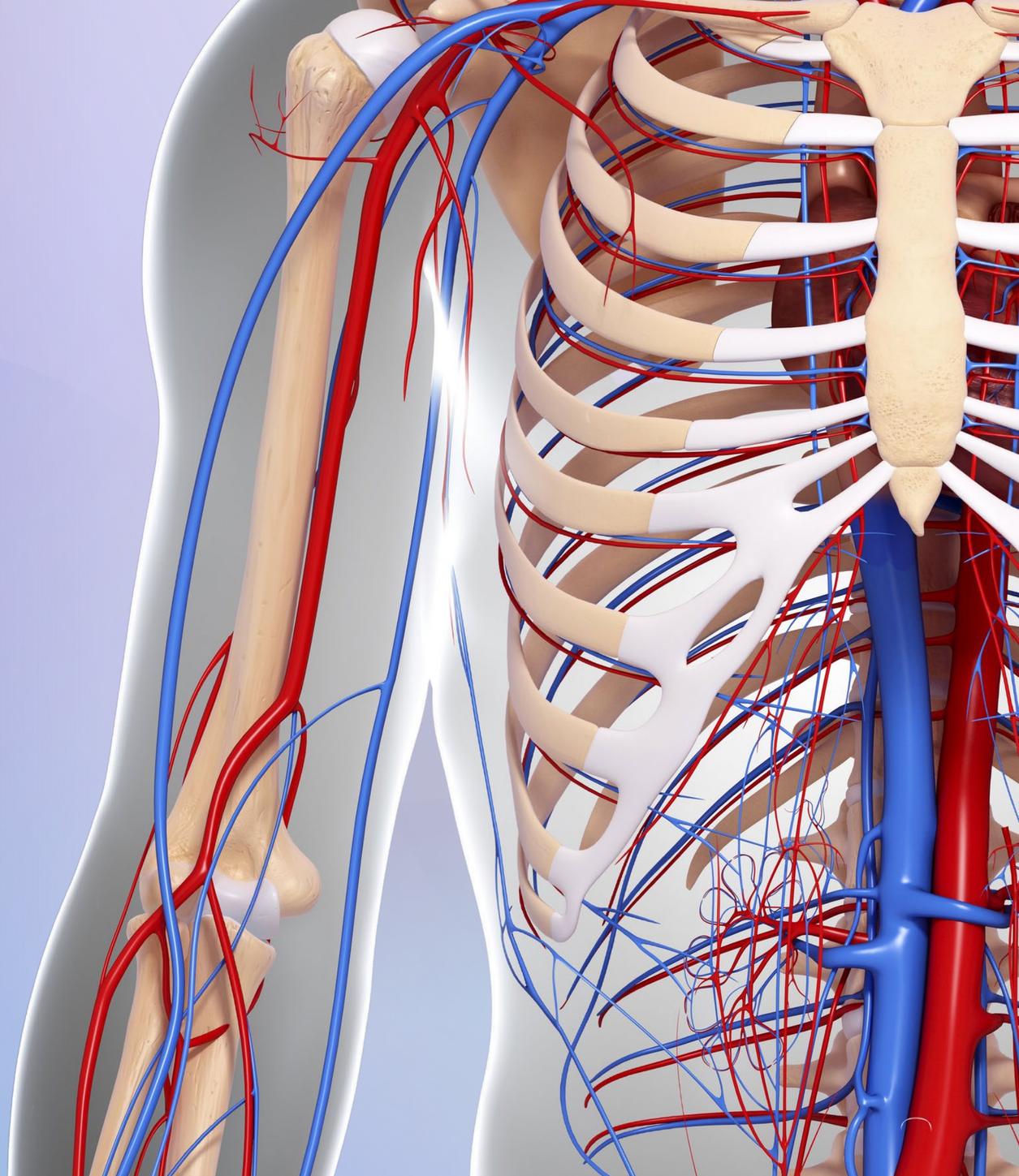
NEURI BICÊTRE

Radial Access for Neurointervention

New routes. Old challenges.

João B. Madureira
Jonathan Cortese, Jildaz Caroff, Cristian Mihalea, Léon Ikka, Vanessa Chalumeau, Sophie Gallas, Jacques Moret, Laurent Spelle

November 16, 2022



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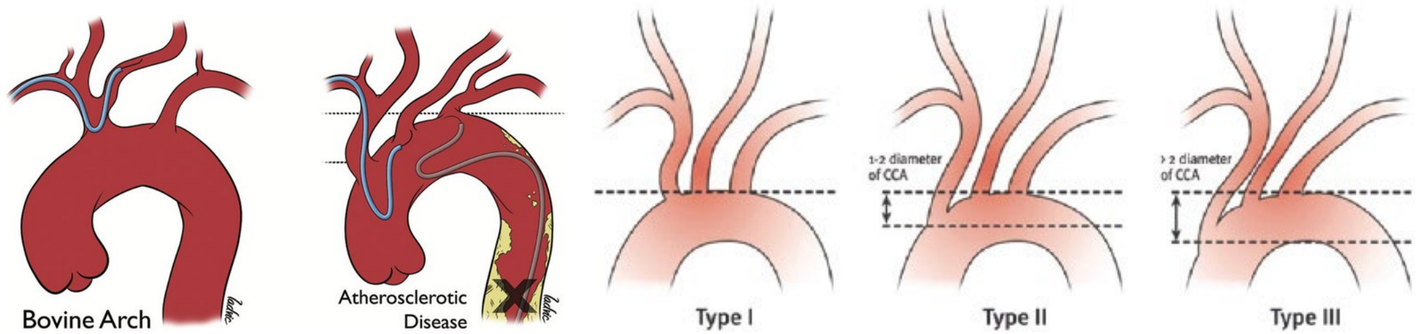
Step-by-step

Literature review and Bîcetre experience

Patient selection

RADIAL FIRST, PARTICULARLY IF:

Obese patient;
Bovine or type II/III aortic arches;
Previous iliac stenting/bypass, or femoral occlusion;
Extensive aortoiliac disease;
Antiplatelet agents or anticoagulation;
Pregnant patients;
Only a need for posterior circulation access.



Careful assessment of both radial and femoral pulses is recommended before entering the angiosuit.

Source:
Zalocar, L.A., Doroszuk, G. and Goland, J. (2020) “Transradial approach and its variations for neurointerventional procedures : Literature review,” Surgical Neurology International, 11, p. 248.
Kotelis, D. et al. (2012) “Morphological risk factors of stroke during thoracic endovascular aortic repair,” Langenbeck's Archives of Surgery, 397(8), pp. 1267 –1273.

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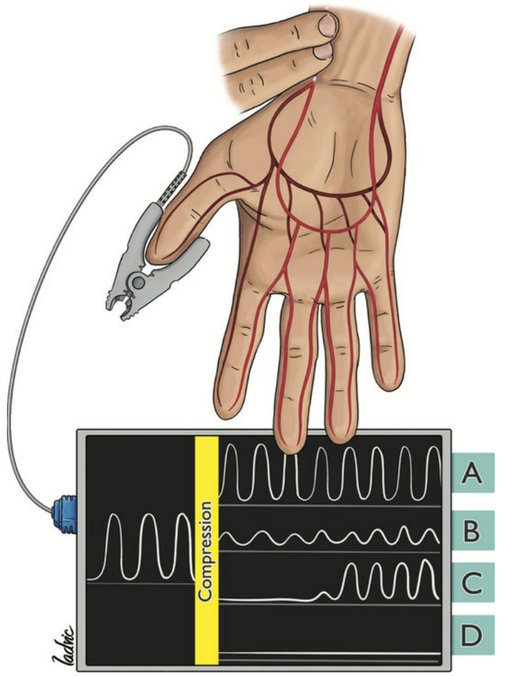
Patient selection

RELATIVE CONTRAINDICATIONS:

Radial artery size < 2mm;
Need for access > 7F;
Cardiogenic shock without palpable radial pulse;
Potential need for future arteriovenous fistula;
Need a radial artery donor site for coronary bypass graft surgery;
Known distal arterial occlusive disease or of Raynaud's syndrome .

Hand collateral circulation assessment through Allen/Barbeau tests has failed to predict hand-ischemia outcomes after TRA.

American Heart Association.



Source: Zalocar, L.A., Doroszuk, G. and Goland, J. (2020) "Transradial approach and its variations for neurointerventional procedures: Literature review," Surgical Neurology International, 11, p. 248.

