Delayed Cord Clamping

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Learning Objectives

• Examine the literature regarding early vs delayed cord clamping

• Describe the benefits of delayed cord clamping

A little history

• The umbilical cord is in medical texts since Hippocrates and Galen postulated its role in nutrition of the fetus.

• First records of cutting before placental delivery appear about 17th century.

• Early clamping “spared the bed linen” from being soiled by placental leakage.

The practice pendulum

“Encyclopedia of Sexual Knowledge”
A Costler MD and A Willy MD
Eugenics Publishing Company New York 1937
(originally published in France, 1933)

“After birth, the child is left to rest for a few minutes between the mother’s legs, until cessation of the pulse in the cord shows that the child has begun its independent life.” (pg 261)

Early cord clamping

• Virginia Apgar suggested that the initial score at 1 minute is determined after “clamping or tying of the cord.” DCC was termed “slow delivery” suggesting DCC was unwise.

• Before effective regional anesthesia, use of opiates and GA hastened early clamping

No evidence to support early cord clamping

Why all the fuss – for babies

• Physiologic studies in terms infants show that a placental transfer of about 80 mL of blood occurs by 1 minute after birth, reaching about 100 mL at 3 minutes after birth.

• Increased blood volume and less need for transfusion in preterm infants

• Decreased incidence of IVH in preterm infants

• Decreased frequency of iron deficiency anemia in term infants

• Provides immunoglobulins and stem cells for organ development and repair
Intact umbilical cord over 15 minutes

Why all the fuss – for moms
Delayed cord clamping does not seem to cause
• Postpartum hemorrhage, low Hgb values
• Need for therapeutic uterotonic

Who says?
• American College of Obstetricians and Gynecologists
• American Academy of Pediatrics
• World Health Organization

ACOG Committee Opinion, Number 543
December 2012 (AAP endorsed in 2013)
• Evidence exists to support DCC in preterm infants, when feasible.
  • Single most important benefit for preterm infants is nearly 50% reduction in IVH.
  • Evidence is insufficient to confirm or refute the potential for benefits from DCC in term infants born in settings with rich resources (risk of anemia vs phototherapy).

Timing of cord clamping in very preterm infants: more evidence is needed (Tamow-Mordi et al, 2014)
• 2014 ACOG Clinical Opinion calling for more research before declaring that DCC is beneficial for very preterm infants.
• Authors review multiple studies and point out gaps in the evidence and share examples of previous recommendations for interventions that showed short term benefit and subsequently, no long term benefit
• Conclusion: promote internat’l collaboration for accelerated research

ILCOR
Internat’l Liaison Committee on Resuscitation
• Comprised of 7 councils North America, Europe, Africa, Asia, Australia and New Zealand
• Every 5 years, provide a forum for research and reviewing scientific data on resuscitation.
• ILCOR produces International CPR Guidelines (Consensus on Science and Treatment Recommendations)
• Then each council (AHA) produces guidelines for resuscitation of adults, children, newborns
• NRP translates the AHA guidelines into practice
Literature Review

2010 Consensus on Science and Treatment Recommendations

“...For the otherwise uncomplicated preterm birth, there is evidence of a benefit to delaying cord clamping for a minimum time ranging from 30 sec to 3 min following delivery. ...had higher blood pressures during stabilization, lower incidence of IVH and received fewer blood transfusions, but more likely to receive phototherapy. ...Limited data on hazards or benefits in the non-vigorous infant.”

2015 question at ILCOR

In preterm infants, including those who received resuscitation:

- Does DCC > 30 secs, compared with immediate cord clamping
  - Improve survival?
  - Improve long-term developmental outcome?
  - Improve cardiovascular stability?
  - Decrease risk of IVH?
  - Decrease risk of NEC?
  - Improve temperature on admission?
  - Increase risk of hyperbilirubinemia?

