

September 22nd, 2023 15:00 - 17:00

PARALLEL SESSION 26 - RESUSCITATION 1

ID 684. Delaying the Clamping of the Cord Using an Ovine Preterm Model - What's the Optimal Duration?

Doctor Mausma Bawa¹, Ms Sylvia Gugino², Mr Justin Helman², Miss Nicole Bradley², Dr Arun Prasath², Dr Clariss Blanco, Dr Mary Divya Kasu², Dr Hamza Abbasi², Dr Munmun Rawat², Dr Praveen Chandrasekharan²

¹Harvard Medical School, Boston Children's Hospital, Boston, United States,

²University at Buffalo, Buffalo, United States

Current guidelines recommend delaying umbilical cord clamping for 30–60s after birth in vigorous preterm neonates. There is insufficient evidence for optimal cord management in preterm infants needing resuscitation.

Objectives: To compare effect of early cord clamping ventilation (ECCV) and various time frames of delayed cord clamping ventilation (DCCV) on: a) primary outcome – i) combined HR ≥ 100 bpm & peripheral SpO₂ $\geq 80\%$ by 5 min, ii) time to achieve primary outcome b) secondary outcomes – gas exchange/hemodynamics.

Methods: Following instrumentation, a total of 21 preterm lambs (126–128d, ~28wk human neonates) were asphyxiated by umbilical cord occlusion to achieve HR < 90bpm. The lambs randomized:1) ECCV(Controls): cord clamped immediately & ventilated. 2) DCCV (Study): cord intact while ventilation initiated 2a) DCCV1 – cord clamp@1 min;2b)DCCV2 – @2 min;2c) DCCV3 – @3 min; 2d) DCCV5 – @5 min. Initial supplemental oxygen of 60% was used in all groups and titrated based on recommended preductal SpO₂. Data on gas exchange and hemodynamics collected for first ten min. (fig 1)



All lambs in DCCV5 achieved the primary composite outcome HR of ≥ 100 bpm & peripheral SpO₂ of $\geq 80\%$ by 5 min. The time taken to achieve the primary outcome in DCCV5 (5 ± 0 min) was significantly lower ($p=0.003$) compared to DCCV1 & ECCV. There was no statistical difference between the groups' supplemental O₂ exposure and arterial oxygenation (Fig 2a, Fig 2b, 3a) . Arterial pH was not different between groups. Arterial carbon dioxide was significantly higher ($p=0.0001$) in ECCV & DCCV1 compared to DCCV5. Pulmonary blood flow was significantly higher ($p=0.0001$) in DCCV5 compared to ECCV & DCCV1(Fig 4a). Carotid blood flow was highest in the ECCV group and was statistically different ($p < 0.0001$) compared to other groups(Fig 4b). In an asphyxiated preterm ovine model, resuscitation with an intact cord for 5 min increased the incidence of primary outcome, decreased the time to achieve primary outcome and improved gas exchange by increasing pulmonary blood flow. Our results suggest that resuscitating an asphyxiated preterm infant with an intact cord could help with transition better than ECCV.

Figure 1: Randomization and Methodology

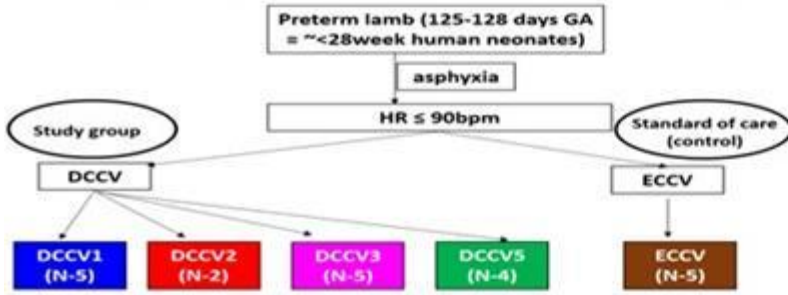


Table 1:
NRP recommended
preductal SpO₂

1 min	60-65%
2 min	65-70%
3 min	70-75%
4 min	75-80%
5 min	80-85%
10-30 min	85-90%