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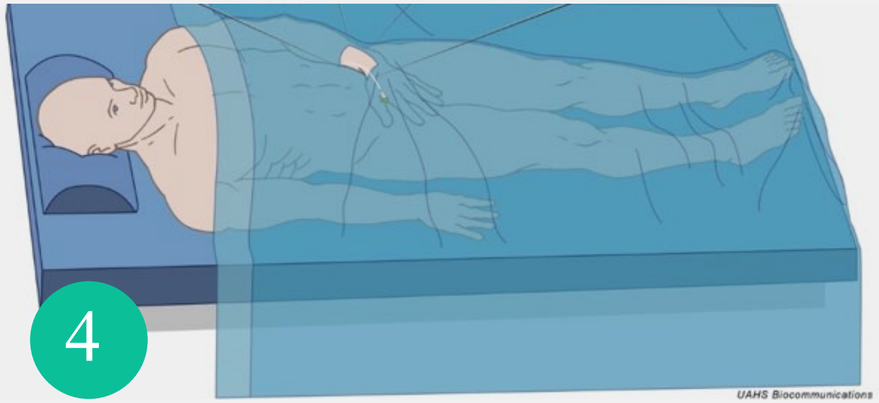
Room setup and patient preparation

Right side TRA is most frequently chosen as it is more convenient and favorable to the operator.

RIGHT APPROACH

Hand supine and extended on an arm -board.

Hand rotation if distal TRA.

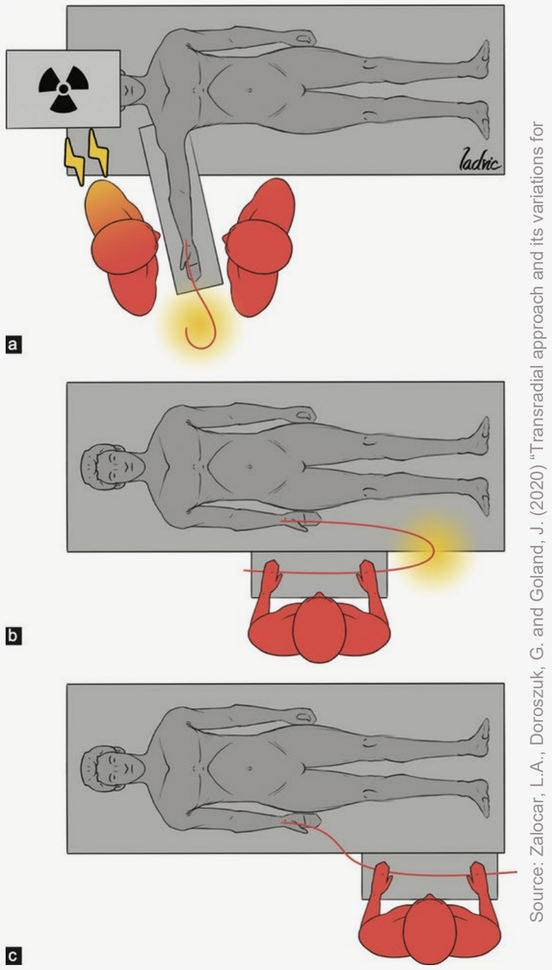


http://indieonlydesign.com/portfolio/surgical -procedure/

LEFT APPROACH

Catheterize from the left.

Work with left extended or bent arm, “Napoleonic” pose .



Source: Zalocar, L.A., Doroszuk, G. and Goland, J. (2020) “Transradial approach and its variations for neurointerventional procedures: Literature review,” Surgical Neurology International, 11, p. 248.

Room setup and patient preparation

Right side TRA is most frequently chosen as it is more convenient and favorable to the operator.

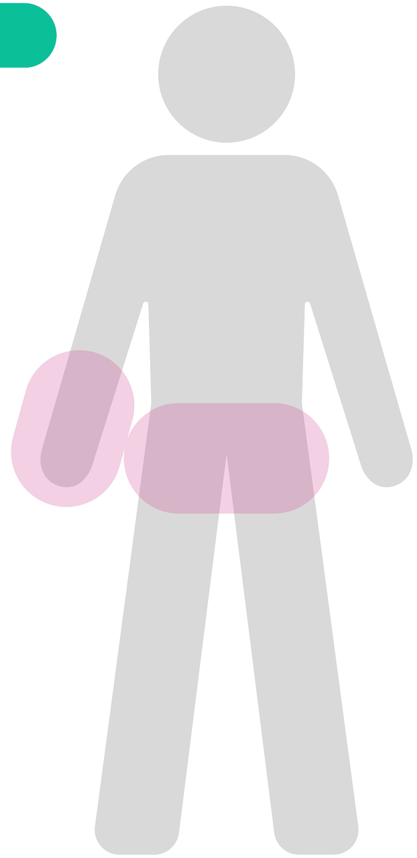
Room setup and patient preparation

Patient comfort is key to success.

STERILIZING PRACTICES

Wrist area from the flexor crease to the mid-forearm .

Groins should also be scrubbed .



PAIN AND SPASM PREVENTION

Topical lidocaine and nitroglycerin cream at least 30 minutes prior to puncture .

PRE-DILATE study

Manual heating of the radial artery prior to puncture .

Conscious sedation with opioids and/or benzodiazepines .

Radial puncture

RADIAL PUNCTURE SITE

Traditionally, TRA is obtained ~1 –3 cm proximal to the palmar wrist crease.

ARTERY SIZE

Proximal TRA:

2.69±0.40 mm (men); 2.43±0.38 mm (women)

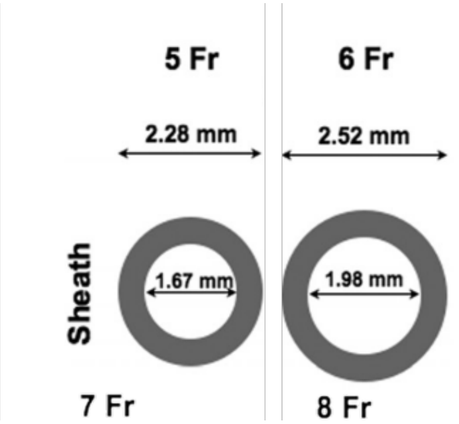
Range 1.15–3.95 mm.

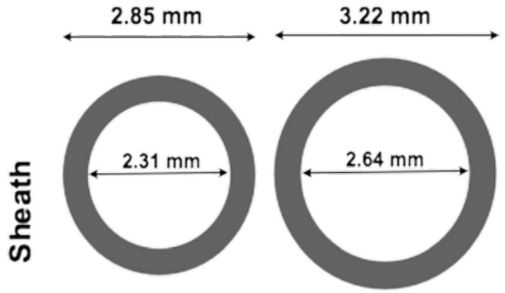
Distal TRA:

Smaller in size, but the difference is not significant .

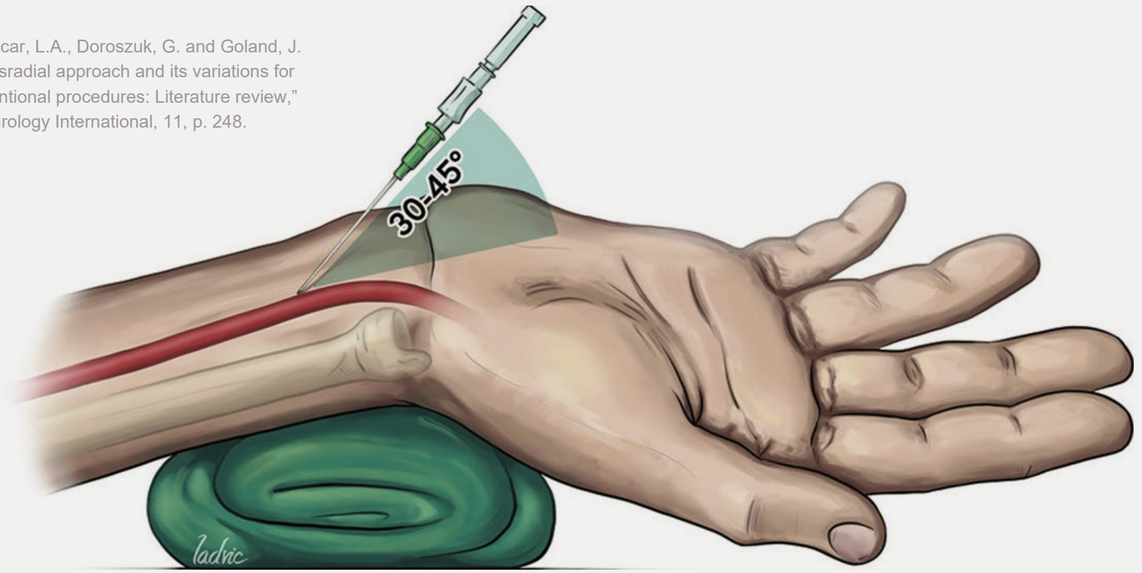
Ulnar artery :

