Method & Sites for Intra-osseous Needle Insertion

There are 8 potential sites for the insertion of an intraosseous needle using the EZ-IO device or standard intraosseous needle, these include proximal humerus, proximal tibia, distal femur and distal tibia.

Other devices with multiple small needles can also be used in the sternum – but these are **not** generally used in paediatric age group.

EZ-IO device

Standard intraosseous needle

Intraosseous device for sternal insertion

Main Insertion Sites suggested for paediatric use are:

Proximal Tibia

Generally used in an unresponsive patient
Easiest site to find landmarks
Medial aspect of the proximal tibia has a flat surface making it an easier surface to place an intraosseous needle

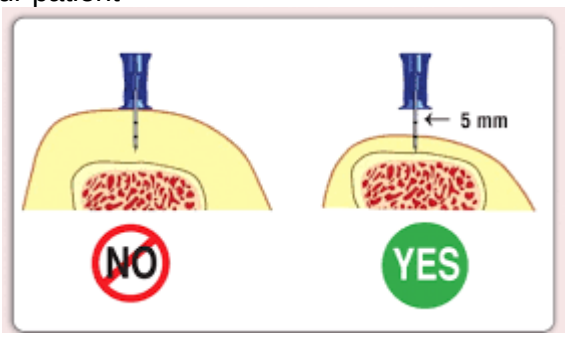
Proximal Humerus

Optimal site for high flow and quick drug uptake
Use in awake, responsive patients
Less painful

Insertion Method:

1. Prepare the skin using 2% chlorhexidine
2. Push the needle through the skin, until the needle is directly on the surface of the bone
3. **Standard IO needle:** using a screwing motion apply steady downward pressure perpendicular to bone but slightly away from the physeal (or growth) plate and advance the needle into the bone
4. **EZ-IO device:** squeeze the driver's trigger and apply steady downward pressure perpendicular to bone but slightly away from the physeal (or growth) plate and advance the needle into the bone.

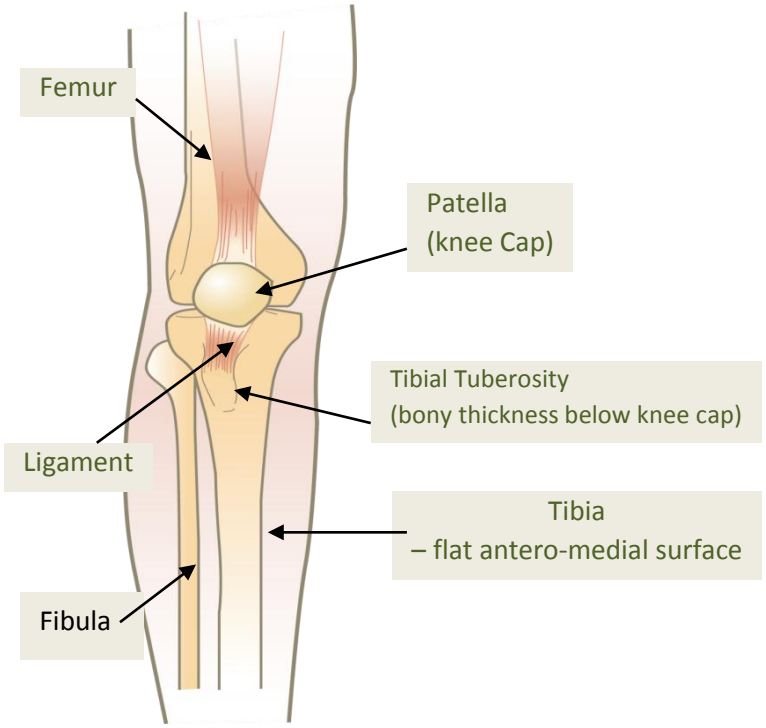
5. Check that the 5mm mark is visible above the skin to confirm that you have correct size of needle for your patient

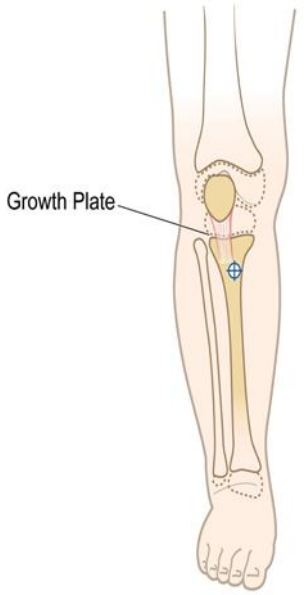


6. There is a slight give as the marrow cavity is entered
7. Remove the trocar/stylet and confirm position by aspirating bone marrow through a 5 ml syringe. Send marrow blood for laboratory sampling (suitable for most standard laboratory values, haematology, biochem, and ABO and Rh typing) but **warn the lab as marrow may damage some machines**.
8. NB Marrow cannot always be aspirated but the IO should flush easily. If marrow is not aspirated try flushing with 5-10 mls 0.9% saline to ensure patency, then try aspirating marrow again.
9. NB most painful part of the procedure is the first bolus of fluid via an intraosseous needle

