

Arterial Line in Great Premature: Use or Not Use?

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Abstract

Arterial line (AL) is a common procedure in Neonatal Intensive Care Unit (NICU).

The radial artery is the first choice place for AL.

The AL procedure carries a risk of vasospasm, thrombosis or thromboembolism, which can compromise arterial circulation and result in fingers soft tissue necrosis.

We presented a case of a preterm male newborn, with 24 + 5 weeks of gestational age, born with 600g, spontaneous delivery. The AL procedure was started in the radial artery. A 24 gauge angiocatheter was used. In less than 10 minutes after the puncture, showed signs of ischemia in some fingers. The catheter was immediately removed. We also did the elevation of the affected limb and application of warm compresses to the opposite limb. The color started to recover after 15 minutes. The Doppler ultrasound revealed normal function of the vessels.

We propose that in very low birth newborns, less than 1 kg, is better use a 25- to 27-gauge needle to reduce the risk of ischemia.

Keywords: Arterial Line; Ischemia; Extreme Prematurity

Background

Arterial line (AL) is a common procedure in Neonatal Intensive Care Unit (NICU).

The radial artery is the first choice place for AL. Brachial and femoral arteries should be avoided in infants under 1000g.

A 20-gauge peripheral artery catheter kit is suitable for large children and adult patients. A 22- to 24-gauge angiocatheter is preferable for infants and neonates. A 22 gauge arterial catheter can be inserted in a term neonate who weighs over 3 kg but it is not appropriate for a premature neonate under 2 kg. In this case we can use a 24, 25 or 27 gauge arterial catheter.

A common location of puncture is over the radial pulse at the proximal flexor crease of the wrist and the site should be at least 1 cm proximal to the styloid process so as to keep from puncturing the retinaculum flexorum and the small superficial branch of the radial artery [1].

Case Report

A preterm male newborn, with 24 + 5 weeks of gestational age, born with 600g, spontaneous delivery. The heart rate was less than 60/m and need chest compression, oxygen supplement and intubation. Apgar score 4/9/9. He was transferred to NICU because of his

extreme prematurity. At admission he has respiratory distress secondary to hyaline membrane disease and need one dose of surfactant. Intravenous Penicillin and cefotaxime was prescribed because of risk of infection. Dopamine was also given to correct hypotension.

The AL procedure was started in the radial artery. A 24 gauge angiocatheter was used by an experience neonatal doctor. In less than 10 minutes after the puncture, showed signs of ischemia in some fingers (Figure 1). The catheter was immediately removed. We also did the elevation of the affected limb, and application of warm compresses to the opposite limb (reflex vasodilation). The color started to recovered after 15 minutes (Figure 2). Later on, the Doppler ultrasound revealed normal function of the vessels.



Figure 1: Ischemia of the fingers.



Figure 2: 15 minutes later.

Discussion

If several attempts at cannulation fail, the artery may spasm, making further attempts more difficult.

In this situation is better allow the artery to recover for a short time before reattempting cannulation. We can use subcutaneous infiltration of lidocaine or similar anesthetic around the puncture site may reduce vessel spasm.

Regularly inspect the area for signs of ischemia after the puncture is obligatory. At the first signs of circulatory compromise or clot formation, immediately remove the catheter and do not flush the catheter in an attempt to remove clots. The AL procedure carries a risk of vasospasm, thrombosis or thromboembolism, which can compromise arterial circulation and result in fingers soft tissue necrosis [1].

The usual treatment of ischemic injuries includes immediate removal of the catheter, elevation of the affected limb, and application of warm compresses to the opposite limb (reflex vasodilation), but these maneuvers afford variable success [2].

To reduce the complication rate, remove the catheter as soon as it is no longer necessary.

The procedure should not be attempted by inexperienced staff without supervision.

The AL access should not be considered in neonates with: evidence of inadequate collateral flow or circulation, abnormal clot study, local skin infection and limb malformation [1].

Our index case, was a very low birth premature baby (600g) with 24 weeks of gestational age. The risk of ischemia, even with 24 gauge needle can happen. We propose that in very low birth newborns, less than 1 kg, is better use a 25- to 27-gauge needle to reduce the risk of ischemia. If the newborn showed normal blood pressure at admission, instead of putting an AL since the first day, we can check the capillary blood gas and only consider an AL if the blood pressure start to drop frequently. This stand by position, will reduce the risk factor of digital necrosis and secondary infection.

In case of no respond to the above treatment when ischemia appeared, we can try with caution topical Nitroglycerine 2% ointment. Nitroglycerine has a direct effect on smooth muscle leading to vasodilation of arteries and veins, improving blood flow after vasospasm or ischaemia. Multiple case reports describe the use of topical nitroglycerine 2% ointment (dose 4 mm/kg) to reperfuse the distal limb when arterial spasm has not resolved. The duration of treatment is based on response. Cautious use is advised in extreme preterm infants due to varied absorption and a theoretical risk of effecting autoregulation of cerebral blood flow. There are no reports of complications with the use of topical nitroglycerine 2% [2].

Conclusion

We propose that in very low birth newborns, less than 1 kg, is better use a 25- to 27-gauge needle to reduce the risk of ischemia.

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