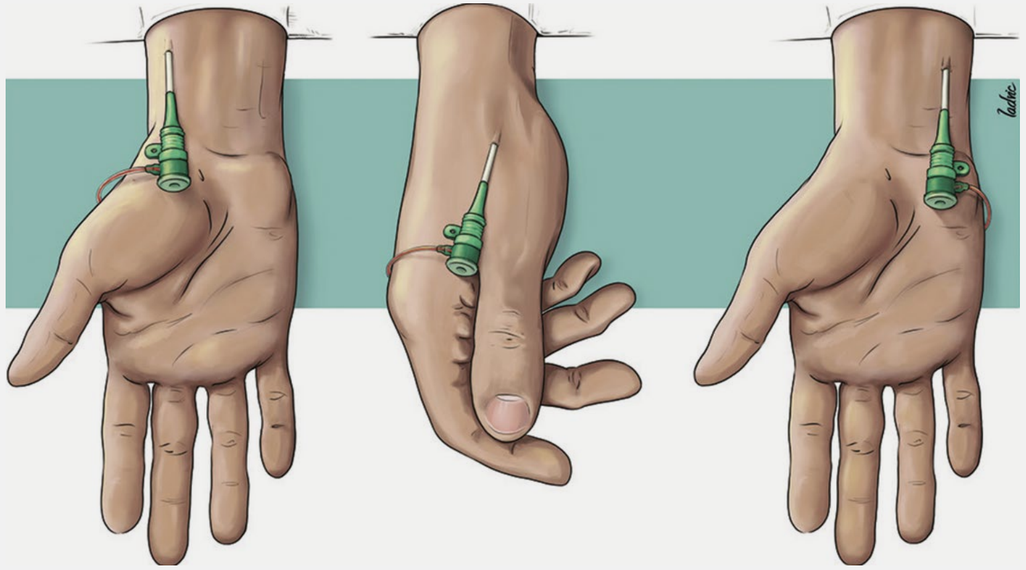
Larger than RA, but deeper .





Source: Zalocar, L.A., Doroszuk, G. and Goland, J. (2020) “Transradial approach and its variations for neurointerventional procedures: Literature review,” Surgical Neurology International, 11, p. 248.





Radial puncture

RADIAL PUNCTURE SITE

Distal transradial access (dTRA) has a lower rate of complications.

There is a lower risk of radial artery occlusion and sparing of the superficial palmar branch origin and conventional TRA access site.

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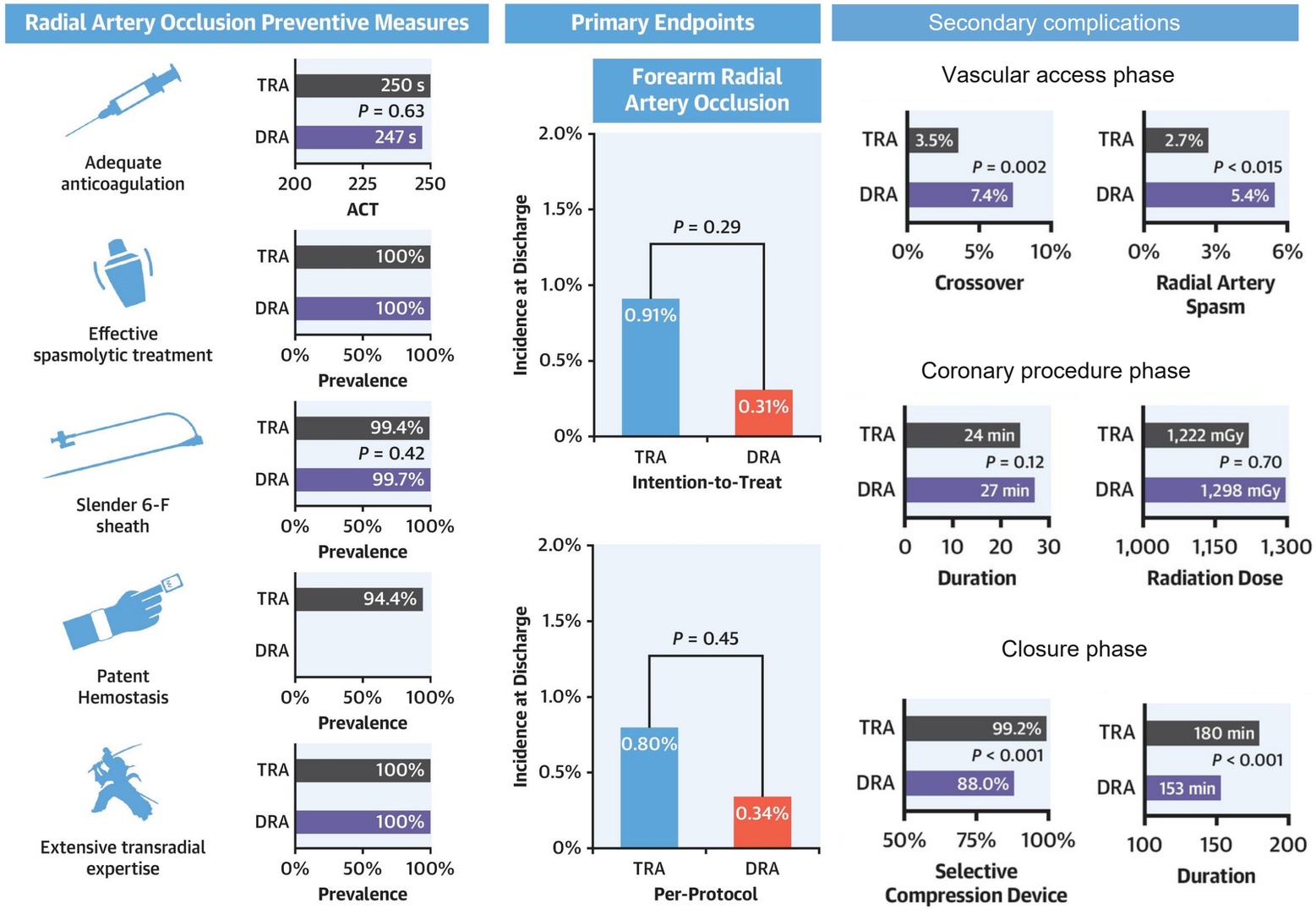
Archives of Cardiovascular Diseases

DISCO RADIAL TRIAL

2017



Source: Georges, J. -L. et al. (2017) "Radial versus femoral access for coronary angiography and intervention is associated with lower patient radiation exposure in high -radial -volume centres: Insights from the ray'act -1 study," Archives of Cardiovascular Diseases, 110(3), pp. 179 –187.

Radial puncture

RADIAL PUNCTURE SITE

To avoid excess spasm caused by multiple punctures, it is ideal if radial artery access is achieved on the first attempt.

Micro-puncture radial set with a 21G needle, 0.018″ micro-guidewire, and sheath (either 4, 5, or 6F) is preferred.

Use the smallest sheath size.

