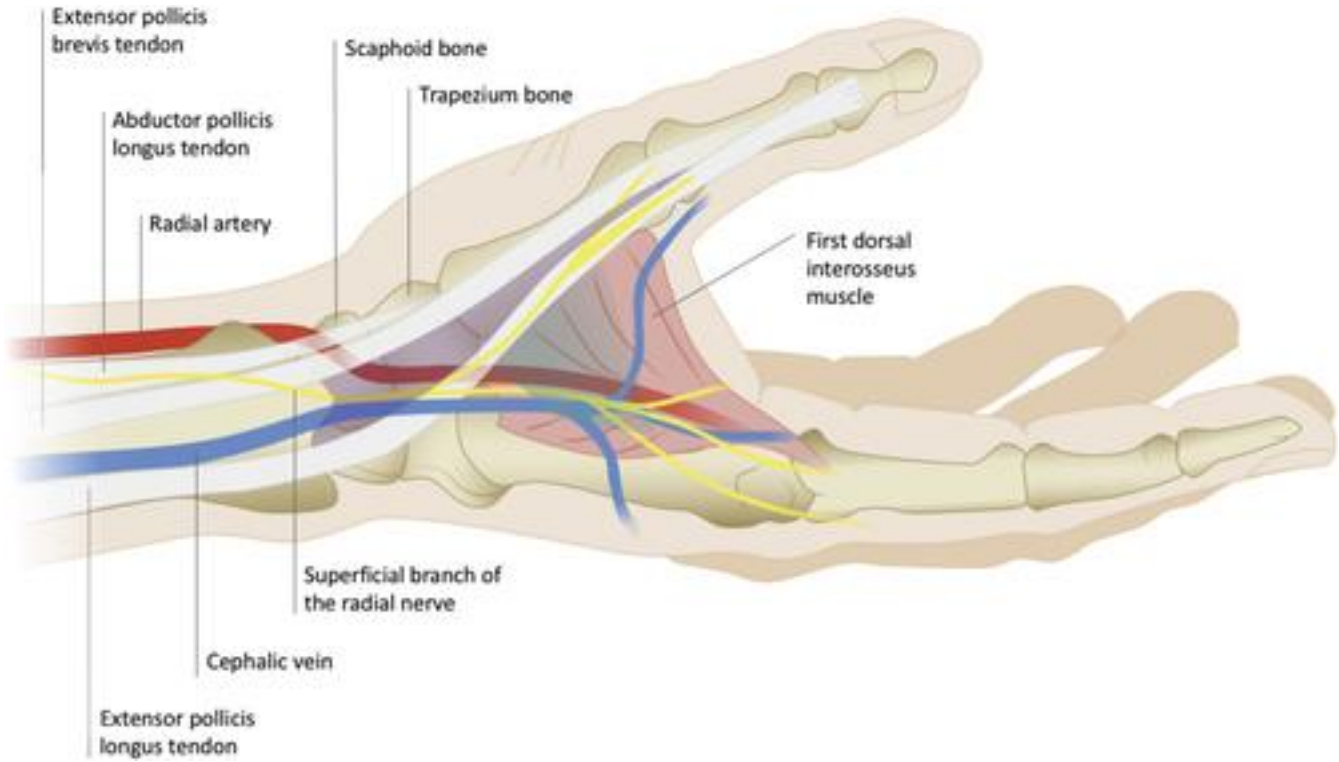

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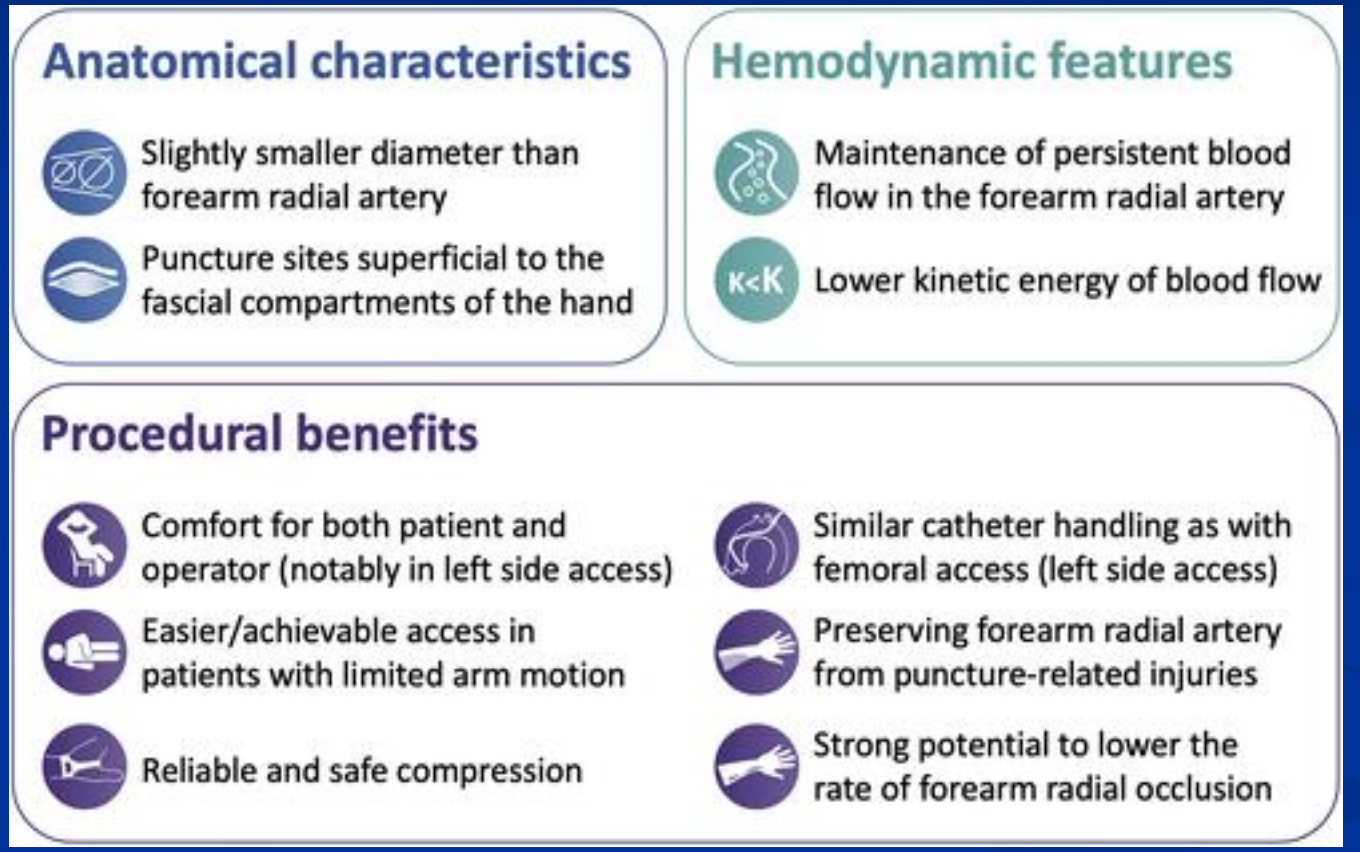
Distal Radial Access Issue Advantages



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