NEONATAL PERCUTANEOUS LONG LINE INSERTION

INDICATIONS

• To provide secure venous access for administration of PN

• To enable safe and uninterrupted administration of clinically essential or locally toxic solutions (e.g. inotropes/concentrated dextrose solutions)

• As a mode of venous access when peripheral options have been exhausted

The insertion of a long line should not be considered routine. Each case must be considered on an individual basis and is usually discussed with a Consultant.

RELATIVE CONTRAINDICATIONS

• Infection:
  o Systemic (unless long line an urgent requirement and/or 48 hours of treatment has been given; requires discussion with Consultant)
  o Cutaneous, at the site of insertion

• Abnormal clotting profile / thrombocytopenia – consider correcting before proceeding with insertion of the long line

PRINCIPLES OF PRACTICE

• If the procedure is difficult, prolonged or multiple punctures are made, consideration should be given to allowing the baby to have a break and/or asking a colleague to perform the procedure.

INSERTION SITE

Most frequently used sites include:

• Large vein in the antecubital fossa
• Long saphenous vein
• Axillary and scalp veins may also be used
Handy Hint:
- Take time to select the best vein
- Start by looking distally

MEASUREMENTS

- For long lines inserted via the arm: measure from insertion site along the arm to the top of the anterior axillary fold, then to the sternum, level with the second intercostal space
- For long lines inserted via the leg: measure from insertion site to the groin and then diagonally to the xiphisternum
- For scalp veins: measure from the site of insertion to the clavicular head and then to the sternum, level with the second intercostal space

Handy Hint:
- Ensure that long line selected is of adequate length to reach the desired position e.g. 15cm lines may be too short for leg lines

Illustration taken from Neonatology, a Lange clinical manual, 5th edition, Gomella, Cunningham, Eyal and Zenk
EQUIPMENT REQUIRED

- Appropriately sized long line (see below)
- Long line pack contains 1 tray, 2 drapes (one adhesive, one with aperture), 4 gauze balls, 2 plastic forceps, 1 paper tape measure, 1 bionector, 1 tegaderm 6x7cm, 5 swab gauze, 1 neonatal tourniquet, 1 pair of scissors, 1 iris straight forceps, 1 iris curved forceps, 1 10ml syringe, 1 gallipot, 1 outer wrap
- Gown and sterile gloves
- Cleaning solution: Unisept (0.05% aqueous Chlorhexidine Gluconate)
- Steristrips
- 10ml 0.9% saline
- Blue 23G needle

USUAL CHOICE OF LONG LINE

<table>
<thead>
<tr>
<th>For infants &lt; 1kg</th>
<th>Usually a Premicatheter (1 Fr) is used unless veins are large and suitable for a larger line</th>
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<tbody>
<tr>
<td>For infants &gt; 1kg</td>
<td>Usually a Nutriline (2Fr) or Epicutaneo-Cava-Katheter (2Fr) is used</td>
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- **Premicath 1Fr (28G) single lumen polyurethane catheter**
  This catheter is 20cm long, and can be introduced via a peelable cannula (included in the pack) or a yellow 24G cannula. There are catheter markings every 1cm. The priming volume 0.15ml

- **Nutriline 2Fr (24G) single lumen polyurethane catheter**
  This catheter comes in 2 lengths: 15cm and 30cm. It is also introduced via peelable cannula. The long line comes in a prepared pack which may need supplementing (see pack for contents). The priming volume is 0.08mls for the 15cm catheter and 0.16mls for the 30cm catheter.

