UMBILICAL ARTERY CATHETERIZATION

SCOPE

Arterial access needed for ABG’s, continuous arterial blood pressure monitoring and vascular access when other sites are not available.

SPECIAL CONSIDERATIONS

Personnel who have experience and have demonstrated competence in UAC placement in the NICU should perform this procedure.

SPECIAL INSTRUCTIONS

A. Equipment:
   1. Betadine, sterile gloves, mask, gown, hat
   2. Sterile normal saline or Heparinized saline
   3. Sterile gauze (4X4’s)
   4. Fine Instrument tray
   5. Tape measure, umbilical tape; No. 3.5 fr. catheter with radiopaque markings (< 2 kg) 3.5 – 5 French catheter (> 2 kg)
   6. Syringes 10 ml, 5 ml, 3 ml
   7. Small grooved director, 3-way stopcock
   8. Suture 4.0 black silk
   9. Tape, blunt needles, 15 or 18 gauge
   10. Scalpel

B. Sterile technique used

C. Place the infant supine, preferably on a radiant warmer. Immobilize the infant’s legs and arms while still allowing observation of the feet for vasospasm. Assure infant’s airway, oxygenation, and thermoregulation. Consider placing port-a-warmer or hot packs under blanket if infant LBW or hypothermic.

D. Be certain to know the correct length of the catheter to be inserted. In low catheterization the tip of the catheter lies at L3-L4. Measure 2/3 of the distance from the umbilicus to the mid-portion of the clavicle, or multiply the shoulder umbilicus length by 0.56. Markings on the catheters are at 1.0 cm increments and are denoted by black dots.

E. An alternative placement may be at the level of T7 – T10. Avoid catheter placement between T10 and L3 because micro emboli may be thrown into the renal vasculature.
F. Prepare the umbilical catheter tray. Attach the stopcock to the catheter. Fill three ml syringes with flush solutions and inject to flush the catheter.

G. Clean the umbilical cord and a small area of surrounding skin with (preferably warmed) antiseptic solution (1/2 strength in LBW). Avoid burns caused by allowing excess solution to remain on the skin including the back. Place sterile drapes around the umbilicus, leaving the feet and head exposed. Consider a steri-drape for VLBW infants. Frequently observe the infant for vasospasm in the extremities or signs of distress during the procedure. (Frequent checking of temperature, color, activity, oxygen concentration and ventilator settings is necessary).

H. Tie a piece of umbilical tape around the base of the umbilical cord tightly enough so that the catheter can be passed easily through the vessel. If the tie is placed around the skin surrounding the umbilicus the tie must be loosened after the procedure.

I. Consider a small side cut-down done below a hemostat clamped about 2.5 cm above the skin. Rotate the hemostat to expose a vessel to cut down upon. A single vessel can then be exposed, partially incised and dilated. Umbilical tape should be loosely around the base of the cord.

J. In the traditional method the cord is transected with a scalpel to a length of 1.0 to 1.5 cm.

K. The cord is stabilized with a forceps or hemostat and the 2 arteries and one vein are identified. The arteries are smaller, thick walled, and are usually located at 4 and 7 o’clock. The vein usually has a thinner, floppy wall.

L. Once the artery is sufficiently dilated, insert the sterile, saline-filled #3.0 to #5.0 F catheter into the artery. Maintaining oxygen saturation’s at >90% may help prevent arterial constriction. Obstruction may occur within 2 cm where the vessel turns. Pulling the stump cephalad can prevent this. Withdrawing the catheter slightly, rotating it, and advancing it again may help. Another area of obstruction may be noted at the distance of 5 cm because of spasm and kinking of the artery. Sustained pressure may resolve the problem. Excessive probing should be avoided to prevent vessel perforation.

M. Once the catheter is in position, perform aspiration to verify blood return. Verify and document position with chest and abdominal x-rays.

N. A purse-string suture may be placed superficially in the umbilical stump and tied firmly to the catheter for anchorage. “Bridge” catheter to abdomen the current securing technique.

O. To prevent thrombo-embolic phenomena while the umbilical artery catheter is in place, heparin, 0.5 U/ml should be in the intravenous solutions and given in a continuous infusion.

P. Precautions:

1. The catheter may pass into the aorta but go caudal to one of the iliac arteries and then down the leg or out one of the arteries to the buttocks. There may be difficulty advancing the catheter resulting in cyanosis or blanching of the leg or buttocks (lift the baby and check the buttocks). If there is persistent cyanosis, blanching, or poor flow, the catheter should be removed.
2. Occasionally, the femoral artery may go into spasm and the extremity may become bluish and cold; this usually lasts for a very short time, warming the contralateral extremity may relieve the spasm. If there is no improvement the catheter should be removed immediately.

Q. Complications:

1. Vascular accidents. Complications are mainly due to vascular accidents, including thromboembolic phenomena to the kidney, bowel, legs, or rarely, to the spinal cord. These may be manifested as hematuria, hypertension, and signs of necrotizing enterocolitis or bowel infarction, and cyanosis or blanching of the skin of the back, buttocks or legs.

2. Infection. Use strict sterile technique. No attempt should be made to advance a catheter once it has been placed and sutured into position.

3. Hemorrhage. Hemorrhage may occur if the catheter becomes disconnected at one of the stopcocks. All connections must be securely fastened.

4. Vessel perforation. The catheter should never be forced. If the catheter cannot be easily advanced, use of another vessel should be attempted, or trim the umbilical stump and re-dilate the artery.

5. False lumen. Use the other artery or insert the catheter into the false lumen, then insert a second catheter into the artery beside the first one.

R. Management of the catheter during transport:

1. Watch for cyanosis, blanching, mottling of lower extremities, hematuria, abdominal distension and bleeding from the umbilicus.

2. Watch for backup of blood in the catheter.

3. Keep catheter free of air.

4. Record all flushes and IV fluids given.

5. Remove arterial catheters immediately if there is:
   a. Blanching, cyanosis, and mottling of buttocks, perineum, lower extremities, and toes.
   b. Sudden absence of the femoral pulses associated with color change
   c. Hematuria or blood passed by way of the rectum
   d. No blood return on aspiration

S. Always be prepared with volume expanders to replenish the blood volume in the event of sudden acute blood loss from the catheter.

T. Always have alarms on with appropriate parameters for gestational age.