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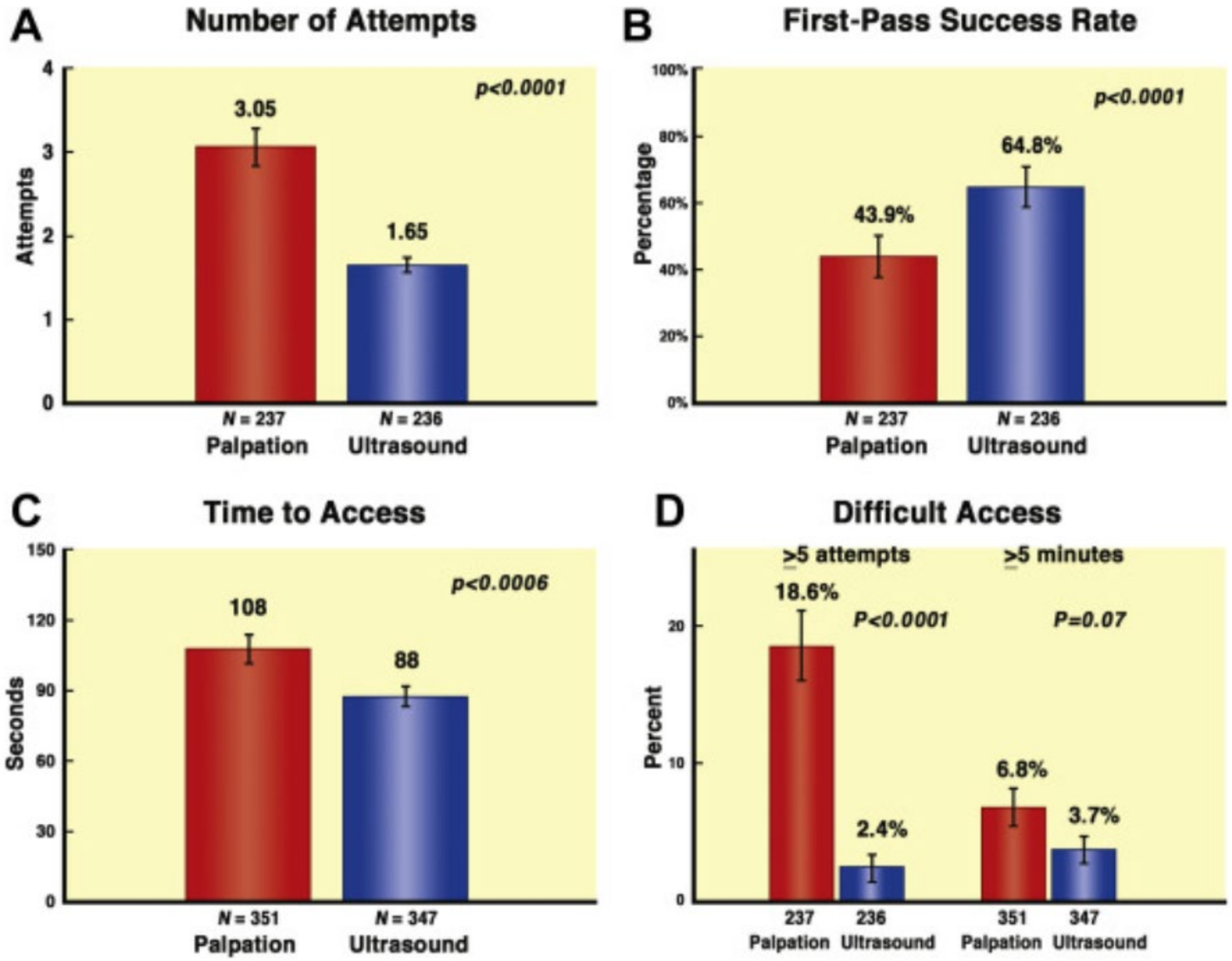
JACC cardiovascular Interventions RAUST STUDY 2015

USE ECOCUIDANCE FOR OPTIMAL ACCESS



Source: Seto, A.H. et al. (2015) "Real-time ultrasound guidance facilitates transradial access," JACC: Cardiovascular Interventions, 8(2), pp. 283–291.

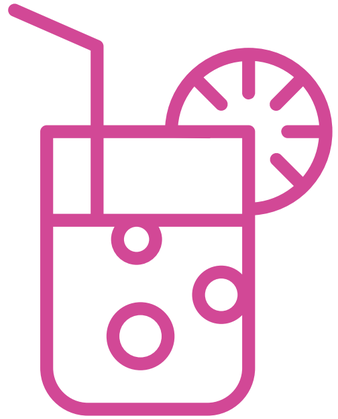
Radial cocktails

VASOSPASM PREVENTION

To prevent radial artery spasm or thrombosis, the use of anticoagulants and antispasmodic drugs is recommended.

If radial spasm is encountered during the procedure, antispasmodic drugs can be repeated.

THROMBOSIS



HEPARIN

Unfractionated heparin
50–70 U/kg or 5000 U

RADIAL SPASM

CCB

Verapamil
2.5 - 5 mg

Diltiazem
2 mg

Nicardipine
1 mg

Nimodipine
1 mg

NITRATES

Nitroglycerin
100 - 200 µg

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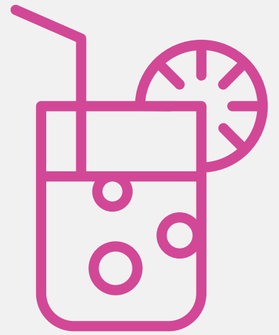
Radial cocktails

VASOSPASM PREVENTION

At Bîcetre we use a combination of unfractionated heparin (5000 U) and verapamil (2.5 mg).

Since the PATENS trial (2022) we stopped using intra-arterial nitrates.

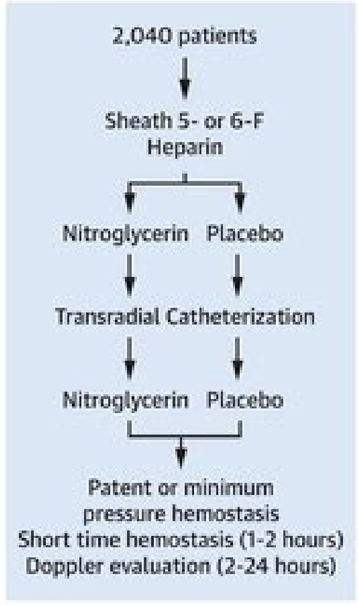


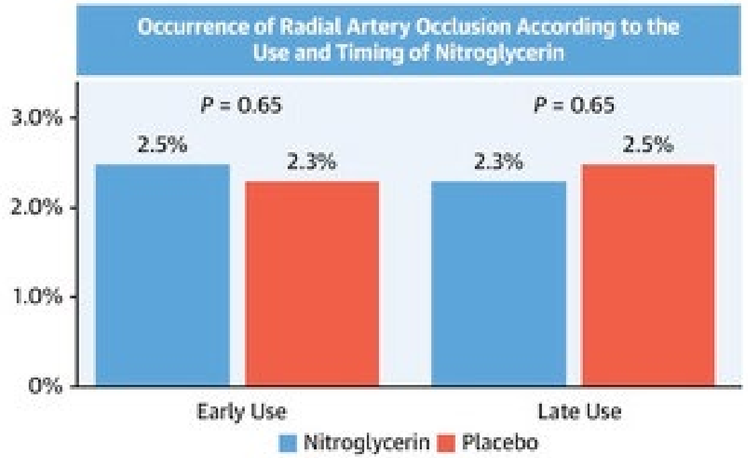
HEPARIN

Unfractionated heparin
5000 U

CCB

Verapamil
2.5 mg





Source : da Silva, R. L., de Andrade, P. B., Dangas, G., Joaquim, R. M., da Silva, T. R. W., Vieira, R. G., Pereira, V. C., Sousa, A. G. M., Feres, F., & Costa, J. R. (2022). Randomized clinical trial on prevention of radial occlusion after Transradial access using nitroglycerin . JACC: Cardiovascular Interventions, 15(10),