Table 2: Data / Measures

1. Oxygenation	Saturation target, PaO ₂ , Oxygen delivery to brain and lungs
2. Ventilation	PaCO ₂ , end tidal CO ₂ , tidal volumes, peak ventilation pressure
3. Hemodynamics	Pulmonary blood flow, carotid blood flow, ductal flow
4. Oxidative stress markers	Tissues from lung and brain

21 preterm lambs instrumented while in placental circulation. Acqknowledge software (Biopac Systems) continuously record blood flow (from brain, heart and lungs) and blood pressure. A Respicronics NM3 monitor (Philips) records arterial saturation, tidal volume and respiratory parameters. At delivery, oxygen was titrated as shown in table 1. Ventilation continued for 2 hours. After 2 hours, lambs was euthanized, and tissues obtained to measure the oxidative injury. Data collection is shown in table 2

Abbreviations:
DCCV1: Delayed cord clamping 1min with ventilation,
DCCV2: Delayed cord clamping 2 min with ventilation,
DCCV3: Delayed cord clamping 3 min with ventilation,
DCCV5: Delayed cord clamping 5 min with ventilation,
ECCV: Early cord clamping with ventilation
PaO₂: arterial oxygenation, PaCO₂: arterial carbon dioxide, GA: Gestational age, HR: Heart rate

Fig 2a: DCCV5 had significantly higher SpO₂

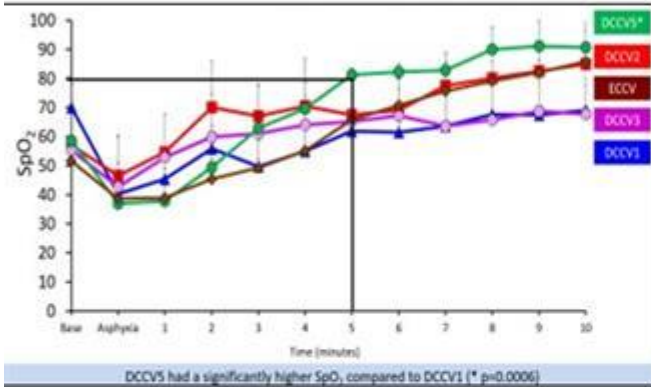


Fig 2b: Supplemental O₂ used was not different

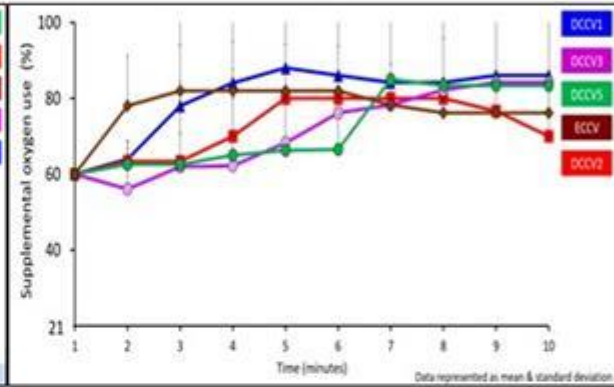


Fig 3a: No difference in arterial oxygenation (PaO₂)

