

Evaluation Of A New Transcutaneous Measurement Of Pco2 Sensor In Newborns In Delivery Room

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Citation

T Özdoğan, S Kavuncuoğlu, Y Şenel. *Evaluation Of A New Transcutaneous Measurement Of Pco2 Sensor In Newborns In Delivery Room*. The Internet Journal of Pediatrics and Neonatology. 2008 Volume 11 Number 1.

Abstract

The intrapartum acid-base status of the fetus is an important parameter to establish the relation between intrapartum events. Respiratory acidosis is the beginning event after intrapartum asphyxia. If the asphyxia continues metabolic acidosis develops and complicates the delivery (1). During the respiratory acidosis phase pCO₂ can be an important parameter. Noninvasive monitoring of pCO₂ and oxygen saturation (SpO₂) can give idea about intrapartum and respiratory status of the newborn infant.

AIM

To evaluate the relation between SpO₂, pulse rate (PR) and transcutaneous measurement of pCO₂ (TcPCO₂) in healthy term infants immediately after birth in delivery room .

METHODS

In a prospective, nonrandomized study of 20 healthy term infants of uneventful pregnancies born vaginally with good apgar scores the new sensor for combined TcPCO₂ , pulse rate (PR) and SpO₂ was tested. The V-Sign™ Sensor is a digital sensor for noninvasive and continuous monitoring of TcPCO₂, SpO₂ and PR. It combines the elements of a Stow-Severinghaus type pCO₂ sensor and a pulse oximetry sensor (SenTec AG, Therwil, Switzerland). For each baby one separate sensor was applied by a pediatric resident after drying the baby and the values of SpO₂, PR and TcPCO₂ were recorded by a neonatologist at 5th, 10th and 15th minutes of birth in the delivery room. The temperature and perfusion of the skin of the infants where the sensor was applied did not change during the study. The study was completed without any complication. Data were analyzed by using SPSS-16 version programme.

RESULTS

Fourteen infants were male, 6 were females. Mean birth weight of infants was 3351gr

(2580-4220). Mean Rates of Parameters at 5-10-15th minutes were shown in Table 1.

5th minute TcPCO₂ value was highly correlated with PR at

5th and 10th minutes (p=0.004). TcPCO₂ at 5th minute was not correlated with SpO₂ at 5th minute (p=0.2). However 5th minute SpO₂ value has no correlation with 5th minute PR (p=0.6) which shows that TcPCO₂ measurement was more sensitive than SpO₂ measurement.

DISCUSSION

Non-invasive methods of CO₂ monitoring are by transcutaneous and endotracheal end tidal measurements which are used in neonatal intensive care and during transport of critical patients

(2). Recently, a new sensor (TOSCA) for combined assessment of pulse oximetry oxygen saturation and TcPCO₂ has been used in a prospective study of ill neonates including preterm babies. According to that study new monitor allows reliable noninvasive estimation of SpO₂ and TcPCO₂ in neonates. They used ear lobe sensor clips (3). In present study we used another sensor in neonates in delivery room. In pediatric cardiology during heart operation measurement of TcPCO₂ can give an idea about the type of acidosis (4). In a recent study by Tobias JD use of TcPCO₂ even in diabetic ketoacidosis is mentioned (5). The same logic worked in the present study.

CONCLUSION

Early measurement of TcPCO₂ value is more sensitive than SpO₂ value to determine the neonatal condition in delivery room. TcPCO₂ can be used to measure intrapartum status of the newborn and comparing TcPCO₂ with that of umbilical cord may be subject of another study.

Figure 1

Table 1 Mean Rates of Parameters at 5-10-15th minutes

	5. min	10.min	15.min
SpO ₂ %	88.78 (73-100)	91 (75-100)	92.7 (77-100)
PR/min	155 (132-180)	149 (130-166)	146 (126-161)
PCO ₂ (mm/hg)	41 (23-66.8)	40.69 (17-75.3)	41.58 (13.8-72)

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