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Radial puncture

RADIAL PUNCTURE SITE

1. Perform surgical field cleaning and disinfection.

2. Prepare the echograph probe with adequate parameters.

3. Assess the radial artery location with palpation followed by echography.

4. Inject subcutaneous lidocaine with or without nitroglycerin (400 -500 µg). Needle 23G.

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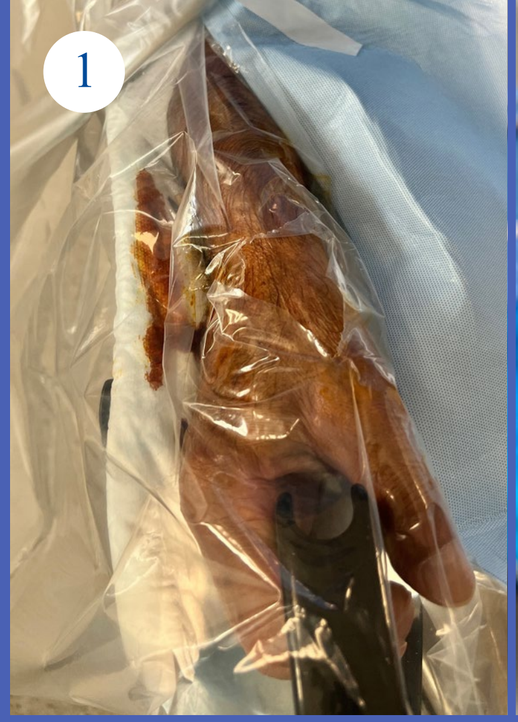
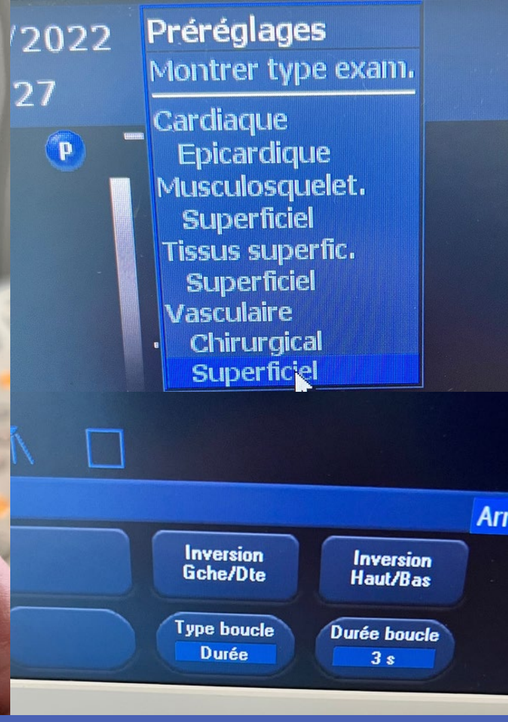
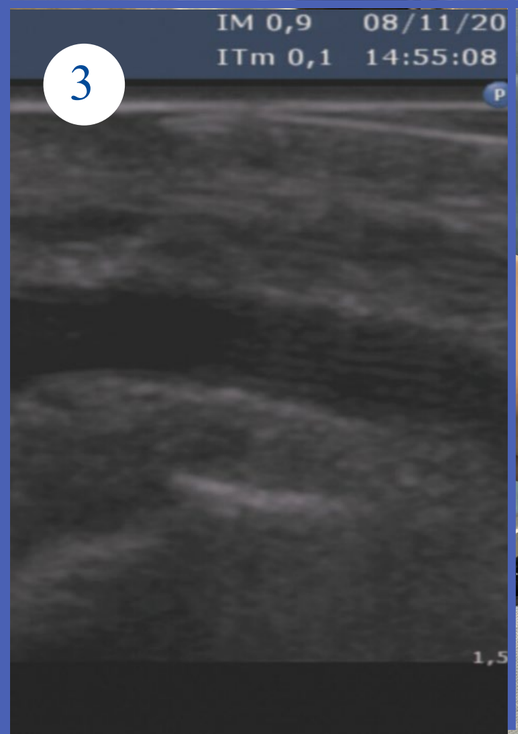
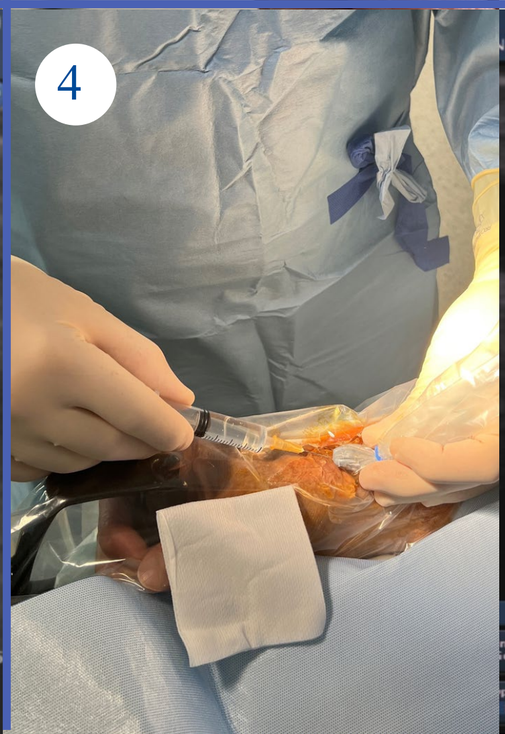
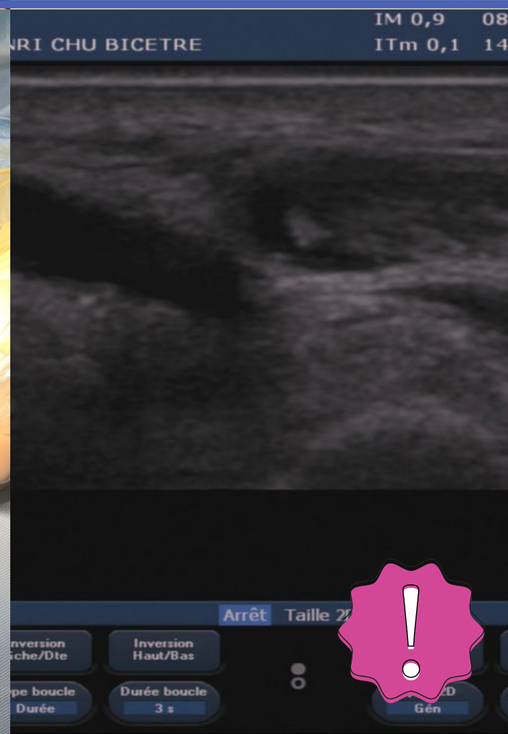










Radial puncture

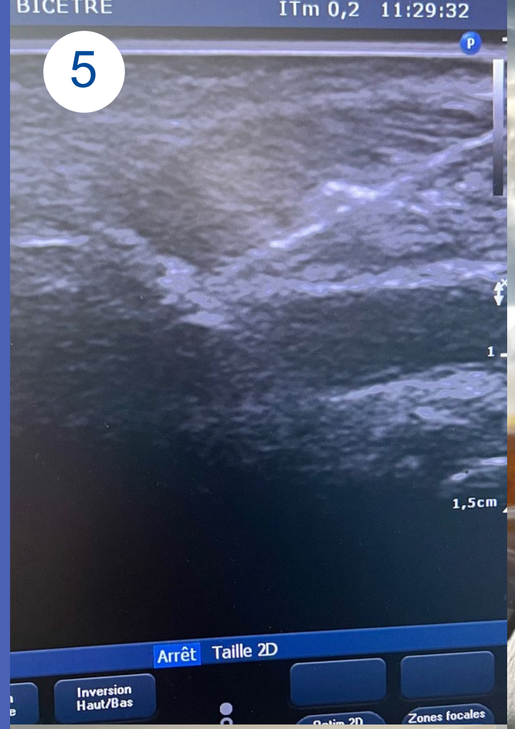
RADIAL PUNCTURE SITE

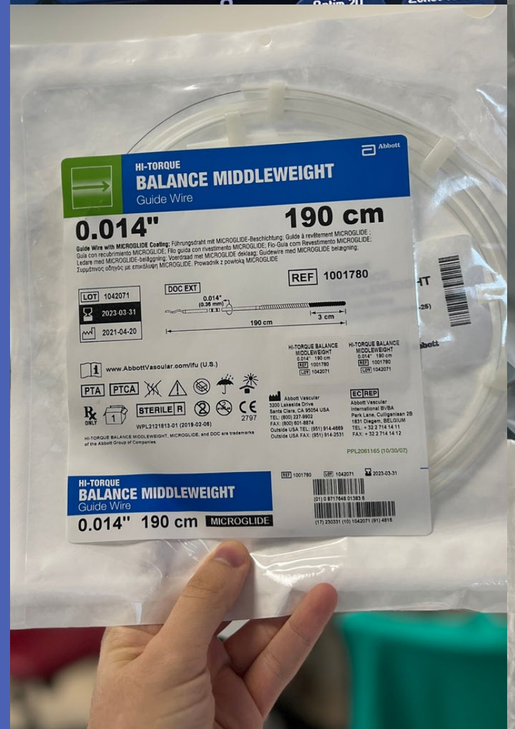
5 . Puncture under echoguidance. In Bîcetre we favor the single -wall puncture.

6. Advance the guide -wire. If resistance is felt, take it back and try again.

7. Place the sheath over the guide -wire.

8. Slowly administer the radial cocktail diluted in the patient blood (20 mL) through the sheath 3 -way stop cock. Fixate the sheath.





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Navigation

ARM NAVIGATION

A radial artery angiogram should be performed through the sheath to include a view of the brachial bifurcation.

