

# UMBILICAL VENOUS CATHETER: INSERTION AND REMOVAL

***Do not attempt to carry out this procedure unsupervised unless you have been trained to do so and have demonstrated your competence under appropriate supervision***

## INDICATIONS

- All babies <1000 g
- Babies ≥1000 g ventilated or unwell (e.g. HIE) (a double lumen catheter may be indicated if baby requires significant support)
- Exchange transfusion
- Administration of hypertonic solutions (e.g. glucose >12.5%, parenteral nutrition or inotropes)

## CONTRAINDICATIONS

- Umbilical sepsis
- Necrotising enterocolitis (NEC)
- Gastroschisis/exomphalos

## EQUIPMENT

- Non-disposable umbilical artery catheterisation pack (send instruments to sterile services after use)
- Umbilical catheter: <2 kg use size 3.5 FG, ≥2 kg use size up to 5 FG
- 3-way tap and red bung
- 1 x 2mL syringe for sampling, 1 x 5mL syringe for aspiration, 1 x 10mL with 0.9% saline
- Sterile gown and 2 pairs sterile gloves
- Sterile towels and sterile drape
- Umbilical tape
- Sutures
- Gauze swabs
- Gallipots
- Tape measure
- Scalpel
- Elastoplast®
- Infusion pump
- Prescribe Sodium Chloride 0.45% infusion containing heparin 1 unit/mL

## PROCEDURE

- 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

### Pre-sterile preparation

- Monitor all vital signs during procedure
- Estimate length of catheter to be inserted: use distance between xiphisternum and umbilicus +1cm
- Remember to add length of cord stump to give final distance catheter needs to be advanced
- Tie umbilical tape loosely around base of cord

### Sterile preparation

- Scrub up, and put on gown and gloves
- Use sterile technique
- Clean cord stump and surrounding skin with Chlorhexidine 0.5%

- Avoid using cleaning solution on skin surrounding umbilical stump in order to prevent chemical burns in extreme preterm babies (<26 weeks) – cleaning solution to be used on umbilical stump only
- 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 sterile towel covering sterile trolley
- Drape umbilical stump with sterile towels
- Place sterile drape with a hole in the centre over the cord. Pull the cord through the hole

#### Insertion of umbilical catheter

- Clamp across cord with artery forceps
- Apply gentle upward traction
- Cut along underside of forceps with scalpel blade cleanly to leave 2–3 cm stump or, if also placing an umbilical arterial catheter (UAC) and you have been trained in this procedure, consider using side-on technique (see **Umbilical artery catheter: insertion and removal** guideline)

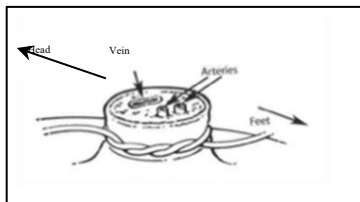
**Remember to measure length of cord stump and add to calculated placement distance to give final length catheter needs to be advanced**

- Identify vessels (see **Figure 1**):
  - single thin-walled vein
  - 2 small thick-walled arteries that can protrude from cut surface
- Support cord with artery forceps placed near to vein
- Locate lumen of vein using either a dilator or fine forceps
- Insert catheter (3.5 F for babies with birth weight <1500 g and 5 F for those ≥1500 g) with 3-way tap closed to catheter
- Resistance often indicates malposition; withdraw catheter until it freely aspirates blood
- Advance catheter to desired distance, and open 3-way tap to check for easy withdrawal of blood

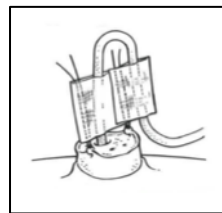
**If catheter will not advance beyond 4–5 cm and blood cannot be withdrawn, it is likely that a false passage has been created. Remove catheter and seek advice from a more experienced senior person**

#### Securing catheter

- If a UAC is also to be inserted, site both catheters before securing either. Secure each catheter separately as below to allow independent removal



