Insertion of Percutaneous Central Venous Catheter (long line) in Newborn Babies

The decision to insert or remove a percutaneous long-line is usually a Consultant decision. Long lines should be inserted by experienced staff or by junior staff under the supervision of experienced staff. Insertion of long lines is a painful procedure, please consider giving paracetamol PO or IV to the patient.

Indications for the use of percutaneous long lines:
- To provide secure venous access for the administration of fluids and parenteral nutrition when it seems likely that full enteral nutrition will not be possible for some time.\(^1\)
- To enable the safe and uninterrupted administration of clinically essential drug solutions.\(^1\)
- As a mode of venous access when peripheral options have been exhausted.\(^1\)

Insertion sites:
- Veins of antecubital fossa
- Long saphenous vein (medial aspect of ankle or knee)
- Superficial temporal vein (not 1\(^{st}\) choice)

Types of long lines:
- Premicath 28G –polyurethane catheter for babies with BW< 1 kg. (20 cm )
- Epicutaneo-Cava-Katheter (Vygon) silastic catheter (15,30 or 50 cm)
- Nutriline Pic Line, (Vygon), polyurethane catheter 24G or 2F (30cm) for babies with birth weight >1kg

Insertion distance:
Measure length of long line to be inserted prior to procedure:
- Via the lower limb: from insertion site to xiphisternum
- Via the upper limb: from insertion site to the sternal angle
- Via scalp veins: from insertion site to the sternal angle

Long line tip position:
- A recommendation of the 2001 Manchester report was that all central venous lines should be sited outside the cardiac chambers.\(^2\)
- For upper limb placement, the line tip should be within the distal superior vena cava.
- For lower limb placement, the line tip should be within the distal inferior vena cava.\(^3\)

Technique:
The procedure should be performed using full aseptic technique wearing a hat (all hair should be covered) and mask (should cover the nose & mouth tightly) and then wearing sterile gown and gloves following surgical scrubbing. *see appendix 1* (Maximal contact precautions)

1. ‘Double’ glove before commencement
2. Using the dedicated long line trolley, cover with a trolley drape.
3. Unwrap the long line pack containing appropriate instruments.
4. Place sterile drape underneath the baby.
5. Prepare the skin using Chloroprep 1.5ml. Use a ‘dab’ rather than ‘rub’ movement. Clean limb to joint above and below site. Allow antiseptic to dry before proceeding.
6. In infants < 28weeks **and/or** < 1 week old, once antiseptic has dried, clean skin again with sterile saline, to remove excess chlorhexidine.
7. Drape the site of insertion with sterile aperture drape provided to ensure a sterile field.
8. Flush line prior to insertion to rule out any leakage along its length.
9. Insert the butterfly needle supplied in the pack (silastic lines) in to the vein and then insert the catheter through the lumen of the butterfly needle using non-toothed forceps.
10. The butterfly needle can be completely sleeved off the silastic catheter by loosening the blue hub which then should be fully tightened before the transparent dressing is applied.
The blue hub should never be completely detached from the tubing as one could lose
the tiny washer which helps in securing a proper seal against the fluid leakage.

11. If one is using the polyurethane catheters then one should use the splittable blue needles
supplied with it.

12. Following the insertion to the correct distance the line should be fully secured, as per
before X ray fixation guideline.

13. Confirm position of tip of long-line with X-ray. Consider injection of 0.5mls of Omnipaque,
immediately prior to X-ray if using premicath1, 4, 5.

14. After the x-ray is reviewed and a satisfactory position confirmed, Document the tip
position. And secure as per permanent fixation guideline

15. If line adjustment is required then maximal contact precautions need to be
utilized.

Note: Correct placement of the line is essential as catheters in the heart may cause
arrhythmias or pericardial effusions and ultimately, cardiac tamponade leading to
sudden death.