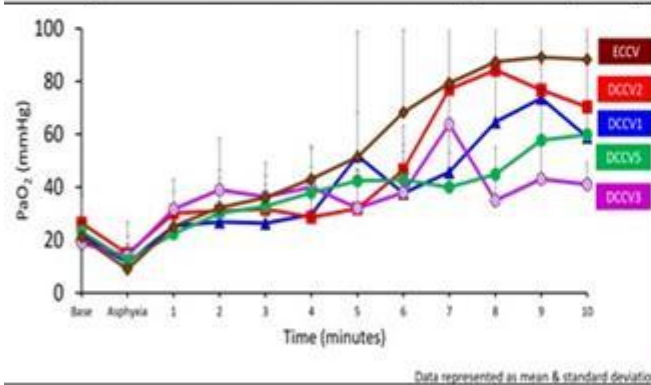


Fig 4a: DCCV5 had significantly higher peak PBF

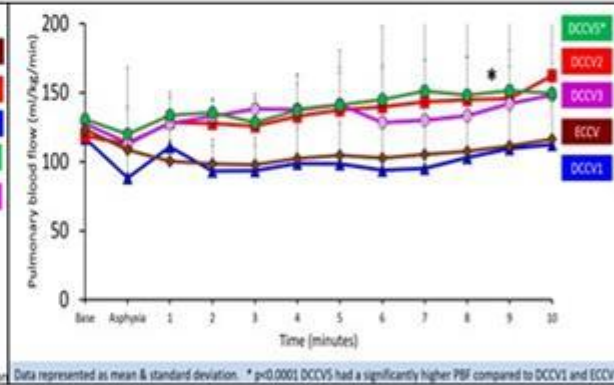


Fig 4 b: ECCV had a significantly higher peak carotid blood flow

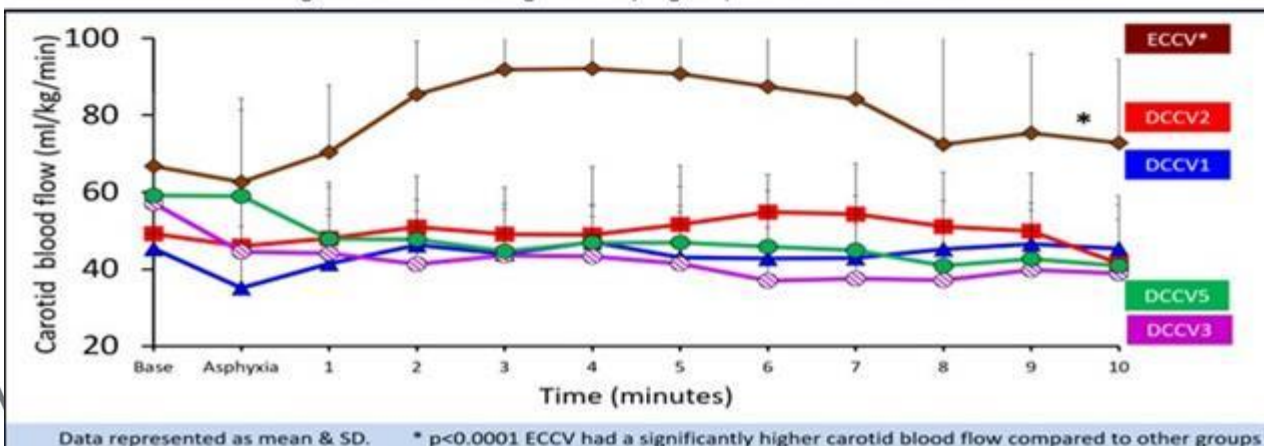




Fig 1:Randomisation and Methodology

Fig2a:Peripheral arterial saturation

Fig2b:Supplemental oxygen used between groups

Fig3a:Arterial oxygenation between groups

Fig4a:Peak pulmonary blood flow between groups

Fig 4b:Peak carotid blood flow between groups

Fig 1:Randomisation and Methodology

Fig2a:Peripheral arterial saturation

Fig2b:Supplemental oxygen used between groups

Fig3a:Arterial oxygenation between groups

Fig4a:Peak pulmonary blood flow between groups

Fig 4b:Peak carotid blood flow between groups

None declared

ID 781. The effects of maternal magnesium sulfate therapy on early neonatal outcomes

Doctor Rumeysa Çitli¹, Professor Dilek Dilli², Doctor Burak Emekli³

¹Memorial Ankara Hospital, Ankara, Türkiye, ²Etlik City Hospital, Ankara, Türkiye,

³Memorial Ankara Hospital, Ankara, Türkiye

Background: Magnesium sulfate (MgSO₄) is frequently used for maternal and fetal neuroprotection in the presence of premature labor in pregnant women with preeclampsia/eclampsia. However, there are concerns about the adverse effects of this practice on neonatal morbidities. Therefore, we aimed to evaluate the effects of maternal MgSO₄ therapy on early neonatal outcomes.