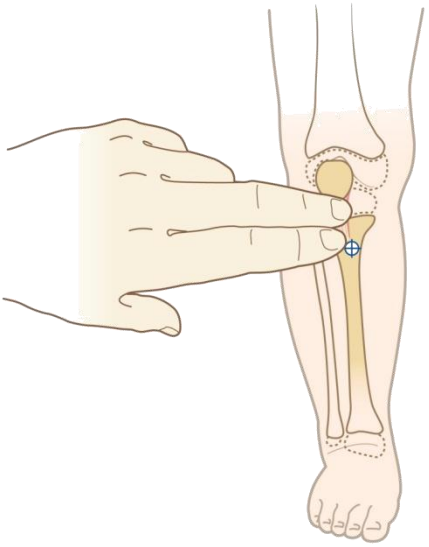
LANDMARKS
1.Proximal Tibia

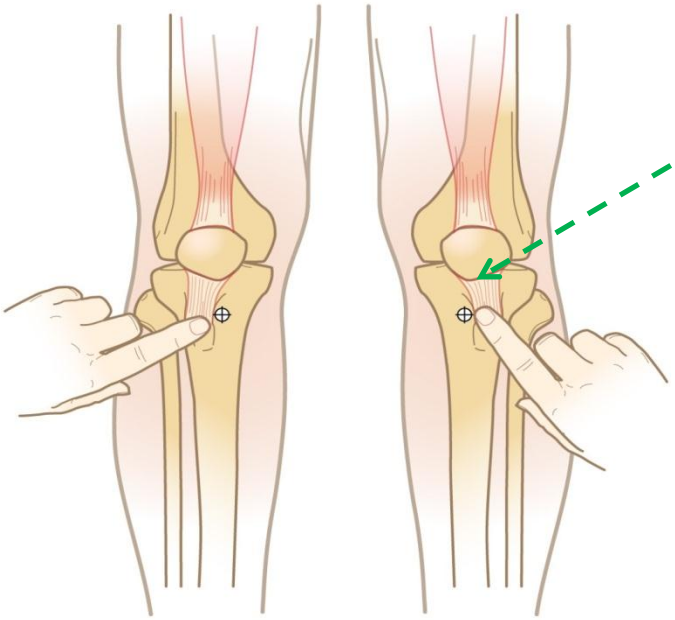
Insert the intraosseous needle into the broad flat antero-medial surface of the tibia





Patients less than 40 kg
Palpate the tibial tuberosity (if possible)
Insert 2-3 cm below tibial tuberosity OR
2 fingerbreadths or 3 cm from the base of the patella



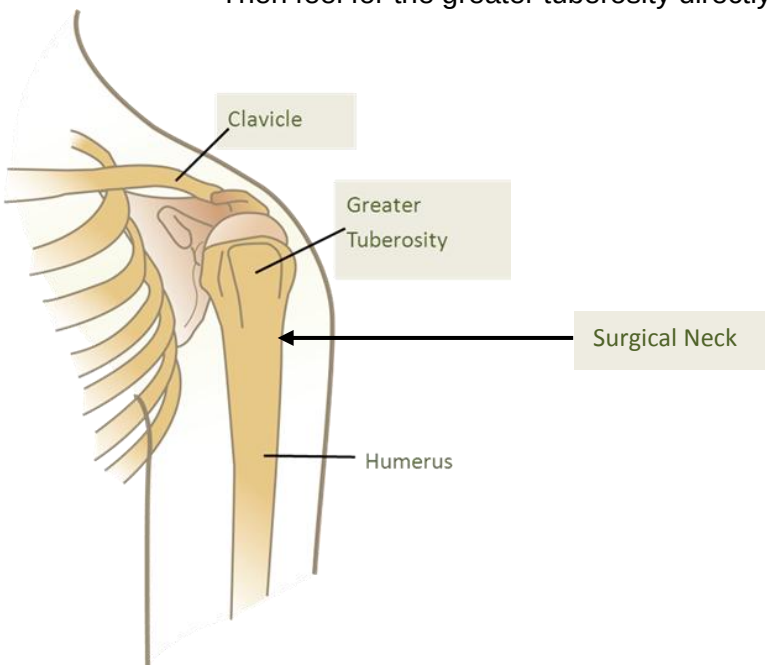


Patients more than 40kg
Palpate the tibial tuberosity
Insert IO 2-3 cm below the tibial tuberosity
OR
2 fingerbreadths or 3 cm from base of patella
Insert IO 1 finger space medial to tuberosity into the flat antero-medial surface of tibia

