Intraosseous Placement

Purpose
1. Establishment of reliable vascular access is a critical step in pediatric ALS
2. If vascular access is accomplished within the first minutes of resuscitation, infusion of medications and fluids is possible and successful resuscitation may be more likely
3. Vascular access is vital for drug and fluid administration, but venous access may be difficult to achieve in the pediatric patient.
4. During CPR the preferred venous access site is the largest most accessible vein that does not require the interruption of resuscitation
5. The intraosseous route enables infusion of drugs, fluid and blood products
   a. This route is a reliable alternative to venipuncture in infants and children who are in shock or cardiopulmonary arrest if peripheral venous access cannot be achieved within a few minutes
   b. The intraosseous route provides access to a non collapsible venous plexus in the medulla of the vein and can usually be established within seconds

Procedure

1. Equipment
   a. Sterile gloves
   b. Povidone - Iodine swabs
   c. Intraosseous needle - 18 gauge
   d. Extension tubing with 3-way stopcock
   e. Saline flush syringes
   f. Small sandbag or rolled towel
   g. Tape
   h. Long armboard

Essential Steps in the Procedure
1. Gather Equipment
   a. The recommended site for insertion of an IO needle is the anterior tibia
   b. Alternative sites include the distal femur, medial malleolus, and anterior superior iliac spine
   c. This technique can be used in all ages of patients
2. Using sterile technique, locate the site of cannulation. Identify the tibial tuberosity by palpation
   a. The site for IO cannulation of the tibia is approximately 1 to 3 cm below the tibia tuberosity
   b. At this site, the tibia usually is immediately beneath the skin surface and is readily palpable as a flat, smooth surface
3. Connect 3-way stopcock to IV extension tubing
4. Open Betadine swabs
5. Position the patient supine and place sandbag or towel behind knee
6. Put on sterile gloves
7. Cleanse skin over the insertion site with Betadine swabs
8. Palpate the landmarks again and insert the needle through the skin over the flat anteromedial surface of the tibia
   a. Intraosseous needles should not be inserted into infected skin or subcutaneous tissue, or bone without cortical integrity (fractures, previous penetration)
9. Using a gentle but firm twisting motion, advance the needle through the bony cortex of the proximal tibia; direct the needle perpendicular to the long axis of the bone
   a. Directing the needle at a slight angle of 10 degrees avoids puncturing the epiphysial plate
   b. When placing an IO needle in other locations, aim slightly away from the nearest joint space to reduce the risk of injury to the epiphysis or joint
10. Stop advancing the needle when you feel a sudden decrease in resistance to forward motion
    a. This decrease in resistance usually indicates entrance into the bone marrow cavity
11. Unscrew the cap and remove the stylet from the needle. Slowly inject 3 cc of normal saline, checking for any signs of increased resistance or increased circumference of extremity
    a. Insertion is successful and the needle is clearly in the marrow cavity if:
       i. A sudden decrease in resistance to insertion occurs; the needle can remain upright without support
       ii. Marrow can be aspirate into a syringe
       iii. Fluids flow freely through the needle
12. If the test injection is successful, disconnect the syringe, evacuate any air in the connection tubing, and join an infusion set to the needle. Secure the needle and tubing with tape. Secure leg to long armboard
13. If the test injection is unsuccessful (i.e. infiltration of NS into the leg tissue is observed) remove the needle and attempt the procedure on the other leg
    a. If the needle becomes obstructed with bone marrow. It can be replaced with a second needle passed through the same cannulation site, provided no evidence of infiltration is observed
14. Discontinue intraosseous infusion as soon as alternate intravenous access is achieved. Remove needle. Apply a sterile dressing over the puncture site

Documentation
1. Document procedure on transport notes, including site of puncture, and any complications