McLean County Area EMS System

EZ-IO Intraosseous Infusion System

Purpose

To provide procedural guidance for insertion and maintenance of the EZ-IO Intraosseous Infusion System.

Indications for Use

Intraosseous access is indicated for immediate vascular access in acute medical conditions in which immediate vascular access is needed. Intraosseous access has been proven useful for infusion/fluid therapy, medication administration, blood drawing or vascular access maintenance.

Contraindications

1. Fracture of the bone selected for IO infusion (consider another approved site of insertion)
2. Excessive tissue at insertion site with absence of anatomical landmarks (consider another approved site of insertion)
3. Previous significant orthopedic procedures (i.e. prosthesis or hardware placement) (consider another approved site of insertion)
4. Infection at the site selected (consider another approved site of insertion)

Considerations

1. Ensure the administration of a rapid SYRINGE BOLUS (flush) prior to infusion
   NO FLUSH =NO FLOW
   - Rapid syringe bolus (flush) the EX-IO PD/AD/LD catheter with 10 ml of normal saline
   - Repeat syringe bolus (flush) as needed

2. Pain: prior to IO syringe bolus(flush) or continuous infusion in patients that are responsive to pain, (ensure that the patient has no allergies or sensitivity to lidocaine) SLOWLY infuse lidocaine2% (preservative and epinephrine-free) through the EZ-IO catheter (via the EZ-Connect)into the medullary space over 30-60 seconds and then wait 15-30 seconds for the anesthetic to take effect.
   - Pediatric Patients: 0.5mg/kg lidocaine 2% (preservative and epinephrine free)
     - Adult patients: 2%(preservative and epinephrine free)lidocaine dosing begins at 1 ml and is slowly titrated, 1ml at a time until the patient is comfortable. Titrated doses of the lidocaine should be given with increasing pressure as this will allow for expanded anesthetic effect in the medullary space. Lidocaine is to be used as an anesthetic and not as analgesia and may need to be repeated.

3. Flow rates will be slower than achieved with intravenous (IV) access. To improve continuous infusion rates, use a pressure bag (or BP cuff).
4. Insertion of the EZ-IO in conscious patients or patients responsive to pain has been noted to cause mild to moderate discomfort comparable to the insertion of a large bore IV catheter. IO infusion, however, has been noted to cause severe discomfort.

EZ-IO Procedure

1. Observe universal precautions.
2. Prepare the EZ-IO driver and needle set:
    a. EZ-IO PD for patients weighing between 3kg and 39kg.
    b. EZ-IO AD for patients weighing greater than 40kg.
    c. EZ-IO LD for patients with excessive tissue
3. Assemble equipment per manufacturer's recommendation.
4. Locate an appropriate insertion site. Approved sites include Proximal Tibia, Distal Tibia, and Proximal Humerus.
    a. EZ-IO AD : (commonly for 40kg and over)

    Proximal Tibia- Insertion site is approximately 2cm (depending on patient anatomy) below the patella and approximately 2 cm (depending on patient anatomy) medial to the tibial tuberosity.
    Distal Tibia- Insertion site is located approximately 3 cm (depending on patient anatomy) proximal to the most prominent aspect of the medial malleolus. Place one finger directly over the medial malleolus; move approximately 2 cm (depending on the patient anatomy) proximal and palpate the anterior and posterior borders of the tibia to assure that your insertion site is on the flat center aspect of the bone.
    Proximal Humerus- Insertion site is located on the most prominent aspect of the greater tubercle. Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. Approximately 1 cm (depending on patient anatomy) above the surgical neck is the insertion site. *Ensure that the patient's hand is resting on the abdomen and that the elbow is adducted (close to the body).*

    b. EZ-IO LD: (for use on patients with excessive tissue over the insertion site or when the 5mm mark on the AD needle is not visible after penetration into the tissue)

    Proximal Tibia- Insertion site is approximately 2 cm(depending on patient anatomy) below the patella and approximately 2 cm (depending on the patient anatomy)medial to the tibial tuberosity.
    Distal Tibia- Insertion site is located approximately 3 cm (depending on patient anatomy)proximal to the most prominent aspect of the medial malleolus. Place one finger directly over the medial malleolus; move approximately 2 cm (depending on patient anatomy)proximal and palpate the anterior and posterior borders of the tibia to assure that your insertion site is on the flat center aspect of the bone.
    Proximal Humerus- Insertion site is located directly on the most prominent aspect of the greater tubercle. Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. Approximately 1cm (depending on patient anatomy) above the surgical neck is the insertion site. *Ensure that the patient's hand is resting on the abdomen and that the elbow is adducted(close to the body)*

c. EZ-IO PD: (commonly for 3-39kg, consider tissue density over the landmark desired)

Proximal Tibia- If NO tuberosity is present, the insertion is located approximately 4 cm below the patella and then medial along the flat aspect of the tibia. If the tuberosity IS present, the insertion site is located approximately 2cm medial to the tibial tuberosity along the flat aspect of the tibia. Carefully feel for the "give" or "pop" indicating penetration into the medullary space.
Distal Tibia- Place one finger directly over the medial malleolus; move approximately 2 cm (depending on the patient anatomy) proximal and palpate the anterior and posterior of the tibia to assure that your insertion site is on the flat center aspect of the bone.
Proximal Humerus- The insertion is located directly on the most prominent aspect of the greater tubercle. Slide thumb up the anterior shaft of the humerus until you feel the greater tubercle, this is the surgical neck. Approximately 1cm (depending on patient anatomy) above the surgical neck is the insertion site. *Ensure that the patient's hand is resting on the abdomen and that the elbow is adducted and positioned at the level of the spine. The proximal humerus may be difficult or impossible to palpate in children less than 5 years of age as the greater tubercle has not yet developed. In these cases, the insertion will most likely be a shaft insertion.*

5. Prep the site with Betadine and set up infusion solution as for regular IV.
6. Stabilize site and insert appropriate needle set.
    a. Position the driver at the insertion site with the needle set at a 90-degree angle to the bone surface. Gently pierce the skin with the needle set until the needle touches the bone.
    b. Check to ensure that at least 5mm of catheter is visible (no black line), patient may have excessive soft tissue over selected insertion site and needle set may not reach the medullary space. Consider an alternative site for insertion or a longer needle set.
    c. Penetrate the bone cortex by squeezing driver's trigger and applying gently, consistent, steady, downward pressure (allow the driver to do the work).
    d. Release the driver's trigger and stop the insertion process when:
        i. A sudden "give or pop" is felt upon entry into the medullary space
        ii. When desired depth is obtained.
7. Remove EZ-IO driver from needle set while stabilizing catheter hub.
8. Remove stylet from the catheter; place stylet in EZ-IO shuttle or approved sharps container.
9. Attach 5-10 ml syringe and aspirate bone marrow to confirm placement.
    a. IO catheter should be at a 90 degree angle and firmly seated in the tibial bone.
    b. Blood may be visible at the tip of the stylet.
    c. The IO catheter should flush freely without difficulty or evidence of extravasation.
10. Connect the luer-lock equipped IV administration set.
11. For **conscious** patients (or for previously unresponsive patients who become conscious): administer **Lidocaine** to reduce discomfort from infusion.
12. Flush the IO catheter with 10ml of normal saline.

13. Utilize a pressure bag for continuous infusions where applicable. If a pressure bag is not available, wrap a BP cuff around the bag of normal saline and inflate the cuff until the desired flow rate is achieved.
14. Dress site, secure tubing and apply wristband as directed.
15. Closely monitor EZ-IO site en route.