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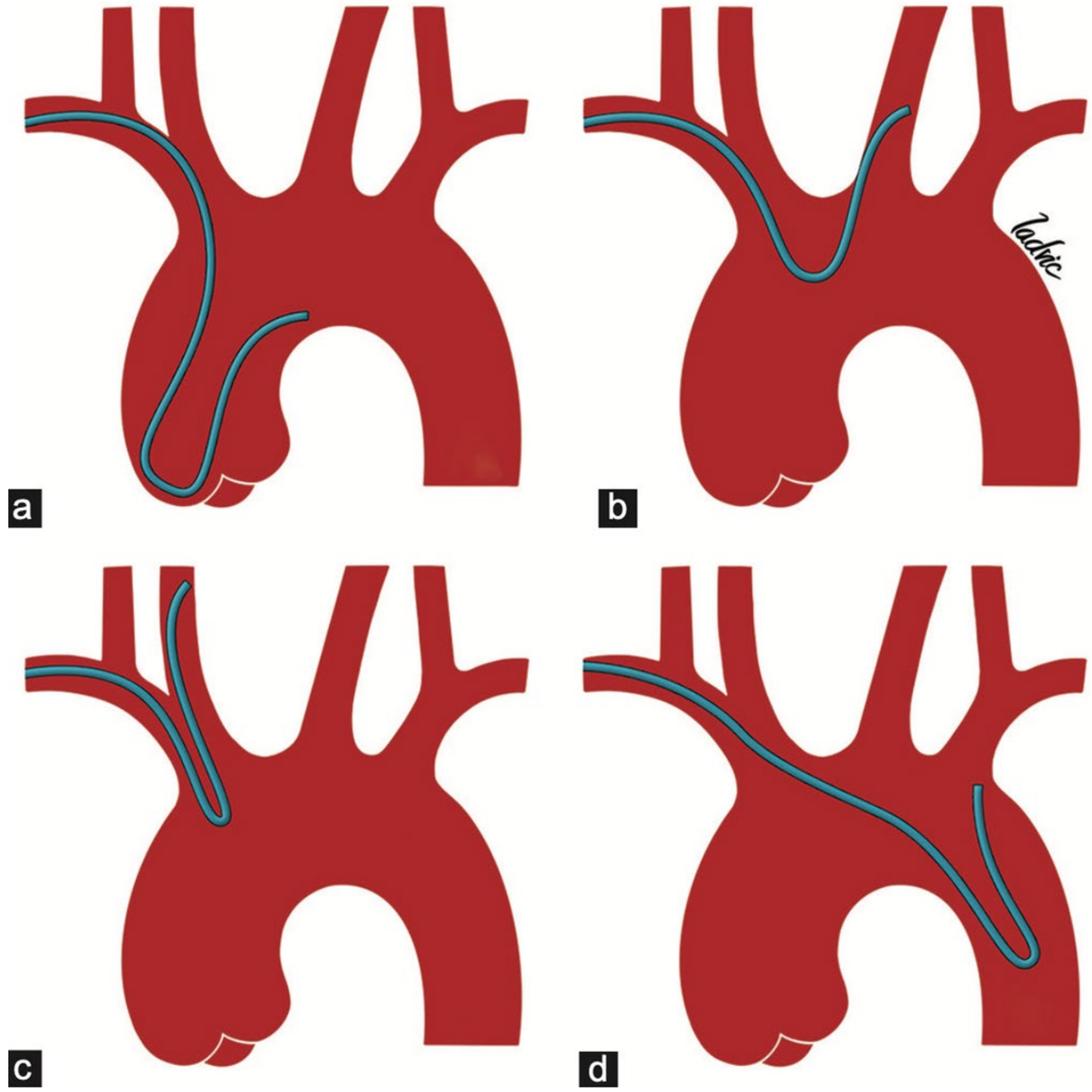
Navigation

CATHETER CURVE FORMATION

Navigation can be usually performed using a Simmons 2 catheter and 150 cm 45-shaped 0.035" wire.

Glide: > navigability, < support
Non-glide: < navigability, > support.

Once the Simmons catheter is reconstituted, selective four-vessel catheterization is performed identically as in TFA.



Source : Zalocar, L.A., Doroszuk, G. and Goland, J. (2020) “Transradial approach and its variations for neurointerventional procedures : Literature review,” Surgical Neurology International, 11, p. 248 .

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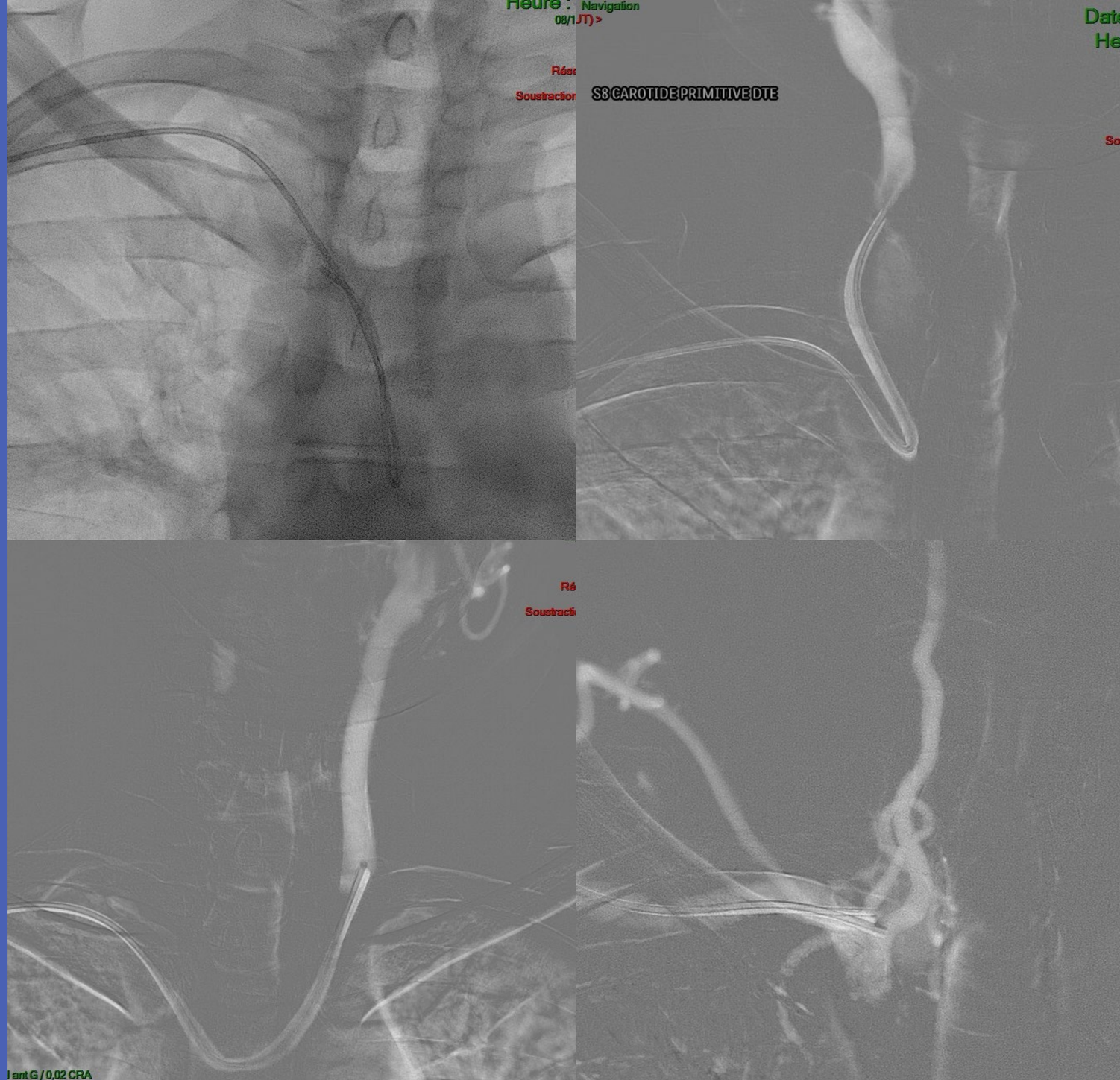
Navigation

CATHETER CURVE FORMATION

Navigation can be usually performed using a Simmons 2 catheter and 175 cm J-shaped 0.035" wire.

Glide: > navigability, < support
Non-glide: < navigability, > support.

Once the Simmons catheter is reconstituted, selective four-vessel catheterization is performed identically as in TFA.



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Navigation

ENDOVASCULAR TREATMENT

When angiography is followed by endovascular treatment, the Simmons catheter usually is exchanged for another type of catheter over an exchange guide.

