

Arterial Blood Sampling

Introduction:

Arteries are punctured to sample arterial blood and determine PO₂, PCO₂, PH and bicarbonate.

Both arterial blood sampling and blood gas interpretation are such basic clinical skills. The result obtained give vital clues to the underlying cause and the severity of the condition.

Contraindications:

- Severe peripheral vascular disease in limb
- Use caution in anticoagulated patients

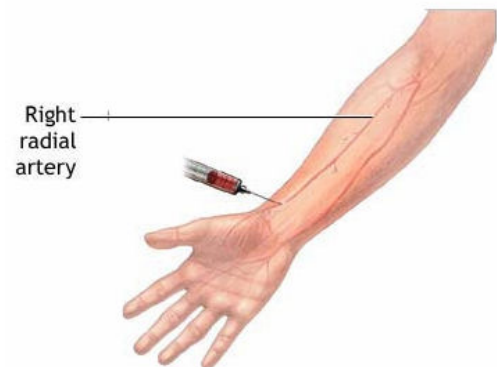
Equipment:

- Povidone-iodine solution
- Cotton wool
- Disposable gloves
- 2 ml syringe or TB syringe
- 20 gauge needle
- Heparin ampula
- 23 gauge needle

Position

Supine: Arteries commonly used are radial, common femoral, and brachial, in descending order of preference.

For radial artery, dorsiflex wrist over towel.



Remember that:

- Warn the patient that the procedure may be painful-and ask them to keep as still as possible. Outline the procedure to the patient and make sure you have their verbal consent.
- If doing a radial puncture, ensure that the ulnar artery is palpable in that wrist and it is able to perfuse the hand. You can use a simple maneuver to demonstrate this:

Obstruct the radial artery by pressure from your fingertips, ask the patient to close their fist tightly to expel remaining blood, keeping pressure on the radial artery. Ask him to open his hand again. Flushing of the palm

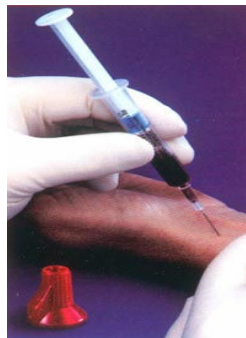
shows that ulnar

artery perfusion is adequate. This is known as “**Allen’s Test**”.

- Note the inspired O₂ concentration.

Technique:

1. Wet syringe with heparin:
 - Draw heparin into syringe through 20 gauge needle, wetting all inner surfaces.
 - Replace 20 gauge needle with 23 gauge needle.
 - Eject all air and excess heparin.
 - Leave needle and dead space filled with heparin.
2. Washes hands and dons disposable gloves.
3. Prep selected site.
4. Give local anesthetic (optional).
5. Insert needle through skin:
 - Insert needle at 30 degree angle to skin at point of maximum pulsation between the index and middle finger of nondominant hand.
 - Slowly advance needle until arterial blood flushes back into syringe.



Note: For a femoral puncture, remember that the nerve runs laterally to the artery, so err on the medial side.

6. Allow arterial pressure to drive adequate blood into the syringe, aspirate gently if needed. (Do not aspirate blood at first)
7. Pick up cotton wool (moistened with Betadine) with non-dominant hand.
8. Withdraw needle and syringe assembly.
9. Press firmly over puncture site with cotton wool for 5 minutes.
10. Remove needle from syringe and discard needle.
11. Eject any bubbles and cap syringe.
12. Place syringe in ice to reduce red cell metabolism and send sample for analysis.

Complications:

-Local bleeding

Etiology: 1. Pressure applied to puncture site for insufficient time
2. Abnormalities of coagulation.

Prevention: 1. Apply pressure for 5 minutes.
2. Use caution in patients with abnormalities of coagulation

- **Venous admixture of blood**

Etiology: Drawing venous blood into system by aspirating

Prevention: Never aspirate blood, allow it to flow into syringe under arterial pressure use short bevel needle so tip on bevel will not project beyond lumen of artery

- **Air admixture of blood**

Etiology: Aspiration, causing air to leak in through syringe-needle connections Incomplete emptying of air from syringe before starting

Prevention: Do not aspirate blood. Eject all air from syringe before arterial puncture.

- **Distal ischemia**

Etiology: Excessive arterial trauma with thrombosis

Prevention: Use narrow-gauge needle. Do not puncture same arterial site numerous consecutive times, rotate sites. Avoid brachial artery puncture if possible; this site carries an increased incidence of ischemic complications

Checklist for Radial Arterial Sampling

1. Mentions handwashing
2. Checks patient's name and hospital number
3. Assembles correct equipments in the tray
4. Greets and introduces oneself to the patient
5. Warns the patient, explains and gets verbal consent
6. Draws a little heparin into syringe
7. Expels and discards needle
8. Attaches fresh needle
9. Uses disposable gloves
10. Checks Allen's test then proceeds, if there is no problem
11. Positions arm with wrist hyperextended
12. Preps selected area by using cotton wool and Betadin
13. Locates artery with index and middle fingers of non-dominant hand
14. Explains to the patient what he/she will feel
15. Inserts needle at 30° degree to skin at point of maximum pulsation
16. Advances until arterial blood flushes back
17. Allows arterial pressure to drive adequate blood into the syringe
18. Picks up cotton wool which is moistened with Betadine
19. Withdraws needle and syringe assembly
20. Presses the site firmly with cotton wool for 5 minutes
21. Removes and discards needle
22. Ejects any bubbles and caps syringe
23. Removes and discards gloves
24. Labels the syringe and takes it in ice to the blood gas analysis machine
25. Thanks and listens to the patient's questions