Methods: In this retrospective study, babies born at/or before 34 weeks of gestation whose mothers received intravenous (IV) MgSO₄ therapy (bolus dose of 6 g over 30 minutes, followed by a continuous infusion of 2–3 g/hour) for at least 12 hours before delivery were included in the study, from November 2022 to May 2023. Control group consisted of babies born in the same study period at the similar gestational weeks. The groups were compared in terms of short-term neonatal clinical outcomes.

Results: A total of 64 newborns were evaluated for the study (32 babies in each group). The mean gestational age and birth weight of all subjects were 29.2 ± 2.7 week and 1213 ± 361 g. Male to female ratio was 1.6:1.0, without any difference between the groups. The newborns exposed to maternal MgSO₄ had a higher incidence of hypotonia and lower 1- and 5-minute Apgar scores compared to control babies (p < 0.001). However, there was no association between these adverse outcomes and maternal serum magnesium concentrations both at delivery and during

the treatment, or cumulative dose of MgSO₄. Study groups did not differ in terms of the neonatal morbidities such as patent ductus arteriosus, bronchopulmonary dysplasia, and necrotizing enterocolitis.

Conclusion: Antenatal MgSO₄ therapy may lead to hypotonia and lower Apgar scores in premature babies regardless of maternal serum magnesium levels. Further studies are needed to clarify the effects of maternal MgSO₄ therapy on early neonatal outcomes.

None declared

ID 265. LARYNGEAL CLOSURE IN PRETERM INFANTS CAUSES OBSTRUCTION DURING NEONATAL TRANSITION AFTER BIRTH; AN OBSERVATIONAL STUDY

Miss Veerle Heesters¹, Dr. Janneke Dekker¹, Mr. Timothy Pannefle¹, Mrs. Kristel Kuypers¹, Prof. Stuart Hooper², Dr. Remco Visser¹, Prof. Arjan te Pas¹

¹Leiden University Medical Center, Leiden, Netherlands, ²The Ritchie Center, Hudson Institute of Medical Research, Melbourne, Australia

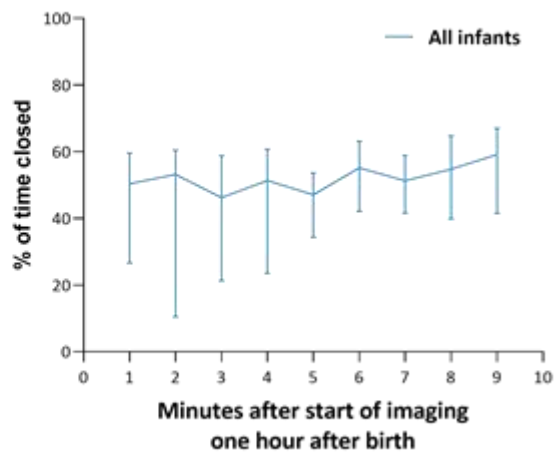
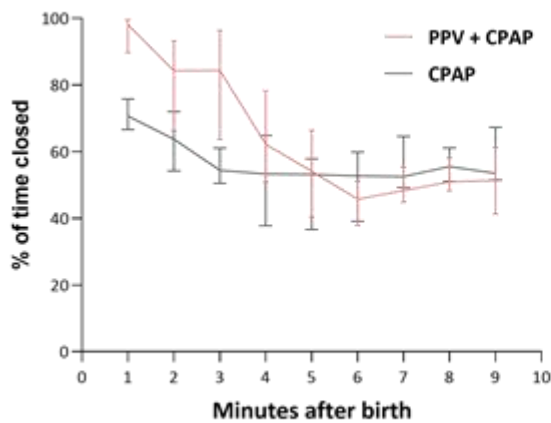
Background: Lung aeration is necessary to achieve optimal transition after birth. Preterm infants receive respiratory support and noninvasive ventilation with continuous positive airway pressure (CPAP) and/or intermittent positive pressure ventilation (IPPV). However, recent animal data showed that the larynx is predominantly closed during apnea after birth, negating the effect of non-invasive ventilation. We hypothesized that laryngeal closure also occurs in preterm infants. The aim of this study was to visualize the position/movement of the vocal cords during non-invasive respiratory support of preterm infants at birth.

