Utility of Umbilical Cord Blood Gas in Preterm Newborns

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BACKGROUND

- Umbilical cord arterial blood gas and acid-base assessment are the most objective measurements of the fetal condition at birth. Perinatal asphyxia is the medical condition of impaired gas exchange before, during or shortly after birth, leading to metabolic acidosis and multiple acute and chronic complications.
- Identifying metabolic acidosis of the newborn is critical and serves as an aid in the assessment and management of this potentially critical condition.
- There is increased interest in determining the significance and value of umbilical cord blood gases as an early indicator of neonatal morbidity and mortality, including those conditions described above. Recent studies have shown that low arterial umbilical cord pH correlates with clinically important neonatal outcomes.
- While the utility of examining cord blood gas in full term infants is well established, the use of umbilical cord blood for predicting morbidity and mortality in preterm infants is less clear. Multiple studies have assessed the correlation between acidosis and short term outcomes of full term newborns, but there is limited evidence of any correlation with preterm newborns.

OBJECTIVE

- Determine the utility of umbilical cord arterial blood gas measurements in preterm infants.

METHODS

- Retrospective review of electronic medical records (EMR) of preterm infants born between June 1, 2013 and October 31, 2016, in an inner city, university affiliated community hospital. EMRs of 146 newborns with a gestational age between 24 and 37 weeks' were identified.
- Exclusion criteria included any child with congenital malformations, twin pregnancies or extramural deliveries. Statistical analysis included bivariate and multivariate analyses.

RESULTS

Table 1. Descriptive Data

	Mean	SD
Maternal Age	28.46 (years)	6.48
Gestation #	3.81	2.71
Gestational Age	35.22 (weeks)	1.87
Birth Weight	2.46 (Kg)	0.58
APGAR 1'	8.63	0.879
APGAR 5'	8.88	0.388
Umbilical Artery pH	7.26	0.07

Table 2. Neonatal Outcomes

Neonatal Outcome	pH<7.2	pH>7.2	p-value
	n=23 (15.8%)	n=123 (84.2%)	
Newborn Resuscitation	4/23	30/123	0.53
Blow by O2	3/23	25/123	0.66
PPV	9/23	6/123	2.23
Intubation	0	3/123	0.57
Ventilation within 4 hours	3/23	27/123	0.94
RDS	2/23	21/123	1.03
TTN	2/23	14/123	0.14

Table 3. Logistic Regression

	p-value	OR	CI	aOR	aCI
APGAR 1'	0.01	1.35	0.88 – 2.06	1.86	1.07 – 3.21

pH	Mean APGAR 1'	SD
>7.2	8.67	0.78
<7.2	8.39	1.27

DISCUSSION

- The study group had a mean gestational age of 35.2±1.8 weeks (mean±SD).
- There was a statistically significant correlation between umbilical artery pH and 1 minute APGAR scores adjusted for gestational age, days on supplemental oxygen, days on mechanical ventilation, history of maternal hypertension and IUGR (AOR: 1.86, CI 1.07 – 3.21, p<.01).
- The mean APGAR 1 minute scores in patients with pH<7.20 and patients with pH>7.2 were 8.39 and 8.67 respectively which suggest that there is little clinical significance in this finding.

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- The study found no correlation of umbilical cord pH with any newborn outcomes including need for newborn resuscitation, intubation rates, respiratory distress syndrome, birth weight, days requiring supplemental oxygen or ventilation.

CONCLUSIONS

- There was a statistically significant yet clinically insignificant correlation between umbilical artery pH and 1 minute APGAR scores.
- There was no correlation of umbilical cord pH with any newborn outcomes.
- These data suggest there is limited utility of blood gas analysis in preterm infants in a community hospital Neonatal Intensive Care Unit.
- A limitation of this study is that patients selected did not represent an extremely ill and premature population.
- Future studies may elect to examine the utility of this procedure using a prospective study design in a higher acuity setting.

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3. ACOG Committee Opinion No. 348, November 2006: Umbilical cord blood gas and acid-base analysis.

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