

Arterial line related limb ischaemia

Acute ischaemia is an uncommon but serious complication of arterial line insertion. Transient severe ischaemia has been reported in 4% of peripheral arterial line insertions but later functional impairment is rare. Ischaemia is often due to transient arterial spasm (which should resolve within 6-8 hours) but may be associated with thrombosis.

Only umbilical, radial or posterior tibial arteries should be used for line insertion and other arteries should not be used without consultant approval.

Focal signs of acute ischaemia:

- skin mottling
- pallor
- cyanosis
- absent pulse(s) with reduced capillary refill
- paralysis (rarely)

If there are concerns regarding limb perfusion there should be urgent review by the medical tier 2.

The immediate management is removal of the catheter.

If removal alone does not rectify perfusion then it should be urgently discussed with the consultant on-call within an hour. The following strategies may be considered to stimulate reperfusion:

- Warm the contralateral unaffected limb to stimulate reflex vasodilatation.
- Raise the affected limb to reduce venous congestion
- Consider a bolus of saline to optimise perfusion if there are any general signs it may be poor (high lactate, reduced capillary refill time, wide toe core differential, low blood pressure).
- Consider application of topical glyceryl trinitrate (GTN) usually via a transdermal GTN patch. GTN may result in reperfusion in around 75% of cases (Sushko *et al.* 2021). This can be applied **proximal** to the area of ischaemia and/or over the anatomical course of the affected artery. Refer to the monograph for dose and frequency. A response should be seen within hours. Treatment duration should be based on response but this varies widely in the literature (1 hour to 27 days). In cases of persistent ischaemia on-going treatment should be discussed the surgical teams (see below).

Potential side effects from systemic absorption include hypotension, tachycardia and methaemoglobinaemia so BP should be checked 4 hourly and blood gases should be checked judiciously. Significant methaemoglobinaemia may increase oxygen requirements. These side effects are more common with larger doses or prolonged duration of GTN, and are reversible when the GTN is removed.

The use of anticoagulation/thrombolysis has been reported in the literature and can be considered for cases where thrombosis can be demonstrated. If thrombosis is suspected then the feasibility of Doppler studies to confirm thrombosis should be discussed with paediatric radiology. A decision to treat a confirmed thrombosis with anticoagulation/thrombolysis should be made in conjunction with paediatric haematology.

In preterm babies, the risk of IVH following anticoagulation/thrombolysis requires consideration.

Surgical specialty review can be sought but is not required in all situations. In cases of persistent peripheral ischaemia plastic surgery review may be appropriate (e.g. for dressings or debridement). If there is concern regarding large vessel thrombosis or occlusion causing critical limb or organ ischaemia then paediatric surgery review and subsequent liaison with vascular surgery and/or paediatric radiology regarding interventional procedures may be useful.

Documentation

It is important to document the site affected, extent, perfusion, pulses of the affected limb and action such as removal of the line. The timing of reviews and events should be clearly documented. Consider serial photographs of the affect limb and upload these to Badger record.

References:

Mosalli, R., Elbaz, M., & Paes, B. (2013). Topical Nitroglycerine for Neonatal Arterial Associated Peripheral Ischemia following Cannulation: A Case Report and Comprehensive Literature Review. *Case reports in pediatrics*, 2013, 608516.

Sushko K, Litalien C, Ferruccio L, et al. Topical nitroglycerin ointment as salvage therapy for peripheral tissue ischemia in newborns: a systematic review. *CMAJ Open*. 2021;9(1):E252-E260.