Maintenance:

- The insertion site with the tegaderm dressing should be left undisturbed1.
- Minimize the frequency of line breaks for infusion change and drug injection4.
- Hypoglycaemia caused by interruption of the intravenous infusion may be a clue to line
breakage or delayed effusion into a body cavity because of damage to the vascular wall
by the infused fluid4.
- In any infant with a percutaneous long line in situ who clinically deteriorates or has a
cardiac arrest, pericardial effusion/cardiac tamponade must be considered and
appropriate action taken.
- Regular training and education of staff in central venous catheter care6.

Removal of long line: All lines should remain in situ for a maximum of 21 days.
Removal will be a Consultant’s or a Registrar’s decision.
Ensure complete length of catheter removed and this should be verified by another colleague.

Documentation:

- Details of each attempt at insertion should be recorded on the neonatal PICC sheet and
the position of the line tip recorded in the notes.
- The parents should be informed about planned long line insertions4. A formal consent is
not required.

### Signs and Symptoms of Pericardial Effusion with Tamponade:

**Note:** This is a clinical emergency and any concerns should be discussed with the
Consultant.

- Bradycardia and diminished heart sounds
- Decreased blood pressure
- Decreased ECG voltage
- Enlarged cardiac shadow on x-ray
- Confirm diagnosis with echocardiogram

References:

2. DoH. Review of four neonatal deaths due to cardiac tamponade associated with the presence of a central venous
catheter. Recommendations and Department of Health response.
3. Beardsall K, White DK, Pinto EM, Kelsall AWR. Pericardial effusion and cardiac tamponade as complications of neonatal
long lines: are they really a problem? Arch Dis Child Fetal Neonatal Ed 2003; 88: F292-295
5. Evans A, Natarajan J, Davies CJ. Long line positioning in neonates: does computed radiography improve visibility? Arch
Dis Child Fetal Neonatal Ed 2004; 89: F44-45

S Cherian and B Owen March 2011 to be reviewed March 2014
Appendix 1  (Insertion of Percutaneous Central Venous Catheter (long line) in Newborn Babies)

Pre-decontamination requirements

• Keep nails short and clean
• Artificial nails and/or nail polish must not be worn
• Remove wristwatches roll up sleeves
• Only plain band rings may be worn
• All cuts and abrasions on hands and arms should be covered with a waterproof dressing

Surgical scrub
(reproduced from main theatres policy, Cardiff and Vale NHS Trust)

If a ring is worn, either remove it or ensure that the area underneath is washed

• To turn on water, place hands underneath tap
• Wet hands and arms to the elbow
• Dispense at least 5ml of selected solution onto hand (once you have selected a solution you must continue to use the same one throughout the scrub, and subsequent scrubs during the same session)
• Lather arms and hands, down to elbows with selected solution for one minute
  - social wash. Keep hands upright and arms away from the body.
• Rinse off lather thoroughly keeping hands above elbow level at all times to allow water to run from hands to elbow
• Using elbow, dispense fresh solution and re-lather hands and arms for a further one minute
• Rinse hands and arms thoroughly keeping arms upright
• Dispense further solution onto hands, lather and wash hands and only three quarters of the way down the arm for one minute
• Rinse hands only, allowing solution on arms to remain undisturbed
• Take fresh solution and re-lather hands only (do not touch arms) for one minute
• Rinse hands and arms thoroughly
• Remove hands from water flow and holding hands up and away from clothing move to gown trolley
• Pick up a sterile towel from the trolley, using one towel to dry each arm, dry each finger individually and thoroughly using a circular movement. Continue the circular movement from hand to elbow ensuring bare hand does not touch arm
• On reaching elbow towel must be discarded straight into bin without being handled
• If you have used a soap solution (rather than an antimicrobial) you must dispense sufficient alcohol gel onto the hand and rub into arms and hands ensuring no areas are missed
• Allow alcohol gel to evaporate prior to donning gloves and gown

Reference
Hand Decontamination : Cardiff and Vale NHS Trust