

Peripheral arterial catheters

Protocol Responsibilities and Authorisation

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Protocol Review History

Version	Updated by	Date Updated	Description of Changes
3	David Bouchier	7/9/2016	Updating only. No changes

Peripheral arterial catheters

1. Overview**1.1 Purpose**

To describe the technique of peripheral artery cannulation.

PART A - CANNULATION OF ARTERY**PART B - SAMPLING****PART A : CANNULATION OF ARTERY****Indications**

Peripheral arterial lines are inserted to allow a route for:

- a) Blood sampling (blood gases in particular) when frequently needed
- b) Continuous blood pressure monitoring
- c) Pre-ductal pO₂ measurement (rarely).

Contraindications

- a) Bleeding disorder
- b) Circulatory insufficiency to the hand or foot of that particular artery
- c) Local skin infection

Equipment

Dependent, to some extent, on technique used i.e. Percutaneous v Cut Down.

For Percutaneous Technique:

- a) Appropriate antiseptic (skin cleaning) solution (chlorhexidine 2%/alcohol wipes)
- b) Cannula (usually 24 gauge)
- c) Heparinised saline syringe – 1 ml
- d) Gauze squares
- e) Artery forceps
- f) Tapes, OpSite and a long splint for securing line
- g) Short extension tube (primed with fluid – saline)
- h) 3-way tap
- i) Cold light source for transillumination
- j) Gloves – best to use gloves if possible.

For Cut Down Technique: - need in addition to the above (which should be sterile)

- a) Cut down tray – containing instruments, needle holder, forceps, sterile scissors
 - scalpel blade
 - suture material
 - sterile drapes
- b) Local anaesthetic
- c) Mask, gloves and gown
- d) Antiseptic solution and ointment.

An arterial pressure line (including a pressure transducer) should be set up with a reliable infusion pump and appropriate fluids – usually heparinised 0.45% saline.

Flow rate usually 0.8 or 1 ml/hour (occasionally may run at lower rates, i.e. 0.5 mL/hour, although at this rate the line is more likely to block).

Doc ID:	5494	Version:	03	Issue Date:	23 SEPT 2016	Review Date:	23 SEPT 2019
Document Owner:	Clinical Director			Department:	NICU		
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Technique

Majority of arterial lines will be inserted percutaneously. Prior to insertion of a line, the Allen's Test should be performed to ensure adequacy of collateral circulation.

Doctor may restrain infant's forearm or lower leg prior to insertion of cannula.

Peripheral artery is identified by use of cold light source, doppler, palpation or anatomically. Sometimes useful to make a small skin puncture with needle prior to insertion of cannula: puncture artery at angle of 15° to skin; when blood appears in cannula, advance cannula into artery. Once in position, flush and check for back flow, then should be securely strapped in such a way that there is no likelihood of disconnection (not usually sutured).

To secure the cannula and extension set OpSite may be used and "trouser leg" type strapping.

All fingertips or toes should remain exposed so circulatory status may be monitored.

Cut Downs

Site of insertion should be infiltrated with local anaesthetic. (Allow time for this to take effect).

Cut down on the radial artery is by means of a transverse incision (\pm 0.5 cm) at wrist and for the posterior tibial by means of a transverse incision medial (or behind) medial malleolus at ankle, followed by blunt longitudinal dissection with curved mosquito forceps.

The artery is identified, stabilised with a suture passed around it (not ligated) and cannulated with 24 gauge cannula. The wound is sutured and the cannula securely strapped and attached to the arterial line. The arterial line should be identified as such with a "red flag".

PART B: SAMPLING AND USE OF LINES

Preparation: Draw up 1 ml of flush fluid (usually $\frac{1}{2}$ N Saline or occasionally N Saline or sterile H₂O). Place paper guard under the peripheral line site.
Wash hands and use gloves.
Swab luer and 3-way tap, allow to dry.

Sampling: Use for sampling only - no medications, blood or parenteral feeding fluids.
Turn 3-way tap off all ways.
Insert 1 ml syringe with luer lock into luer – gently and slowly aspirate 0.8 – 1ml blood (i.e. to clear the "dead space").

Gently and slowly withdraw required blood samples; using heparinised syringe (dry powder or liquid heparin) for blood gas samples 0.3 mL, and non-heparinised syringe for other relevant blood tests for haematology and biochemistry.

Using the 1ml syringe of flush, the catheter and tubing should be gently and slowly flushed till clear. During flush observe site for blanching. If blanching occurs, stop and allow reperfusion then continue slowly.

Reopen 3-way tap- infusion to baby and off to luer and check that a satisfactory wave form is still present on monitor.

Position and support limb carefully to avoid stress on joints and nerves.

"Dead space" blood is returned to baby via peripheral venous line.

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Possible Complications Arising From Insertion and Use of Peripheral Arterial Lines

1. Burns from cold light source used for transillumination at time of insertion.
2. Haematoma formation.
3. Damage to peripheral nerves on insertion, e.g. carpal tunnel syndrome.
4. Thromboembolism, vasospasm, thrombosis leading to:
 - a) Blackening of fingers or toes, progressing to frank gangrene
 - b) Cerebral emboli
 - c) Skin ulcers.
5. Infiltration.
6. Infection.
7. Accidental dislodgement – leading to haemorrhage.
8. Air embolism.

Further Information

1. Damp trace – possibly small clots in short extension tube – cannot be aspirated, disconnect and replace the short extension.
2. Make sure all taps are turned on, the line is likely to block if turned off or not flushed continually.
3. Blanching may be due to arteriospasm – stop flush briefly and consider running for a short period at a slower rate.
4. Persistent duskeness of digits requires the line to be removed.