

LONG LINE INSERTION (PERIPHERALLY SITED)

Central venous catheters allow administration of infusions that, if given peripherally, may cause damage to the vein and surrounding skin, or be less effective. These benefits must be weighed against the risks of line sepsis, thrombosis, embolism, and pleural and pericardial effusion. Units which use central line catheters should have a formal training package for insertion of catheters which should include assessment of technical competence and awareness of potential complications

INDICATIONS

- Total/partial parenteral nutrition
- Concentrated (>12.5%) glucose infusions
- Infusions of glucose >5% + calcium gluconate
- Inotrope infusions
- Prolonged drug or fluid administration where peripheral access difficult

CONTRAINDICATIONS

- Infection at proposed insertion site
- Systemic sepsis: defer until sepsis treatment commenced and blood cultures negative
- Tissue perfusion concerns

EQUIPMENT

- Sterile gown and sterile gloves
- Cleaning solution as per unit policy
- Sodium chloride 0.9% for injection
- Tape measure
- Overhead light
- Neonatal long line – appropriate for size of baby and expected rate of infusion
- Decide whether double or single lumen line required
- Long line insertion pack or, if not available, individual items to include:
 - dressing pack with swabs and plastic dish
 - sterile towels/sheets
 - non-toothed forceps
 - 5–10 mL syringe
 - Steristrips
 - sterile scissors
 - clear dressing (e.g. Tegaderm/Opsite)

PROCEDURE

Must be performed or directly supervised by an individual competent in the insertion of these devices

Consent and preparation

- Inform parents and obtain verbal consent as recommended by BAPM
- Discuss timing of procedure with nurses
- Keep baby warm. Work through portholes
- Identify site of insertion
 - typically long saphenous at ankle or medial/lateral antecubital vein at elbow
 - where access difficult, other large peripheral veins or scalp veins anterior to ear may be used

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- Measure distance, aiming to insert tip of catheter into superior or inferior vena cava (to xiphisternum for lower limb insertion, to upper sternum for upper limb insertion)

Developmental care

- Unless contraindicated, give sucrose or breast milk and non-nutritive sucking
- Shield baby's eyes from bright light
- Second person to provide containment holding – see **Pain assessment and management** guideline

Aseptic insertion

- Maintain strict asepsis throughout
- Prime catheter and cut small piece of gauze for under hub
- Clean site and allow to dry. Ensure that cleaning fluid does not pool beneath baby
- Puncture site with needle from pack and follow instructions for that catheter
- Avoid use of cannulae for long line insertion
- When blood flows back through the needle, insert line using non-toothed forceps
- If appropriately placed, the line will pass easily beyond the tip of the needle
- Release tourniquet if used
- There may be some resistance when the line passes joints, such as knee, and gentle repositioning of baby's limb may help
- Should catheter advancement become difficult, infuse a little fluid whilst simultaneously advancing catheter
- **Never** withdraw catheter back through needle
- When in place, withdraw needle as stated in catheter instructions
- Catheter should allow free aspiration of blood in the final position

Securing catheter in correct position

- When haemostasis achieved, fix with SteriStrips. Place small piece of gauze under hub, and cover with Tegaderm/Opsite, making sure that all dressing and site is covered, but not encircling the limb tightly. Ensure line insertion site is visible through clear dressing
- Connect a sterile 5 mL syringe containing sodium chloride 0.9% and infuse at 0.5 mL/hr, while awaiting X-ray, to ensure that the line does not clot off
- X-ray to determine position
- Small gauge neonatal long lines can be difficult to see on plain X-ray
 - use X-ray magnification, contrast adjustment and inversion to aid process
 - use of contrast medium can help
 - if using contrast medium, refer to local policy
- If inserted in upper limb, ensure arm is at 90° angle to thorax during X-ray
- Determine satisfactory position
- Upper limb catheter tip should preferably be in superior vena cava (SVC). Lower limb catheter should be in inferior vena cava (IVC) above L4–5 and outside heart. Other large veins e.g. innominate, subclavian, common iliac are acceptable
- If the left leg is used for the site of insertion, ensure that the tip of the catheter crosses the midline towards the right side on X ray to avoid risk of insertion into ascending lumbar vein
- Catheter tips in axillary, cephalic and femoral veins are acceptable if the benefit outweighs increased risks of reinsertion
- Monitor site closely
- If catheter tip beyond desired location, using aseptic technique, remove dressing and, withdraw catheter the measured distance. Redress with new sterile dressing and confirm new position by X-ray

Catheter tip must not lie within heart (risk of perforation and tamponade)

Failure of insertion

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- If second operator is required following an unsuccessful attempt at placement, use fresh equipment

DOCUMENTATION

- Record in case notes:
- date and time of insertion
- success of insertion and number of attempts
- type and gauge of catheter
- site and length of insertion
- X-ray position and alterations
- Insert tracking stickers from all packs

AFTERCARE

Dressings and site care

- Routine dressing changes are unnecessary
- Replace aseptically only if dressings lift or catheter visibly kinked or becomes insecure
- Observe site every shift for bleeding, leaking of infusate and signs of infection (redness, swelling)

Line management and medication

- Minimise number of line breaks
- Intermittent medications only given via this route in extreme circumstances. (This is a senior medical decision). Plan timing to match infusion changes
- When breaking into line, observe hand hygiene, wear sterile gloves and clean connection as per local infection control policy
- Change tubing used to give blood products immediately after transfusion (use to give blood product only if it is difficult to insert alternative IV line)

Position maintenance

- Repeat X-ray weekly to detect line migration
- Never routinely resite a line
- Review continued need on daily ward rounds and remove as soon as possible

COMPLICATIONS

Clinical deterioration of a baby in whom a central venous catheter is present should raise the question of catheter related complications; particularly infection, extravasation and tamponade

Prevention

- Do not give blood products and medications routinely through long line
- Avoid the use of small syringes <2 mL for bolus injections as they generate high pressures which may result in catheter damage
- Avoid the use of alcohol or acetone to clean the catheter as this may result in catheter damage
- Limit line breaks as above
- Do not exceed the pressure limits given by the manufacturer because of the risk of damage to the line

Catheter-related sepsis

- Commonest complication
- See **Infection (late onset)** guideline

Extravasation of fluids

- Into pleural, peritoneal, pericardial (above) and subcutaneous compartments
- Seek immediate advice from senior colleagues and follow **Extravasation injuries** guideline

Suspected/proven pericardial tamponade

- Suspect if any of the following symptoms:
 - acute or refractory hypotension
 - acute respiratory deterioration
 - arrhythmias
 - tachycardia / [persistent bradycardia](#)
 - unexplained metabolic acidosis
- Confirm by X-ray (widened mediastinum, enlarged cardiac shadow) or by presence of pericardial fluid on echocardiogram
- Drain pericardial fluid (see **Pericardiocentesis** guideline) and remove catheter

- **Embolisation of catheter fragments**
 - Lines can snap if anchored within a thrombus
 - If undue resistance encountered during removal, do not force
 - Inform consultant: if accessible it may need surgical removal

REMOVAL

Indications

- Clinical use is no longer justified
- Remove 24 hr after stopping total parenteral nutrition (TPN) to ensure tolerance to full enteral feeds, running glucose 10% through line at 0.5 mL/hr to maintain patency
- Complications – see **Complications**

Technique

- Using aseptic technique:
 - remove adhesive dressing very carefully
 - pull line out slowly, using gentle traction in the direction of the vein, grasping line not hub
 - ensure catheter complete
 - if clinical suspicion of line infection, send tip for culture and sensitivity
 - apply pressure to achieve haemostasis
 - document removal in notes