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REFERENCES

1. Sollai S, Dani C, Berti E, Fancelli C, Galli L, Martino M, *et al*. Performance of a non-contact infrared thermometer in healthy newborns. BMJ Open. 2016:6;1-5.
2. El-Radhi AS. Determining fever in children: The search for an ideal thermometer. Br J Nurs. 2014; 23:91-4.
3. Smith J. Are electronic thermometry techniques suitable alternatives to traditional mercury in glass thermometry techniques in the pediatric setting? J Adv Nurs. 1998; 28: 1030-9.
4. Atas Berksoy E, Bag Ö, Yazici S, Çelik T. Use of noncontact infrared thermography to measure temperature in children in a triage room. Medicine (Baltimore). 2018; 97: 9737.
5. Robertson-Smith J, McCaffrey FT, Sayers R, Williams S, Taylor BJ. A comparison of mid-forehead and axillary temperatures in newborn intensive care. J Perinatol. 2015; 35:120-2.
6. Sethi A, Patel D, Nimbalkar A, Phatak A, Nimbalkar S. Comparison of forehead infrared thermometry with axillary digital thermometry in neonates. Indian Pediatr. 2013; 50:1153-4.
7. Wang K, Gill P, Wolstenholme J, Price CP, Heneghan C, Thomson M, *et al*. Non-contact infrared thermometers for measuring temperature in children: Primary care diagnostic technology update. Br J Gen Pract. 2014; 64: 681-3.
8. Osio CE, Carnelli V. Comparative study of body temperature measured with a non-contact infrared thermometer versus conventional devices. The first Italian study on 90 pediatric patients. Minerva Pediatr. 2007;59: 327-36.
9. Uslu S, Ozdemir H, Bulbul A, Comert S, Bolat F, Can E, *et al*. A comparison of different methods of temperature measurements in sick newborns. J Trop Pediatr. 2011; 57: 418-23.
10. Chiappini E, Sollai S, Longhi R, Morandini L, Laghi A, Osio CE. Performance of non-contact infrared thermometer for detecting febrile children in hospital and ambulatory settings. J Clin Nurs. 2011; 20: 1311-8.

Ultrasound Guided Confirmation of Tip of Peripherally Inserted Central Catheter in Neonates

The neonatal peripherally inserted central catheter (PICC) is commonly inserted in the neonatal intensive care unit (NICU) for long-duration intravascular access and the tip of PICC is normally placed at the junction of the right atrium and either superior or inferior vena cava [1]. Often the catheter tip is not in the correct place and requires manipulation and frequent radiographs [2,3]. In this study, we sought to determine the time taken-up by bedside ultrasound (as compared to *X*-ray) and its accuracy for PICC placement and tip confirmation.

A cross-sectional study was conducted at the neonatal intensive care unit, Manipal hospital, Bangalore from August, 2017 to September, 2018, among neonates requiring PICC line insertion as a part of their intensive care management. The study protocol was cleared by the Ethics Committee of Manipal Hospital. Data were collected in a pre-designed proforma after taking consent from parents. Neonates with major congenital anomalies involving thorax and abdomen were excluded from the study.

Objectively, the time taken during the confirmation of the tip of PICC by using bedside ultrasound and digital *X*-ray in each patient was determined, and also the number of attempts was documented. PICC line was placed by the neonatal fellow under the guidance of the consultant neonatologist. Ultrasound was performed by Philips CX50 by using an S 12-4 frequency footprint probe in the subcostal sagittal view to identifying the inferior vena cava and high parasternal view to identify superior vena cava. After the insertion of predetermined length, the tip was visualized and manipulated by using real-time ultrasound for optimal position. A small volume (1 mL) of sterile normal saline was injected to confirm the location of the catheter tip. Bedside digital *X*-ray was ordered at the same time. Time taken to confirm the position of the tip of PICC was recorded by using bedside ultrasound and *X*-ray. The start time was defined as the time of ordering *X*-ray after inserting the predetermined length of the PICC catheter. The starting time was the same for ultrasound and *X*-ray, whereas the completion time was defined as the time when ultrasound confirmed the tip of the PICC catheter and for the *X*-ray method when the *X*-ray was read by the neonatologist on-site. A single attempt was counted after the determination of tip by ultrasound and catheter fixed. The repositioning of the catheter was done if the position was not correct as confirmed by *X*-ray.

Forty neonates out of a total of 300 neonates admitted to neonatal intensive care unit during the study period which required PICC insertion; consent could not be obtained for seven neonates. For these 33 neonates (72% males, 72% appropriate for gestational age), the mean (SD) gestational age and birthweight were 29 (3) weeks and 1087 (561) g.

