



## ARTERIAL ACCESS FOR INVASIVE CARDIOVASCULAR PROCEDURES

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### Trans Radial Artery (TRA) Access

#### **Pre-procedure considerations:**

Planned use of RA as vascular conduit: CKD/ESRD, RA graft for CABG	<ul style="list-style-type: none"> <li>○ There is a signal for higher graft failure with prior TRA access (1)</li> <li>○ While this needs further exploration, at present would recommend <b>patient-specific risk/benefit assessment</b> for TRA, especially in presence of already existing RA occlusion (RAO) <ul style="list-style-type: none"> <li>○ <i>Use of TRA in patients with ESRD is associated with lower bleeding vs. TFA (BMC2 data)(2)</i></li> </ul> </li> </ul>
Right vs. Left RA	<ul style="list-style-type: none"> <li>○ Consider using LEFT RA if: <ul style="list-style-type: none"> <li>○ Short stature (&lt;5'3"), female gender</li> <li>○ Age &gt; 75</li> <li>○ Presence of LIMA graft</li> </ul> </li> </ul>
Allen's/Barbeau Testing	<ul style="list-style-type: none"> <li>○ Useful for use in identifying unilateral radial artery occlusion, prompting contralateral RA or ipsilateral ulnar cannulation <ul style="list-style-type: none"> <li>○ <i>There is growing data to support the use of TRA in patients with abnormal Allen's/Barbeau testing (3)</i></li> </ul> </li> </ul>
Prior Imaging	<ul style="list-style-type: none"> <li>○ If present, review prior chest imaging (angiography, CT, ultrasonography) or catheterization for anatomic considerations that may influence access strategy <ul style="list-style-type: none"> <li>○ <i>i.e. aberrant innominate insertion, upper extremity occlusive disease, known radial loop/occlusion, aberrant insertion of RA, prominent recurrent radial</i></li> </ul> </li> </ul>
Hemodynamic considerations	<ul style="list-style-type: none"> <li>○ Choosing spasmolytic: severe or critical aortic stenosis, severely decompensated heart failure</li> <li>○ Using ultrasound guidance: significant hypotension, PAD</li> <li>○ STEMI, Shock: TRA safe and effective</li> </ul>
Anticoagulation status	<ul style="list-style-type: none"> <li>○ Reasonable to perform transradial angiography and elective PCI in the presence of therapeutic anticoagulation with warfarin (4, 5) <ul style="list-style-type: none"> <li>○ While there is data to support TRA in setting of therapeutic anticoagulation with warfarin, we would recommend <b>patient-specific risk/benefit assessment</b> of interrupting anticoagulation prior to procedure</li> </ul> </li> <li>○ DOACs: Further exploration necessary to confirm safety, efficacy (6)</li> </ul>
RA pulse	<ul style="list-style-type: none"> <li>○ If not readily palpable, <u>ultrasound guidance</u> should be considered to assist cannulation(7)</li> </ul>

### **Access Technique + Cannulation:**

Arterial Puncture	<ul style="list-style-type: none"><li>○ Single (modified Seldinger) or double wall (true) techniques:<ul style="list-style-type: none"><li>○ Similar success and similar rates of complications'</li><li>○ Double wall (true Seldinger) with higher "1<sup>st</sup> pass" success (8)</li></ul></li></ul>
Sheath	<ul style="list-style-type: none"><li>○ Smallest caliber sheath necessary: reduces risk of RAO</li><li>○ Hydrophilic coating: improved patient comfort, lower rates of RA spasm</li></ul>
Antispasmodic -intra-arterial	<ul style="list-style-type: none"><li>○ No single optimal agent, most investigations have been of calcium channel blockers and nitrates.<ul style="list-style-type: none"><li>○ Verapamil (IA): 2.5mg or 5mg of verapamil</li><li>○ Nitroglycerin (IA): 100-200mcg of nitroglycerin</li><li>○ combination of both</li></ul></li><li>○ Special circumstances: avoid Ntg in setting of critical AS, avoid verapamil in severe decompensated heart failure</li></ul>
Anticoagulation	<ul style="list-style-type: none"><li>○ There is ongoing uncertainty for the optimal initial dose of anticoagulant to balance risk of RAO and bleeding</li><li>○ Dosing: <b>at least 50u/kg (or 5000u)</b> of unfractionated heparin (or equivalent dosing for bivalirudin)<ul style="list-style-type: none"><li>○ Recent data supports the use of 70-100 U/kg (in divided doses at the time of sheath insertion and removal), with less RAO (9) but with prolonged time to hemostasis</li></ul></li><li>○ Intravenous and Intra-arterial administration with similar efficacy</li></ul>
Hemostasis	<ul style="list-style-type: none"><li>○ Focus is on <i>patent hemostasis</i>: achieving a balance between maintenance of radial artery flow and arteriotomy hemostasis.</li><li>○ After application of radial compression device and achieving hemostasis, <i>confirm ongoing RA patency with ulnar occlusion (Barbeau)</i></li><li>○ No consensus for compression duration: consensus recommendations of 60 min. after diagnostic angiography, 120 min. after PCI (10)</li></ul>

