Resuscitation by Intraosseous Infusion in Newborn

Maj RP Singh Tomar*, Brig Arvind Gupta*

MJAFI 2006; 62 : 202-203

Key Words: Intraosseous infusion lines; Neonatal resuscitation

Introduction

Establishing vascular access in a child in shock, may be difficult and delay can compromise resuscitation [1].

Intraosseous Infusion (IOI) is an alternate method if peripheral venous access is not established within three attempts or 90 seconds [2]. IOI an alternate route for neonatal resuscitation if umbilical vein catheterization (UVC) or other direct venous access is not readily available [3].

Case 1

A term male neonate was received in hospital gasping. He was delivered to a 24 yr old second gravida in a vehicle en route to the hospital. A neighbor, travelling along assisted the delivery and attempted to separate the cord but failed. On examination, the neonate was gasping, heartbeat was 187 bpm, capillary refilling time >3 sec, hypothermic with gross pallor and unrecordable SpO₂. There was no cry and neonatal reflexes were absent. Umbilicus was unhealthy with mud applied to it. A working diagnosis of shock due to hemorrhage was made. Immediate attempt for establishing intravenous and umbilical cannulation were unsuccessful. Intraosseous cannulation in the right tibia was done through which resuscitative fluids followed by dextrose and antibiotics were given (Fig. 1). The condition stabilized and peripheral venous access was established after 2 hours and intraosseous cannulation discontinued. The neonate improved with 2 units of blood transfusion that brought up the hematocrit. He was discharged on the 11th day and followed up till the age of 4 months.

Case 2

A 12 day old female preterm neonate was referred from a civil hospital for recurrent apnea. Born to a primi in hospital at 34 weeks, with a birth weight of 1.7kg, she was managed conservatively and discharged on the 5th day but readmitted on the 9th day for lethargy. She was treated with antibiotics but her condition deteriorated. On admission the neonate was in shock with prolonged periods of apnea and severe

bradycardia. Immediate resuscitative measures with bag mask ventilation and chest compression were started. Vascular access could not be obtained due to shock and punctured thrombosed veins due to the prior treatment. Intraosseous infusion of drugs and fluids was given and finally her condition stabilized. The IOI was discontinued after 5 hours when peripheral cannulation was established. Investigations revealed right sided pneumonia with severe septicemia. She was managed accordingly and discharged 3 weeks later and regularly followed up.

Discussion

Intraosseous line is easily achieved when peripheral intravenous lines cannot be placed in critically ill children

Fig. 1 : Showing a 18 G disposable needle used as an intraosseous needle. A guard of any sternal or bone marrow needle is used.

*Classified Specialist (Pediatrics), MH Amritsar, *Commandant, 166 MH, 56 APO.

Fig. 2 : A commercially available intraosseous needle

less than five years of age. It has been in use for resuscitation since 1943 [4] and only recently has been recommended for resuscitations in neonates and preterms [3]. Due to the highly vascular marrow of the neonate, administration of resuscitative drugs, blood products crystalloids and vasopressors is done and the medullary cavity of the long bones serves as a non-collapsible vein from where rapid absorption takes place into the circulation. Blood from marrow aspiration can also be sent for initial laboratory investigation and cross matching. The preferred site of intraosseous line placement is the medial plate of proximal tibia, 0.5-1.0 cm distal to the tibial tuberosity. It cannot be placed in cases of fractured bones, overlying vascular injuries, osteogenesis imperfecta, osteopetrosis or repeated placement of lines in the same bone. If the technique is performed with careful asepsis, the complication rate in most studies is less than 2% and include osteomyelitis, skin infection, skin necrosis, subcutaneous abscess, fat embolism, fractures, compartment syndrome or leakage through the foramina of the nutrient vessels [5]. The technique is easy, but precaution should be taken to prevent damage to the epiphyseal plate with proper size

and type of needle, which is ideally an intraosseous needle (Fig 2) or a Jamshidi needle for bone marrow aspiration. However, in case of non-availability, an 18 gauge disposable needle with an intravenous cannula stylet can be assembled and used in a peripheral setup [6]. The intraosseous route must remain a transitory vascular access and be replaced with intravenous line as soon as possible, preferably within 24 hours [7]. During intraosseous infusion, patients have to be monitored with radiography and hourly measurement of leg circumference to determine whether the line is still in place. Intraosseous route has life saving abilities due to speed and ease of establishing emergency vascular access, as an alternate route during neonatal resuscitation [8].

Conflicts of Interest

None identified

References

1. Chemeidses L, Hazinski MF. Vascular access. In: Text Book of Pediatric Advanced Life Support National Center 72 Greenville Avenue Dallas, TX, USA, 1998; 5:pp 1-17.
2. Brownstein DR, Rivera FP. Emergency medical services for children. In: Nelson Text Book of Pediatrics, 17th edn. Eds. Behrmann RE, Kliegman RM, Jenson HB. Philadelphia W.B. Saunders company, 2004; pp 299.
3. Niermeyer S, Kattwinkle J, VanReempts P et al. International guidelines for neonatal resuscitation: An excerpt from the guidelines 2000 for cardiopulmonary resuscitation and emergency cardiovascular care: International consensus on science. Contributors and reviewers for neonatal resuscitation guidelines. Pediatrics 2000; 106(3): E 29.
4. Heinild S, Sondergaard T, Tudvad F. Bone marrow infusions in childhood: experiences from a thousand infusions. J Pediatr 1947; 30: 400-11.
5. Ellemunter H, Simma B, Trawoger R, Maurer H. Intraosseous lines in preterm and full term neonates. Arch Dis Child Fetal Neonatal Ed 1999; 80: 74-5.
6. Kalappanavar NK, Kesaree N, Banapurmath CR. Simplified intraosseous needle. Indian Pediatr 2001; 38: 378-80.
7. Wright R, Reynolds SL, Nachtsheim B. Compartment syndrome secondary to prolonged intraosseous infusion. Pediatr Emerg Care. 1994; 10(6): 378.
8. Abe KK, Blum GT, Yamamoto LG. Intraseous is faster and easier than umbilical venous catheterization in newborn emergency vascular access models. Am J Emerg Med 2000; 18: 126-9.