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.

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
- To enable the safe and uninterrupted administration of clinically essential drug solutions
- As a mode of venous access when peripheral options have been exhausted

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

Types of long lines:
- 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
- Premicath 28G –polyurethane catheter (20cm). Use only in the smallest babies where difficulty with insertion is anticipated or when attempts to insert a larger line have failed

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
- 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.

Technique:
The procedure should be performed using full aseptic technique wearing sterile gown and gloves following surgical scrubbing.

1. Unwrap the long line pack containing appropriate instruments
2. Appropriate cleansing of skin: Use aqueous chlorhexidine (pink solution)
3. Drape the site of insertion with sterile towels provided in the pack to ensure a sterile field
4. Flush line prior to insertion to rule out any leakage along its length.
5. 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.
6. 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.
7. If one is using the polyurethane catheters then one should use the splittable blue needles supplied with it.
8. Following the insertion to the correct distance the catheter should be adequately secured with steristrips. This is essential as some lines are known to migrate.
9. Confirm position of tip of long-line with X-ray. If using a premicath, inject approximately 0.3mls of Omnipaque to fill the line and a further 0.3ml as the X-ray is taken\(^1,4,5\). Keep the area sterile until the x-ray is reviewed and a satisfactory position confirmed.

**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. Lines should be withdrawn promptly if they have been inserted too far, but never advanced.

10. After confirming the correct position of tip of catheter apply sterile gauze under the blue hub of long line/wings of polyurethane lines.

11. Ensure complete coverage of puncture site and catheter assembly using sterile occlusive dressing e.g. tegaderm or opsite.

**Maintenance:**
- The insertion site with the tegaderm dressing should be left undisturbed\(^1\).
- Minimize the frequency of line breaks for infusion change and drug injection\(^4\).
- 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 fluid\(^4\).
- 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 care\(^6\).

**Removal of long line:** This 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 long line sheet (see appendix) and the position of the line tip recorded.
- The parents should be informed about planned long line insertions\(^4\). 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.

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