



Arterial Access Protocol for PCI

PCIs are performed via three access sites - brachial, radial or femoral with the latter two being the most common routes. Vascular complications can affect the well-being of the patient and the effectiveness of the procedure itself. The risk of bleeding complications can be decreased by having a protocol in place for clinicians to follow.

Adapted with permission from the Blue Cross Blue Shield of Michigan Cardiovascular Collaborative (BMC2) Best practice protocols available at (<https://bmc2.org/system/files/private/best-practice-protocols-5-20-14.pdf>)

Access Site

1. Brachial

- a) Cut down
 - 1. Performed by Attending Interventionalist or Vascular Surgeon.
- b) Percutaneous
 - 1. Performed by Attending Interventionalist or Fellow.

2. Radial

- a) Percutaneous
 - 1. Performed by Attending Interventionalist or Fellow.
 - 2. Set up / Access
 - a) Confirm no contraindications.
 - 1. Known PAD in upper extremity used for access.
 - 2. Raynaud's
 - 3. Buerger's disease
 - 4. Patient refuses
 - b) Patient on monitor per standard protocol.
 - c) Place arm on arm board with wrist gently hyper-extended.
 - d) Remove excess hair.
 - e) Sterile prep and drape.
 - f) Palpate radial pulse.
 - g) Administer local anesthetic over radial pulse 1 cm proximal to radial styloid process.
 - h) Obtain access either with catheter-over-needle system (counter-puncture) or with bare needle.
 - i) Once sheath placed, administer vasodilators through arterial sheath (vasodilators studied include nitroglycerin 100-400mcg, verapamil 2-5mg, and nicardipine 250 mcg)
 - j) Administer unfractionated heparin at a dose 50-70 u/kg either intra-arterial or intravenously at some point after access and prior to angiography
- N.B.: Consider using ultrasound guided access routinely or if radial pulse is not palpable
- N.B.: Ulnar artery access may be used as an alternative to radial access using similar steps as above. Ultrasound guidance is strongly encouraged for ulnar artery access.



3. Sheath removal and radial band application.
 - a) Administer vasodilator through the arterial sheath and flush.
 - b) Withdraw sheath 2-3 cm.
 - c) Apply radial hemostasis device over arteriotomy, apply maximum pressure, and remove sheath.
 - d) Once sheath is removed, release pressure until some bleeding is seen from the arteriotomy site. Then re-apply pressure sufficient to stop the bleeding (patent hemostasis).
 - e) Check for radial (or ulnar) patency using the reverse Barbeau (or Barbeau for ulnar access) test.

4. Removal radial of compression band.
 - a) 2-3 hours after placement, gradually release pressure every 15minutes until removed.
 - b) If bleeding occurs, tighten wrist band and contact Attending Interventionalist or Fellow.
 - c) 1 hour after removal of radial band, remove wrist immobilizer.
 - d) Instruct patient to only use light activity with affected limb for 24 hours

3. Femoral

- a) Performed by <>HOSPITAL SPECIFIC
 1. Set up
 - a) Place patient on table in standard position.
 - b) Ensure adequate hair removal and adjust as needed.
 - c) Sterile prep from umbilicus to knee.
 - d) Drape patient.
 2. Access to be obtained by <> HOSPITAL SPECIFIC
 - a) Palpate land marks.
 1. Inguinal ligaments extend from anterior superior iliac spine to pubic tubercle.
 2. Palpate the femoral pulse.
 3. Place hemostats over desired access point and use fluoroscopy to confirm location. Goal is to access the common femoral artery 1 cm lateral to the most medial cortex of the femoral head. Post procedure compression against the femoral head will aid in hemostasis. Puncture above this site will increase the risk of retroperitoneal bleeding. Access lower than this increases risk of AV fistulas and pseudo-aneurysms. Access below the bifurcation of the common femoral artery into the superficial femoral artery and the femoral profunda is also a contraindication for closure devices.
 - b) Administer local anesthesia. Using a 23½ gauge needle administer 10 ml of 2% Lidocaine subcutaneously between 1 – 3 cm below the inguinal ligament, at the site where the femoral artery can be palpated. Once a wheel has been made, the Lidocaine is administered into the deep tissue along the trajectory for arterial and venous entry. Aspirate before administering Lidocaine in the deep tissue.
 - c) Make a small skin nick (with a #11 scalpel) above area of the femoral artery and vein (optional). This decreases resistance encountered with the advancement of the needle.
 - d) If a venous line is needed, obtain access prior or after obtaining arterial access. To obtain **venous access**, use an 18 gauge Cook needle. Apply a syringe to the end of the needle, and with the bevel up, one finger beneath and one finger medial to the femoral artery, gentle suction should be applied to the syringe. Femoral venous access is secured prior to arterial access to allow for administration of fluids, drugs, or access to advance a Swan-Ganz catheter.