Articles that made the cut

- Included all studies with concurrent controls
- Excluded review articles, studies with historical controls, animal studies, and studies that did not specifically answer the question
- Excluded unpublished studies, and studies only published in abstract form unless accepted for publication

Fifteen articles were finally included:
- RCTs: 12 articles (691 cases)
- Non-RCTs: 3 articles (760 cases)
- Excluded 231 articles – most DCC research excluded newborns who required resuscitation

Effect of timing of umbilical cord clamping of term infants on maternal and neonatal outcomes (McDonald, Middleton, Dowswell, 2013)

- Cochrane Review of 15 papers involving 3911 women/infant pairs
- No significant differences between ECC or DCC for neonatal mortality or morbidity
- DCC = more phototherapy needed
- ECC = over 2x likely to be anemic at 3 and 6 mos

Conclusion of authors: DCC is beneficial for healthy term infants with access to phototherapy

Effect of Delayed vs Early Umbilical Cord Clamping on Iron Status and Neurodevelopment at Age 12 Months (Andersson O, Domellof, Andersson D, Hellstrom-Westas, 2014)

- Secondary analysis of RCT of 382 singleton FT infants with healthy non-smoking Swedish moms
- DCC = 180 seconds vs ECC = 10 seconds
- Sampled at 4 & 12 mos using ASQ

Conclusion: at 4 mos, DCC = higher Hgb and lower anemia and higher ferritin level. Neuro development same in the 2 groups.

Effects of placental transfusion in ELBW infants: Meta-analysis of long and short term outcomes (Ghavam, Batra, Mercer; et al., 2014)

- Meta-analysis of 10 RCTs of infants < 30 weeks gestation and < 1000 gms. Compared DCC or cord milking with immediate cord clamping
- DCC = better BP and Hgb at NICU admission, fewer transfusions, and reduced IVH
- No good data on developmental outcome

Conclusion: more well-designed RCTs are needed
ILCOR draft conclusion

- We suggest delayed umbilical cord clamping over immediate cord clamping for preterm infants not receiving resuscitation after birth.
- There is insufficient evidence to recommend the approach to cord clamping for preterm infants who do receive resuscitation immediately after birth.
- All ILCOR draft conclusions: https://volunteer.heart.org/apps/pico/Pages/default.aspx

Potential Contraindications

- Placental abruption/maternal hemorrhage
- Insufficient umbilical cord length
- Airway or pulmonary anomalies
- Abnormal Fetal Status
- Blood type incompatibility
- Any neonate requiring immediate intubation
- Severe IUGR
- Maternal HIV positive with high viral load
- Other maternal or fetal conditions where the risks would outweigh the benefits

Delay clamping for how long?

30-60 seconds?
90 seconds?
3-5 minutes?
When pulsation stops?
Never?

Optimal transfusion

Pulsation of the cord may not indicate blood flow. Pulsing cords may or may not be transferring blood.
(15 infants; Boere, 2014)

Position of newborn (on mom vs at placenta level) does not make significant difference in transfusion amount.
(Vain et al, 2014)

Should we ventilate first, then cut and clamp?

NIH Randomized Controlled Trial that asks:
Does the addition of ventilation provide a larger placental transfusion and a smoother transition at birth?
Vaginal or cesarean birth 23 0/7 weeks – 31 6/7 weeks’ gestation

One group gets routine care (warm, dry, stimulate)
One group gets routine care + CPAP or PPV

Excludes placental abruption, twin-to-twin transfusion, placenta accreta, known congenital anomalies

https://clinicaltrials.gov/ct2/show/NCT02231411

Resuscitate with cord intact

Inditherm Lifestart (UK)
Cord Blood Banking and DCC

- ACOG and AAP: cord blood collection should not alter timing of umbilical cord clamping
- Minimum 30-40 mL is needed for collection
- Collect cord blood after DCC from the cord or placenta

Recommended DCC no more than 3 minutes: “...because benefits decline exponentially after that. This way, we can still get a sufficient cord blood collection.”

The bottom line

- Delayed cord clamping is probably beneficial for vigorous term and preterm newborns with intact placental circulation
- We don’t know the optimal timing for DCC
- We don’t know if delayed cord clamping is beneficial for babies that require resuscitation
- We may someday resuscitate newborns with intact umbilical cords
- When we are finally good at this, it will change
Until we know more

- Keep up with the developing science
- Support efforts to delay cord clamping for vigorous newborns
- Talk about it, educate your colleagues
- If needed, find a physician champion to help influence others

Resources


- Tarnow-Mordi et al. Timing of cord clamping in very preterm infants: more evidence is needed. AJOG 2014 Aug;211(2):118-23. PMID: 24686151


Resources, cont’d


Comprehensive Review on this topic