Intro to Procedures:
The Arterial Blood Gas

Information Obtained from an ABG:
• Acid base status
• Oxygenation
  – Dissolved O2 (pO2)
  – Saturation of hemoglobin
• CO2 elimination
• Levels of carboxyhemoglobin and methemoglobin

Indications:
• Assess the ventilatory status, oxygenation and acid base status
• Assess the response to an intervention
Contraindications:

- Bleeding diathesis
- AV fistula
- Severe peripheral vascular disease, absence of an arterial pulse
- Infection over site

Why an ABG instead of Pulse oximetry?

- Pulse oximetry uses light absorption at two wavelengths to determine hemoglobin saturation.
- Pulse oximetry is non-invasive and provides immediate and continuous data.
Why an ABG instead of Pulse oximetry?

- Pulse oximetry does not assess ventilation (pCO2) or acid base status.
- Pulse oximetry becomes unreliable when saturations fall below 70-80%.
- Technical sources of error (ambient or fluorescent light, hypoperfusion, nail polish, skin pigmentation)
- Pulse oximetry cannot interpret methemoglobin or carboxyhemoglobin.

Which Artery to Choose?

- The radial artery is superficial, has collaterals and is easily compressed. It should almost always be the first choice.
- Other arteries (femoral, dorsalis pedis, brachial) can be used in emergencies.
Preparing to perform the Procedure:

- Make sure you and the patient are comfortable.
- Assess the patency of the radial and ulnar arteries.
Collection Problems:

- Type of syringe
  - Plastic vs. glass
- Use of heparin
- Air bubbles
- Specimen handling and transport

Type of Syringe

- Glass-
  - Impermeable to gases
  - Expensive and impractical
- Plastic-
  - Somewhat permeable to gases
  - Disposable and inexpensive

Heparin

- Liquid
  - Dilutional effect if <2-3 ml of blood collected
- Preloaded dry heparin powder
  - Eliminates dilution problem
  - Mixing becomes more important
  - May alter sodium or potassium levels
The Kit

Air bubbles
- Gas equilibration between ambient air (pO2 ~ 150, pCO2~0) and arterial blood.
- pO2 will begin to rise, pCO2 will fall
- Effect is a function of duration of exposure and surface area of air bubble.
- Effect is amplified by pneumatic tube transport.

Transport
- After specimen collected and air bubble removed, gently mix and invert syringe.
- Because the wbcs are metabolically active, they will consume oxygen.
- Plastic syringes are gas permeable.
- Key: Minimize time from sample acquisition to analysis.
Transport

- Placing the AGB on ice may help minimize changes, depending on the type of syringe, pO2 and white blood cell count.
- It’s probably not as important if the specimen is delivered immediately.

Performing the Procedure:

- Put on gloves
- Prepare the site
  - Drape the bed
  - Cleanse the radial area with alcohol
- Position the wrist (hyper-extended, using a rolled up towel if necessary)
- Palpate the arterial pulse and visualize the course of the artery.

Performing the Procedure:

- If you are going to use local anesthetic, infiltrate the skin with 2% xylocaine.
- Open the ABG kit
- Line the needle up with the artery, bevel side up.
- Enter the artery and allow the syringe to fill spontaneously.
Performing the Procedure:

- Withdraw the needle and hold pressure on the site.
- Protect needle
- Remove any air bubbles
- Gently mix the specimen by rolling it between your palms
- Place the specimen on ice and transport to lab immediately.