- **Epicutaneo-Cava-Katheter 2Fr (24G) single lumen silicone catheter**
  This comes in 3 lengths: 15cm, 30cm and 50cm lengths. The kit comes with a 19G butterfly style introducer needle, which can be removed after insertion via the removable Easy-lock extension tube. The priming volume for the 15 cm catheter is 0.1mls, for the 30cm catheter is 0.12mls and for the 50cm catheter is 0.16mls.
PROCEDURE

- Select a vein and measure distance of insertion as per instructions above
- Consider methods of pain relief (see pain relief guideline)
- Position and expose patient adequately. Maintain thermoregulation
- Clean hands and forearms thoroughly, then put on gloves and gown using aseptic technique
- Prepare equipment:
  - Make sure equipment correct and functioning
  - Flush long line with 0.9% saline to check for integrity of the line
  - Cut Steristrips and Tegaderm in half
- Establish sterile field by cleaning site of insertion and surrounding area with cleaning solution. Allow skin to dry. Cover with sterile drape, ensuring full access to required site by making a hole in the drape beforehand (see cleaning skin for procedures guideline)
- Tourniquets may be useful but must be used with care. For small babies, a piece of gauze is the most appropriate choice. The green tourniquet provided in the long line pack should not be used
- Use slight tension on the skin to stabilise the vein and then insert the introducer needle into the vein. Once a flashback is seen, stop and advance the plastic cannula over the needle for 1-2mm whilst removing the needle completely from its plastic cannula. Stabilise the cannula with one finger to maintain its position. Release the tourniquet

**Handy Hint:**
- It may be necessary to alter the angle of the cannula in line with the vein

- Using non-toothed forceps, carefully advance the long line to the measured distance. If resistance is met at 4-5cm, this is probably the end of the cannula. Take the line out to check if the cannula is still in the vein. If resistance is met between 5-10cm, then try repositioning limb as the line may be stuck at a junction of vessels. Flushing may also be helpful
- Once the long line has been inserted to desired distance, remove the cannula
- If there is bleeding at the insertion site, apply pressure with gauze until bleeding stops. This may take some time, 15 minutes or more in some babies
• Flush the long line with 0.9% saline

**SECURING THE LINE**

• Prior to securing, clean the site as blood is a source of infection

• Secure the long line by taping it flat against the skin using Steristrips

• Place the catheter hub on a small square piece of sterile gauze

• Coil the remainder of the line near the insertion site, ensuring there are no kinks. Secure with further Steristrips

• Cover the insertion site, hub, and the coiled line with Tegaderm. Take care not to completely wrap the Tegaderm or Steristrips around the limb.

• Using sterile technique, connect the line to a 10ml syringe of 0.9% saline, which in turn is connected to a Grazeby pump. Run at 0.5ml/hr to keep the line patent pending confirming of position

**CONFIRM LONG LINE POSITION**

• The location of the tip of the line should be assessed prior to its use, unless it is an emergency. This is usually achieved by X-ray.

• The limb with the line should be positioned appropriately to image the maximum line incursion (so that when the limb position is adjusted, the line should not be able to enter the heart).
  
  o For lines inserted into the basilic vein, the arm should be flexed at the elbow and fully ADDUCTED at the shoulder
  
  o For lines inserted into the cephalic vein, the arm should be flexed at the elbow but ABDUCTED at the shoulder
  
  o For lines inserted into the axillary vein, the arm should be ADDUCTED at the shoulder. Elbow flexion/extension does not make a difference
  
  o For lower limb lines, the leg should be flexed at the hip and the knee

• Contrast (Omnipaque 3000) should be used if a Premicatheter has been inserted. The other lines are radio-opaque so contrast is not required

• If contrast is used, the line should be primed with contrast (0.3-0.5ml) and locked. Never inject contrast during the X-ray
• Ultrasound/ECHO is also a reliable method of confirming tip position, if there is adequate expertise available.  

• Ideal tip locations:
  
  o For upper limb lines, the line tip should be within the thoracic cavity or within a large blood vessel (see red target areas)
  
  
  o For lower limb lines, the preferred position is within the IVC
  
  o All long line tips must lie outside the right atrium.  
  
  If the line tip is beyond the desired position, it must be withdrawn as an aseptic procedure.  
  
  Under no circumstances should the line be advanced further
  
  o Long line tips outside the target areas are considered short but can still be used with caution
Following readjustment, the position of the tip must be confirmed either radiographically or using ultrasound.

- Complete a blue line insertion form and file in patient’s notes, including any subsequent adjustments to the line and final position of the tip. When removing the line, the date and reason for removal must be documented.

REFERENCES


Written by Dr S Sukani December 2008
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