The mean (SD) time taken in tip confirmation by using bedside ultrasound was 5.1(1.2) minutes, *X*-ray it was 28 (8.1) minutes (P<0.001). The catheter tip was in an optimal position in the first attempt in 30 (91%) neonates after the ultrasound and confirmed by *X*-ray. In these three cases (9%) the tip of the PICC catheter was in the right atrium after first attempt confirmation. There was no inter-observer variation in the interpretation of the result.

Previous studies [4-8] have also shown that the mean time taken in confirmation of tip by using ultrasound is significantly less than standard care. The accuracy of ultrasound was also comparable with radiography. By using ultrasound, we can reduce radiation exposure, and ensure lesser handling of babies.

Bedside ultrasound is an accurate and time-efficient modality to guide the insertion and confirmation of the tip of the PICC line. However, training of neonatologists in ultrasound may be required before routine use of this modality.

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REFERENCES

1. Ramasethu J. Complications of vascular catheters in the neonatal intensive care unit. Clin Perinatol. 2008;35: 199-222.
2. Diamond LK, Allen FH, Thomas WO. Erythroblastosis fetalis. VII. Treatment with exchange transfusion. N Engl J Med. 1951;244:39-49.
3. Sharma D, Farahbakhsh N, Tabatabaii SA. Role of ultrasound for central catheter tip localization in neonates: A review of the current evidence. J Matern Fetal Neonatal Med. 2019;32:2429-37.
4. Katheria AC, Fleming SE, Kim JH. A randomized controlled trial of ultrasound-guided peripherally inserted central catheters compared with standard radiograph in neonates. J Perinatol. 2013;33:791-4.
5. Tauzin L, Sigur N, Joubert C, Parra J, Hassid S, Moulies ME. Echocardiography allows more accurate placement of peripherally inserted central catheters in low birthweight infants. Acta Paediatr. 1992. 2013;102:703-6.
6. Saul D, Ajayi S, Schutzman DL, Horrow MM. Sonography for complete evaluation of neonatal intensive care unit central support devices: A pilot study. J Ultrasound Med. 2016;35:1465-73.
7. Telang N, Sharma D, Pratap OT, Kandraju H, Murki S. Use of real-time ultrasound for locating tip position in neonates undergoing peripherally inserted central catheter insertion: A pilot study. Indian J Med Res. 2017;145:373-6.
8. Jain A, McNamara PJ, Ng E, El-Khuffash A. The use of targeted neonatal echocardiography to confirm the placement of peripherally inserted central catheters in neonates. Am J Perinatol. 2012;29:101-6.

Infantile Cardiac Beriberi in Rural North East India

Twenty eight exclusively breastfed infants presented between 1 July, 2017 and 30 June, 2018 with acute heart failure syndrome, with 23 (92%) showing dramatic clinical resolution of shock within 24 hours of receiving intravenous thiamine (100 mg) bolus. Our findings raise awareness for addressing this neglected nutritional disease in North East India.

Keywords: *Heart Failure, Infantile Beriberi, Thiamine*.

The cardiac form of infantile beriberi is a fulminant disease, affecting exclusively breastfed infants of mothers with thiamine deficiency. The classical description is a well thriving infant presenting in acute cardiac failure succumbing to the illness within four hours, if left untreated [1]. Laos has documented widespread thiamine deficiency in communities, causing a peak in infant mortality in the third month of life [2]. The overall infant mortality rates in the Karen refugee camp in Thailand reduced from 183 to 78 per 1000 live births after early diagnosis and management of infantile beriberi [3]. We report on infantile beriberi as a preventable cause of death among infants from rural North East India.

The study was conducted in a charitable hospital in Karimganj district of Assam, which has an infant mortality rate of 69 per 1000 live births in 2012-13 (National average, 42/1000 live births). A retrospective review of medical records was conducted for all infants who were discharged between 1 July, 2017 and 30 June, 2018 with a diagnosis of infantile beriberi. Infantile beri beri was diagnosed when an otherwise well, exclusively breastfed infant presented with a thiamine responsive acute cardiac failure syndrome [1].

A total of 28 infants with a mean (SD) age 69 (29.1) days and weight 3.84 (1.26) kg from rural Assam and Tripura were diagnosed with infantile beriberi during the study duration. The commonest complaints were short history of vomiting, breathlessness and poor feeding. All infants presented in a critically ill state with prolonged capillary refill time (93%), tachycardia (93%), seizures (36%) and severe respiratory distress (92%). The capillary blood gas of all infants showed severe high anion-gap metabolic acidosis (***Table* I**).