# Arterial Puncture

**Purpose**

Arterial blood gas sampling by puncture is accomplished by aseptic technique with a needle and heparinized syringe to obtain a specimen for analysis.

**Scope**

Respiratory Care Services safely and promptly obtains arterial blood samples for the purpose of monitoring ventilation.

**Audience**

This policy applies to all personnel functioning in a clinical capacity in Respiratory Care Service authorized under conditions described by Policies # 7.1.15 and # 7.1.16 to do Arterial Blood Gas Samples.

**Physician's Orders**

Arterial Puncture will be done at the written order of the physician.

**Indications**

When the need to assess the patient's respiratory/metabolic status exists.

**Contra-indications**

- Negative modified Allen Test denotes presence of ulnar artery occlusion.
- Any inflammation, infection, or poor integrity at selected puncture site.
- There is relative contraindication for arterial puncture in the patient with diagnosed Raynaud's Phenomena.

**Goals**

To obtain a sampling of blood for analysis via the radial or brachial artery by puncture using aseptic technique.

**Guidelines**

- **The femoral artery <u>shall not</u> be used for arterial puncture.**
- When a patent arterial line is in place, arterial samples will be drawn from the A-line not by puncture.
- When the radial artery site is chosen, an Allen Test will be used to determine if collateral circulation by the ulnar artery is adequate. The results of the Allen Test will be documented on appropriate flow sheet in patient's chart.
- After blood sampling is obtained, apply pressure for a <u>minimum of five minutes</u>. If the patient continues to bleed after five minutes, has a blood dyscrasia, is anti-coagulated, or if the physician has drawn femoral gases apply pressure for a <u>minimum of ten minutes</u>.
- Suctioning and/or changes in oxygen concentration or ventilator changes will precede arterial blood gas samplings by 20 to 30 minutes.
- The Respiratory Therapist will run $PO_2$, $PCO_2$, pH, and $HCO_3$ on all specimens received. Oxygen saturation will not be run unless specified.
- The Laboratory request slip <u>MUST</u> include $FIO_2$, time specimen drawn, patient's temperature, type of respiratory equipment, PEEP, and respiratory rate and PEEP applied and patient temperature.

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## Procedure

| Step | Action |
|---|---|
| 1 | Verify physician's order. |
| 2 | Check patient's record for precautions to be taken, such as in anticoagulant therapy. |
| 3 | Make positive identification: check I.D. bracelet and/or bed label and ask for verbal identification. |
| 4 | Introduce yourself to patient and explain what you are about to do. |
| 5 | Palpate right and left radial pulses. Select the vessel with the most prominent pulse for puncture. |
| 6 | Perform the modified Allen Test on hand with best radial pulse to insure adequate collateral circulation.<br>Modified Allen Test:<br>**In the conscious, cooperative patient:**<br>• Compress both ulnar and radial arteries at the wrist to obliterate pulses.<br>• Have patient clench and release a fist until blanching of the hand occurs.<br>• With radial artery still compressed, release pressure on ulnar artery.<br>• Watch for the return of pinkness to the hand.<br>**In the unconscious, uncooperative patient:**<br>• Compress both ulnar and radial arteries at the wrist to obliterate pulses.<br>• Elevate patient's hand above level of his heart.<br>• Elevate patient's hand above level of his heart.<br>• Lower patient's hand below the level of his heart.<br>• With radial artery still compressed, release pressure on ulnar artery.<br>• If pinkness fails to appear, collateral circulation may be assumed to be inadequate. Inform physician that you are unable to obtain ABG.<br>• A positive modified Allen Test denotes the presence of ulnar collateral flow. |