Several support catheters have been described in the literature for endovascular treatment procedures:

	OD F / inch / mm	ID inch / mm	Working length cm
BALLAST .088	8 / 0.106 / 2.70	0.088 / 2.24	80, 90,100, 105
RIST .079	7 / 0.092 / 2.36	0.079 / 2.01	95, 100, 105
BENCHMARK .071	6 / 0.079 / 2.03	0.071 / 1.80	95, 105, 115

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Navigation

POOLED-ANALYSIS FROM:

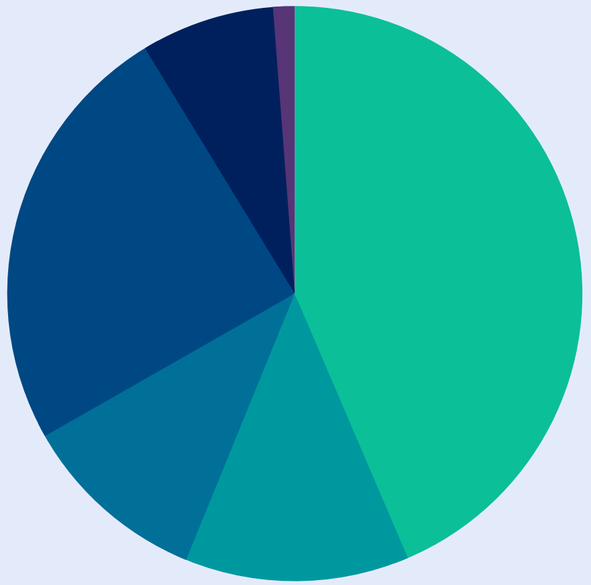
Catapano, J.S. et al. (2019)
Journal of NeuroInterventional Surgery
N=206 / Multiple procedures / Multiple devices

Abecassis, I.J. et al. (2021)
Journal of NeuroInterventional Surgery
N = 152 / Multiple procedures / RIST (7F)

Weinberg, J.H. et al. (2021)
Clinical Neurology and Neurosurgery
N = 91 / Multiple procedures / BALLAST (8F)

Siddiqui, A.H. et al. (2021)
Journal of NeuroInterventional Surgery
N = 93 / Stroke / Multiple devices

ENDOVASCULAR PROCEDURES VIA TRA



DIAGNOSTIC / VASOSPASM (N= 325 / 43 .6 %)

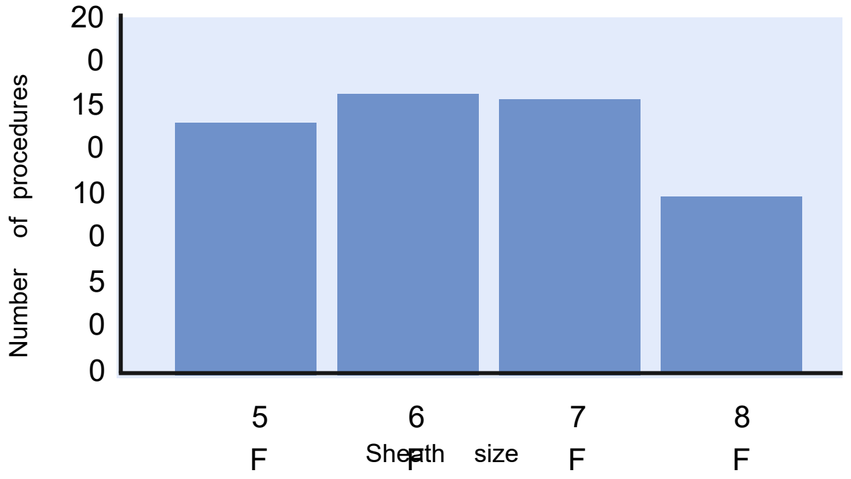
ANEURYSM COILING (N= 94 / 12 .6 %)

MECHANICAL THROMBECTOMY AND STENTING (N= 183 / 24 .5 %)

FLOW DIVERSION, STENT OR INTRASACULAR (N= 79 / 10 .6 %)

EMBOLIZATION OTHER THAN ANEURYSM (N= 56 / 7 .5 %)

OTHER TREATMENTS (N= 9 / 1.2 %)



Crossover to TFA: N=8

Access - site hematomas: N=4

Thromboembolic events: N=1

Vessel dissection/perforation : N=2

Weakness or paresthesia: N=2

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Closure

TECHNIQUE

Several techniques have been proposed for radial artery hemostasis.

The objective is to promote hemostasis, while preventing radial artery occlusion.

Lower compression times, patent hemostasis technique and distal access have been show to improve patency rates.

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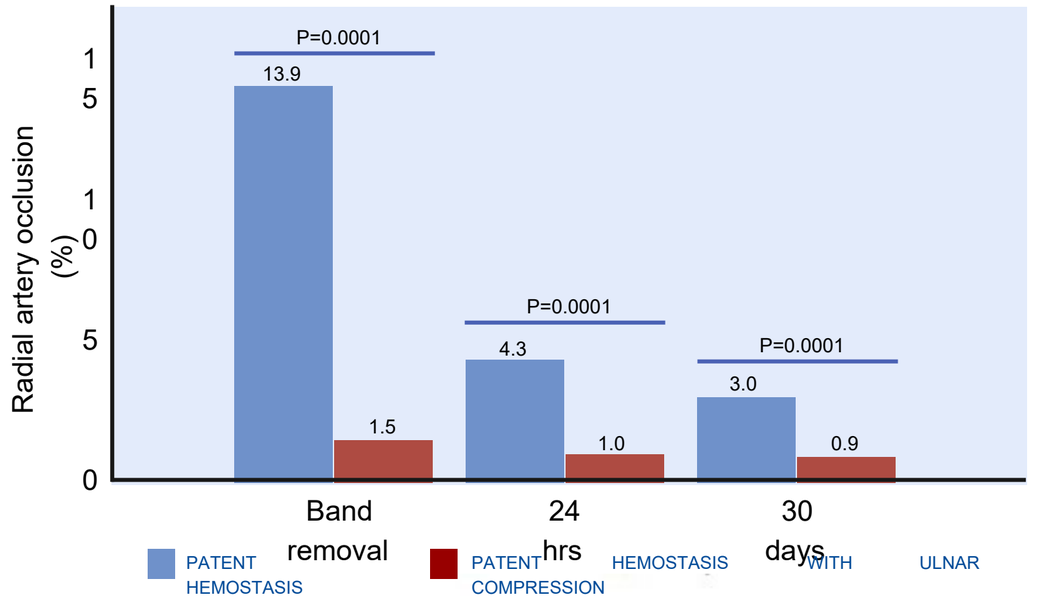
JACC cardiovascular Interventions PROPHET-II TRIAL 2016

CONFLICTING EVIDENCE REGARDING ULNAR COMPRESSION



Source: Pancholy, S.B. et al. (2016) "Prevention of radial artery occlusion after Transradial catheterization," JACC: Cardiovascular Interventions, 9(19), pp. 1992–1999.

Closure

TECHNIQUE

Several techniques have been proposed for radial artery hemostasis.

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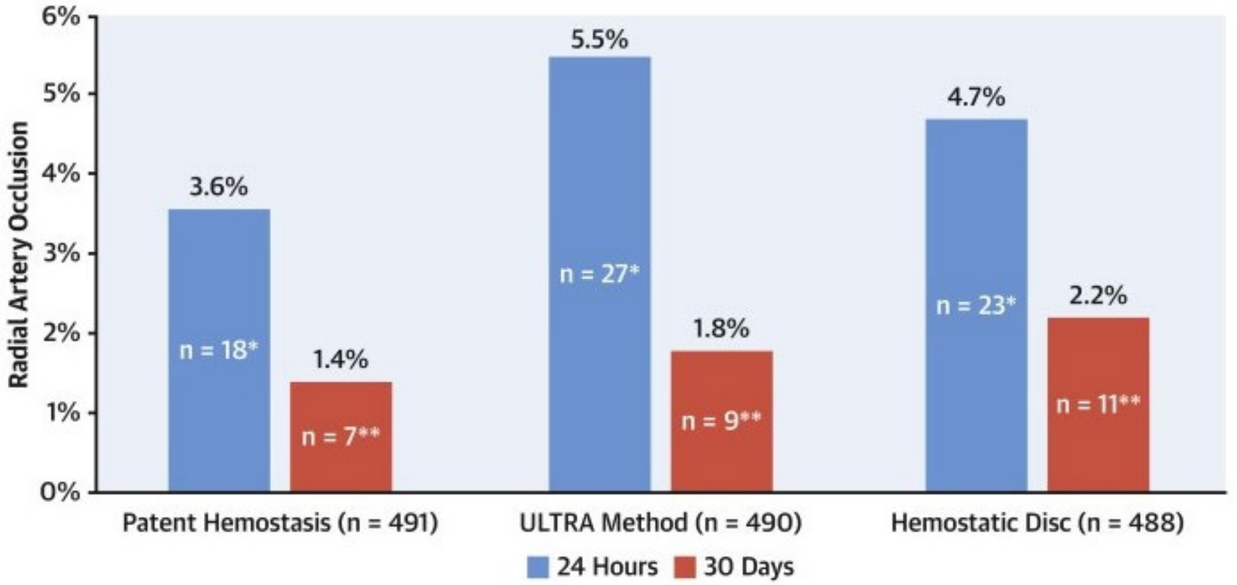
JACC cardiovascular Interventions 2022

CONFLICTING EVIDENCE REGARDING ULNAR COMPRESSION



Source: Eid-Lidt, G. et al. (2022) "Prevention of radial artery occlusion of 3 hemostatic methods in transradial intervention for coronary angiography," JACC: Cardiovascular Interventions, 15(10), pp. 1022–1029.