Methods: In this observational study, vocal cords were visualized using ultrasonography, of infants <30 weeks gestation directly after birth and at one hour after birth. To determine the percentage of time the vocal cords were closed, position of the vocal cords was reviewed by 15 frames per second and compared with the breathing patterns of the respiratory function monitor.

Results: Twenty infants were included (GA of 27+5 (26+2–29) weeks), of which 60% (12/20) were initially breathing and 40% (8/20) were apneic at birth. In infants breathing at birth, vocal cords were closed in between breaths and during breath holds, resulting in a closed position for 55% (45–64) in the minutes that CPAP was

given. In infants who were apneic at birth, vocal cords were closed 100% of time during apnea, obstructing positive pressure ventilation. The vocal cords opened only during a spontaneous breath, resulting in a closed position for 93% (80–99) of the time during PPV.

Conclusion: In preterm infants at birth, vocal cords are closed during apnea, in between breaths and during breath holds, negating the effectiveness of ventilatory support.



The percentage of time the vocal cords are in a closed position. Data is presented as median (IQR).

The percentage of time the vocal cords are in a closed position. Data is presented as median (IQR).

None declared

ID 918. CHEST COMPRESSION RATES OF 60/MIN VERSUS 90/MIN DURING NEONATAL CARDIOPULMONARY RESUSCITATION: A RANDOMIZED CONTROLLED ANIMAL TRIAL

Doctor Marlies Bruckner^{1,2}, PhD Megan O'Reilly^{2,3}, PhD Tze-Fun Lee^{2,3}, MBBS, PhD Po-Yin Cheung^{2,3}, PhD Georg Schmölzer^{2,3}

¹Division of Neonatology, Department of Pediatrics and Adolescent Medicine, Medical University Of Graz, Graz, Austria, ²Centre for the Studies of Asphyxia and

Resuscitation, Neonatal Research Unit, Royal Alexandra Hospital, Edmonton, Canada,

³Department of Pediatrics, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, Canada

Background

A 3:1 compression-to-ventilation ratio with 90 chest compressions (CC) and 30 inflations to achieve approximately 120 events per minute is the current consensus of science and treatment recommendations (CoSTR) for neonatal resuscitation. However, the optimal CC rate to optimize coronary and cerebral perfusion during cardiopulmonary resuscitation (CPR) remains unknown. The aim was to compare CC rates of 60/min with 90/min and their effect on the time to return of spontaneous circulation (ROSC), survival, hemodynamic, and respiratory parameters. We hypothesized that asphyxiated newborn piglets that received CC at 60/min vs. 90/min during cardiopulmonary resuscitation would have a shorter time to ROSC.

Methods

Newborn piglets (n=7/group) were anesthetized, tracheotomized and intubated, instrumented and exposed to 45min normocapnic hypoxia followed by asphyxia and cardiac arrest. Piglets were randomly allocated to a CC rate of 60/min or 90/min. CC were performed using an automated CC machine using CC superimposed with

sustained inflation. Hemodynamic parameters, respiratory parameters, and applied compression force were continuously measured.

Results

The mean (IQR) time to ROSC was 97 (65–149)sec and 136 (88–395)sec for CC rates of 60/min and 90/min, respectively ($p=0.31$). The number of piglets that achieved ROSC was 5 (71%) and 5 (71%) with 60/min and 90/min CC rates, respectively ($p=1.00$). Hemodynamic parameters (i.e., diastolic and mean blood pressure, carotid blood flow, stroke volume, end–diastolic volume, left ventricular contractile function) and respiratory parameters (i.e., minute ventilation, peak inflation and peak expiration flow) did not differ with a CC rate of 60/min compared to 90/min.

Conclusion

Time to ROSC, survival, hemodynamic, and respiratory parameters were not significantly different between CC rates of 60/min versus 90/min. Different CC rates during neonatal resuscitation warrant further investigation.

None declared