2. Proximal Humerus

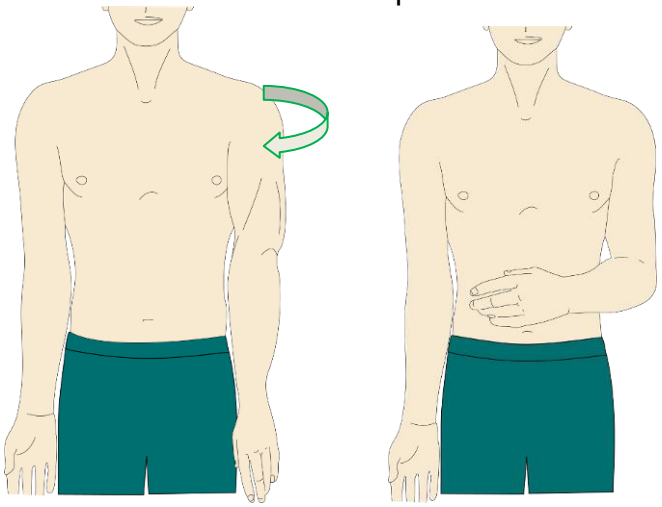
Insertion point is the greater tuberosity, **avoiding** the surgical neck
Locate the surgical neck by pressing hard on the upper arm moving your fingers upwards from the elbow.

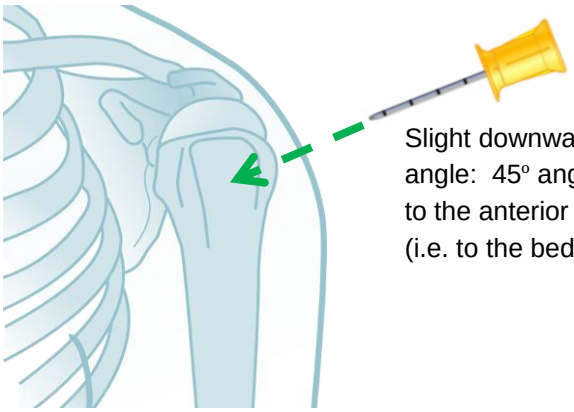
Then feel for the greater tuberosity directly above.



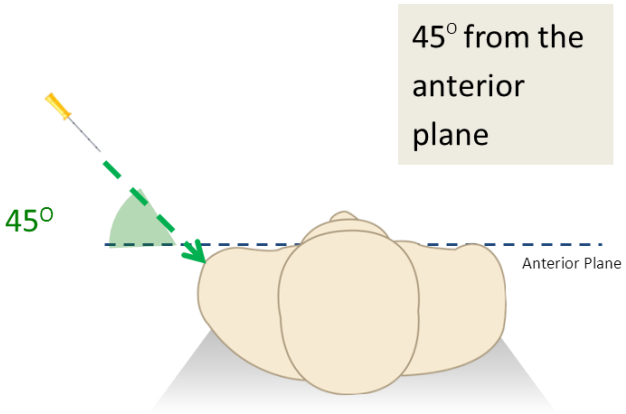
Position for Insertion of IO Needle – proximal humerus

Rotate the arm inwards **or** place hand on umbilicus





NB to accentuate the internal rotation you can position the patients' hand behind their back

