Clinical Guidelines

Intra Osseous (IO) Line Insertion

Document Control Information

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Introduction
The insertion of IO access is indicated when immediate circulatory access needs to be obtained and previous IV line insertion attempts have failed. It is the recommended technique for circulatory access in decompensated shock and should be established if vascular access is not rapidly achieved.

Uses
- IO Lines can be used for any drug infusion or fluid bolus.
- Use an IO in the same way as a central line, for example to administer inotropes, electrolytes and resus drugs.
- Flushes will need to be used between drug administration.
- Infusions will need to have pressure to deliver the drug, eg. in a pump, not a drip.

Contraindications
- Proximal ipsilateral fracture
- Ipsilateral vascular injury
- Osteogenesis imperfecta—> if using a Cook device
- Infection at site of insertion
- Landmarking not identifiable
- Failed IO attempt in selected bone
- Orthopaedic procedure near site

Selecting IO size

EZI-IO with Drill

<table>
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<tr>
<th>Size</th>
<th>Application</th>
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<tr>
<td>Neonates. 15mm</td>
<td>Manual Cook IO</td>
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<tr>
<td>Paediatrics. 25mm</td>
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<td>Adolescents. 45mm</td>
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Most paediatric patients will require the blue 25mm needle
IO Site Location

Proximal Tibia

2. Palpate tibial tuberosity (bony thickness below patella)
3. Insert 2-3cm below + medial to tibial tuberosity into the flat anteromedial surface of tibia

Distal Femur

1. Position straight leg
2. Palpate 2-3cm above condyle
3. Insert just medial to midline to avoid tendon

Proximal Humeral Head

1. Position: Elbow adducted, hand over the umbilicus, or place flat of patient hand under their bottom.
2. From the mid-shaft humerus, palpate up, toward the proximal aspect/humeral head.
3. Palpate small bony protrusion close to shoulder.
4. Insert at the base of the greater tubercle @ 45 degrees to the bone.
Inserting the IO

- Prepare the skin, clean with antiseptic solution
- Consider local anaesthetic if the patient is awake
- Stabilise the skin and soft tissues with non-dominant hand, do not put fingers under the site
- Insert the needle through the skin, push until you feel the periosteum
- Use a perpendicular screwing motion if using a manual IO or when using the IO drill press button once needle rests on periosteum
- There is a pop/give as the marrow cavity is entered
- Remove the trocar and confirm position by aspirating bone marrow through a 5 ml syringe
- Marrow cannot always be aspirated but the IO needle should flush easily
- Secure the needle with dressing and attach a t-piece (pre-flushed with 0.9% saline)
- Flush the IO with 2 – 5mls 0.9% Saline before administering bolus or infusion drugs
- Look for signs of extravasation eg. swelling

Considerations following insertion

- When giving a fluid bolus through the IO, support the IO and the limb, and give the bolus slowly. This will prevent the IO popping out of bone cavity.
- Monitor limb for signs of extravasation: swelling, limb colour, limb perfusion.

Complications

- Failure to enter the bone marrow, with extravasation or subperiosteal infusion
- Penetration through the bone
- Osteomyelitis (rare in short term use)
- Physeal plate injury
- Local infection, skin necrosis, pain, compartment syndrome, fat and bone microemboli have all been reported but are rare

Transport Considerations

- Secure the IO line with appropriate dressing
- Monitor IO site for extravasation (before, during and after transport)
- Document location and size of IO needle use
- Document drugs given through IO line
- Document any failed IO attempts
- Hand over to accepting PICU IO details