Clinical Guideline:
Insertion of an Umbilical Venous Catheter (UVC)

Adapted by: Pauline Fellows, Neonatal Project Facilitator

For use in: Eastern Neonatal Units (x11)
Guidance specific to the care of neonatal patients

Used by: Medical Staff, Neonatal Nurse Practitioners and Enhanced Neonatal Nurses

Key Words: Indications, position of catheter, complications

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Review due: May 2013 (or earlier in the light of new evidence)

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Audit Standards:

Clinical Guideline: Insertion of an Umbilical Venous Catheter
Adapted by: Pauline Fellows
Review Due: May 2013
Version 3
1. Acceptable positions for the UVC are in the inferior vena cava above the right hemi-diaphragm or below diaphragm in the mid-line.
2. The position of the UVC should be confirmed with an x-ray.
3. The insertion procedure and confirmation of the position of the UVC tip is documented in the case notes.

Eastern Perinatal Network

Procedure for insertion of umbilical venous catheter (UVC)

1. Goal
To ensure the safe insertion of an umbilical venous catheter

2. Indications
- Venous access for low birth weight infants to avoid multiple peripheral cannulation
- Emergency vascular access for resuscitation of infants at birth
- Exchange transfusion

3. Contraindications
- Abnormalities of the abdominal wall
- Necrotising enterocolitis
- Peritonitis

4. Complications
- Sepsis
- Embolism
- Venous thrombosis
- Pericardial effusion
- Pleural effusion
- Portal hypertension
- Displacement leading to blood loss
- Breakage of catheter on removal

4.1 Malpositioned catheters
- Catheters placed in the heart can cause pericardial effusion, cardiac tamponade, endocarditis, arrhythmias.
- Catheters placed in the portal system are associated with necrotising enterocolitis, perforation of colon and hepatic necrosis.

5. Key notes
- The catheter tip should ideally lie in the inferior vena cava.
- The catheter position should always be checked prior to use with an x-ray
Once secured in place the catheter ideally should not be advanced into the vein.
Do not use hypertonic solutions if the catheter is not in the inferior vena cava.
UVC’s placed during newborn resuscitation should be placed where there is adequate blood sampling.

6. Physiological instability during insertion
- Closely observe the infant during and following the procedure for any deterioration.
- Monitoring (ECG and oxygen saturation) should remain in place throughout the procedure.
- If the infant is intubated, check the endotracheal tube is secure before commencing the procedure.

7. Position of the catheter
- Determine the desired length of catheter by calculating $2 \times \text{weight in kg} + 5\text{cm} + \text{stump length in cms}^{13,14,15}$.
  i.e. if infant weighs 1.5kg $(1.5 \times 2) + 5 = 8\text{cm} + \text{stump}$
- This should place the tip of the catheter above the diaphragm and outside the chambers of the heart.*

8. Equipment
Sterile pack for insertion of umbilical lines
Chlorhexidine 2% for skin preparation
Sterile water
Umbilical catheter size 3.0 or 5.0Fr or a double lumen catheter size 4.Fr(20G)
10 ml syringe
Green needle (21G)
0.9% sodium chloride – 10ml ampoule
Scalpel
Sterile gloves and gown
Suture
Tape to secure the line in place with suture or umbilical catheter holder
Umbilical tape

9. Preparation
1. Clean trolley surface.
2. Wash hands.

* Alternatively, using a tape measure to measure the distance from the cord base to the xiphisternum and add on the stump length to give the distance that the catheter should be inserted to.
3. Assess the depth that the catheter needs to be inserted adding the length of the umbilical stump. 

4. Position the infant and surrounding equipment so that the cord is accessible.

5. Where possible, depending on the urgency of the procedure ensure that infant’s temperature is at least 37°C before starting the procedure. Check that there is adequate output from the radiant heat source or incubator to keep the infant warm during the procedure.

6. If the infant is particularly active and doesn’t calm when the drapes are in place ensure that an assistant is on hand to contain and support the infant for the procedure.