## **Femoral Artery (FA) Access**

### ***Pre-procedure considerations:***

Consider use of TRA	<ul style="list-style-type: none"><li>○ Preponderance of data supports use of a transradial approach over transfemoral for patient safety, comfort, and costs<ul style="list-style-type: none"><li>○ Recent data with contemporary femoral access techniques suggest outcomes similar to RA can be achieved in STEMI (11)</li></ul></li></ul>
Prior Imaging	<ul style="list-style-type: none"><li>○ If present, review prior femoral imaging (angiography, CT, ultrasonography) or catheterization for anatomic considerations that may influence access strategy</li></ul>
Prior revascularization	<ul style="list-style-type: none"><li>○ Consider access strategy in the presence of prior iliofemoral revascularizations:<ul style="list-style-type: none"><li>○ Endovascular: Iliofemoral stenting</li><li>○ Surgical: aortofemoral, fem-fem bypass, femoral endarterectomy</li></ul></li></ul>
Anticoagulation status	<ul style="list-style-type: none"><li>○ For elective cases, recommend alternative access approach or deferral for patients on therapeutic anticoagulation with either(12):<ul style="list-style-type: none"><li>○ Warfarin (INR&gt;1.7 within 24h of procedure)</li><li>○ DOAC</li></ul></li></ul>

**Access technique:**

<p>Guidance: Combination of fluoroscopy and ultrasonography</p>	<ul style="list-style-type: none"> <li>○ We recommend a combination of fluoroscopic and ultrasonographic guidance for femoral access</li> <li>○ Fluoroscopy: establish compressible site for arteriotomy             <ul style="list-style-type: none"> <li>○ establish superior and inferior borders of femoral head using radiopaque marker (i.e. Kelly clamp)</li> <li>○ Ensure gantry oriented over femoral head, minimizing parallax</li> </ul> </li> <li>○ Ultrasonography: identify anatomic landmarks and guide needle entry             <ul style="list-style-type: none"> <li>○ Superior: identify posterior dive of vessel and inferior epigastric artery, identifying entry into pelvis</li> <li>○ Inferior: bifurcation into SFA and profunda femoris</li> <li>○ Common femoral: identify optimal site for arterial puncture, above bifurcation and below pelvic transition,                 <ul style="list-style-type: none"> <li>▪ correlate w/fluoro-obtained femoral head position</li> <li>▪ Avoid significant plaque or calcification that may compromise access/hemostasis</li> </ul> </li> <li>○ Under ultrasonographic guidance, advance needle to anterior wall and puncture in <i>modified</i> Seldinger technique.</li> <li>○ Puncture site <i>should be visualized within</i> ultrasound plane to ensure optimal position of arteriotomy.</li> <li>○ Ultrasonographic guidance <i>especially helpful</i> in obese patients or those with obscured or distorted anatomic landmarks</li> </ul> </li> </ul>
<p>Needle Choice</p>	<ul style="list-style-type: none"> <li>○ Micropuncture (21g) systems should be considered over standard (18g) systems for femoral arterial puncture.             <ul style="list-style-type: none"> <li>○ use of micropuncture for access associated with reduced vascular complications compared with standard 18g (13)</li> </ul> </li> </ul>
<p>Arterial imaging</p>	<ul style="list-style-type: none"> <li>○ In elective cases, angiographic imaging of the arteriotomy via sheath recommended prior to initiation of anticoagulation, and in all cases prior to deployment of a vascular closure device (12)             <ul style="list-style-type: none"> <li>○ Position gantry ~30 degrees <i>ipsilateral oblique</i> to arteriotomy to splay out bifurcation</li> <li>○ perform sideport angiography to identify any procedure-related complication/arteriotomy position prior to use of anticoagulation or vascular closure device (VCD).                 <ul style="list-style-type: none"> <li>▪ To minimize risk of hydraulic iliac dissection, either assess sideport pressure waveform or advance wire through sheath prior to injection</li> </ul> </li> </ul> </li> </ul>
<p>Hemostasis</p>	<ul style="list-style-type: none"> <li>○ There is no definitive data to support the use of VCDs to reduce femoral complications over manual compression alone             <ul style="list-style-type: none"> <li>○ VCDs can reduce time to ambulation but should be deployed consistent with device-specific instruction for use</li> <li>○ There is an association between VCD use and reduced bleeding in obese patients (BMC2 data)(14)</li> </ul> </li> <li>○ For manual compression in patients with therapeutic anticoagulation, recommend waiting until ACT &lt; 180s before sheath pull (12)</li> </ul>

## References

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