

TEMPLATE

Procedure Guidelines for the EZ-IO®

Intraosseous Devices

Purpose

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

Definitions

Intraosseous: situated within, occurring within, or administered by entering a bone

Key Words

Intraosseous, EZ-IO®, infusion, vascular access

Equipment

1. One (1) EZ-IO Power Driver
2. Appropriate size intraosseous Needle Set based on patient size and weight
 - EZ-IO 15mm 3-39 kg
 - EZ-IO 25mm 40 kg and greater
 - EZ-IO 45mm excessive tissue
3. One (1) EZ-Connect®
4. Three (3) 10 ml syringes
5. Sterile saline solution for flush. Note: 2% lidocaine without preservatives or epinephrine (cardiac lidocaine) for patients responding to pain
6. Two (2) pairs non-sterile non-latex gloves
7. Antiseptic agent per institution protocol
8. One (1) semi-permeable transparent dressing (optional)
9. One (1) sterile 2x2 or 4x4 gauze pad
10. One (1) (appropriate volume and type) intravenous solution
11. One (1) fluid administration set (institution specific)
12. One (1) fluid administration pump or pressure bag (institution specific)
13. EZ-Stabilizer

1. Indications for Use

- 1.1. 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.

2. Contraindications

- 2.1 Fracture of the targeted bone
- 2.2 Previous orthopedic procedures near insertion site (prosthetic limb or joint)
- 2.3 IO within the past 24 hours in the targeted bone
- 2.4 Infection at the insertion site
- 2.5 Inability to locate landmarks or excessive tissue over the insertion site

3. Considerations

- 3.1. Ensure the administration of a rapid SYRINGE BOLUS (flush) prior to infusion NO FLUSH = NO FLOW
 - Rapid syringe bolus (flush) the catheter with 10 ml of normal saline
 - Repeat syringe bolus (flush) as needed
- 3.2. **Pain:** The prescribed dosage of 2% lidocaine without preservatives or epinephrine (cardiac lidocaine) must be infused slowly in 0.2 ml increments to prevent it from being sent directly into the central circulation. Titrated doses of the lidocaine should be given with increasing pressure as this will allow for expanded anesthetic effect in the medullary space. Following administration of the prescribed dose, it is crucial that you wait a minimum of 15-30 seconds for the drug to reach maximum anesthetic effect before giving the bolus. Lidocaine is to be used as an anesthetic and not as analgesia and repeated dosing may be necessary.

****Consult pharmaceutical DFU's for lidocaine 2% (preservative and epinephrine-free) prior to infusion***

****Medical Director must authorize appropriate dosage range***

Pain Management Bibliography available to aid decision (M-220)

****Do not exceed 3mg/kg/24hr***

4. Procedure

- 4.1. Explain procedure to patient/family
- 4.2. Choose appropriate intraosseous Needle Set and assemble equipment
- 4.3. Obtain assistance as needed
- 4.4. Wash hands
- 4.5. Draw up syringe with sterile saline solution (10 ml)
- 4.6. Inspect Needle Set package to ensure sterility
 - 4.6.1. Connect 10 ml syringe to EZ-Connect, primed with sterile saline or lidocaine as appropriate
 - 4.6.2. Obtain blood samples for laboratory analysis (as necessary) prior to priming EZ-Connect
 - 4.6.3. Leave syringe attached to EZ-Connect
- 4.7. Palpate site to locate appropriate anatomical landmarks for Needle Set placement
- 4.8. Locate appropriate insertion site
 - EZ-IO 25mm: (commonly for 40 kg and over)
 - **Proximal Tibia** – Insertion site is approximately 2 cm 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 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 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).*
- EZ-IO 45mm: (recommended for the proximal humerus application, patients with excessive tissue over the insertion site or when a black line is not visible after penetration into the tissue)
 - **Proximal Tibia** – Insertion site is approximately 2 cm 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 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 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).*
- EZ-IO 15mm: (commonly for 3-39 kg, 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 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** - 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 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 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.

- 4.9. Apply non-sterile latex free gloves
- 4.10. Drop the following onto non-sterile field:
 - 4.10.1.1. Antiseptic agent per institution protocol
 - 4.10.1.2. Semi-permeable transparent dressing (optional)
 - 4.10.1.3. 2x2 gauze or 4x4 gauze
 - 4.10.1.4. Needle Set, in cartridge, and EZ-Connect (with attached syringe)
- 4.11. Cleanse site using antiseptic agent per institution protocol
- 4.12. Allow to *air dry thoroughly*
- 4.13. Connect appropriate Needle Set to driver
- 4.14. Stabilize site
- 4.15. Remove needle cap
- 4.16. Insert EZ-IO needle into the selected site. IMPORTANT: Keep hand and fingers away from Needle Set
 - 4.16.1. 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 set tip touches the bone.
 - 4.16.2. Check to ensure that at least one black line is visible. If no black line is visible, 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.
 - 4.16.3. Penetrate the bone cortex by squeezing driver's trigger and applying gentle, consistent, steady, downward pressure (allow the driver to do the work)
 - 4.16.4. Release the driver's trigger and stop the insertion process when:
 1. A sudden "give or pop" is felt upon entry into the medullary space
 2. When desired depth is obtained
- 4.17. Remove EZ-IO Power Driver from Needle Set while stabilizing the catheter hub
- 4.18. Remove stylet from catheter by turning counter-clockwise and immediately dispose of stylet in appropriate biohazard sharps container
 - *NEVER return used stylet or cartridge to the EZ-IO kit or crash cart
- 4.19. Secure site with EZ Stabilizer
- 4.20. Connect primed EZ-Connect to exposed Luer-lock hub
- 4.21. Confirm placement
- 4.22. Syringe bolus: flush the catheter with 10 ml of normal saline
 - 4.22.1. If the patient is responsive to pain the clinician should consider 2% lidocaine without preservatives or epinephrine (cardiac lidocaine) for anesthetic effect prior to the 10ml normal saline flush and it may be necessary to administer additional lidocaine following the saline flush.
- 4.23. Assess for potential IO complications
- 4.24. Disconnect 10 ml syringe from EZ-Connect extension set
- 4.25. Connect primed EZ-Connect extension set to primed IV tubing
- 4.26. Begin infusion utilizing a pressure delivery system
- 4.27. Secure tubing and catheter per institution policy
- 4.28. Continue to monitor extremity for complications
- 4.29. Place EZ-IO armband on patient, document time and date

CATHETER REMOVAL

1. Remove the extension set from the needle hub
2. Attach a 5-10 ml sterile syringe (with standard Luer-lock) to act as a handle and to cap the open IO port
3. Grasp syringe and continuously rotate clockwise while gently pulling the catheter out (maintain a 90-degree angle to the bone). **DO NOT ROCK OR BEND DURING REMOVAL.**
4. Dispose of catheter into a sharps container
5. Apply pressure to site as needed; apply adhesive dressing as indicated