10. **Procedure**

1. Wash hands

2. Open the packaging of equipment with a non-touch technique

3. Wash hands thoroughly and dry.

4. Put on gown and sterile gloves.

5. Follow aseptic procedure principles.

6. Draw up 10mls of 0.9% sodium chloride into syringe and attach a three-way tap to the catheter. Flush through both the three-way tap (if used) and the catheter with the saline ensuring that there is no air in the system.

7. Turn the three-way tap off or clamp the line to prevent any entry of air into the catheter to reduce the risk of air embolism whilst the catheter is being inserted.

8. Clean cord and peri-umbilical area with chlorhexidine 2%. Avoid excess application and any spillage around down to the buttocks as this may cause burns to very preterm skin. Allow to dry, then remove with sterile water to prevent adverse skin reactions.

9. Holding cord clamp with sterile gauze, apply sterile drapes.

10. Tie umbilical tape around the base of the cord tightly enough to minimise blood loss but loosely enough to allow the catheter to be passed through.
11. Grasp the cord with the artery forceps and gently pull the cord upwards whilst you cut the underside of the forceps with a scalpel blade leaving 1-2cm of cord above the skin junction.

12. Identify the vessels in the cord. The vein is a thin walled vessel, larger than the two arteries.

![Figure 2: Inserting catheter into umbilical vein](image)

13. Hold the stump with the toothed forceps and remove any visible clots.

14. Place the tip of the catheter, held with forceps (see Figure 2) into the lumen of the vessel and gently advance to 5 cm into the vein. Remember that the vein goes up towards the heart unlike the arteries which descend first before looping upward; therefore the catheter should be passed upwards.

15. Turn the three-way tap so that the catheter is open to the syringe and apply gentle suction on the syringe.

16. If there is smooth blood flow, continue to insert to the predetermined length and aspirate with syringe to verify blood return.

17. If no blood is aspirated at this point either advance the catheter 1cm at a time or withdraw catheter 1cm at a time until blood can be aspirated.

18. If it is not easy to get blood back, rarely the catheter may be in a small blood vessel and have a clot in the tip – withdraw whilst maintaining suction, remove the clot and reinsert the catheter.

19. If there is any resistance and you cannot advance the catheter to the desired depth or there is a bobbing motion of the catheter, it may have entered the portal vein or be wedged in the intra-hepatic branch of the umbilical vein. The catheter will either have to be removed or another
smaller bore catheter inserted which should pass into the ductus venosus then remove the original catheter\textsuperscript{19}.

20. Take blood samples as required and flush the line with saline.

21. Secure the catheter using a technique that avoids tape being applied to the skin if possible e.g. suture and flag or Sulle securing device secured with a suture to the umbilicus\textsuperscript{20,21}. Or use a colloid based umbilical catheter holder that will protect the skin e.g. Neobridge\textsuperscript{22}.

22. Ensure that the correct position of the catheter is confirmed on AXR/CXR. The catheter should ideally be placed above the right hemi-diaphragm at T9 or 10.

23. There may be some bleeding from the umbilical vein because it is not a contractile vessel. Applying pressure may be enough to stop the oozing or the ligature around the bottom of the stump can be tightened slightly for a short while, but released once oozing has stopped.

24. Connect the catheter to the prescribed infusion.

25. Clear away all equipment and ensure that any needles or scalpel are safely disposed of into a sharps bin.

26. Record the procedure in the infants' medical notes. The entry must include:
   - Date and time
   - Procedure undertaken
   - Blood loss if any
   - Type and size of catheter used
   - Length of catheter insertion
   - Confirmation that the line flushes and samples well
   - Confirmation of catheter tip location following x-ray
   - If any changes are made to catheter length following x-ray, this needs to be documented in the medical notes and on the PACS image.
   - Signature, printed name and designation.

27. The catheter should be removed as soon as it is no longer required to prevent complications such as thrombosis and infection\textsuperscript{4,23,24}.

References


