Optimal Cord Management to enhance physiological transition at birth – What is the evidence? Heike Rabe

BAPM webinar 2 Feb 2021



Resuscitation and *Physiological Transition*?

- Optimal timing for clamping of the umbilical cord at birth is under discussion.
- Early clamping allows for immediate resuscitation of the newborn.
- Delaying clamping or milking of the cord facilitates transfer of additional blood between the placenta and the baby.
- Optimal Cord Management gives the baby more time for *physiological transition* of circulatory changes.



Postnatal Changes of Circulation

- Placental circulation stops
- Fetal shunts should close
- PDA: Change to left-right shunt

↑ Pulmonary vasodilatation
↑ RVO, pulmonary BV
↓ Vascular resistance

↑ BP

↑ Cardiovascular stabilization



Definitions of Optimal Cord Management Methods

- **Delayed (Deferred) Cord Clamping,** leaving the cord intact for 30-60 seconds in preterm infants, upto 3-5 minutes in term infants before clamping and cutting the cord.
- **Resuscitation with the intact cord,** leaving the cord intact and starting resuscitation such as inflation breaths or intubation, before clamping and cutting the cord.
- **Cord milking (also referred to as "stripping"),** defined as repeated compression of the cord from the placental side toward the infant with the connection to the placenta intact at any time point within the first few minutes after birth.
- **Cut cord milking (also referred to as "stripping"),** defined as drainage of the cord by compression from the cut end toward the infant after clamping and cutting a long segment

Blood distribution



Immediate Cord Clamping



Enhanced Placental



Importance of Circulatory Adaptation

Zachary A et al. Blood pressure extremes and severe IVH in preterm infants.

Pediatric Research 2019



Zachary A et al. Blood pressure extremes and severe IVH in preterm infants. Pediatric Research 2019



Improved Circulatory Adaptation DCC: RCT 22-27 GA



Blood Pressure in Postnatal Adaptation

Preterm Infants < 32 weeks: 4x Milking vs 30 sec DCC:

60 55 **Mean Blood Pressure** 50 (mmHg) 45 40 35 30 25 20 1h 4h 6h 12h 24h 48h 72h 120h hours Milking — Clamping

Blood pressure in first 120 h of life

Rabe et al Obstet Gynecol 2011; 117:205-211

Delayed Cord clamping and use of resus trolley

Brouwer Arch Dis Child Fetal Neonat Ed 2018

- Pilot study 37 preterm infants < 35 weeks GA
- Delayed cord clamping once heart rate > 100/min and first breaths established, mean 4-6 min
- Respiratory support if needed
- Use of bespoke trolley



Temperature control near term lambs Physiological cord clamping versus Immediate (Blank Frontiers Pediatr 2020)





Active Resuscitation needed? Let the Baby breathe

(Katheria J Pediatr 2016)



What is the latest evidence?

Updated Meta-analysis: Seidler et al Pediatrics 2021 42 studies, 5772 infants

- Mortality
- ICC vs DCC: favours DCC
- ICC vs UCM: favours UCM
- DCC vs UCM: no difference
- ICC vs DCC with resuscitation: too few studies, but favours DCC

Seidler et al Pediatrics 2021

Intact UCM vs DCC: no clear differences for key neonatal morbidities

- Severe IVH (RR 0.60, 95% CI 0.32 to 1.12),
- Chronic lung disease (RR 0.91, 95% CI 0.67 to 1.25),
- NEC (RR 1.57, 95% CI 0.83 to 2.97)
- Hyperbilirubinemia treated phototherapy (RR 1.05, 95% CI 0.90 to 1.24)
- Peak hemoglobin 24 h concentrations: MD -0.02 g/dL, 95% CI -0.56 to 0.53
- Peak hematocrit 24 h concentrations (%): MD -0.18, 95% CI -1.90 to 1.54).

Reported Benefits from Optimal Cord Management Preterm Infants

- Higher circulating blood volume for 24-48 h
- Fewer blood transfusions
- Better systemic blood pressure
- Reduced need for inotropic support
- Increased blood flow in the superior vena cava
- Increased left ventricular output
- Reduced necrotizing enterocolitis
- Higher cerebral oxygenation index
- Lower frequency of any intracranial haemorrhage
- No adverse effects on neurodevelopmental outcome at 2 years

Reduction in hospital deaths by 27-30%

Fogarty 2017, Ghavam 2014, Rabe Cochrane 2019, Seidler 2021

Immediate cord clamping reduces the risk of bleeding after birth?

So why do we clamp the cord immediately?

WHO 2016: Immediate cord clamping

is contra-indicated

Immediate cord clamping reduce the risk of bleeding after birth?

Immediate cord Clamping increases mortality rate by 30%

So why do we clamp the cord immediately?

Benefits of Optimal Cord Management

Term Babies McDonnell Cochrane Review 2013

Body Weight

↑ Heavier 60-100 g

Skin

- ↑ Cutaneous perfusion
- ↑ Peripheral temperature

Cardiovascular

- ↑ BP
- ψ Vascular resistance
- ↑ Cardiovascular stabilization
- ↑ RBC flow to brain (18%)
- ↑ RBC flow to gut (15-20%)

Respiratory

- ↑ Pulmonary vasodilatation
- ↑ RVO, pulmonary BV

Renal

- ↑ Renal blood flow
- ↑ Urine output
- \checkmark Sodium excretion

Hematologic

- ↑ RCV, Hct, Hb
- ↓ Hypovolemia

Iron Stores

- ↑ Ferritin (4-6 mo)
- ↑ Total Body Iron (6-12 months)

Brain

↑ Better Neurodevelopment Outcome at 4 years of age

Optimal Cord Management

BAPM QIP Toolkits 2020:

1.Normothermia

2. Antenatal Optimisation for

Preterm Infants < 34 weeks

3.Optimal Cord Management

preterm infants < 34 weeks

4. Breast Feeding



The Quality Context

>= 1 minute

Counselling of parents and shared decision-making

BAPM Toolkit Optimal Cord Management

- Delayed cord clamping of at least 1 minute in preterm infants
- Early cord clamping not recommended
- Develop unit guidance according to locally possible settings
- Several examples and guidance on how to proceed in toolkit
- If optimal cord management methods already established, continue
- No recommendation about special equipment
- MDT approach
- Parents involvement



WHO 2015





Optimal Cord Management in preterm infants – benefits versus risks? Summary

- Mortality improved by 27 to 30%
- Survivors will develop *co-morbidities of prematurity*
- No increased risks demonstrated so far in metaanalysis
- <u>Immediate cord clamping</u> may cause harm by reducing chances for survival
- Make plans for implementation
- MDT approach
- Audit your own practices

Thank You

To all the Parents, Babies and Staff involved in this Research

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- BSUH Neonatology
- BSUH/BSMS ResearchTeams
- BSUH R&D
- Cochrane Collaboration
- International Placental Transfusion Research Community
- Collaborators in Nepal, Tanzania and Zambia
- BAPM Working Group
- Animations: Donna Winderbank-Scott



Other Clinical Indications for Optimal Cord Management

- Rhesus incompatibility
- Maternal HIV
- Twins and triplets
- Congenital cardiac abnormalities
- Under investigation:
- Diaphragmatic hernia (DCC with intact cord)
- HIE? (milking)

Optimal Cord Management Term Infants



Where to start? WHO Pathway





WHO Pathway





WHO Pathway





WHO Pathway