Closure

TECHNIQUE

Several techniques have been proposed for radial artery hemostasis.

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Lower compression times, patent hemostasis technique and distal access have been show to improve patency rates.

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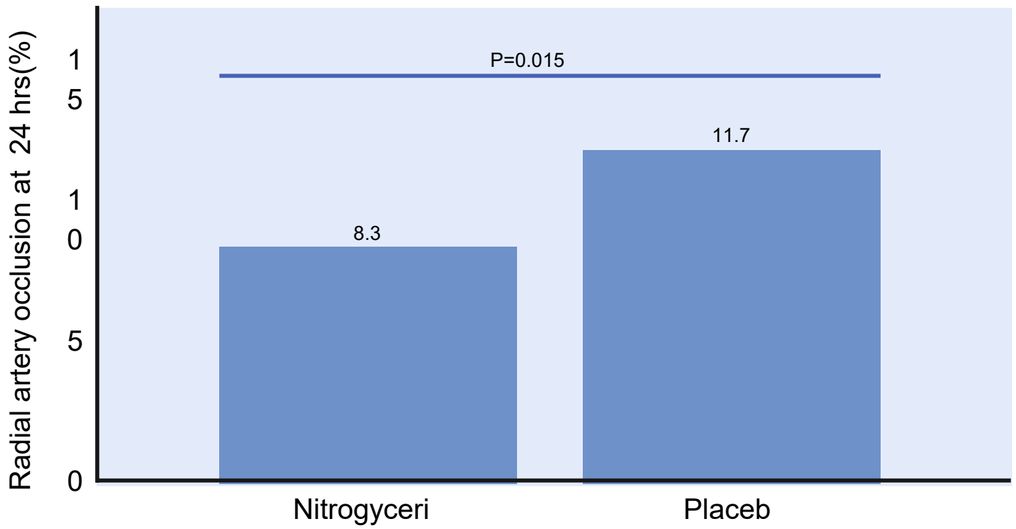
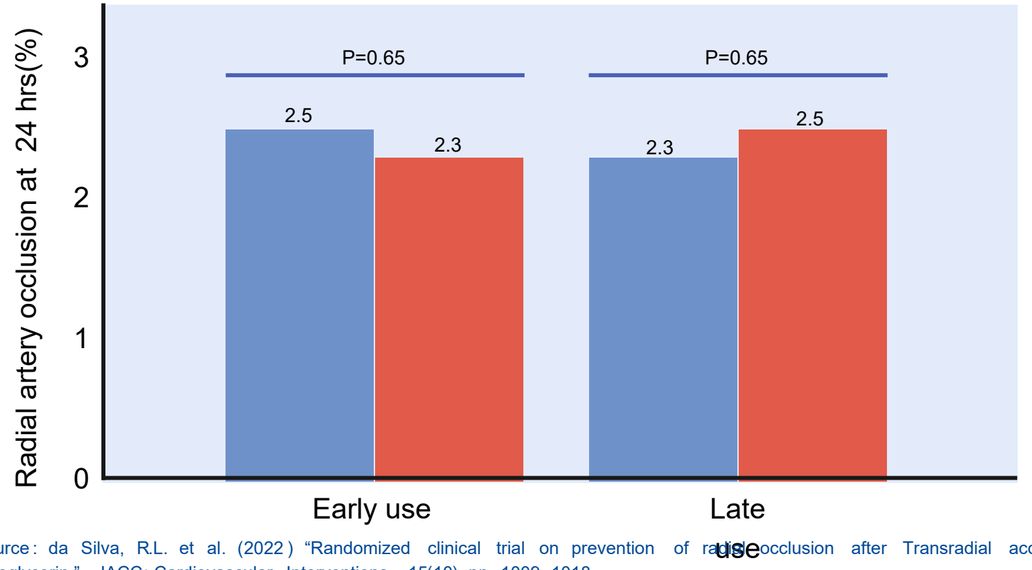
CONFLICTING EVIDENCE REGARDING NITROGLYCERIN



CCI Catheterization & Cardiovascular Interventions

2014

Source: Dharma, S. et al. (2014) "A novel approach to reduce radial artery occlusion after transradial catheterization : Postprocedural/prehemostasis intra-arterial nitroglycerin," Catheterization and Cardiovascular Interventions, 85(5), pp. 818–825



JACC Cardiovascular Interventions

PATENS TRIAL

2022

Source: da Silva, R.L. et al. (2022) "Randomized clinical trial on prevention of radial occlusion after Transradial access using nitroglycerin," JACC: Cardiovascular Interventions, 15(10), pp. 1009–1018.

Closure

TECHNIQUE

Several techniques have been proposed for radial artery hemostasis.

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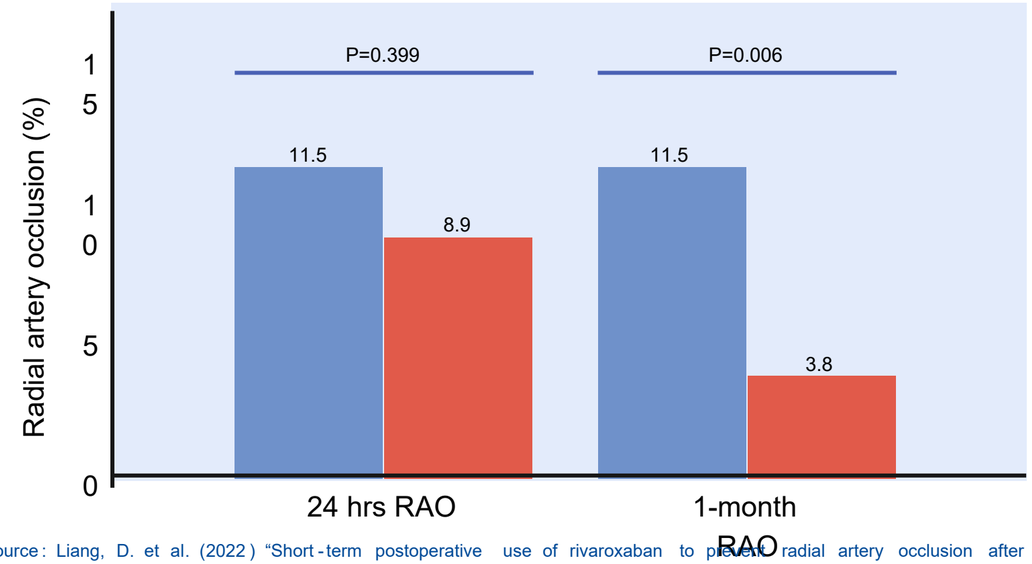
Lower compression times, patent hemostasis technique and distal access have been show to improve patency rates.

Circulation:
Cardiovascular Interventions RESTORE TRIAL 2022

RESTORE TRIAL: 7 DAYS RIVAROXABAN TO PREVENT RAO



Source: Liang, D. et al. (2022) "Short-term postoperative use of rivaroxaban to prevent radial artery occlusion after Transradial coronary procedure : The Restore Randomized Trial," Circulation : Cardiovascular Interventions, 15(4).

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Closure

TECHNIQUE

At Bîcetre we use a radial band insuflated 1-2 cc above the bleeding pressure.

Full compression is maintained for 45min-1 hour, with a gradual release of pressure in the following hours.

Compression device can be removed when hemostasis is visually confirmed.

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Thank you for your attention