Vascular Access

Purpose: To outline the process in patients requiring vascular access. This policy applies to EMT-Specialists and Paramedics.

Indications

1. For the purpose of fluid or medication administration.
2. External jugular cannulation should be initiated in patients in whom access is necessary and other peripheral vascular access is not accessible or is contraindicated.
3. IO indications: Adult and pediatric life threatening situations where venous access using peripheral veins has been unsuccessful. IO access should be considered early in situations where IV access is unsuccessful or technically challenging. Indications include:
    a. Cardiac Arrest
    b. Severe burn injury with shock
    c. Shock
    d. Severe multiple trauma with shock
    e. Status epilepticus
    f. Contact medical control for other situations without delaying transport
4. Umbilical vein catheterization in newborn resuscitation may be considered.

Saline Lock may be initiated in patients in which IV access for medication administration may be necessary but IV fluid therapy unlikely.

IVs will be initiated in those situations in which fluid resuscitation may be indicated.

Contraindications

1. To peripheral vascular access:
    a. No peripheral sites available
    b. Burns overlying available peripheral sites unless no other sites available
    c. Infection overlying available peripheral sites
2. To intraosseous infusion and placement:
    a. If infiltration occurs (rare), do not reuse the same bone as fluid will leak out of the original hole; select another site.
    b. Do not place in a fractured extremity. If the femur is fractured, use the opposite leg.
3. To umbilical vein catheterization:
    a. Inability to identify the umbilical vein or place the catheter.

Special Considerations (Side effects/Complications)

1. Initiation of vascular access generally should not delay patient transport to the hospital.

2. General side effects or complications: infection, air embolism, catheter shear, hematoma, arterial puncture, fluid overload
3. Intraosseous placement:
    a. Complications include subperiosteal infusion, osteomyelitis, sepsis, fat embolism, bone marrow damage.
4. Umbilical vein catheterization:
    a. Should not be attempted unless the single, large umbilical vein can easily be identified.
    b. To be initiated after transport has begun.

Standards for IV attempts

1. Two (2) attempts per provider, maximum 4 attempts.
2. Consider IO early, as indicated above.
3. Document any reasons for deviation.

Needle size for IV placement

1. Adult TKO 18 ga - 20 ga Angiocath
2. Adult trauma/internal bleeding/C-arrest 14 ga - 18 ga.
3. Child 20 ga - 24 ga Angiocath

Flow Rates

1. Flow rates for all IV's are to be at rates TKO or saline lock unless otherwise indicated by specific protocol or Medical Control.
2. The amount of fluid infused along with the IV rate is to be noted on the EMS Medical Record
    a. 25 ml/hr is TKO rate.
    b. The use of saline locks is encouraged in place of prophylactic TKO IV lines.
3. Any reason for variation from standard flow rates must be documented on the EMS Medical Record.
4. The standard fluid bolus volume will be 1 liter normal saline with repeat as necessary, unless otherwise noted by protocol. The bolus would be contraindicated in patients with pulmonary edema. Volume for pediatric patient will be 20 ml/kg, unless otherwise noted by protocol.
5. Medicated drips should be piggybacked to main IV line or saline lock.

Solutions - Protocol or Medical Control dictates choice of solution

1. Normal Saline 0.9%

IV Tubing

1. Normal Saline – macrodrip
2. Children - macrodrip

Procedures

1. Utilize universal precautions

2. **Procedure for Peripheral Vascular Cannulation:**
    a. Gather and prepare equipment
    b. Place the tourniquet on the extremity
    c. Cleanse the skin
    d. Make your puncture while maintaining vein stability.
    e. Watch for flashback. Once you have a blood return, advance the catheter as per normal IV technique and attach the IV tubing or Normal saline lock cap. If you have no blood return and you are in the vein, remove the needle hub and attach your syringe to assist in aspirating for blood.
    f. Instill 2-3 ml of normal saline if normal saline lock placed
    g. Secure catheter and IV tubing

Procedure for External Jugular Cannulation:

1. Gather and prepare equipment
2. Position patient supine (trendelenburg, if possible)
3. Turn head to opposite side of venipuncture (if no C-spine injury is suspected)
4. Cleanse the skin
5. Occlude the vein by using the side of your finger above the clavicle to facilitate filling the vein.
6. Make your puncture midway between the angle of the jaw and the middle of the clavicle.
7. Watch for flashback. Once you have a blood return, advance the catheter as per normal IV technique and attach the IV solution or normal saline lock cap, covering catheter with gloved finger while preparing to attach the IV tubing. If you have no blood return and you are in the vein, remove the needle hub and attach your syringe to assist in aspirating for blood.
8. Instill 2-3 ml of normal saline if normal saline lock placed.
9. Secure IV catheter and tubing.

Procedure for Intraosseous Placement:

1. Placement of the IO line by the following technique:
    a. Have all IO equipment ready prior to bone penetration
    b. Expose the extremity
    c. Stabilize the extremity to minimize motion
    d. Selection of site
        i. Proximal Tibia or Proximal Humerus
        ii. In children less than six years of age, the preferred site is the proximal tibia
    e. Insertion
        i. Follow the manufacturer's recommendations for IO insertion with the above indications
    f. Scrub the insertion site with alcohol prep/chlorhexidine. Strict adherence to aseptic technique is essential.

g. Insert the IO needle
h. Attempt to confirm marrow placement by removing the stylet and aspirating blood and/or bone marrow.
    i. If unable to aspirate, attach 12 ml syringe with normal saline and gently infuse normal saline.
    ii. Observe for normal saline leakage or SQ tissue swelling
        1. If neither occur, proceed
        2. If either occur, select a different site
i. Connect the appropriate IV equipment (normal saline locks not indicated in IO placement)
j. Administer the appropriate fluids and/or drugs
k. Stabilize the entire intraosseous set-up as if to secure an impaled object
l. In conscious patients experiencing pain with IO infusion consider lidocaine administration 20 mg IO for adult patients, for pediatrics administer 0.5 mg/kg maximum 20 mg. (Lidocaine 2% = 20 mg/ml).
m. Notify Medical Control of the IO placement
n. If the IO is unsuccessful after 2 attempts, contact Medical Control.

Procedure for Umbilical Vein Catheterization:

1. Prepare sterile field.
2. Prepare equipment
    a. 20ga. IV catheter with needle removed
    b. Stopcock flushed, with normal saline extension set attached to IV catheter
    c. 12 ml syringe filled with normal saline
3. Trim umbilical cord down to 1/2 - 1 inch from abdomen
4. Identify umbilical vein
    a. The cord has two arteries and one vein, with the vein being larger and having a thinner wall.
5. Insert IV catheter into vein until tip would be just below abdominal skin.
    a. Observe for free flow of blood
    b. Gently aspirate on syringe slowly to confirm lack of resistance
    c. If no "flashback" of blood is noted, catheter may be inserted too far; withdraw catheter slightly and check for flashback.
    d. Inject normal saline
6. Secure umbilical tape around cord tightening around catheter to prevent any blood loss and tape catheter and extension to umbilicus.
7. Administer medications or fluids per **Newborn Resuscitation Protocol.**