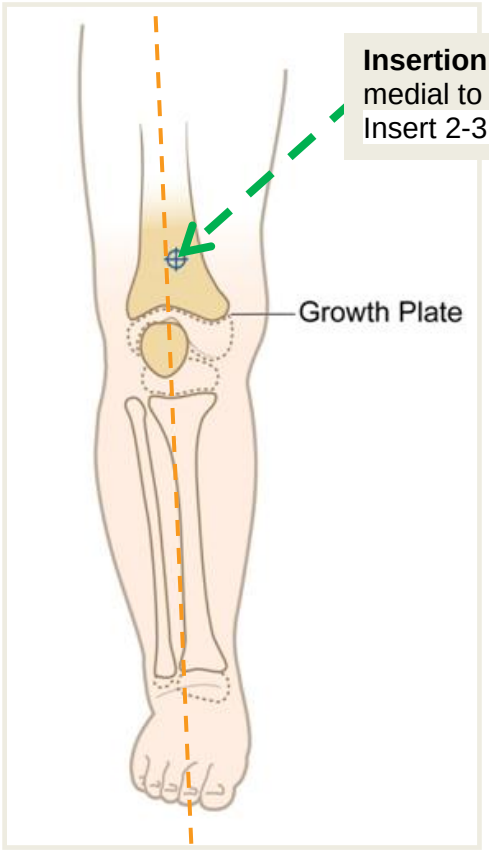


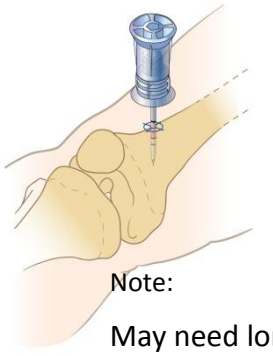
Advantages: optimal site for high flow infusions and drug uptake, plus it is **less** painful

3. Distal Femur

Recommended in Europe only

Best for children under 6 years





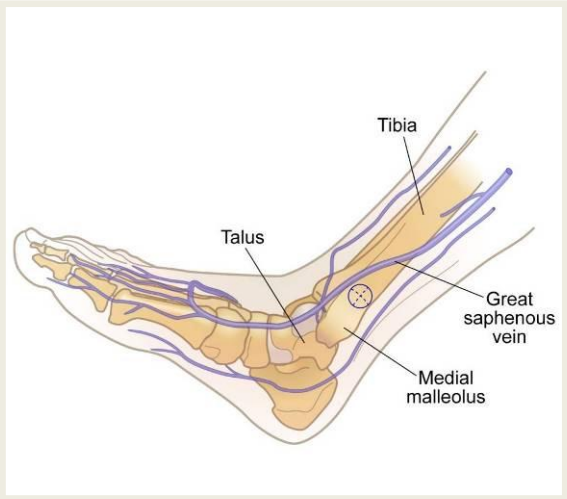
Note:

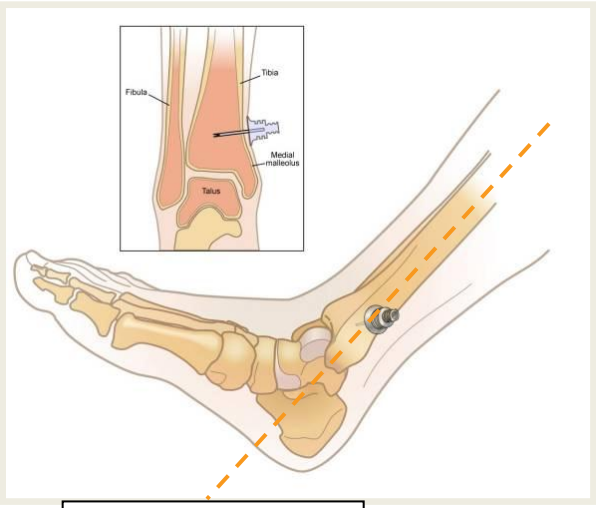
May need longer needle – check skin depth

4. Distal Tibia

Useful for larger patients & if unable to access other sites
NB Cannot use if there is a fracture proximal to insertion site or any previous IO inserted proximally has tissued

Insert proximal to the medial malleolus as shown below



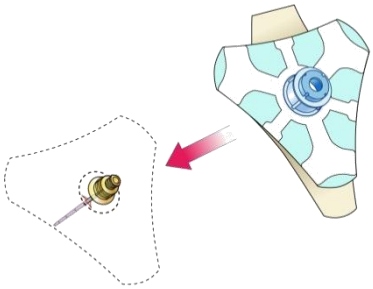


Midline of bone

Securing the EZ-IO Device

After insertion, check…

- Firmly seated needle (no wobble)
- Aspirate blood via a syringe (flash of blood)
- No leaking around site
- No sign of extravasation
- Secure e.g. using EZ Stabilizer or similar method
- Attach a Luer-lock connector



NB whilst infusing regularly check the site and ensure that limb perfusion normal, and no sign of extravasation or compartment syndrome (check the muscle closest to the insertion site e.g. for proximal tibia check that the calf muscle – gastrocnemius feels soft as normal).