**Figure 1:** Identifying umbilical cord vessels



**Figure 2:** Effective system for more permanent fixation of umbilical catheters

- For each catheter place 2 sutures into cord, 1 on either side of the catheter, allowing suture ends to be ≥5 cm long beyond cut surface of cord. Bend the catheter in a loop, then sandwich it and ends of the 2 sutures between Elastoplast® tape, as close to the cord as possible without touching cord (like a flag) (see **Figure 2**). The sutures should be separate from the catheter on either side as this allows easy adjustment of catheter length, should this be necessary. Top edge of sutures can be tied together above flag or woven through layers of Elastoplast for extra security after confirming X-ray position
- alternatively, suture can be criss-crossed along shaft of catheter and secured

- If catheter requires adjustment, Elastoplast® tape between catheter and 2 suture ends, pull back catheter to desired length and retape; never advance once tape has been applied as it is not sterile
- Connect catheter to infusion of sodium chloride 0.45%
- Confirm position of catheter in IVC by combined chest and abdominal X-ray (UVC that has passed into the IVC should travel vertically from the umbilicus)
- optimal catheter placement: tip at T8–9 but not in heart or liver shadow (usually at the level of or just below diaphragm)
  - if tip at T10 or below:
  - check catheter still sampling
  - discuss with consultant
  - use short-term only (consultant decision to use at risk)
  - replace at earliest opportunity
- If catheter length adjusted, repeat X-ray
- X-ray after line insertion, routinely combined chest and abdominal
- subsequent X-rays following line adjustment may be combined or dedicated chest/abdominal, depending on initial and new estimated line positioning

## DOCUMENTATION

- Record on Badgernet and Asepsis Care Bundle details of procedure, including indication, description of catheter, number of attempts, length inserted, catheter position on X-ray and whether any adjustments were made
- A repeat X-ray may be needed to confirm of position must be done via X-ray
- Position to be verified in writing by radiologist report
- Always label umbilical arterial and venous catheters, using the appropriately coloured and labelled stickers
- Place traceability sticker from catheter/insertion pack onto Asepsis Care Bundle

## AFTERCARE

- Review need for catheter daily (if catheter tip at or below T10, replace with long line at earliest opportunity as there is greater risk of extravasation)
- Monitor circulation in lower limbs and buttocks whilst catheter *in situ*
- Leave cord stump exposed to air
- Catheter may remain in place for up to 7–10 days. If needed for >7 days consider insertion of long line due to increased risk of infection
- Any infusions must be connected to UVC using aseptic technique

## COMPLICATIONS

- Air embolism
- Bleeding resulting from accidental disconnection
- Refractory hypoglycaemia due to malpositioning of catheter
- Infection: prophylactic antibiotics not required
- Thrombus formation
- Cardiac tamponade (see below)
- Any deterioration in a baby in whom a central venous catheter is present should raise the question of catheter related complications; particularly infection, extravasation, PN ascites and tamponade
- PN ascites may require urgent abdominal paracentesis

### Cardiac tamponade

- Suspect in presence of:
  - tachycardia
  - poor perfusion
  - soft heart sounds
  - increasing cardiomegaly
  - decreasing oxygen saturation
  - arrhythmias
- Confirm diagnosis by:

- chest X-ray – widened mediastinum and enlarged cardiac shadow
- echocardiogram (if available)
- If there is cardiovascular compromise, consider drainage (see **Pericardiocentesis** guideline)

## REMOVAL

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## INDICATIONS

- Central venous access no longer required
- Concerns regarding sepsis
- Remove after a maximum of 10 days

## EQUIPMENT

- Stitch cutter
- Appeel wipes
- Alcohol wipes
- Apron and gloves
- Gauze
- Umbilical cord tie

## PROCEDURE

- Wash hands and put on gown and gloves
- Clean cord stump with cleaning solution
- Turn infusion pump off and clamp infusion line
- Ensure umbilical tape secured loosely around base of umbilicus
- Take utmost care when cutting the sutures so as not to cut through the UVC
- Withdraw catheter slowly
- If any bleeding noted, tighten umbilical tape
- Confirm catheter intact
- Consider sending catheter tip to microbiology

## AFTERCARE

- Nurse baby supine for 4 hr following removal and observe for bleeding

## COMPLICATIONS

- Bleeding
- Catheter tip inadvertently left in blood vessel
- Infection