UMBILICAL ARTERY CATHETERISATION AND REMOVAL

Do not attempt to carry out this procedure unless you have been trained to do so and have demonstrated your competence

INDICATIONS
- Frequent blood gas analysis:
  - ventilated infants
  - non-ventilated infant requiring >40% oxygen at 4–6 hr of age
- Continuous monitoring of arterial blood pressure
- Exchange transfusion

CONTRAINDICATIONS
- Umbilical sepsis
- Necrotising enterocolitis (NEC)
- Evidence of vascular compromise in legs or buttocks

EQUIPMENT
- Umbilical artery catheterisation pack
- Sterile mask, gown and gloves
- Sterile drape
- Infusion pump
- Sodium chloride 0.9% infusion containing heparin 1 unit/mL
- Umbilical tape

PROCEDURE

Consent
- Wherever possible inform parents of need and associated risks before procedure; if an emergency, delay explanation until after insertion
- Risks include sepsis and thrombosis
- See Consent guideline

Non-sterile preparation
- Monitor infant’s SpO₂ during procedure
- Estimate length of catheter to be inserted:
  - measure from shoulder tip to umbilicus
  - use graph in pack to determine catheter placement
  - prefer high catheter position: tip above diaphragm (T6–T9 vertebral bodies) but below T6
  OR
  - in absence of graph, use formula: (weight in kg x 3) + 9 cm
  - whichever calculation used, add length of cord stump to give final length
- Inspect legs and buttocks for discolouration
- Tie an umbilical tape loosely around base of cord

Sterile preparation
- Scrub up, put on mask, gown and gloves
- Use sterile technique
- Ask assistant to gently hold infant’s legs and arms away from umbilical site
- Clean cord stump and surrounding skin with non-alcohol antiseptic solution
- Attach 3-way tap to catheter and flush all parts with sodium chloride 0.9%. Leave syringe attached
- Place all equipment to be used on a sterile towel covering a sterile trolley
- Drape umbilical stump with further sterile towels
**Insertion of arterial catheter**

- Cut cord cleanly leaving a 2–3 cm stump; remember to measure length of cord stump and add to calculated placement to give final advancement distance
- Clamp across cord with artery forceps
- Apply gentle upward traction
- Cut along underside of forceps with a scalpel blade to reveal either the cut surface of the whole cord, or use a side-on approach cut part way through the artery at a 45° angle
- Identify vessels
  - single thin-walled vein
  - two small thick-walled arteries that can protrude from the cut surface
- Support cord with artery forceps placed near to chosen artery
- Dilate lumen using either dilator or fine forceps
- Insert catheter with 3-way tap closed to catheter. If resistance felt, apply gentle steady pressure for 30–60 sec
- Advance catheter to the calculated distance
- Open 3-way tap to check for easy withdrawal of blood and for pulsation of blood in the catheter

**Securing catheter**

- If an umbilical vein catheter (UVC) is also to be inserted, site both catheters before securing either. Secure each catheter separately to allow independent removal
- To secure catheter:
  - place purse string suture around UAC
  - knot suture round umbilicus three or four times
  - place two sutures into cord, one on either side of catheters, allowing suture ends to be at least 3 cm long beyond cut surface of the cord
  - sandwich catheter and ends of the two sutures between zinc oxide tape as close to cord as possible without touching cord. The sutures should be separate from the catheter on either side as this allows easy adjustment of catheter length, should this be necessary. It is not necessary to stitch suture to zinc oxide tape
  - if catheter requires adjustment, cut zinc oxide tape between catheter and the two suture ends, pull back catheter to desired length and retape; never advance once tape applied as this is not sterile
  - Connect catheter to infusion
- Confirm position of catheter by X-ray: unlike a UVC, a UAC will go down before it goes up
  - a high position tip (above diaphragm but below T6) is preferred
  - if catheter below diaphragm resite at L3–L4 (low position)
  - if catheter position too high, withdraw to appropriate length

**If catheter will not advance beyond 4–5 cm and blood cannot be withdrawn, it is likely that a false passage has been created.**

*Remove catheter and seek advice from a more experienced person*

**Avoid L1, the origin of the renal arteries**

*Never attempt to advance a catheter after it has been secured; either withdraw it to the low position or remove it and insert a new one*

**DOCUMENTATION**

- Record details of procedure in patient notes, including catheter position on X-ray and whether any adjustments were made

**AFTERCARE**

- Nurse baby supine while an UAC is in-situ
- Monitor circulation in lower limbs and buttocks while catheter is in-situ
- Leave cord stump exposed to air
• Infuse sodium chloride 0.9% 0.5 mL/hr containing 1 unit of heparin/mL
• Do not infuse any other solution through UAC. Glucose or drugs may be administered through UAC only in exceptional situations, on the authority of a consultant

COMPLICATIONS
• Bleeding following accidental disconnection
• Vasospasm: if blanching of the lower limb occurs and does not resolve within 30 min, remove catheter
• Embolisation from blood clot or air in the infusion system
• Thrombosis involving:
  • femoral artery, resulting in limb ischaemia
  • renal artery, resulting in haematuria, renal failure and hypertension
  • mesenteric artery, resulting in necrotising enterocolitis
• Infection: prophylactic antibiotics are not required

REMOVAL

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INDICATIONS
• Catheter no longer required
• No longer patent
• Suspected infection
• Complications [e.g. necrotising enterocolitis (NEC), white toes]

EQUIPMENT
• Alcohol swab
• Sterile stitch cutter
• Sterile blade
• Umbilical tape

PROCEDURE
• Wash hands and put on sterile gloves
• Clean cord stump with non-alcohol antiseptic
  • if umbilical tissue adherent to catheter, loosen by soaking cord stump with damp gauze swab
• Ensure an umbilical tape is loosely secured around base of umbilicus
• Turn infusion pump off and clamp infusion line
• Withdraw catheter slowly over 2–3 min taking particular care with last 2–3 cm
• If bleeding noted, tighten umbilical tape
• Do not cover umbilicus with large absorbent pad, a small piece of cotton gauze should suffice
• Inspect catheter after removal: if any part missing, contact consultant immediately
• Send catheter tip for culture and sensitivity

AFTERCARE
• Nurse baby supine for 4 hr following removal, and observe for bleeding

COMPLICATIONS
• Bleeding
• Catheter tip inadvertently left in blood vessel