Endovascular Technical Note

Transradial Cerebral Angiography

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Introduction

The radial artery approach is a well-established practice in coronary artery intervention and has been used since 1989 however its use in neuroangiography is not widespread. There are several case series of successful diagnostic cerebral angiograms as well as interventional procedures in the literature and this approach offers a safe, practical adjunct to transfemoral approach. All relevant vessels can be accessed from the radial artery for diagnostic studies.

Click here to view a Transcranial Cerebral Angiography video demonstration.

Procedure

Prior to the radial artery puncture, an Allen test is necessary to ensure adequate collateral circulation to the hand from the ulnar artery (see video). The examiner begins by compressing both the radial artery and the ulnar artery. Patient is instructed to repeatedly clench the fist until the hand becomes pale. Pressure is taken off the ulnar artery. Normal capillary refill time is 5 s or less; a refill time of greater than 10 s is abnormal and an evidence of poor collateral circulation to the hand from the ulnar artery via the palmar arch. In equivocal cases after visual Allen testing, a pulse oximeter is placed on the patient's thumb, and the both radial and ulnar arteries are compressed until the pulse oxymeter waveform becomes flat. Patency of the palmar arch is considered present if a strong waveform returns after the release of ulnar artery and the percentage of oxygen saturation remained unchanged.

Once adequate circulation is confirmed by the Allen test, the forearm is prepped and draped. A modified arm board may be used to support the extremity. Local anesthesia is used and puncture of the radial artery is performed approximately 2 cm cephalic to the radial styloid process. The right

radial artery is used in preference to the left radial artery, except in rare instance. After subcutaneous infiltration with 1% lidocaine buffered with 8.4% sodium bicarbonate a 21-gauge needle is used to enter the radial artery. A single-wall puncture is considered ideal; otherwise the needle could be retracted back until good flow returns. After arterial entry is punctured, a 0.018-inch guidewire is inserted. A micropuncture set is used to place a 4-5 French sheath in the radial artery. Once the sheath is inserted, the stopcock on the sheath is opened briefly and pulsatile arterial backflow is observed to confirm adequate positioning of the sheath within the artery. A 10 mL *radial artery cocktail* (5,000 IU of heparin, 2.5 mg of verapamil, 1 mL of cardiac lidocaine 2%, and 0.1 mg of nitroglycerin) is then infused into the sheath as a measure to minimize the risk of vasospasm and thrombosis of the radial artery. After cocktail infusion, 4 or 5 French sheath can be upgraded for a 6 French sheath.

Some operators do not use a continuous heparinized saline infusion in the radial sheath, due to the pressure and pain it can produce. At the end of the procedure, the sheath is removed, and a pressure dressing is applied to the wrist. Wrist brace may also be used to obtain hemostasis. If resistance is encountered during removal of the sheath, a second infusion of verapamil may be given. There is usually no need to reverse anticoagulation. The wrist brace may be kept in place for 2–3 hours, depending on the amount of heparin administered during the procedure. If hemostasis is not completely achieved at the time of initial brace removal, an additional 1 hour of bracing should be used. Close observation should be maintained regarding the adequacy of distal tissue perfusion. Pulses should be checked after adequate homeostasis is achieved; however, no further evaluation is required to confirm the patency of the radial artery.

Advantages

- Patient comfort: Patients can be allowed to sit up immediately after the procedure, if their medical condition allowed it.
- Anticoagulation safety: Anticoagulation is a contraindication for axillary-brachial and femoral approaches secondary to the potential for neurologic compromise caused by a large hematoma. Anticoagulation does not have to be terminated for the transradial approach.

Furthermore, anticoagulants can be administered without the need for reversal at the termination of the procedure.

- It completely eliminates the risk of retroperitoneal hemorrhage and the need for several hours of bed rest that are associated with femoral artery puncture.
- It is cost-effective as shown in cardiology literature.
- This approach can be advantageous when vessel tortuousity makes access to the vertebral artery difficult from a femoral approach.

Disadvantages

- Major disadvantage is the learning curve required for the operators who are comfortable with transfemoral approach.
- There is also a small risk of hematoma formation which is easily observed since radial artery is superficial in location unlike groin hematoma.

References

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