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## Procedure Continued

| Step | Action |
|---|---|
| 7 | Open ABG collection set; remove pre-heparinized syringe, needles, and syringe cap; and fill plastic bag about half full with crushed ice. |
| 8 | Assemble the syringe, keeping the chamber and tip sterile. |
| 9 | Attach needle to syringe, keeping needle in sterile protective cap. |
| 10 | Palpate the chosen radial artery as before, noting the point of maximal pulse. This will be the puncture site. |
| 11 | Stabilize the wrist in the position that presents the maximal pulse. |
| 12 | Rub the puncture site with a Betadine prep pad and let dry. Wipe with an alcohol prep pad. |
| 13 | Remove the needle cap, and at a 35-40 degree angle, pierce the skin at the puncture site and slowly advance the needle in one plane. When the artery is punctured, blood will enter the syringe. If the needle goes through the artery, slowly withdraw the needle until blood again appears in the syringe. |
| 14 | After enough blood has filled the syringe, withdraw the needle and immediately apply pressure directly on the puncture site with sterile gauze. |
| 15 | After applying pressure pad at the puncture site for a sufficient period of time, remove pressure pad and again palpate a pulse distal to puncture site |
| 16 | Hold syringe vertically, gently tap the barrel and advance the plunger until it forces air bubbles out of the syringe. |
| 17 | Remove needle and cap syringe. Gently roll the syringe between the palms of your hands to mix heparin and totally immerse barrel of syringe in the bag of ice. |

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## Procedure Continued

| Step | Action |
|---|---|
| 18 | On lab slip indicate $FIO_2$ and patient's temperature and check off tests requested by physician. |
| 19 | Record ventilatory parameters on appropriate clinical sheet if applicable. |
| 20 | Analyze the arterial blood and call results to the physician. |
| 21 | Document on RCS flow sheet, date and time of stick, results of Allen Test, and which radial artery was used to perform puncture. |
| 22 | Document results of ABG on the blank section under "General" of the patient's RCS treatment card. Follow procedures outlined in RCS Policies # 7.1.1 and # 7.1.2. |

## Undesirable Side Effects

- Infection - Sterile technique must be used so that no pathogens will be passed directly into the patient's blood stream.
- Hematoma - Bleeding from the artery into the surrounding tissue can occur if insufficient time or pressure is applied to the puncture site. Patients on anti-coagulant therapy (aspirin, coumadin, heparin) will be especially susceptible to the complication. Patients who are no longer receiving anti-coagulation dosages of the following drugs will still be susceptible to this complication for the listed length of time:
  - Aspirin - 8 days.
  - Heparin - 4 hours.
  - Coumadin - 2-5 days.
- Thrombus - When an artery is punctured there is always a danger of a thrombus forming and blocking the arterial blood flow. For this reason it is necessary to check for collateral circulation (Allen Test) before the puncture and check for a pulse distal to the site of the puncture following the procedure.
- Peripheral Nerve Damage - The radial and brachial nerves run adjacent to the artery and passing a needle through them can do permanent damage.

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## Undesirable Side Effects Continued

- Pain - Since arteries have a nerve supply and major nerves pass close to them, this procedure can prove very painful. It is always necessary to prepare the patient for this possibility to avoid unnecessary movement.

## Assessment of Outcome

This procedure shall be deemed effective if the following criteria are met:

- The procedure is performed with minimal pain to the patient and without permanent damage.
- The results of analysis are interpreted by qualified medical personnel and appropriate adjustments in the patient's care are made as needed.

## Patient Teaching

Instruct the patient as follows:

- Explain to the patient why an arterial puncture is done. Relate it to injury or disease state.
- Tell the patient that the procedure will be uncomfortable but that everything will be done to alleviate the discomfort.
- Explain the importance of normal breathing to prevent altering the analysis.

## Infection Control/ Safety

- Perform Allen's Test prior to all arterial punctures (radial).
- Prepare site for arterial puncture as described in Essential Steps section of this policy/procedure.
- Apply pressure to puncture site after obtaining blood sample as presented in Procedure section, # 15 of this policy/procedure.
- Deposit all "sharps" such as needles, empty vials, and ampules in "sharp" box at nursing station. Leave nothing in the patient's room.
- Follow procedures as outlined Healthcare Epidemiology Policies and Procedures: #2.24 Respiratory Care Services. http://www.utmb.edu/policy/hcepidem/search/02-24.pdf

## References

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