- e) When venous access is achieved, advance .035 or .038 guide wire into the needle, if resistance is met, do not force the wire in, but withdraw wire and reposition the needle. If unable to easily advance wire, withdraw needle. Once the wire can be successfully advanced, remove the needle. Then advance the sheath over the wire to maintain access. Flush the sheath with heparinized solution.
- f) To obtain arterial access, advance an 18 gauge Cook needle with the bevel up and the needle positioned at a 45° angle. Palpate the artery using three middle fingers of the left hand 1 – 3 cm below the inguinal ligament. Do not puncture greater than 3 cm below the inguinal ligament to prevent entering the profunda (to ease in obtaining hemostasis) or the superficial femoral branches (to prevent limb ischemia in the event an IABP will need to be inserted).
1. Advance the needle, supporting it with the index finger and middle finger straddling the needle. Slowly advance the needle until a brisk pulsating blood flow is achieved. Avoid advancing the needle through the artery to prevent bleeding through the back wall of the vessel.
 2. Once the needle has entered the artery and a brisk flow is noted, stabilize the needle.
 - a) Then slowly advance a .035 or .038 J-Guide wire through the needle. There should not be any resistance noted.
 - b) If there is, stop and remove the wire. Slowly advance the Cook needle to 1- 2 mm, and attempt to re-advance the guide wire as long as adequate flow is noted. Reattempt to advance the guide wire. The needle may be only partially in the artery and a dissection may occur if the wire is forced forward. Avoid advancing the needle through the artery. If flow is not brisk with needle repositioning, or the wire cannot be advanced, then slowly pull back.
 - c) If unable to achieve blood return, remove the needle and the groin should be compressed for 5 minutes. The Attending Physician should be consulted at this time before an additional attempt is made to achieve access.
 3. Once the wire has been advanced, and location of the wire has been verified under fluoroscopy, then the needle is removed. (If the patient complains of any pain when the wire is advanced, withdraw the wire, remove the needle, and hold pressure for 5 minutes. Then consult the Attending Physician before re-attempting access.) Using the left hand to stabilize the artery and wire, the sheath is placed over the wire. Using a rotational motion, the sheath is advanced into the artery. Warn the patient that they will feel pressure at this point as the sheath is being manipulated. If the operator is experiencing difficulty advancing the sheath, use the dilator only or a smaller sheath. If still experiencing difficulty, consult physician. The wire should move freely up the aorta, which is located to the left side of the patient. The wire may cause a dissection. Contrast maybe needed to verify placement.
 4. Once the sheath has been placed, flush the sheath with Heparinized solution. To maintain patency of the sheath and remove debris.

5. The Attending Interventionalist should be achieving access in the following situations:
- a) Patient who has had Aorta-Bifemoral Bypass.
 - b) Severe Peripheral Vascular Disease.
 - c) Multiple procedures at the same site with large amount of scar tissue.
 - d) Hemodynamically unstable, (i.e. cardiogenic shock).
 - e) Critical Aortic Stenosis secondary to risk of potential vagal response.
 - f) Morbid Obesity.

b) Turi technique*^{Turi Z. "Optimal Femoral Access Prevents Complications." Cardiac Interventions Today. Jan/Feb 2008:35-38.}

1. Place hemostat over the presumed location of the femoral head, and confirm location using fluoroscopy
2. Place the drape in such a way that opening allows access to the common femoral artery over the femoral head. The drape is commonly misplaced, especially in obese patients.
3. Puncture the skin at a 45° to enter the common femoral artery approximately 5 to 15 mm below the centerline of the femoral head and over its medial portion.
4. Before entering the artery, but after penetrating with the needle through the skin and to where pulsation can be felt through the needle, remove hand from the field and repeat fluoroscopy. Adjust the needle location to approximate entry at the location shown in the Figure A below. The appearance of the needle on fluoroscopy should be similar to that seen in Figure B.
5. After sheath placement, perform femoral angiography in an ipsilateral view on every patient. If the location of the sheath entry cannot be clearly identified, and the question of puncture into the femoral bifurcation or one of the bifurcation vessels is suspected, perform an angiogram in the ipsilateral caudal view.
6. If the puncture location is high, avoid administering anticoagulation if possible. In case of an elective and/or *ad hoc* intervention, perform diagnostic angiography and bring the patient back in 24 hours for a repeat femoral puncture an intervention.

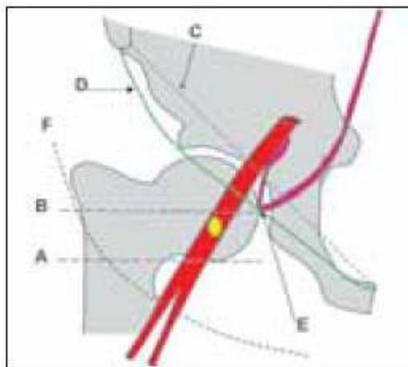


Figure A

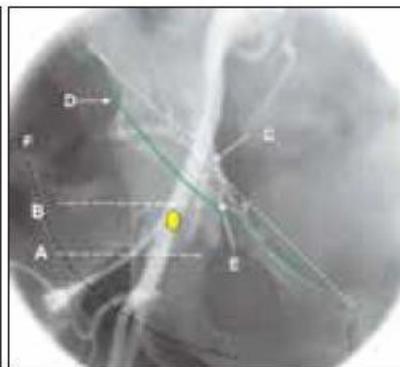


Figure B



Sheath removal and hemostasis

1. Manual pressure in recovery area.
2. Closure devices place per protocol by <> HOSPITAL SPECIFIC
3. Prior to placement of a closure device, angiography should be performed of the access site to ensure access in proper location, no PAD and adequate vessel size.